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Otto C.C. Lin
Promoting Education, Innovation and Chinese Culture in the Era of Globalization
Volume I: Oral History

Interviews conducted by
Robin Li and Emily Hamilton
in 2007-2009

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Otto Chui Chao Lin, Hong Kong University of Science and Technology, 2003

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Interview History

In late spring of 2007, Professor Otto Lin chaired a session at the Salzburg Global Seminar titled “From Lab to Market: Accelerating Innovation through University, Business, and Government Partnership.” As Professor Lin recounted the story of Taiwan, fellow seminar faculty-member Lesa Mitchell of the Kauffman Foundation asked if he had published this unique story of rapid national innovation. Lin explained that life was too busy, but perhaps after he retired he would take on such a project. As Professor Lin describes it “Lesla, being a doer, said ‘Why wait? Why don’t you try oral history.’” Participating in the conversation, Professor Judson King, who also served as faculty at the same seminar, suggested that The Regional Oral History Office might be able to help. With generous funding from the Kauffman Foundation, ROHO Director Richard Cándida Smith accepted the project as part of ROHO’s growing interest in documenting the role of the Pacific Rim in the history of the California region. Based on my experience researching and interviewing Chinese student immigrants to the United States, Professor Cándida Smith asked me to participate in documenting Professor Lin’s history, and through it, this critical moment in the history of globalization. Due to the scientifically technical nature of some of these interviews, Emily Hamilton, a doctoral student working in the History of Science, agreed to be co-interviewer on this project.

In the fall of 2007, Professor Lin sat down with me and Emily in a remote office in Evans Hall; it was a small, plain room which proved to be stark contrast to the vivid stories of educational striving, global friendships, scientific discovery and international politics which Professor Lin would share with us. Over the course of the next two years, as ROHO moved to its newly renovated home in The Bancroft Library, and Professor Lin took a secondary residence near his daughter in Ann Arbor, Michigan, the interviews moved to spaces larger and more pleasing. Yet, without fail, as I turned off the tape at the conclusion of each interview, I would experience a disorienting jolt as I returned from the global stage of social transformation to the three of us sitting together with a video camera. I am extremely grateful for the opportunity to have heard firsthand the story of the “Taiwan miracle,” and of what is possible when a group of people share access to education, commitment to hard work, and an expansive vision of human possibility.

Robin Li
Regional Oral History Office
The Bancroft Library
University of California, Berkeley
October 2010

Interview 1: September 14, 2007
 Audiofile 1

01-00:00:07

Li: It's September 14th, Friday, and Emily Hamilton and Robin Li are interviewing Otto Lin at the UC Berkeley campus. Emily, do you want to begin and talk a little bit about what we want to talk about in this interview?

01-00:00:34

Hamilton: Yes, thank you. This interview starts off a series of interviews with Dr. Otto Lin. What we are going to be focusing on today is his early childhood, early education, and his family. After that we will be looking more at his professional adult life. Today we will be opening up with a little bit of background about his family, and moving on to perhaps up to the time that he moved to the United States. I think that the first thing that we want to know is, of course, when and where were you born? And can you tell us the same sort of information for your siblings?

01-00:01:41

Lin: I was born in Shantou [汕頭], which is one of the major cities in Guangdong [廣東] Province. Shantou was fairly close to Fujian [福建] Province and the locals speak the Min Nan dialect [閩南] [Southern Fujian dialect], same as in Xiamen [廈門], which is a major sea port of Fujian. Shantou and Xiamen are very similar; both have fine harbor and opened to foreign trade and commerce very early back to the Opium War days. Historically Shantou was also known since the Tang Dynasty. The great Tang poet and man of letters, Han Yu [韓愈] [Narrator's Note: also known as Han Wen-Gong 韓文公] was put to exile here as governor of Chaozhou. Han got the displeasure of the Tang Emperor for openly opposing sending an official delegation to India to welcome the relics of the big Buddha. Chaozhou [潮州] was very underdeveloped at the time. The story goes that there were so many crocodiles around the swamp area snatching domestic animals as well as people. It was such a disaster causing so much anguish to the people that Han decided to take action. So Han wrote a letter of reprisal to the crocs deploring their irresponsible demeanor. He served notice that if the crocs did not clear the area in ten days, he as governor will not tolerate it anymore and shall consider extreme measures including the use of arrows and spears. At the same time, he offered the crocs some pigs and lamps as courtesy and pleaded with them to go. Apparently the crocs were moved by his sincerity and disappeared accordingly. What heroic action for a governor! The Han letter [祭鱷魚文] was widely circulated and occupied a place in the Chinese literature. Of course he also opened up schools and encouraged people to behave according to the teaching of Confucius and Mencius. Shantou was proud of the association with Han and considered itself a city of the enlightened.

01-00:05:46

I was born on August 8, 1938. Actually it was not exactly August 8; it was the eighth day of the eighth month on the lunar calendar. I was born in my parents' home, not the hospital. So there's no formal birth record like it is today. This became a problem, really. Later on when I was applying to come to the States, one of the basic documents needed was the birth certificate. Of course in my case, there's no such thing [laughter]. It was really a guessing game as to exactly when and where I was born. I was not alone with this dilemma; most of my family members were like that.

01-00:06:59

Li: That's a very auspicious birthday, 8/8/38. It's a good number.

01-00:07:04

Lin: Yes, yes, that is a very good number. And 8-8 sounds like *baba*. It meaning father. The Fathers Day in Taiwan coincides with my birthday. You know, I'm joking that next year there will be a grand celebration on my birthday in Beijing. The Olympics will open on 08-08-2008 my 70th birthday. But when I was born, 1938, the war between China and Japan had already broken out. It took place at the Marco Polo Bridge, on July 7, 1937. July 7 is the birthday of my daughter Ann.

01-00:07:53

Li: The Marco Polo Bridge incident of 1937.

01-00:07:54

Lin: In 1938, the war had advanced to my area. There were a lot of bombings from Japanese airplanes over Shantou. My mother told me that within a week of my birth, she has to leave Shantou because the air raid was so frequent and so close to home. So she wrapped me all up and held me close to her chest and moved to Chaoyang [潮陽] where my hometown village was. It is in the outskirts of Shantou, the countryside. There I was spared all the Japanese bombings. Therefore I was basically a farmer boy growing up in the countryside.

01-00:09:00

Li: Were your parents both from Shantou? Were your mother and father from the same town?

01-00:09:05

Lin: My father was born in Chaoyang. That's how we identified our self. In the household registration record, I was shown as one having the originality of Chaoyang, not Shantou. Because that was what the old-style domestic registration would show. In most of my formal records I would say I was born in Shantou which is the correct birth place. My mother was born in Jie-yang, which is fairly close to Chaoyang. My father was the number 5 of a eight children family. When he was about 6 or 7, the elders decided that he should be adopted by his younger uncle who had no children. Thus he addressed his blood father uncle and his uncle father. With this tradition, my siblings also

called my blood father uncle and mother aunt, until we were married. While family love all the same, this tradition of addressing was admittedly very confusing to newcomers of the family.

In the early part of the 20th century, Chaoyang was underdeveloped; agriculture was primitive and poverty was common. A lot of people from the general Shantou—Chaozhou area went over to Thailand, Indochina, Vietnam, Laos, Cambodia, Singapore. Because in the hometown there was very little to do, irrigable farmland was limited and technology non-existent. This was pretty common all through the Guangdong Province. People from Guangzhou area went farther abroad and clustered in the United States. To this day you will find old Chinatown in San Francisco, Los Angeles, Seattle, New York full of people speaking the Cantonese dialect. I visited Bangkok many years ago and by speaking my home town Chaozhou dialect, I could get around town quite well.

01-00:11:21

Li: Oh, really?

01-00:11:22

Lin: Yes, speaking Chaozhou dialect was fairly common in Bangkok. There are many Chaozhou people also in Saigon, Kuala Lumpur, Singapore and of course Hong Kong. The number one rich man in Hong Kong, Li Ka-shing, was from Chaozhou. There are also many others making big money in these areas. Although Chaozhou is a place with very little farmlands, but because of the aptitude in commerce and trade, the people was known around the world outside.

01-00:12:11

Li: Right, they travel out and come back.

01-00:12:13

Lin: Yes, they traveled, they returned, or send some money back. A lot of our neighbors and acquaintances traveled to Southeast Asia. In my larger family there are also people that were settled in Singapore and Malaysia. But my own grandfather stayed in Shantou. He was a farmer in Chaoyang; later picked up carpentry and opened up a shop in Shantou. The geographical relationship of Shantou and Chaoyang is pretty much like San Francisco and Berkeley. People just consider that area as one region. Right now there's an airport in Shantou connecting the region with many other major cities in China.

As a child I had also played at my grandfather's carpentry shop. One time I stepped into a big nail which punctured the shoe sole and had a deep cut into the bottom of my feet. I could still remember the pain! My memory of grandfather is, perhaps, relatively little but vivid. One very distinctive one is I was waking up early one day and he said, "Well, lazy bone, come out and *bai-bai* quick." It means to pay tribute to the heaven and earth and to the ancestors. Because that was his fiftieth birthday – fiftieth birthday! It was a

big deal at that time. When a man reaches the age of fifty, he is allowed to grow a moustache and beard. It was a big event for him. I don't know the formal life expectancy then. But perhaps won't be too much over fifty. So if one lives to seventy like I am now, it would be a rare event at that time.

01-00:14:58

Li:

So did your grandfather live with you when you were growing up?

01-00:15:03

Lin:

I lived with my grandfather until he died around 1945-46. At that time the Japanese war was just about ended. I remembered his funeral. My father by then was fairly established and held a fairly large funeral service for him. A lot of paper furniture were fabricated: – his favorite desk, table, tea-set, were reproduced and burned as offer, so that grandfather can use them in the other world. This is the custom that we have in our area. My grandfather was a connoisseur tea drinker. He was basically like an artist in tea, gongfu cha or gongfu tea. Here, the term gongfu does not mean martial arts, but something that is very fine, delicate and artistic. It takes great skill to serve tea. I was always marveled at how he did it. He would cup his palm for a good measure of very fine tea leaves, drop them into an exquisite ceramic teapot, pour in boiling water, wash it at once or twice, then pour in boiling water again, wait for a number of seconds or minute, then tilt the pot to let out the tea slowly into very small, fine, ceramic cups. He would cycle the spout around the cups to make them even. He would look at the color, smell the flagrant, sip the tea and let it linger at his tongue. Drinking tea is a ritual and an enjoyment much like one with fine wines. Through the years, my grandfather had many tea sets. One favorite teapot he had was one made of special pottery and it had a thick layer of tea residue lining the inside wall. Simply pour in boiling water, and it will give you very good tea. He always washed the tea pot himself very carefully and skillfully so as not to scrape or disturb the layer of tea “essence.” Apparently my father was doing quite well so he could afford for grandfather to preserve this hobby in his later days.

01-00:18:30

Li:

You said your father was doing fairly well. What was his business?

01-00:18:34

Lin:

My father had a great desire for knowledge. He wanted to learn and study, but the family was poor. He was admitted to the University of Guangzhou. Guangzhou is the capital city of the Guangdong province and was may be 500-600 km southwest of Shantou. Unlike people now in college, before he left for the university he had to figure out the means to support his family. He was already married with children and of course the parents. So regretfully he could not finish the college and had to drop out at some point and return to his work in Shantou. But he was a highly motivated man and decided to pursue a study program of his own. He worked very hard and studied very hard. Search

for knowledge was one of his values in life. He said to me that the most enjoyable sport to him was standing about the sideline of a soccer field as he was returning home from work. Occasionally the ball would roll his way, he would then grab the opportunity and gave it a good kick! He later became a writer and worked for the local newspaper and was well known in the community. Later, I think around mid-1930's, he was selected to attend the Central Military Academy which was run by Kuomintang [中國國民黨], Dr. Sun Yat-sen's Nationalist Party. The Academy is commonly known as Huang-Pu Military Academy because of the location of the campus. [Narrator's Note: An image of the diploma of father's attendance and graduation from the Academy is shown as Photograph #1 in an album of photographs documenting my career as evolved. The album is shown as Appendix 1.]

01-00:20:29

Li: The Whampoa? [Editor's Note: Also written "Huangpu"]

01-00:20:30

Lin: Yes, Whampoa. He was selected for a special session of the Academy. At that time the Whampoa Military Academy was busily training officers and assigned them to duty immediately. There was a great demand in the field. At graduation, father was assigned for action in the mountainous area of northern Guangdong where he had to face guerrilla wars from the Chinese Communist Insurgents. This was actually before Mao Zedong's leadership of the CCP [中國共產黨]. I understood the group was led by He Long [賀龍] and Ye Ting [葉挺]. Unfortunately, my father was injured badly in his knee and was then re-assigned to work in the KMT party office. He was proud as a cadet and a KMT member all his life. He of course also took many assignments in the government. So basically my father's career was an officer, official, or civil servant. He did well in all his jobs. During the war with Japan, in World War II, he was the chief, the director of the KMT in Shantou.

01-00:22:23

Li: He must have been very busy. Not at home very much.

01-00:22:27

Lin: Not very much indeed. Actually, once the Japanese had occupied Shantou, he led a group of people to go underground. They were waging a guerilla warfare against the Japanese invaders to save people from victimization and murder. This was also one of the reasons, as I found out later, we need to leave Shantou and hid out in our native Chaoyang village. My father was on and off and I didn't see him often. I was very young, but I remembered sometime in the middle of the night he would come back. We were so happy to see him home and he was so happy to see us. Then early next morning he would leave home and disappeared for a while. Because of this I really felt the war that's going on with Japan.

My father was very well respected by his friends. He came from a poor family and worked his way up. He was very sincere to people and very loyal to friends. If people needed assistance, he always tried to do his best. He was very patriotic to the Republic of China because that's what he belonged. He believed in Dr. Sun Yat-sen and his successor in revolution, Chiang Kai-shek, and was preparing to die for them anytime during the war.

01-00:23:57

Li:

So would you describe your father as a modern person?

01-00:24:01

Lin:

Not knowing how to define a modern person, I would say my father was very dedicated to the ideal of Dr. Sun Yat-sen and the KMT party. He has a very strong influence on me.

You know, I'm jumping around here and let's talk about the year around 1973. When President Richard Nixon, a die-hard Republican, came to power, he maneuvered behind the scene to contact Mao Zedong and sent Henry Kissinger to Beijing to strike a deal. He then forced the Republic of China, a founding member of the United Nation, to give up the seat at the UN in favor of the People's Republic. At that time, my father was visiting us, first time of seeing grandchildren Ann and Gene, and first time to the United States. I remembered this happened one evening when we were having dinner with a couple of friends. Then the news came out in the TV. Father was devastated with the news. He said he wanted to go back to Taiwan as soon as possible. Most friends warned him saying that Taiwan might become a very dangerous place now. Once the U.N. seat was replaced by the People's Republic, it might give PRC further legitimacy to pressure Taiwan and rage new military conflicts. He said he had to go real soon and return to his government regardless of the consequences. As he requested, we cancelled his remaining journey and arranged the flights for him to go back to Taiwan.

01-00:26:00

Li:

So his whole life he was very patriotic?

01-00:26:03

Lin:

Yes, very patriotic. He started his career fighting with the Communists, and then fighting with the Japanese. Thanks to the United States and the allies who came in to join fighting Japan after the bombing of the Pearl Harbor. But China was fighting the Japanese imperialists for several years already. They were very confident that the Chinese will win the war on their own. China was so big and strong in national resolve and Japan was so small and evil. How can China lose to Japan? You might say there's a certain sense of chauvinism for China. But the national pride was un-mistakable. They felt that there's no way Japan can overcome China for long. They're always confident that though it's very difficult, but China will win in the end.

Now, back to the wartime, I was very young, life was very difficult. My father was fighting the invaders as a guerilla. The rest of the family was at home. My mother was from a farmer's family and was holding the family together. My grandfather basically did not do much except being a nice grandfather, nice to us and to other people. The war was getting ugly. The Japanese had already moved to occupy our hometown in Chaoyang. I remembered as a little guy I walked to the market with my mother – and from time to time you would see a couple of Japanese soldiers standing there, holding their weapons in hand. And we had to bow, to those guys, as we passing them head down. How distressing and revolting it was. Yes, patriotism was very much in my generation.

01-00:28:31

Li: How many siblings did you have, brothers and sisters?

01-00:28:35

Lin: Well, I'm the number three of the family. The oldest is a sister, Big Sis Chui-Shuan [林垂璇], she now lives in Shanghai. The second was my brother Chui-yu [林垂宇], or Eric, who lives in Fresno.

01-00:28:58

Li: Oh, the winemaker!

01-00:28:59

Lin: Yes, Eric was my favorite playmate and true friend and big Sis was my protector. I am the third of the family, and the number two son. Actually before Big Sis there were two children but died early. Child mortality was high at that time. So we don't count them anymore. There were three more after me, two kid brothers and a kid sister that I know, that I hold, and play with. So we are a family of six siblings. Eric and Chui-Hsuan, being older, were already in the primary school. They were about to go secondary school when I was old enough to tell. Eric was three years older than me.

I want to tell a story: of poverty, war, sharing and fellowship. From time to time we'd have people come to our home around dinnertime. As usual we'd have porridge, *xifan*, all the time. When the guests come, my grandfather would say, good humorously, to the visitors, "Oh, please stay for dinner. We will just put in some more water!" And, we did. So we would share the rice soup! I remembered that scene well because it happened repeatedly.

We don't have a school in Chaoyang, Eric and Big Sis had to go away to another town for schooling.

01-00:31:34

Li: Was it a missionary school or a Chinese school?

01-00:31:35

Lin: It was an old style Chinese primary school. Also, unless you insist to check it out, I would say it was not formally qualified or certified as school as such.

But when you had kids gathered around and was interested in learning, they would just call it a school. And you just had somebody come to teach, regardless of formal credentials. When Eric returned home, he'd usually bring some toys, however primitive. Sometimes, giving the advantage of knowing the side streets and back alleys, I would grab his toys and ran away. He would be running to catch me. It was his toy, and we would end up playing a lot of games or fights in the family like that. These are the kind of things I remembered when I was young.

01-00:32:14

Li: Did your parents give you Western names? When you were born did your parents name you Otto?

01-00:32:20

Lin: No, no, no. I'll come to that later. It was a story all by itself.

01-00:32:28

Yes. My name is Chui Chau. My brother is Chui Yi. Chui is the generation name. My sister is Chui Shuen, again carries the Chui. And my two other brothers are Chui Yong [林垂榮] and Chui Hui [林垂輝]. Chui-Hui now lives in L.A with his wife Lily and two daughters, Susan and Sara, and was also known as Ken. My mother never had any formal schooling. She is a farmer's daughter, destined to be a homemaker. But I would say she had a very high— I don't know the number exactly — I.Q. She was smart, intelligent and with a dry sense of humor. She had a difficult life — as we go on, we'll talk about it more. She was very nice to people, very loving and generous. My parents were both very well respected in our hometown.

In 1945, the Japanese ended the war by submitting to the Allied Forces an unconditional surrender. I was then about seven or eight — so I was able to go back to Shantou, which being a major city of the province, have better schools, and more formal schooling. Around that time, Chiang Kai-shek wanted very much to establish the National Assembly and be elected President of the Republic. Honestly, this is not exactly Dr. Sun Yat-sen's teaching. Dr. Sun said it has to be done in phases. The first is election at the county level, then the province level. When half of the provinces have elected their governors and the provincial parliaments, then it is time to advance to the national level to elect the president. This is the proper sequence of things. But Chiang Kai-shek couldn't wait. Although most of the provinces had not gone through that sequence, he wanted all the counties to elect a national representative to the National Assembly. This National Assembly could, according to the Constitution, elect a President and a Vice President. It was indirect election, much like the electoral college in the U.S.A. The representatives of different counties would actually together in Nanjing, held meetings for several weeks, had deliberations on constitutional matters and major national policy matters. Then in the end they would cast the ballots for the president and vice-president.

Having been a leader for many years locally, my father wanted to run for the National Assembly. I remembered at that time I was eight or nine years old. I helped distribute the campaign leaflets. Actually I was fairly well known myself in the countryside. For a few years then, I would usually go to the post office to collect letters for the country folks or deposited their letters in the post office. I would get their letters, helped distribute them to my neighbors in my village. Some of my neighbors were illiterate and I would read the letters to them and also penned their reply. So I was fairly well known and admired. At the age of maybe nine or ten, I became a campaign worker for my father. Father has displayed his photograph in his Huangpu military outfit. It looked very handsome. He easily won the local election, which may be seen as a reward to him for service rendered to the community.

However, Chiang Kai-shek's inner circle in Nanjing wanted to be sure that someone who would vote for him to be the representative from this county. So the local KMT said my father could run as a KMT representative, but could only serve as the Representative-alternate even if elected. Since most of the central government's candidates have strong relationship with the ruling committee, they made the local candidate to sign a letter of resignation stipulating that if elected, he/she will resign, on demand, in favor of the party nominee. This is an agreement that seemed absurd and unlawful now but was common at the time. Some very unhappy, disgruntled elected "alternates" later organized a protest marching with a coffin on the street at the opening day of the National Assembly.

01-00:39:59

Li: Did your father have to resign?

01-00:40:00

Lin: So my father had agreed to this arrangement.

01-00:40:03

Li: Was he upset?

01-00:40:04

Lin: I supposed he was not happy but he was very loyal to the party. He felt that maybe it would be better for someone who is more able to influence the central government to represent the county. And, in effect, the other person was a senior member of the Party whom he knew. So he accepted the arrangement to be the alternate representative. There's a lot of things like this happened. Obviously some legal or ethical issues were concerned here. The fall of the KMT in 1949 in the Chinese Mainland now appeared to an unavoidable event, even without the help of CCP.

01-00:40:43

Li: What was it about the KMT that your father believed in so much? Was it the democracy?

01-00:40:49

Lin: He believed in the KMT because of its leader, Dr. Sun Yat-sen and the Three People's Principle that Sun proposed for the Republic. It is the KMT that led the revolution movement that established the Republic of China. The monarchy system has ruled China for many thousands of years and was overthrown under Sun's leadership. Democracy would come in its place. So he believed in the leaders and believed in the Party's vision. Dr. Sun Yat-sen is also my hero.

01-00:41:28

Li: You mean for you as well as your father, Sun Yat-sen was someone that you admired.

01-00:41:34

Lin: Yes. You might say some of these values are very much ingrained in the family. When I grew up, I was a KMT member. I am still a KMT member although not active for the last 15 years. Well, I don't know my official status with the Party. Probably I'm in a sinking ship. But I still believe in Dr. Sun Yat-sen's principles for upholding the traditional Mencius philosophy of people comes first, then the state, then the ruler, on one side, and, the American way of democracy and government on the other. I hope that as we go along we have more time to talk about Sun Yat-sen.

01-00:42:08

Li: Yes, I'd be curious to see how you see his ideals translated into modern China. It could be very interesting to hear about that.

01-00:42:16

Lin: Yes, very much so. Sun Yat-sen's Three People's Principle is simply this: People's nation, People's rights, People's livelihood. This is often cited as analogous to Abraham Lincoln's state of the people, by the people and for the people idealism. That's the vision Dr. Sun wanted for the future: China, a country of the people, ruled by the people, and for the benefit of the people. But China, you know, the old feudal system and social mindset are still very much in circulation. So the revolution was an uphill battle all this time. I think even today, it's not entirely successful. The Chinese Communist Party [CCP] was making some headway in the last twenty years, but still has a long way to go. Dr. Sun Yat-sen's ideal was actually held very high by Mao Zedong.

01-00:43:13

Li: Yes.

01-00:43:15

Lin: I was told a story that one time, the author Edgar Snow –

01-00:43:21

Li: Edgar Snow, yes. *Red Star Over China*?

01-00:43:24

Lin: Yes. He was a friend of Mao Zedong. According to a story I read, after Mao took over China, Snow visited China as Mao's guest. He was entertained and treated like a king. Mao asked people to escort him to many cities and famous places. Afterward, Mao asked him his impression of the new country. By the way, have you been to China?

01-00:44:03

Li: Yes.

01-00:44:04

Lin: Have you been to Huang Shan [the Yellow Mountain]?

01-00:44:06

Hamilton: No, I have not.

01-00:44:07

Lin: Or, Tai-shan, or any famous Chinese mountains.

01-00:44:13

Hamilton: Yes, I went to Putuo Shan

01-00:44:15

Lin: Oh, Putuo Shan. Yes, Hua Shan, Putuo Shan, yes. E-mei Shan, these are great mountains with a good deal of association with Buddhism. The story goes like this. Mao asked Snow, "In your mind, which shan [Narrator's Note: in Putonghua, shan, or sen, pronounces similar with "mountain"] is the greatest in China?" Snow was hedging a bit. You know Hua Shan was famous for the pine and the rocks. Tai Shan was famous for the royal connection, etc. Seeing his predicament, Mao told Snow, "I'll tell you, the greatest shan in China is Sun Yat-sen."

Yes, this was how Mao thought of Sun Yat-sen. The great among all greats. The first time I went to Beijing in 1993, I saw Sun Yat-sen's portrait was hanging over Tiananmen Square opposite to Mao's. It was true that most of the time the only portrait that people see was Mao's. Right?

01-00:45:24

Li: Yes, everywhere.

01-00:45:25

Lin: During certain national holidays, they actually put Sun Yat-sen's portrait facing Mao's at the Tiananmen's Square. It was Sun Yat-sen's ideal that have attracted Mao. We can talk about this more later. Chiang Kai-shek also, in a way, followed Sun Yat-sen's ideal, although he did not do things properly, in hindsight. For one thing, he was very hasty in the promulgation of the Constitution because he felt he needed the power of the presidency to implement the KNT policy. He formed this National Assembly, and was elected President. This was no problem. But his nomination of vice-presidency has created so much conflict inside the KMT party. Chiang Kai-

shek wanted to support Sun Yat-sen's son, who was also an alumni from Berkeley.

But he lost to Li Zhong-ren, of Guang-xi Province, who is a rival of Chiang inside the KMT. Li worked with Mao in the later months and forced Chiang to abdicate the presidency. No, Chiang was forced to "taking a leave of absence" and Li became acting president. After CCP had crossed the Yang-tze River and captured Nanjing, Li hastily flew to the U.S.A. to undergo "medical treatment" and stayed in New York claiming himself as president in exile. I had no part in these episodes, I mention that simply trying to say that there were a lot of things Chiang did wrong in the last years when he was in China.

At that time, he was confronted with the war with Japan, threats from Russia and the U.S.A. alike, then war with the Communists. But within his own party, there were different factions warring fiercely with each other. I think it was too much at his hands. Finally he retreated to Taiwan. It was a smaller environment, things were better controlled, and then he had the opportunity to implement the ideals of Sun Yat-sen.

01-00:48:25

Li:

This was such a turbulent period in Chinese history, would you say your parents were born into a different China, completely, than you were.

01-00:48:34

Lin:

Yes, it was great turmoil at the time. When the Japanese surrendered, we returned to Shantou. My father took a position in the city government. But already Mao's forces had taken over Beijing and Shanghai within a very short period of time, and soon came to Shantou. My father had to leave Shantou finding refuge in Hong Kong.

Remember in 1949 we were a family of six children. I was eleven. My big sis was about sixteen or seventeen, still in high school. My mother had another three small children, the two younger sons and a daughter, who was no more than two year old. The group is large and we had no money. My father, who worked for the government all those years with a minimum salary, had no savings. He was one of those very dedicated public servants who did not care for his own security or comfort, suddenly found himself in a very difficult circumstance. He knew he could not support his wife and five kids in a strange place like Hong Kong. So he hastily left by himself. Then my older brother, Eric, who was a boy and easier to tag along. Actually the thinking at the time was that, the actual distance between Shantou and Hong Kong is not that far, so he might be able to bring the family out gradually, in batches or individually if needs to. That turned out to be a wishful thinking. Because the border was shut rapidly, basically locked and bolted. By the time I came out in late 1949, I had to take another name, presumed another identity. I was smuggled in the bottom of a little boat, in the lowest stage of the boat, with an official paper that says I am Chen somebody.

01-00:51:37

Li: You were by yourself?

01-00:51:39

Lin: I was with my uncle, a younger brother of my mother, but pretended not related.

01-00:51:47

Li: And how old were you?

01-00:51:48

Lin: I was eleven at the time.

01-00:51:51

Li: Was it scary?

01-00:51:53

Lin: It was scary, pretty scary. But it looked like if I didn't take the risk, then I could become prisoner or a candidate to feed any war, as one was looming in Korea. The decision was that my brother and I had to leave quickly. My sister is a girl, you know, more fragile like the three younger kids, so all stayed behind with mother, not knowing that the family would be separated for 30 years from that point on. That's history; that's life—a petty personal misery in the tumultuous era.

Begin Audiofile 2

02-00:00:00

Li: This is Emily Hamilton and Robin Li with Otto Lin, on September 14th, tape number two.

02-00:00:09

Hamilton: I would like to move back a couple years, I'm interested in your early schooling. I understand that you had to travel away from home to do that. Could you tell me a little bit about your experiences first starting school?

02-00:00:25

Lin: I started school at home, basically. During the wartime my father was leading the guerilla group fighting against the Japanese and was not home. My big sister and brother were in a different place. So in our home village, we had a group of maybe five or six kids of my age and would get together at the common hall of the village. Some older folk would come to teach us a few things. But basically we had to study on my own. All we studied was Chinese literature. My father would leave us a syllabus, a program of the major pieces we should read. So I built up a very good foundation in Chinese literature, mostly classical Chinese. I liked to read, anything I could find, besides Confucius and Mencius, The Story of the Three Kingdoms, the Monkey King, and Sherlock Holmes, etc. Basically that was my early schooling. I did not enter any formal school until after the war when I returned to Shantou. I must

admit that I did not have a diploma showing completion of primary school education. Luckily when I became professor and vice-president of Hong Kong University of Science and Technology, they combed through my all my credentials but somehow did not check for that part!

02-00:02:07

Hamilton:

Did your parents push you? Did they think that the education was very important?

02-00:02:13

Lin:

My father thought that education was absolutely essential. One of the values he upholds for life is the search of knowledge. It was his view that knowledge stimulates, motivates and makes a person re-fined. It is something that one has to have. This is astounding before the term knowledge based economy is ever invented. As for himself, his college education was truncated because of financial hardship, so he always wanted to help other people through college. All of us, all of the children, had to go to school. We know that this is not an option. And when we were in Hong Kong as refugees and were basically struggling on the poverty line, my father worked very hard to get Eric and I to school. It was a priority in life.

02-00:03:05

Hamilton:

Was your experience first being schooled in your home village? Was that typical of people in your generation during the wartime especially?

02-00:03:17

Lin:

Yes. I think it was so for my generation and especially for people in the countryside. Schools are found in big cities like Shantou or Shanghai. But most of the countryside was like Chaoyang, so I would say my situation was fairly common.

02-00:03:40

Hamilton:

In a big city like Shanghai, what would the typical curriculum be? You said you studied mostly literature.

02-00:03:47

Lin:

Yes, they would have literature, you know, the three R's, reading, writing, arithmetic. I think these are the basics. And there would be others such as geography, national and world, history, ancient and contemporary, and, of course science and possibly English. Science would include mathematics, physics, chemistry and biology, depending on the level and the grade. Other than that there would be physical education. Also, there would usually be a course about personal characteristics, family and social relationships. Overall, the Confucius philosophy was the guide: build up the body, build up the mind, build up your values, and build up the ability to interact with people. This is all in Confucius's teaching.

But I would say Chinese literature was the centerpiece, the most important one, and there would be different academic levels. I was fairly good in

Chinese literature because my father placed emphasis on it. I learned many good essays by heart, the crocodile piece of Han-Yu is an example. In retrospect, the ability in Chinese literature has helped my professional career in China as well as in U.S. I was usually quick to read and write and not afraid to communicate and interact with people.

02-00:06:13

Li: So you have a classic Confucian education.

02-00:06:18

Lin: Yes, I might say it's kind of typical classical education. You learn to respect your parents, your ancestors, your country, and be good to people. Be respectful, trustworthy, responsible and put your heart in the right place. We learned very little about religion. You know, Confucius was quoted to say that I don't know enough of this life, why bother with the next? That's Confucius's philosophy of religion. He respected the ghosts and spirits but advised students to stay away from them. I think this was his excuse not to get into the issues of religion.

02-00:07:04

Hamilton: You said your father very much supported education. What role did your mother play in your early education while you were at home?

02-00:07:12

Lin: I would say a few more words about the legacy of my father. He is a person of great generosity because he has been helped by people when he needed help. Therefore he was always ready to offer help to others when the situations called for. Friendship, patriotism, trust, knowledge – these are the values that he treasured. His legacy was not by preaching it as value but by practicing it. I talked about the United Nations incident earlier as an example.

My mother has total dedication to her husband to her family. She did not have any formal schooling, but she learned from other people, the closest being her husband, and has cultivated values of her own. She was generous to people, worked hard, aimed high for personal integrity and had faith in her God of Heaven. She very much believed in conduct – the proper way of personal behavior. One might say again, she is very much a Confucian at heart or typical, traditional Chinese. I knew she was pleased that I did well at school and was well liked by the community.

02-00:08:53

Hamilton: You said that there was a bit of science in the more formal education. Did you run into that in Shantou?

02-00:09:02

Lin: Honestly speaking, I would say the only little bit of science that I learned is that the earth is round, as evidenced by Magellan's travels around the globe. I learned very few things else in science until my secondary education, in Hong Kong, and then in Taiwan, of course.

02-00:09:52
Hamilton:

When you went to Hong Kong did you find that your earlier education had prepared you?

02-00:09:59
Lin:

Not much except for a solid background in the Chinese history and literature. Hong Kong in the late 1940s and 50s was basically a city of refugees. There were perhaps three million people in Hong Kong then. My guess was that two million of them were probably refugees. Everybody was trying to make enough to eat, find a place to sleep. There were many primitive refugee camps around. I can tell you a few stories about that period.

Today there is an interesting place called Diamond Hill located in the center of the very populated Kowloon City. It was a community of 60 years history and the name should be, literally, the Hill of Drilling Rocks. When the refugees settled there in the 50s, the only way they could make a living was to drill holes to the rock to hold dynamites. Exploded it to slabs and gradually broke them to small pieces or gravels sellable as ingredients for cement. “Drilling rocks” sounded similar to “Diamond” and that was how the place was re-named. There’s another place nearby now called Tiu Kin-ling, meaning, “Mountain View Ridge.” Again, in those days it was a big concentration of refugees. With the feeling of desperation, a good number of refugees hanged [in Cantonese, diu-kin] themselves to cut short the misery. Tiu Kin is a slight twist of Diu Kin and is a circumlocution. With a nice name it was also getting affluent in the last decades. How soon people has forgotten the history!

A few words about refugee livelihood. Those camps were very poorly fabricated. They were shacks, barely enough to keep out the rain. There was no sanitation, no running water, whatsoever—it was just shelters for the refugees. I would say may be up to a million people lived in that kind of environment in Hong Kong during that period. And often fires raged in the midst of the shacks. I think the British colonial government soon got smart on managing the area. After the fire, the shacks were not allowed to be rebuilt. They would have to be replaced by more decent housings. Gradually there were more fires, albeit suspicions that not all the fires were created naturally, and better dwelling. The shacks became more decent housing. But from today’s view, if you visit a few remaining places you would realize that the “decent housing,” are no better than deplorable slums. They’re terrible. Refugees’ lives were downright miserable.

Back to the subject of education. Yes, people set up schools even during this time because most Chinese respected knowledge—a typical Confucius’s teaching. In 1950s, my father had great difficulty financially. He took odd jobs. I slept at friend’s home or office. Come to think of it, it was really efficient utilization of the space. The office at daytime can be turned to sleeping floor at night by simply putting the chairs on the desk. T.op. This was

our normal sleeping place. That's why my father figured it's no time to bring the daughter over. Being a man is lucky, in a way. But even under that kind of circumstance, father wanted us to go to school. Some friends had told him to send us to textile or other factories as workers. We had inquired at the possibility, full time or part-time. But the manager took a look at me and said, "No, he's too young. A child like him is useless to us." So it didn't take long for father to realize that there was no alternatives but going to school for Eric and I.

Li: Were most of these people in the refugee camps were very educated people from the Mainland?

02-00:15:25

Lin: I would say mostly they were from the better-educated sectors.

02-00:15:30

Li: What a huge contrast to go from that to a refugee camp in Hong Kong.

02-00:15:34

Lin: Yes, but because they are more educated they are keen to take risks weighing all factors in that kind of situation. They know they have to work very hard with any odd jobs. But eventually they would work their way out with freedom, might even be able to find some good opportunities for the future.

I went to schools for half a day, and when I came out of schools I had do work at home. Have you ever seen matchboxes? I don't mean the Matchbox toy cars, but book matches and small boxes to keep matches?

02-00:16:07

Hamilton: Right.

02-00:16:07

Lin: But before the book matches –

02-00:16:09

Hamilton: They were decorative, right?

02-00:16:10

Lin: Yes, matches were used to be kept in a little box – in a little bamboo or wooden box. I was very good at wrapping and gluing thin sheets of wood or bamboo skins to make boxes for matches. You know, one of the things I did – at the age unfit for drilling rocks nor combing textiles, was doing these small jobs at home to make some money. If you can wrap so many boxes you can get so much pay from some people. That's no way to strike rich but can help paying the school.

02-00:17:13

Hamilton: In the refugee camp, or outside?

02-00:17:15

Lin: No, the schools are mostly outside the refugee shelters areas. They are in the city and usually have a nice concrete building complete with classroom and black boards and desks. There would be adequate lighting and for the teacher and the class, maybe 20 or 30 students. It's pretty much like a class at any school now. But one thing they have additionally was a PA system, however primitive. A PA system was important because in the old time it would announce that the Japanese bombers are coming and people would need to run to shelters. I have a special connection with the school PA system because almost every month it would broadcast my name, along with a few others, to report to the treasurer's office. And my classmates would know that I still owed the school the tuition and fees for that month. Every month was an ordeal.

02-00:18:36

Hamilton: That had to be common at the time, other students in the school had to –

02-00:18:40

Lin: Luckily I'm not the only one. There would be a certain percentage of students who could not afford to pay on time, and then the school would have to go after them, naturally. I was special in that group, elite group. And so I moved from school to school, and –

02-00:19:08

Hamilton: Why did you move from school to school?

02-00:19:11

Lin: Why did I move? Because the peer pressure and the environment. I hated for my name to be called on the PA system every month. We'd find a school with a lower tuition that maybe my father could afford to pay. My brother and I wanted to find a job but my father would not let us to waste our whole time on meaningless job. Education, education. But I came to respect my father more for his conviction.

02-00:19:52

Li: Were the girls educated as well? Were your sisters sent to school as well, the girls in your family?

02-00:19:58

Lin: My sister, yes. She's the oldest of the family so she did go to school in Shantou. When my father left and my brother and I left, she also left Shantou – but instead of moving to Hong Kong she went north.

02-00:20:29

Li: Oh. Was that safe?

02-00:20:30

Lin: It was not safe, but there was no other option. I didn't tell you about my mother was constantly detained by the Communists. Back in our hometown, the Communists would take her out, beated and tortured her. In one of the

instances, my mother, wearing long hair like most women, was made to stand on the top of a table, the hair was knotted and tied to a hook on the ceiling. Then the table was pulled away under her feet. She was beaten and quickly passed out. She was branded a public enemy, because of her marriage to a man who was a KMT official.

02-00:21:36

Li: Was this after your father left?

02-00:21:38

Lin: This was in the early 50s after my father left and we were in Hong Kong. They could not find the man, so they held hostage the wife and the remaining family members.

Basically every wrongs Chiang Kai-shek had possibly committed in China was blamed on my father who was a KMT member. And as his wife, an innocent farmer girl regardless, my mother had to take total national responsibility. On another instance, my mother was made standing on the platform in the public trial and somebody slapped her. The force knocked her off the platform, and she crumbled to the ground with five broken teeth and a face splattered with blood.

During this time, my youngest sister, barely two year old, had nothing to eat and finally died of starvation. My mother and the two little brothers were driven out of our old house in the village. With no place to go and no one dared take them, they found a shelter in a corner of the public temple. It's a little temple and they sneaked there as a place to rest their heads. During the day time, my two younger brothers would go out as beggars, carrying a bowl from house to house for something to eat. And sometime Communist Party persons would follow them and threw stones at them and broke the bowls. They were barely five and seven years old boys.

Later on, my mother told me a story that was entrenched in her memory. One night she came to the point that she could not stand it any longer. She managed to find a rope, tied it around her waist and the two little sons on the sides, each with a piece of rock. She wanted to wait for the daybreak, when it was most quiet, and slipped to the little lake outside to drown themselves. As she got all these prepared, she was exhausted and fell to sleep. And suddenly she felt the temple was shaking and people were running about. She saw the Guarding Angel of the temple hastily making moves from his golden chair. She asked, in her dream, "My Lord, what are you doing?" The Guarding Angel then replied, "They are coming, they are coming soon. I have to run for a little while; got to wait for the storm to settle." It suddenly dawned on my mother, that if the even the Angel has to run under the circumstance, who am I to be complaining about? If the Guarding Angel can not defend himself, naturally he cannot protect me, and these two little children. So it was all up to me to keep the children alive. Then, she said to herself, "Let's wait for another

day.” Luckily she had waited for another day. For at next morning, the mob came to the temple, thundered with slogans and fists, broke to pieces the sculptures and offering tables and everything inside. Nobody seemed to pay attention to the women and the two little boys at the far corner. They were as good as dead!

My mother had just passed away at the age of 100. Her 100 years was a reflection of the history of the Chinese Republic.

She, as millions of innocent people in China at the time, has experienced unusual cruelty, absurdity and misery created by Mao Zedong. People nowadays would not like to talk about that. All the while, Mao led a life, not as revolutionary, but an Emperor with all the trappings in Zhong- nan- hai. It was now all history. It can be forgiven, but not forgotten.

Don't let anybody tell you that Mao Zedong has led a peaceful revolution and that people all welcomed Mao with open arms. No, it was a dark and shameful period of the Chinese history. Tens of millions of people died unnecessary because of Mao's arrogance and conspiracy. Remember this was the Land Reform Period, well before the Great Leap Forward and the Cultural Revolution which caused death and sufferings to another tens of millions Chinese. If you're classified as one of many categories of public enemies that he dictated, then you're doomed and your children are disgraced for life. It was most unfair and unjust.

[Narrator's Note: In the Spring of 1978, U. S. President Jimmy Carter, as a follow up to the meeting of Richard Nixon and Mao Zedong in Beijing during the previous years, was preparing to formally recognize the People's Republic of China with the simultaneous termination of diplomatic relation with the Republic of China. While the strategic importance of engaging PRC into the global community is understandable, there is grave humanitarian concern. I wrote a letter to President Carter in May 1978, shown as Appendix 2.]

My father risked his life as a guerilla defending the farmers from the suppression of the Japanese. My mother was an innocent farmer girl, did not have the opportunity of formal schooling. All her life she was a homemaker and helped the poor and the stranger that came to her house. But Mao has to build his authority and power on the corpses, or, the backs of the innocent who are defenseless. Besides, the country was so huge and poor; there was no food for all. So Mao decided to get rid of some millions to limit his headache.

02-00:27:13
Hamilton:

Did you have any communication with your mother and your brothers?

02-00:27:18
Lin:

Very limited and difficult, the communications were always through other people, through other family members and friends. But we had managed to send money to them every month. I don't know how much of it they had

actually received. But however little was a help to survive them day by day for the next thirty years. There were also times we had to send materials such as dried rice crust, animal fat and oil.

02-00:27:44

Li: So what happened to your mother? You said she didn't go into the lake that day, she waited one day.

02-00:27:51

Lin: Oh, one day – oh yes, the second day – they destroyed the temple, and my mother moved away of the shambles and found a hide out in another public place.

Later on I asked my mother about it. I said, “ Tell me, who have beaten you? Who have hit you so hard to make you lose your teeth?” She simply said, “I forgot.” I know mother remembered them well but did not want me to take revenge. And God knows, I would have done just that.

We talked further about this period later when she came out of China and reached the safety of Hong Kong. I said, “Mother, you look quite strong.” She said, “Thank God I do. If I'm any less, you would not be able to see me today.” Mother said that there was a point that she was numbed with all the pain of beating, she heard one hatchet man commented to another that this women had the bone of steel. No, I think this woman had the will of steel.

My mother was a very strong person, intelligent and with good sense of humor. We will come to that later.

You may want to know how did I manage to get my mother out of the Chinese Mainland?

In 1967, graduating from Columbia, I worked for Du Pont as a scientist, and became a U.S. citizen. I also made a little name for myself in the field. By 1970 after my son Gene was born, I started an application to my home village in Chaoyang requesting that my mother, at her old age, be allowed to come to stay with us in the United States. The village authority replied: “ Sorry, this is something beyond our authority. You have to go to Shantou.” With that, I followed up with a letter to Shantou and came the response, “No, that's something that's well above us. You have to go do the province of Guangdong.” I wrote to Guangdong and the provincial authority said, “No, it is a national policy matter for the State.” I wrote to the State Council in Beijing. The reply said, “No, this is a matter can be considered only starting from the county and the village.” It's a big circle like that. I came to realize that the Revolutionary Machinery really turns 360 degrees!

Then I started to work on the U.S. side. I wrote to Senator Harrison Williams of New Jersey, where I was a resident. Thanks to his diligence and repeated inquiries, the Chinese Embassy sent my request to Beijing. But basically

nothing came out of it until the late 1970s when Deng Xiaoping visited the United States. Deng, as a guest of President Jimmy Carter, was confronted with the question of many people in my situation: Why won't China let long separated family members out of the country? Deng was quoted to say that, "How many people do you want? One million, or two?" That really did it. When Deng returned to China, the floodgates opened. Because we had already done many runs of the letter-writing, for many long years, my mother was permitted to leave in the summer of 1979. It was a doubly excited news for us shortly after my son Dean was born. Furthermore, Ken was allowed to keep mother company, together with his wife Lily and young daughter Susan. How magnificent for us!

Like a dream come true, mother came to stay with us in New Jersey and with Eric's family [with wife, Katherine, and two sons, Elmer and Elton] in California. She found uneasiness to adjust and mesh in with the new U.S. environment. And about a year later she went to Taiwan to be reunited with my father.

During these thirty years of separation, my father was doing well in business in Taiwan, and was finally given his seat as a Representative of the National Assembly. And many friends came and met mother. Some would say, "Mrs. Lin, you are a very lucky person. See Mr. Lin here, for all these thirty years he's not re-married." Behind the admiration was the implication that she should perhaps be grateful for a faithful husband. At first, mother took comments like this with a good laugh. But it repeated and repeated and she finally decided to speak up. In response to one such comment later, she said, "Yes, it was smart for him not to remarry. I did not remarry either!"

One day I took mother to see an orthopedist in Taipei for problems with the right knee. By this time, she was already eighty years old. After examining the knee, the doctor said, "Mrs. Lin, there's nothing to be worrying about. It's a simple matter of aging. Look, you have been using this leg for eighty years now, right? There'll be wear and tear." My mother was not happy over repeated comments of her age. She said, "Well, my left knee was also used for 80 years, how come it did not present any problem? It's only the right knee that I feel pain." You can quickly see that although she did not have any formal schooling, she was exceptionally witty.

Lin: So where are we now?

02-00:34:11

Hamilton: Do you have any other – Robin, any other questions about Hong Kong before we move on to later schooling?

02-00:34:17

Li: So, well, how old were you when you left Hong Kong? How long were you in Hong Kong for?

02-00:34:22

Lin:

I was in Hong Kong for three years, from 1949 to 1952. One interesting thing is that under the very difficult conditions of the time, most people felt that somehow one day they would be able to return to China. So I would be able to be reunited with my family and that the two Chinas would come together. That was a firm belief. Two-thirds of the residents in Hong Kong were refugees, driven out of China during this political transition. But the sentiment for the Republic of China was very strong. During the New Year Day or Double Ten Celebration, you would see seas of flags, national flags for the Republic of China waving all over the refugee camps. The spirit was high. The only question was how can we return to China? One popular scenario was the coming of World War III, in which the Americans will fight the Communists and will expedite our return.

One day I was wrapping matchboxes inside the house and suddenly I heard tremendous noise roaring outside on the street – “Extra, extra!” And I went out to the front door and saw people waving copies of the newspaper with the headline: “Korea War broke.” We were so happy because the War will surely bring in the Americans and hasten the coming of the third world war, thus, our opportunity to return to China. That was the kind of mentality prevalent among the refugees. It was reported that Chiang Kai-shek soon offered to send troops to China to fight with the Americans, but Douglas MacArthur didn’t go along for that.

I stayed in Hong Kong for three years. It was a burden to master enough financial resources to go to school. During this time my father was able to go to Taiwan from Hong Kong. In Taiwan education is free through primary and secondary levels, nine years altogether. So he wanted me to go to Taiwan. My brother Eric was only one year from high school graduation, so my father felt that Eric should stay in Hong Kong to finish it.

02-00:37:48

Li:

So in Hong Kong were the schools run by the British?

02-00:37:52

Lin:

No, the British did almost nothing for education in Hong Kong. The British colonial government just sat tight and collected duty and taxes. I’ll talk about the education problems of Hong Kong later. But all the secondary schools are privately own and run.

02-00:38:12

Li:

Is that where you learned English then? Because your English is very good. Did you learn English in Hong Kong?

02-00:38:18

Lin:

My first contact with the English language was in Hong Kong, but I learned very little about the language, really. Yes, the ABCD alphabet of course. Later, my father arranged for me to go to Taiwan. The major reason was that

in Taiwan, primary and secondary education was free. The government has to operate by sticking to the confine of the Constitution. The Republic of China Constitution says that the central government annual budget on education, culture, and science shall be no less than fifteen percent of the total. On the provincial level, no less than twenty percent; and on the county level, no less than twenty-five percent. The Parliament actually checked the budgeted items to see whether they were up to par with the Constitution. This is why education was a priority in the national policies of KMT. The free and compulsory nine-year education was later extended to twelve years. I went to Taiwan in 1953 after staying nearly three years in Hong Kong.

02-00:40:03

Hamilton:

And these schools were considered better than the ones in Hong Kong?

02-00:40:06

Lin:

Oh yes, it's much better. The school system now had Chinese literature, history, geography, science and math. In math, there would be geometry, algebra, and analytical geometry, linear algebra, that kind of thing. English was a required course from year one of the Junior High and would run for six years. And there is physical education, military training, and others. I would say it's a full program.

02-00:40:41

Hamilton:

What sciences were you introduced to there?

02-00:40:45

Lin:

Biology, Physics and Chemistry. I had a great chemistry teacher who stimulated my interest in being a chemist. I would say the teachers, high school teachers, were very important for one's career.

02-00:40:55

Hamilton:

Who was the chemistry teacher you had?

02-00:40:57

Lin:

He, Mr. Che, was a gentleman, a very educated chemist and great teacher. He was from the Mainland. He said he was a refugee when he was about 20; so he must have gone through college education as a chemist before coming to Taiwan.

I went to a senior high school in Taipei, which was reportedly the Number One high school in Taiwan, with the best records in college admissions, for several decades. Transferring from Hong Kong to Taiwan, I took and passed entrance examinations of all three top high schools in Taipei. But because of financial restraints, I picked the one closest to home so that I could walk to school to save on bus fare. Luckily it was also the best in town. Although a lot of my good friends were from competitive schools and would say, arguably, that their alma mater is the best. That battle goes on all the time. The education system in Taiwan was undoubtedly very good.

02-00:42:13
Hamilton:

What was the name of the school?

02-00:42:15
Lin:

Jiang-Kuo. The Provincial Taipei Jiang-Kuo Middle High School. The school was historical and located next to the Taipei botanical garden, a perfect environment. My background in the Chinese literature became an edge for me. I was able to learn science, math, English from a strong position. Over the years, I was lucky to have a competitive advantage over many scientist friends – I can write pretty well and pretty quick. Of course literature is not just about writing, it also trains one for good organization and analysis. I turned out to be out front in the class in all those areas in high school.

At high school, students were also very serious preparing for college entrance examination. The higher education system in Taiwan was like this: if you were admitted to the national universities, then basically the tuition was nothing. The next tier would be to private universities and the tuition would be higher. So in a way, there a social inequity exists there. Some problems with this elitist system are real. One would argue that in the United States most better universities are private universities, such as Columbia, Harvard, Princeton, Stanford, except of course UC Berkeley, But there's a different history of development of higher education in Taiwan.

Because I did very well in college entrance examination, I was admitted by National Taiwan which was my first choice with chemical engineering as my preference field of study. The financial burden to my father was very little. Actually, when I was about to make choices for university majors, I wanted to go to the military. I wanted to become a cadet.

02-00:45:03
Hamilton:

Like your father.

02-00:45:04
Lin:

My father advised against it. He said, "War will not be as important in the future as in the past. The competition you have to go through will be in science, technology and economy. Actual warfare will just be a very small part of world affair." He added, "People in the military will advocate to solve social and national problems through war. This gives them the opportunity to move ahead." Another possible choice for me is medicine. I was pretty good in science subjects and could very well be admitted to a medical school of my choice, the envy of many in the society. Interestingly enough, my father has a different view of medical doctor as a profession. This is after looking over his many medical doctor friends. And he said, "Well, if you are really good, you will be in so much demand busy to death. And if you are not so good, nobody will come to you and you may be starved to death." Basically you will not have any family life.

Pondering over my interests and strengths, I came back to chemistry. Chemical engineering was my field of choice because I was fascinated by chemistry, the ability to create new substances and new materials for life. This was great. My teacher has given me stimulations to become a chemist.

02-00:46:59

Hamilton:

Was there a choice between a major in chemistry and a major in chemical engineering, or was it one?

02-00:47:06

Lin:

Yes, there is a difference between chemistry and chemical engineering. Chemistry is a science in the study of the nature of things. Chemical engineering is more on the application of the science. Chemistry and chemical engineering belonged to different academic departments in many universities; UC Berkeley and U of Illinois are exceptions. In both these places, the School of Chemistry and Chemical Engineering is one.

02-00:47:37

Hamilton:

Why did you choose that?

02-00:47:39

Lin:

Why did I? I wanted to be able to help people to enrich their quality of lives: better living and better lifestyle. Foods, clothes, shelters, medicines, transportation, etc. These were the kinds of things China and the developing world would need.

When I say industrial chemistry, applied chemistry or chemical engineering – there was very little difference at the time. In the academic world, the discipline of chemical engineering was basically chemistry plus mechanical engineering during that period prior to the 1960s. Later on, there were chemical engineers concerned with mass transfer, heat transfers, kinetics, thermal dynamics, and then moving into molecular sciences. But that was the trend during the 1970s and 1980s. Now in chemical engineering we are also talking about nano-technology, environment technology, biotechnology, electronic applications, sustainable development and the like.

Chemical and materials processing are also important parts of chemical engineering. You have to learn how to make use of filtration, evaporation, distillation, separation, pumping and transferring, etc., so you also need the knowledge of equipment, mechanics and machineries. Yes. The science of chemical engineering is changing continuously to keep pace with society needs.

02-00:49:56

Hamilton:

Were financial considerations involved in that?

02-00:50:00

Lin:

There was no financial situation because when you were admitted by the national universities, the tuition is very small.

02-00:50:11

Hamilton: What about in terms of choosing eventual careers?

02-00:50:14

Lin: I did not think about a career at that point because it's still far away. But I feel that if I got into this field, eventually I would be able to do something good for the society in terms of, improving living standards, lifestyles, and economy.

02-00:50:38

Hamilton: Did you have mentors that you saw doing this type of work before you got entered into Taiwan National University?

02-00:50:48

Lin: I think it was natural for high school students to want to get into national university. It's natural for a student in California to want to go to the UC systems, right? That's how it was in Taiwan. And National Taiwan being the best, so we all wanted to go to National Taiwan. As to the field of chemical sciences, my chemistry teacher, Mr. Che, was unquestionably my mentor.

02-00:51:10

Hamilton: Did you have role models who were working in chemical engineering?

02-00:51:14

Lin: After I was in the university, there were several professors whom I admired and might be fit to say as role models; good professors, and also participated in some industrial developments.

02-00:51:31

Hamilton: Do you recall any of the people that really impacted you? Who were they?

02-00:51:30

Lin: Yes. If we want to jump to university now, I can talk about specifically Professor Ming-shan Hsieh. He was not only a good teacher who focused on the basics but could also talk about actual cases of application. I had some professors, young scientists who have returned from UC Berkeley or University of Michigan, top institutions for chemical engineering, who taught courses in thermodynamics, kinetics, unit operations and would write mathematical equations from one end of the blackboard to the other. And most of the students would be lost. But Professor Hsieh was able to discuss actual cases—showing how the use of the principles in the factory and in the real world. So, Prof Hsieh was a very good professor and my role model. Professor Hsieh was also a very dedicated Christian. Later on he became the president of Tunghai University, an institution that received strong supports from the Methodist Church in the U.S.A.

02-00:52:52

Hamilton: So were most of your professors Western educated?

02-00:53:00

Lin:

Actually, Professor Hsieh went to Nankai University, which is in Tianjin, China. He did not have a PhD, but he was interested in applied chemistry so he had a lot of interaction with people in the West. In the university there were many professors who studied in Japanese universities or worked for Japan industry. There are some younger professors who studied in the U.S. Professor C. Y. Cheng, for example, has had a master's degree from the University of Michigan, which is the top university for chemical engineering. In my time, chemical engineering was very much also petroleum based. You take the crude oil, distilled to separate it to different streams. Some become gasoline, jet fuel, some become petrochemicals. From the petrochemicals you can make polymers, pharmaceuticals, adhesives, plastics, and all kinds of new materials for modern living. It was an exciting field. So we have many professors who have local industrial experiences and had expertise in certain technological subjects. But at that time, trained professionals from the Western countries are still a rarity. When Prof Cheng returned to NTU from the University of Michigan, he was viewed as a star. UM is also famous for Prof G.G. Brown who wrote the standard textbook on unit operation. The standard textbook on thermodynamics was authored by G. N. Lewis of UC Berkeley. So are standard texts on chemical kinetics and organic synthesis, all from U.S. scientists. So the western influence, especially U.S., in the 1960s in university education for chemical engineering are substantial.

I should also say that chemical engineering really started in the late 19th century in Europe. Many fundamental observations and applications were first established there. From the turn of the 20th century, the centers gradually moved over to the U.S. Chemical industries such as Du Pont, Dow, Monsanto, Union Carbide gradually occupying leadership position in the market. At the same time, the science of chemical engineering have also witnessed rapid development in academic centers in MIT, UC Berkeley, University of Michigan, Wisconsin, Illinois and others. The number of Chinese students pursuing advanced degrees and worked in leading industrial or academic institutions in the U.S. was relatively few until after 1960's. However, U.S. influence in the field of chemical engineering was rapidly expanding through scientific publications and the ever growing new chemical products.

02-00:56:07

Hamilton:

To talk about what's going on at the university, were you only being educated there or was there also some sort of industry associated with the university? Was that happening elsewhere in Taiwan or elsewhere in the world?

02-00:56:23

Lin:

The interaction between university and industry was basically minimal in the 60s or 70s. But chemical engineering is a branch of science that has great application in the industry. Therefore more university-industrial interactions are unquestionably expected, in Taiwan as well in the developed or developing countries.

02-00:56:30

Li: Has that changed?

02-00:56:32

Lin: Oh, there are a lot of changes in the last 40 or 50 years. It won't be presumptuous to say that I and my colleagues might have something to do with that in Taiwan! At that time, through people like Professor Hsieh, who was well known in both camps, there are more visits and exchanges of personnel between universities and the industry. At that time Chinese Petroleum was a state-owned company and instrumental in promoting the science and technology of chemical engineering. Through university professors we were able to visit and communicate with some industrial people from time to time. Really, chemical engineering, chemical industries in Taiwan was blooming in the late 1960s to 1980s. Much progress was made in that period and I was pleased to be a part of that.

02-00:57:50

Li: I'm going to stop here. We're at the end of another tape.

Begin Audiofile 3

03-00:00:00

Li: I had a couple follow-up questions. I wanted to ask you, you had mentioned that you didn't have your English name when you went to school, so maybe could you tell the story about that?

03-00:00:15

Lin: All right. The time is around 1959 when I was in the last years of college and have gone through part of the ROTC services.

03-00:00:26

Li: American-style ROTC?

03-00:00:28

Lin: Yes, there were many similarities. When finished with ROTC as a part of military service obligation, university graduates are then free to leave Taiwan and go abroad for graduate studies. This would be same for my age group. So I was becoming a free man by 1959-60 and was preparing for coming to the United States. I was very lucky and was awarded a Fulbright Fellowship. I also had a girlfriend, Ada Wen-shung Ma, who later became my wife. She has started graduate studies at Columbia. So naturally my next move would be to the U.S.

I have applied for admissions to several universities with excellent programs on chemistry and chemical engineering. The Fulbright Fellowship would allow me to study at Yale. At this point, University of Illinois, Champaign-Urbana, also awarded a fellowship-assistantship package. Eventually I have decided to go to Illinois because, unlike the Fulbright, the package came with

no strings attached. Furthermore, UI has offered a more integrated Chemistry-Chemical Engineering program.

With the destination set, I then decided to learn more about the English language, especially the spoken and conversational English. So I went to a conversational English class given by Sister Tierney who is a Catholic nun. After a few sessions, she pointed out that my given name, Chui-Chau, is very difficult to say. She suggested that I might use an English or American name so that I will be easier to interact with friends in the University. After all, I wanted to be like a part of the group. This was quite common for foreigners, ministers, for example, in China—they picked up Chinese names. I thought Sister Tierney’s suggestion was a good one. The next job was then to pick an American name. Of course, my father was no help because he did not speak the language. I asked Sister Tierney for suggestion. She said, “Well, Peter, Paul, John, these would be great names for you.

Umm, I said, they are great name all right; but may not suit me. Why? I pointed out to her that, Lin is a very popular name in China, just like Smith or Johnson. There indeed can be hundreds or thousands of John Lin, Peter Lin or Paul Lin. I would then lose my identity. Nobody would know who I am and how to identify me. So I said I would try to find a name for myself. So I looked through the Webster and the Oxford, finally the name Otto came up. I said Otto is for me. Why? If one write my name in Chinese, Lin Chui Chau, up and down, it has a two fold symmetry, or a mirror image. With O-T and T-O, this feature is preserved. Listening to this reasoning, Sister Tierney approved my selection. Of course she did not explain the Germanic nature of the name and the many famous Otto before me. But I guess it would pick Otto for me in any case. I was pleased with name and I must say it has served me very well. All these years, I have not met another person with the same name Otto Lin.

03-00:03:59

Li: And the “t” is like a tree, like the limbs in *mu*.

03-00:04:02

Lin: Thank you for pointing out this one.

03-00:04:44

Li: So you put a lot of thought into your name.

03-00:04:45

Lin: Yes, I thought of that, yes.

03-00:04:50

Hamilton: Thank you.

03-00:04:51

Li: I was wondering. So Chui, like C-u-i?

- 03-00:04:58
Lin: C-h-u-i.
- 03-00:05:00
Li: And then Chau.
- 03-00:05:00
Lin: Chau, C-h-a-u.
- 03-00:05:02
Li: C-h-a-u, oh.
- 03-00:05:03
Lin: Now in the Chinese pinyin, you will say it more like Chui, Z-h-o-u. But I was using – in my time, a translation system by Chao Yuen-ren, a famous professor at Harvard –
- 03-00:05:26
Li: Wade Giles? [Editor’s Note: Chao’s system of transliteration was called “Gwoyeu Romatzyh.” He taught at the University of California at Berkeley from 1947 to 1960.]
- 03-00:05:28
Lin: Chao Yuen-ren. Yes, I think he also has some UC Berkeley connection. But you know, he had edited a Chinese-English dictionary which was a standard at my time. It was translated as C-h-u-i C-h-a-u. So in all this fifty years my name was always Lin Chui Chau, Otto Lin Chui Chau, or Otto Chui Chau Lin.
- 03-00:05:58
Li: So Otto C.C. –
- 03-00:05:59
Lin: Yes, Otto C.C. I might add that over the years many people have showed curiosity at my name and inquired at its origin. Do I have a German grandmother, etc? Before I told the story, I usually asked for a beer or martini in return. I have made many friends through this name.
- Li: Emily, did you have any other questions?
- 03-00:06:06
Hamilton: Yes, I think that I want to be moving on to your time in the U.S. next meeting, so this is a good breaking spot.
- 03-00:06:13
Li: Yes, so we’ll talk about your time in the U.S., both your education and I’m also curious about sort of the more social experience of being in the U.S. at that time.
- 03-00:06:21
Lin: Yes, right.

03-00:06:22

Li: Thank you so much.

03-00:06:23

Lin: Thank you, thank you.

03-00:06:24

Hamilton: Thank you.

[End of Interview]

Interview 2: December 18, 2007

Audiofile 4

04-00:00:07

Li: Today we're meeting with Otto Lin. It's December 18, 2007, in Berkeley, California. This is interview session number two, tape four.

04-00:00:32

Li: You mentioned last time the significance of Sun Yat-sen's thinking in your upbringing. Could you tell us more about that?

04-00:00:00

Lin: Yes. Sun Yat-sen was—an extremely intelligent person, of course, I am sure you know his—I don't have to go through a lot. He grew up in the countryside of Guangdong, and then had the opportunity to go to Hawaii, because his big brother was in Hawaii. There he had the opportunity to study and had a taste of what American life is like. Afterward, he returned to China to Hong Kong, and went to a medical college to be a physician. Recently, I went to a museum in Hong Kong; they were exhibits about his college days. That was a very interesting period of history.

At college, he worked with a number of idealist classmates, and they became revolutionaries, planning to pressure the Qing Dynasty government to adopt some of the new measures for the country. I may not get the dates right, but Li Hongzhang [李鴻章] was the Prime Minister at the time. Li was the student of Zeng Guofan [曾國藩], both are famous and important personality in history. At that time, Li was pretty old; Sun and Li did not have good communication with each other. I always used to joke that probably Sun Yat-sen spoke Cantonese; his Putonghua [Standard Mandarin] was not that proficient, and Li, spoke with his Anhui accent. There might not be able to have any communication at all. The story goes that Li asked Sun to write his proposal to him, and Sun returned with a “Ten-Thousand Words” [萬言書] report. I think that's much too long for Li. Sun should do better with an executive summary!

Seeing that The Qing Dynasty was going downhill, Sun finally decided that there was no hope to try to salvage the monarchy, so he was willing to become a revolutionary. Because of his experience with the United States, he knew

how the United States gained independence from the British Empire, so he was very much interested in taking a similar route for China.

Another aspect was that Sun had learned a lot of Chinese culture. He knew the Confucius theory and vision of *Da Tong She Hui* the society—the ideal of the final harmonious society. There is something that has to be in here: it all started from “Tian Xia Wei Gong” [天下為公—the nation belong to all the people], which is simply democracy. [Editor’s Note: *Tian Xia Wei Gong* [大同社會] is a famous four-word idiom from Sun Yat-sen, inscribed at the gate of his memorial, meaning “What is under heaven is for all”.] The whole chapter of *Da Tong She Hui* contains only 106 words. It is the “utopia” of Confucius. In it, he talked about how the country, the nation, belonged to everybody. People, through the election of the talented and the virtuous give them the power. Everybody will treat other people's parents like his own parents; treat other people's children as his own children. The society will provide social security net for the widow, widower, the orphan, the disabled and the deserted. It is a society with effective policies on environmental protection, on encouraging social and voluntary work, education for all and full employment.

Sun Yat-sen was able to capture the Confucius vision and blend it with Abraham Lincoln's ideal: “of the people- by the people- for the people”. Sun advocated the “The Three People's Principle”, or, *San Min Chu'i*. *Chu-I* [三民主義] is principle, *San* is three, and *Min* is people. In short, Sun advocated for Independence of the Chinese people, a lawful government established by the people, and Social well being for the people. The beauty of Sun’s vision is that he was able to combine the traditional Chinese -the best of Chinese culture- and the modern practice of democracy based on the American model. And, he has a mechanism to implement this in China. I think that's why Sun Yat-sen is so important for the Republic.

The uprisings against local governments took place near the end of the 19th century. In Guangzhou, there was a large-scale military action on March 29, 1911. This attempt, like the eight similar ones took place around the nation, failed. Then came the tenth attempt in Wu-chang, which took place on the Double Ten: the tenth day of the tenth month [October 10, 1911]. The revolution was successful and the local Qing government was thrown out. Actually, at the time, Sun Yat-sen was fund-raising in the United States. His followers had the uprising and threw out the Qing Dynasty and declared independence for Wu-chang. After that, a lot of other places followed. That led to the downfall of the Qing Dynasty. This monarchy system in China that had been in existence for over 4,000 years thus came to the end. And Sun is the person whose visionary and leadership had brought about this change.

Sun's ideal became the blueprint in the establishment of the Republic of China, ROC, and he was elected provisional president of the Republic. However, he was a trained medical doctor, and basically a scholar. He has no real power. But China was still run by several power groups. Although the

Qing Dynasty had basically abdicated and the royal family withdrawn from the scene, the real political power did not go back to the people. In no time, the de facto prime minister, Yuan Shikai [袁世凱] took over and started an era of the warlords in China. Yuan Shikai actually wanted the return of monarchy and wanted to be crowned as King again. But his personal effort was denounced by all parties and he soon died in anguish and disappointment. Other power groups, the warlords, which created turmoil for the country for almost twenty years, followed Yuan's hold on the power.

Now, I don't want to go through all the history here, but simply to fill in a personal perspective to show the significance of Sun Yat-sen in the Republic of China. He is a man of many names. "Sun" is the family name, just like "Li" or "Lin." His given name is Wen. Thus Sun Wen [孫文] is the formal name in official documents. [Narrator's Note: Scholars in the traditional China used to adopt other names or pen names to make certain statements at a time.] He has fondly used the name Yixian. In Cantonese, Sun Yixian pronounced as Sun Yat-sen [孫逸仙]. This became the most popular name for him in the United States and also in England Japan. When he was in Japan, he had also used a Japanese name Zhongshan. That's why he was also known as Sun Zhongshan [孫中山].

04-00:09:49

Li:

Like "mountain?" Like "central mountain?"

04-00:09:51

Lin:

"Zhongshan" in Japanese is "Nakayama" in Japanese. [Narrator's Note: He took the name Nakayama as a cover for Qing officials who were constantly pursuing him in Japan.]

04-00:09:59

Li:

So "zhong" like "center?" Like "central?"

04-00:10:00

Lin:

Zhong is "center," yes. "Shan" is "mountain," So Zhong-shan is "Center mountain," right. So a lot of people addressed him as Zhongshan xiang-shen" for respect.

I want to tell a story here. It happened after Mao Zedong came to power by overthrowing Chiang Kai-shek. At that time, an American journalist, Edgar Snow, was very friendly with Mao, and had said a lot of good words about Mao and the Chinese Communists. He portrayed Mao as the land reformer, and that kind of thing, to build up Mao's position and image in the Western world. This is the late 1950s, or earlier 60s. Edgar Snow received an invitation from Mao. He went to China to see Mao.

The story goes that Mao arranged for Edgar Snow to visit a number of cities and places, scenic places. Afterward, Snow went back to Beijing, and in a friendly chat, Mao said, "Well, you have been through all of these scenic

places. What do you think?" Snow was, of course, full of pleasantries. And Mao asked him, he said, "Well, in your view what is the greatest "shan" [mountain] of China?" And Snow hesitated and tried to go down a list, "Oh, Taishan is big and majestic; Huangshan, is elegant and beautiful, Huashan is full of natural spirit, and – " you know, different *shan* has different attractions. And Mao told him, "The greatest *shan* in China is *Sun Zhong shan*."

04-00:12:07

Li: Sun Yat-sen appealed to both sides?

04-00:12:08

Lin: Yes, he appealed to both sides.

I was told that during the Double-Ten Day celebration, or Sun Yat-sen's birthday, you can see Sun Yat-sen's portrait, a big picture, in Tian'anmen Square, just opposite Mao Zedong. Without Mao's approval, this kind of respect toward Sun Yat-sen would not be possible [in the Chinese Mainland].

So his ideal of setting up a republic along the line of *Da Tong She Hui* is basically what a lot of Chinese have wanted. China has been for thousands of years looking for, that kind of society, the socialist society.

04-00:13:00

Li: What are some of the ideals of that society?

04-00:13:04

Lin: Yes, well, we need to talk about this in more detail, but let me just say this. Five years ago, in the 16th Plenary Session of the Chinese Communist Party—Jiang Zemin transferred the power to Hu Jintao. Also in that Session the goal of building China as a *xiao kang she hui* was proclaimed. I'll write these words in Chinese. *Xiao kang*, relative to *da tong*, the final utopia is the middle step in the process. In the 16th Plenary Session, the Chinese Communist Party says, "We want to build a *xiao kang she hui* by the year 2050" And this year, at the 17th Plenary Congress of the CCP Hu Jintao said he wants to build a "Harmonious Society." I'm sure you saw this in the newspaper worldwide. So his political vision for China is clear: "the harmonious society." If one inquires at what's Hu was talking about. The "harmonious society" is basically *da tong she hui*. It's what Confucius and Sun Yat-sen had put forth for China.

04-00:14:40

Li: So it's a return to traditional values?

04-00:14:42

Lin: Yes, it appeared to be a return to traditional values. Basically, that's what happened.

Sun was a very eloquent speaker, and he wrote very well. When my father was about in his teen years, he already heard Sun's name, and knew about his

work. He went to the Huangpo Military Academy to join the Sun's followers to build a new China.

Now, at that time, actually, Sun had already died. Sun, although elected provisional president, had no real power. And all the warlords who controlled those different provinces didn't really listen to him. It's interesting to note that a pioneer is always a loner. Look at Confucius: 2,500 years ago, he was preaching democracy. I don't know if we talked about this last time.

04-00:15:56

Li: No.

04-00:15:56

Lin: Confucius, who grew up Shangdong, never really had an opportunity to be above a minister. Yes, he became a fairly high-ranking official for only a few years, and then he was driven out of the position because everywhere he went, he was preaching democracy. He would say "the king should listen to the people and should do what the people wanted him to do." This kind of idea was not really trendy 2500 years ago. No wonder everywhere he went, he did not sit well with the ruler. He finally became a teacher, and he was a professor at large, literally,—moving from one place to the other seeking disciples. Basically, perhaps unknowingly, he was building an education model of private education and self-financed education. All the students have to pay their own tuition. He did not get a permanent position or support from any major foundation so he had to move around.

Coming back to Sun Yat-sen, even though he was elected provisional president, he gave up his position to Yuan Shikai because he recognized Yuan had the [practical] power, so it's better to let him do it. But Yuan wanted to become king, so Yuan was thrown out by people in a few years. Then it [the country] fell to different warlords [ruling] in different regions.

My father, at that time, was a teenager. He felt—and many other people felt the same way that—the only way to do it is to try to get [your] party to power, military power. Military, gunpowder; you know, "Power comes out of the gun barrel."

04-00:18:15

Li: This party would be the National Party?

04-00:18:17

Lin: The National Party, the Kuomintang. So he went to Guangzhou. If you go to China, you can see the site of Huangpo Junxiao. The training then was not entirely like a regular university. At this time, this is already Chiang Kai-shek's time, and he has started the "Northern Expedition". They trained a cadet there for a year or two, and immediately put them into commanding posts. It's a very short turnover time – compared to four years program for

BA, or six years for PhD. It was a one or two-year deal. Just off you go, to fight as a commanding officer.

04-00:19:06

Li: So how old was your father when he went to the military academy?

04-00:19:09

Lin: How old?

04-00:19:10

Li: Yes

04-00:19:12

Lin: I think he was about late twenties [or pushing to thirties]. [Narrator's Note: He graduated from the Huangpo Military Academy in May, 1937, see Appendix 1]

He went there, and joined the Kuomintang. But then in a couple of battles, he was injured in his legs and was unable to pursue a military career. Then he was given assignment in the government and in the Party, Kuomintang. The family, prior to this, was basically a farmer's family. After my father became related to the government. It stood out in the village and the people looked up to my father. Very soon, the Japanese invasion came over to the Shantou area, in 1937-38.

Last week, I was in Hong Kong attending a party in honor of the fifth sister of my mother. She was eighty-two years old. And this old lady said that when I was born—she was at my side. And on the eleventh day, my mother and this kid sister took the infant fleeing Shantou to hide in our countryside village. She said, "I hold you firmly in my hands."

04-00:21:14

Li: So you had to flee the Japanese—

04-00:21:16

Lin: The Japanese.

04-00:21:16

Li: —when you were a baby.

04-00:21:17

Lin: A baby, yes. At eleven days. This last week was the first time I met my aunt—my mother's number five sister—after nearly sixty years. I was curious and asked many questions. Well, at that time, she was only thirteen or fourteen years old. She was staying with my parents' family, and helping to take care of the children.

My father after graduating from Huangpo Military Academy took assignment to, in basically, organize the guerilla troops. He was the party leader, commanding in the general area the guerillas against the Japanese. I did not

get to see my father a lot. I didn't have too much memory of my father when I was young. One thing I remembered of him is that it was often in the middle of the night, my mother woke me up and said, "Say hello to your father."

04-00:22:38

Li: So at this time, was the Kuomintang fighting with the CCP against the Japanese?

04-00:22:42

Lin: No, no. The Kuomintang was fighting with Japanese alone in my area.

04-00:22:45

Li: No, but were they aligned with the CCP—

04-00:22:47

Lin: Oh, yes.

04-00:22:49

Lin: That's right. The CCP territory at that time was in the northern China, centering around Xi'an. You know, already,—I am skipping a lot of history there. But at that time, the entire China was fighting against Japanese invasion. [Editor's Note: The Xi'an incident of December 1936 marked the beginning of a period of peace between the KMT and the CCP, as they formed a united front against the invading Japanese.]

04-00:23:04

Li: So did your father have friends that were members of the CCP?

04-00:23:06

Lin: Oh, yes.

04-00:23:08

Li: It didn't matter?

04-00:23:09

Lin: It didn't matter. Zhou Enlai [周恩來] was a party member of Kuomintang, so was Lin Biao [林彪] and many others. Zhou Enlai was the director of political education in the Huangpu Military Academy. Many others, who later became CCP leaders, were in the same school. They grew up in the same system.

04-00:23:34

Li: It's amazing that it fell apart.

04-00:23:36

Lin: Yes. Well, you know, I think many of the falling apart was kind of circumstantial.

04-00:23:44

Hamilton: So why do you think both the Communists and the Nationalists still admire Sun Yat-sen?

04-00:23:51

Lin:

Well, first of all, it was because of his ideal. He has a vision for the country, which leads to the change from monarchy to republic democracy. I think he was the first person who, not only had that ideal, but also able to start the movement. I think that is really revolutionary. And secondly, he is unselfish. At the time, seeing that Yuan Shi-kai was in a better position to more effectively promote the ideal of populism, he just gave up the presidency in favor of Yuan Shi-kai.

04-00:24:52

Li:

Do you think his science background is a factor in why he is so important? Like his interest in advancing Chinese technology, advancing Chinese science—?

04-00:25:01

Lin:

Certainly, this might relate to his knowledge of the modern world. As a medical doctor, he knows Western medicine. And, he knows the difference of Chinese medicine and Western medicine. Chinese medicine which was based on herb treatment and folk practice has cumulated experiences through thousands of year. But traditional Chinese medicine was never really well documented as a science. Western medicine has developed through scientific process. Later on Sun had suffered from and died of liver cancer. At that time, people tried different things to help him—including traditional Chinese medicine. Well, at about that time [100 hundred years ago], we didn't really understand liver cancer. It was an illness very difficult to deal with it. Basically, one has no hope if contracted liver cancer. Because of the hopeless situation, some friends suggested to him, "Well, why don't you try Chinese medicine?" He refused to do it because he did not understand how it work. [Narrator's Note: Especially so when he was being treated in a Western hospital. It could be taken to mean he had no confidence in western medicine and a betrayal to what he has believed for life.] Probably also, he felt it was too late. You know, Chinese medicine worked on the principle of building up the body strength, even though it might not cure any disease specifically. He felt that he is a believer of Western medicine. And, on his last days, converting to Chinese medicine—would be against his principle. He did not use [it].

I do not know of anybody that has tried to follow up the line that you just mentioned, but I think it's very interesting what you just said. I don't think background in science and technology is the reason that Mao Zedong, or Chiang Kai-shek, or many people, felt strongly about Sun Yat-sen. I think they felt strongly for, Sun Yat-sen, for his high ideal. And he was able to combine the best of both worlds: the Chinese world and the Western world, in terms of political theory and practice. Then certainly, he was able to motivate people. And he was unselfish. I think this is example of what hero is and the role model for people. You know, I admire him to this day.

04-00:27:49

Li: Maybe we'll come back to this later, at a later point, when we talk about visions for China and Taiwan's future. But I wanted to actually jump—to ask you about some of your school years in Taiwan, because you had mentioned the value of friendship, and how your father and your mother had instilled this as an important part of life. When did that become an important component in your life, the friends that you made? Was it during your school years in Taiwan?

04-00:28:20

Lin: Yes. That's right. Perhaps before we talk about friend, let me talk about teacher.

04-00:28:27

Li: Yes.

04-00:28:28

Lin: There are several teachers who were very important to me. And last time, we also mentioned that.

04-00:28:35

Li: Yes, in Hong Kong and Taipei.

04-00:28:37

Lin: Yes. When I was a refugee from China to Hong Kong, life was very miserable, you know? My father felt that in the future, knowledge comes first. If you don't have knowledge, you will not be able to help yourself or the country. He wanted us to go to school. At that time, he was basically a destitute refugee. And some relative, suggested that my big brother and I be sent to a factory, textile or shirt factory or something to do some odd jobs. But father said no. He insisted, "Let them go to school."

But overall, it was a very chaotic situation. But I was fortunate to meet many good teachers in those schools in Hong Kong. So in three years' time, I went to three schools. I mentioned that last time?

04-00:29:55

Li: Yes.

04-00:29:56

Lin: This was a teacher in one of those schools, Deming Zhongxue [德明中學 Deming High School]. He was only a teacher for me for about six months,—I did not make very high marks, but in my report card he written some comment which made lasting impacts to me. He wrote 16 words, in Chinese characters: "*zhi xiang yuan da / du shu nu li / le yu zhu ren / fu wu re xin.*" A translation is: this young man has high ideals, very diligent, enthusiastic in helping people, and has a good service attitude to the society. I have remembered all that he said in my life. It became very motivational to me. I always think that I should not let my teacher, somebody who really knows me, down. I should not let my mother and my father down. My father, very rarely

would tell me that I should do this or that, because he felt I can make the right decision on my own. I looked at his example, and I felt that's the example I will follow. And I know my father had that kind of expectation for me. But when this teacher, Mr. Deng [鄧老師] who wrote that in my report card, I was so very grateful. I said, "Well, I have found somebody who knows me." You know, that kind of feeling is extremely precious. Regretfully, I was never able to see him afterward.

OCCL note added: The sixteen words are “志向遠大 讀書努力 樂於助人 熱心公益。”

But this also teaches me the importance of being a teacher. I was then in junior high school. That's like a –

04-00:32:19

Li: Twelve, thirteen—?

04-00:32:19

Lin: Twelve, thirteen. That's right. Later, I went to Taiwan because of the free education provided in Taiwan. I had a teacher, a high school teacher; he taught me Chinese.

04-00:32:40

Li: Written?

04-00:32:40

Lin: Written. Written Chinese. Chinese language and Chinese literature. And a lot of people will talk about Confucius, who is very important, of course, in China. But Mr. Ge [葛勤修] told me that one time in the future, you might want to learn Laozi. [Editor's Note: Also written Lao Tsu, Lao Tse¹ And I always think, when I retire and have more time, I will study Laozi. I had spent more time to and learned more and more about Laozi in the recent years. Yes. Laozi was a person who talked about the relationship of man and the nature, and equilibrium and balance. He recognized that in the real world, the haves and the have-nots, the real and the virtual co-exist. Or, virtual reality. Yes, he discussed the real and the virtual, the fullness and the emptiness in life and in nature. And like when I am drinking out of this cup.

Say this cup is made of ceramic, or clay. Laozi said people mills clay to make vessels, but it is not the clay but the emptiness that provides the use of the vessel. People builds houses out of stone; it is the emptiness that provides the use of the house. So the haves and the real define the application; the have not's and the virtual provide the utility, the usefulness. I am now learning Laozi by myself, but I first got interested in Laozi because of this—

04-00:34:43

Li: Professor Ge?

04-00:34:44

Lin:

Mr. Ge, yes. One time, I had a conversation with a friend of mine, Mr. Han Bao-de [漢寶德], who is a great architect, trained in the Harvard School of Design, I talked with him about Lao-tze. He said, "Well, you know, all architects do was simply to define an empty space and to make use of it. You build a shell, a crust, but it's how you make use of the space inside this shell that matters." That is in all architect's job.

Laozi talked about balance. But Laozi's philosophy was kind of distorted by people with interest more in astrology—you know, Feng-sui that kind of thing. But he focused on the balance between the real and the virtual. You see, the *taiji* – the universe is part white, and part black, and the line of demarcation is a curvature. And inside the black, there is white—there is a hole. Inside the white, there is black, a spot. So it is always a balance of have and have-nots, full and void.

And Mr. Ge treated people like this. He always looked at the student, looked at a person, and tried to also see the inner side, "why are you not doing this?" He left a very strong impression on me.

Another professor was at National Taiwan University [NTU]. He was Professor Hsieh [謝明山], a chemical engineering professor, and also an industrialist. At that time, back in the 1960s, chemical engineering was very primitive from what we know now. Chemical engineers tried to make soaps, or mix some chemicals for something new to enrich or daily life. Professor Hsieh, was not only the person who taught us the principles of chemical engineering, but he also has a factory and practices what he teaches. This gave me the impression that, engineers not only learn from the books, but should also practice, and produce something that's useful for the society. I think these are the three professors that have a very strong impression on me.

Now, let me talk about friends. In Hong Kong – at that time, I was in the 9th or 8th grade. – During that period, I have several close friends. We shared interest in one thing, the future of China. At that time, utmost in our mind was the fight between Kuomintang and CCP. And I considered myself a Kuomintang, because of my father and Sun Zhongshan and their teaching. And considered the CCP as the rebellion. In the Hong Kong society, there are always two camps. In the newspaper, in school, in factory, in the society, it's always the division and struggle between the two sides—like the Democrat and the Republican during the presidential election here. But much worse, in China's situation.

I have several classmates of similar views, and I said, "Since we are good in writing why don't we put out a newspaper?" Or, if not a fully-fledged newspaper, a journal or some kind of publication aimed for students. So we started to do it. We divided the jobs in the preparation and developed different versions. Finally, we realized that we have no money – for obvious reasons.

04-00:39:27

Li: So what kind of newspaper was it? Did you write about politics?

04-00:39:30

Lin: No, not necessarily limited to politics – we'll write politics, stories, or essays. It's a combination of things, like a newspaper. But then it was aiming to catch the reader—really, the high school people.

I remember this story. When we realized that we need to find somebody to fund our project, we worked very hard for a proposal and we went to see this man who was a relative of one of our group. At the time, there's not too many newspapers around. He listened to our proposal, and said, "So What's the name of your paper?" We said, "The *Morning Star*." We thought it was a very good name – *Shengxing* – *Morning Star*. [晨星]

04-00:40:29

Li: Very poetic.

04-00:40:30

Lin: Yes. Well, he said, "Well, "morning star," in Chinese, is something that is going to fade very quickly. And he said, people used to say that the real learned scholars are like the morning stars—you can just count them by your hand, and gradually disappearing [晨星寥寥, 如賢者之四散]. So it was a bad omen. We thought it was a good name, right? But "Rising Sun" might be better, yes.

04-00:41:14

Li: This was in Hong Kong?

04-00:41:16

Lin: In Hong Kong, yes. I still have some of those friends today. Two of them, we still see each other.

04-00:41:23

Li: That's amazing.

04-00:41:24

Lin: Yes, after that many years, so—. I always developed an interest in working with people. And so in Jianguo Zhongxue [建國中學—Jianguo Senior High School]. Jianguo Zhongxue is [still] the Number One school in Taiwan today. I was a Cantonese, born in Guangdong. At that time, in the Taiwan situation, there's a lot of people like myself who came to Taiwan like immigrant. The school was made up mainly of local Taiwanese people. I was coming from Hong Kong.

At that time, the Vietnamese War was looming and in Taiwan were some refugees of Chinese origins, not the boat people as later known, from Vietnam, in the sixties. It was the middle fifties. The North and the South Vietnam, there was already war going on there. So there are some students being evacuated gradually, and came to Taiwan.

04-00:42:54

Li: From Vietnam?

04-00:42:56

Lin: From Vietnam. That's before the entire downfall of the Diem regime. It's before that. It had evolved for a long time. So taking the Vietnamese Chinese [*Hua qiao*] was again an important policy of the Kuomintang government. Education is a key element for the Kuomintang government. And I think this goes back to Sun Zhongshan's philosophy of the Republic. So they have decided that the government not only need to educate its own people in the land, but also children of overseas Chinese. Many moved from China to find living in Singapore, Indochina, the Philippines, Indonesia, and the like. Often these "overseas Chinese" are unfairly prosecuted by the local governments; they are not permitted to teach and learn Chinese locally. Many of the overseas Chinese people wanted their second generation to have a better education. So the government, the Kuomintang government, always took a very liberal policy to try to provide education assistance to the overseas Chinese students.

04-00:44:16

Li: To welcome the overseas Chinese?

04-00:44:18

Lin: Yes. At that time, particularly for Vietnam, because of the war and the unrest, a lot of families are starting to send their children to Taiwan. So Jianguo Zhongxue, being one of the top middle schools, has to take in [many new] students coming to it.

[But] there is an orientation problem: they do not speak Putonghua. They do not speak Taiwanese. Most only know Cantonese or nothing. It's very difficult. I have my background in Mandarin, Cantonese and some Taiwanese dialects and was able to work with them. Thus I was a focal point of helping this group of newcomers. I have developed many friends like this, so in the school, I was kind of stand out. Basically, I stood out because of my ability to work with people.

04-00:45:25

Li: To work with different people from different places?

04-00:45:28

Lin: That's right, yes. That's it.

04-00:45:31

Li: Like Sun Yat-sen!

04-00:45:32

Lin: Yes, basically, that's the way it looked, yes.

Many of these overseas students in high school went on to university, to National Taiwan University. There, there are local students, overseas Chinese students, and soon the Hong Kong and Macao students as well. Again, I

became a focal point with these different group of people, so I was quickly a student leader, a class leader, that kind of thing.

And I made many other friends—some local friends as well. Yes. It's good to talk about one. In the same chemical engineering class, I met Mao Kao-wen [毛高文] as a classmate. His family name is Mao, M-A-O like Mao Zedong, but no relation. Actually, he has some distant relationship with the Chiang Kai-shek family. Kao-wen and I shared a lot of values. We talked about our concern for China. You know, this is very interesting, there are very few things we were concerned about: what kind of job we get or how much money we can make after graduation—that kind of thing.

04-00:47:17

Li: You *didn't* talk about that?

04-00:47:17

Lin: No, we didn't talk about that. We mostly talk about the country, the society.

04-00:47:23

Li: Did you talk about those sorts of things with other classmates?

04-00:47:26

Lin: Yes, yes. But really on very few occasions would we sit down and say, "What kind of job do we get?" Or "How much money can we make a month?," and that kind of thing. We were only concerned about the society, the future of the nation.

04-00:47:47

Li: So did people feel a lot of responsibility to—

04-00:47:49

Lin: Felt responsible, yes.

04-00:47:500

Li: —make future China stronger, and—?

04-00:47:52

Lin: Yes. And I think most people were poor, their family was poor, so there's not much [earthy things] to talk about, really. We would bring lunchbox, to school. Did I talk about how I moved to Taipei and decided on the school to transfer? Well, I took entrance examinations for three schools. I don't know if I did talk about this. And I was admitted to them all. I was very, very happy about this. Especially for my father, all three were top schools in Taiwan, Jianguo is one of them. And the reason I picked Jianguo High School, was not because it was the best, but because it was closest to my home, so I can walk to school and do not need to pay bus fare! I don't have money to buy a bicycle and bus fare became a consideration. That tells you the kind of situation there and then.

So we carried lunchboxes to school. And my lunchbox, it was always rice – my mother was in China, so we have a housemaid to prepare the lunch box. I don't know whether we paid her for anything, but at least she got something to eat, right? Yes. Always in the lunchbox for me: rice, and then just some radish. Monday it is radish, so is Tuesday, Wednesday, and so on. Of course some day it might be chopped radish, you know?

I have another good friend who also brought lunchbox. His lunchbox: rice, and then there's *ji dan*, eggs, or juicy chicken legs. He is from a very well-off family! His father is a manufacturer of textile. Soon we had learned to trade and share. We always put things together, place them side by side like you go to a Chinese restaurant, always mix the ingredients and find the balance. He still is a dear friend of mine. Later on he became a professor in NTU. A good friend, Chu In-Long, [朱英龍].

Anyway, so I went to Taiwan, into chemical engineering and knew Mao Kao-wen among other friends. K.W. later became a graduate student of U.C. Berkeley. He and I would also talk about music—that was about the time of Elvis Presley.

04-00:51:06

Li: Was he popular in Taipei?

04-00:51:08

Lin: Elvis was very popular. We don't have a school song, you know? I don't know whether there are UC Berkeley or U Michigan songs. But for sure at that time we didn't have a National Taiwan University song. But all students would pick Elvis. Everybody sings the tunes of Elvis all the time.

04-00:51:27

Li: So were you going to American films and listen to American music?

04-00:51:30

Lin: Yes, yes.

04-00:51:32

Lin: America had a very good, very popular reputation. They helped China fight the war, that kind of thing. People looked up to America. I wanted to go to America. And Kao-wen wanted to go to America. We also talked about this a couple of times. One time we got off school and took a hiking trip to the mountain Yang-ming Shan. We talked about our ideals, and things in the future. Kao-wen became a good friend of mine.

And later on, I went to Illinois, and he went to U.C. Berkeley. Then after Berkeley, he continued on to Carnegie Mellon. At that time, it was the Carnegie Institute of Technology, before "Mellon" came in. And as a chemical engineer Kao-wen worked for General Motors. I mention this, because Kao-wen was also an important help for my later career.

In mid 1970s, he went back to Taiwan and taught at Tsinghua University, at Hsinchu. Later on, I worked for DuPont, but we have kept up communications. Actually, when he was in Berkeley, I came to visit him once at his laboratory. Probably that was the first time that I visited Berkeley.

In 1977, while working for DuPont, I visited Taiwan and went to see him. He was already dean of Engineering in Tsinghua University in Hsinchu, and he wanted to set up a polymer institute and asked if I can help. You see, I worked for DuPont and polymer is my field. I said, "OK, I'll come to help if needed." So afterward, I went back to Taiwan to set up the polymer institute and that's how I started my career in Taiwan.

04-00:54:20

Li:

So you were both chemical engineers? But then you said you had these very philosophical conversations about the future of China. How did that relate to your decision to be chemical engineers—instead of political science or philosophy?

04-00:54:37

Lin:

Yes. Good question. Good point.

When I graduated from high school, from Jianguo Zhongxue I had to take college entrance examination. The system is not like College Board here—you take college board exams voluntarily on many possible dates, right? But in Taiwan, everybody goes through that in a one day, or two days examination. The scores you get determines what school that you can be admitted. Just one shot.

Yes. Nobody likes the exam, but that's the way it is. Again, it's fair. In a way, it's the fairness for all that sustains this system. I think that most people always debate about what is a good system of college admission. Yes. But you can indicate your preference of university at the exam— you know: first choice, second choice, and so on.

When I graduated from high school, I actually wanted to go to the military academy of my father. But my father expressed reservation. He said, "In the future, we're talking about how to build a country. The people who will play a more important role in the country are the engineers." He recommended an engineering career. Whether it's civil, or electrical, or mechanical, or whatever, it doesn't really matter. He simply said that he felt that I should not go to a military academy because in the future, there will be more opportunity in science and engineering, and also I will be able to have more contribution there.

But he also said one thing that affects my choice of a profession. In high school, I was doing pretty good academically and was known as a good student. My score would allow me to go to medical school if I wanted to be a medical doctor as a career. Father suggested that medicine is a rough

profession. He said—and I still remember, "Well, if you know your trade very well, you will be so busy that you will work to death. However, if you are a lousy doctor, you will starve to death." Basically, no quality of life, he said. Except for going to the service or the army or being a medical doctor, he said nothing else about what I can or cannot do.

At my age, my group, the best students either go to medicine or engineering. So I picked Engineering. And I like chemistry, so I picked Chemical Engineering. Yes.

04-00:57:48

Li: So when you and Mao would talk about the future of China, did your engineering play an important role in what that future would look like?

04-00:57:56

Lin: We thought about some of that, what should be done. Not necessarily from a chemical engineer's point of view. I think both Mao and myself, we maintained interest on many subjects of society: transportation, food, politics, the structure of government.

Begin Audiofile 5

05-00:00:09

Lin: Mao is a distinguished Berkeley alumni, he had a very distinguished career. K.W. Mao,—he might be Judson King's student.

05-00:00:24

Li: Oh, really?

05-00:00:25

Lin: Yes. I think one time Jud and I talked about how we got to know each other. You know, we have forgotten how did the friendship start. But then he mentioned that one of his earlier student is from Taiwan, and I said, "Yes, probably—." And then I think, "That's right." I think Kao-wen was probably Jud's student.

05-00:00:49

Li: Maybe we can move on to talking a little bit about your choice to come to the U.S. It sounds like a lot of your friends were planning to come to the U.S. for school.

05-00:00:57

Lin: Yes, yes.

05-00:00:59

Li: So would you talk about this at National Taiwan?

05-00:01:01

Lin: Yes. At that time, basically, there's very little opportunity in the society, and when you graduate, what do you do? You can go to teach high school, you

can go to work for the government, or go to the Army. I think for most of the people, we felt that we wanted to pursue graduate study to learn more, to better equip ourselves, that kind of thing. I think most of us wanted to go to the United States. Why not Europe? I think some would like to go to Europe, but certainly—this is after the Second World War. I think that America is at the peak—well, not the peak—it's going up, the rising sun, right? And it's good. Roosevelt was good; I think U.S.A. was very well respected, worldwide.

05-00:02:09

Hamilton: Would you say that it was mostly your friends that wanted to come to the United States, or most of the students in the school wanted to go?

05-00:02:18

Lin: Well, my friends are students in the school, right? I don't understand.

05-00:02:28

Hamilton: The students that you might not have considered your close friends, did they tend to do go to the United States as well?

05-00:02:33

Lin: I see, I see. Good point. Well, only top students go to National Taiwan. I would say at National Taiwan University, my Chemical Engineering class, I would say at least 60 percent of them ended up in the United States for graduate study. If you were talking about students or young person, young men and women, in other universities, they may not be able to come.

Now, at that time, there are a lot of handicaps. One is money – schools are expensive here. At that time, I think tuition is maybe about \$1,000 a year. And \$1,000 is way above what people can afford. Second is language. We learned very little English, just several hours a week. It's impossible to learn written English and conversation in that time. So language is [a handicap]. Thirdly is that America has a policy of not wanting to let too many students come over. We had a tough time with the [U.S.] Consulate.

After I graduate from National Taiwan, I have to do some military service. My classmates, the female classmates, they are lucky. They can just come, just like my girl friend who later was my wife. Yes, my wife—we were classmates. So she came here one year ahead of me.

05-00:04:47

Li: Because she didn't have to do the military service?

05-00:04:48

Lin: Yes. So let me go back a little bit on this. My age group, a lot of our people have forged very close relationship, friendship. We have developed friendship during high school time, and then the top students get to the university. The elite go to the university. So we have an opportunity to get together again. And then after we graduate from the university, we have to go to military,

ROTC [Reserve Officers' Training Corps] training. And then we kind of regroup, you know? So some of my high school friends went to National Taiwan; some of them went to National Cheng Kung University, in a different city. But when we come to ROTC to do our service, then we can get together again. Sometimes, I had friends that became history students, the arts. But when we went to the military, we came together. We had many opportunities of refreshing our friendship, and then getting to know some new friends. It's that kind of environment. A lot of us became very close friends after many of these things.

I just mentioned another friend; his name is Chu In-Long [朱英龍]—I want to include his name in my memories, because our family and his family, we know all each other. His children and my children, also know each other. Ing-long was a classmate; he's was the one who shared his lunchbox with me. Then he also went to Taiwan University, and ended up becoming a mechanical engineer. His family was relatively well off. Again, I think for our generation, wealth was only a remote concern. Because of the war, because of the poverty of the people, I think we have high ideals. Most of us wanted to be able to help the society: let's help the country, help the people.

When he graduated, his family was able to send him to Europe. Ing-long went to Germany and studied in Munich. He is a very lucky person: he did not have to work during summertime, so he—in summertime, has a retreat in one of those mountains in the Alps. But he was not there studying any Western religions; he was studying Buddhism! He's very good at Buddhism, Buddhist ideology—that kind of thing. Then he went back to Taiwan, and he followed his father's path in the textile business, and also taught in the university as a part-time professor.

I'm kind of jumping around. So when I was in DuPont, I went back to Taiwan. one time, and called to see him. He was already the manager of this factory, and also a part-time faculty at the university. We were eating lunch in his factory, and then suddenly somebody came knocking his door and said, "Mr. Chu, we have a problem." He said, "What's the problem?" The man said, "Our boiler does not work right. And it's been down for a couple of hours." If the boiler did not work, then there is no power for the factory, so the factory will have to shut down. So Ing-long just said, "OK. Chui-Chau—you know, that's me—"just sit here and wait for me." He has to go to see the boiler, so I walked out with him. He changed his clothes, and then climbed down the stairs where the boiler is to check the water and others.

05-00:09:43

Li:

So very hands-on?

05-00:09:45

Lin:

Yes, very hands-on.

And Kao-wen Mao. Let me just say another words about him. Kao-wen was Dean of Engineering at Tsinghua University—later on, I was going to go back to help set up the polymer institute, and he got promoted to become the president of another university and the deanship was open. When I was going to the polymer institute, before I have a chance to do any work, the university president wanted me to be the Dean of Engineering! So our professional paths, our careers did cross. The relationship was helpful here. That's how Kao-wen has played an important role in my career.

05-00:10:43
Hamilton:

Did he come to the U.S. before you to study?

05-00:10:46
Lin:

About the same time.

05-00:10:46
Hamilton:

At the same time?

05-00:10:47
Lin:

Yes. We went to college; we went to ROTC. I was an MP – that's the military police. I was a second lieutenant in our military police, and Kao-wen was probably in another Army section, but we all served our time.

05-00:11:08
Li:

Did your brother Eric come to the U.S. for school?

05-00:11:12
Lin:

My brother, yes, yes, yes. He did not go to Taiwan for high school. He stayed in Hong Kong to finish school. Because I have still a few more years to go, my father felt that it's easier for me to get oriented in Taiwan. But my brother was two years ahead of me, or one year ahead of me at that time, so father felt that it's not too good to move in the last years. This also showed that my father was very considerate. Eric, after graduating [from high school], he also took the exam, and was admitted to National Taiwan. So we met again in National Taiwan. He was one year ahead of me in NTU.

Afterward, after graduation from National Taiwan, Eric wanted to study fishery and marine biology. And then he went to University of Toronto, and finally moved to University of California-Davis. He became [interested] in food technology, food science and technology, and getting into the winemaking. He is still in Fresno today. He is expert in winemaking.

05-00:12:38
Hamilton:

Now, you had said before that you were interested in coming to the United States. And what made you interested in applying to the schools that you did apply to?

05-00:12:50
Lin:

As I mentioned, there's several difficulties: money, language, and the U.S. consulate. And of course, the university – you have to find a university that

will admit you, and be willing to provide a fellowship or scholarship, to solve the [financial] problem. Then you can go. With this, all will come together. At the time, I was making applications to universities. But there, I also participated in a selection process of, the Fulbright Scholarship, established in honor of U.S. Senator Fulbright [D. Arkansas]. And I got awarded a scholarship, so I was pretty good, right?

My future wife, then my girlfriend, was already in the U.S. at that time.— I went to college, National Taiwan, in 1956. And in 1957, the Nobel Prize in physics was given to Tseng Dao Lee [李政道] and Chen-Ning Yang [楊振寧]. This created a big wave for people in China and in Taiwan. You know, these are two Chinese scientists. T.D.—was at that time about thirty years old, not even forty. So it was an inspiration to Chinese students everywhere. It further added as encouragement to students for coming to the United States for graduate study.

T.D. was a professor at Columbia University. My future wife, Ada, was a classmate of mine, and she made application to Columbia among other universities. She was admitted to Columbia and awarded a scholarship, so Ada was coming to Columbia! But at that time, I was going to ROTC, so we were parted temporarily. But I also participated in some of the selections, so I went to take the Fulbright Scholarship exam, and got awarded. Fulbright's would send me to any university that admits me. I applied to Yale [University]. Yale! I think the name is very easy, and—of course, Yale is a famous name for China. Many earlier Chinese students came [there].

05-00:15:58

Li:

The first Chinese student in the U.S. was at Yale.

05-00:15:459

Lin:

Yes, [they] came to Yale, and later Harvard and Columbia.

For some reason, I applied to Yale, and Yale admitted me. And when I was about ready to come to the United States, Ada, said that you want to take note of the restriction of Fulbright Scholarship. If I were to take a Fulbright Scholarship, then after I finish the degree, I have to go back to Taiwan immediately. The scholarship was aimed at training students, to give them good education, and then want these people to go back, to return to the original country.

05-00:16:54

Li:

To share the education?

05-00:16:54

Lin:

—to serve their country, yes. I mean, it's good thinking. And, at least, I have an opportunity to come to Yale. But because I was getting this scholarship, I said, "Well, I might also apply to some other universities."

I made an application to [University of] Illinois, the Department of Chemistry and Chemical Engineering. At that time, Illinois was among the top universities in this field, probably even better than UC-Berkeley [University of California, Berkeley]. I applied to Illinois. Illinois admitted me and gave me a package of financial assistance. It ended up like the Fulbright Scholarship without the restriction, so I went to Illinois.

05-00:17:48

Hamilton:

To back-track a little bit, how did you even fill out the applications if language was a tough issue?

05-00:17:54

Lin:

It was very difficult. No, people, students would talk; we'd consult each other and do that. Yes, it's not very easy. The most difficult thing is, however, how do you pay the \$25 or \$20 application fee? That is a burden. It's a very large [financial] burden. Now, at that time, the exchange rate essentially is about one to forty. So \$20 of application fee is \$800 New Taiwan dollars. And do you know how much a high school teacher probably made? It was about \$500 a month. By your salary, you wouldn't be able to pay the application fee for one university. We had to work very hard, like tutoring, taking odd jobs to save the money so that we can afford the expense of making applications. I did many odd jobs, mostly tutoring.

05-00:19:11

Hamilton:

So you must have known that you were going to be applying to go to school in the United States very early on.

05-00:19:20

Lin:

Well, I think in our college time, because we're exposed to textbooks, we learned about the scientists and engineers. Those people mostly are Americans. I think it was natural to think that I wanted to come to the United States for graduate study. I remember in chemical engineering curriculum, the number one, most important class is "Principles of Chemical Engineering." We were using a textbook by G. G. Brown of University of Michigan, – nobody uses that book anymore nowadays. Later on, when I went to visit Michigan, Professor Brown was already retired, his book was considered an one of a kind classic.

We learned about America because of the textbook we used, and because most of the research was done by American scientists. There's no question that I wanted to come to the U.S.—I think those student whose academic abilities can support it, they would aspire to do it, I think.

05-00:20:46

Hamilton:

Would it have been possible to study chemical engineering as a graduate student in China then?

05-00:20:52

Lin:

Not at the time. Well, the faculty—Professor M.S. Hsieh, I mentioned Hsieh earlier. I don't think he has a PhD. He was a chemical engineer. At that time when I was his student, he probably was fifty or something. He got his college degree in Nankai University. This was fairly good, one of the older universities. Then he worked, and then he was able to teach. We had a young faculty member at the time returning to teach in my National Taiwan University class. He is Professor C. Y. Cheng [鄭建炎]. He got a master's degree from Michigan. I think he had probably studied under G. G. Brown, and became a star professor in my department. I'm saying that he just graduated,—just getting his master's degree, returns to Taiwan, and became a star professor. That tells you the faculty level, and that the university did not have the capacity to provide a complete graduate curriculum for students.

05-00:22:35

Hamilton:

Well, this obviously had an impact on you, but you were saying before that your girlfriend, your wife, reminded that if you had a Fulbright Scholarship, you'd have to go back. I'm interested in what made you decide that you wanted to pursue a PhD, to stay in the United States for that long, and perhaps stay for even longer when you're seeing these examples of someone who will go and just get a master's degree, and come back and have a star professorship.

05-00:23:06

Lin:

Yes. Well, I just liked to have the freedom [of choice]. See—for engineering, you have to have professional training. Even though it's fun just to learn, to go to graduate school of a university, you don't have that kind of hands-on training needed. Hands-on training is very important for chemical engineering.

At that time, Professor Cheng was a young faculty. His course, was a very difficult one. The students all felt that way. He would talk about principles, write down the formulas on the blackboard, with boundary conditions and everything. It was very difficult to comprehend. A lot of time, we didn't understand why—what's the use of the constitutive equations, for example. The conservation of mass, conservation of energy, conservation of momentum—what does it mean in real life? Very few life examples were given. I think Professor Cheng, while considered a star professor and researcher then, is a much better professor now than he was at the time. But he is retired.

I am just trying to explain to you that for an engineering professor, some practical training, experience in the real world, is very important. It can be very motivational to the students. I felt that when I got my advanced degree, I would also like to have some opportunity to be trained in industry, or in a university, rather than just having learned something, then go back and teach.

05-00:25:05

Hamilton: Did you want to do that in the United States?

05-00:25:08

Lin: Yes.

05-00:25:11

Hamilton: So there were more opportunities for education, and then also for the practical training after?

05-00:25:16

Lin: Yes, in the United States, yes.

05-00:25:21

Li: Could you tell us—I'm just curious—the story of you actually coming to Illinois? Did you take a plane? Did you take a boat? How did you get your visa?

05-00:25:31

Lin: Yes. At that time, airplane trip was very expensive. I could not afford the air ticket. Did I talk about this last time?

05-00:25:51

Hamilton: No.

05-00:25:51

Lin: No? I cannot afford an air ticket, although University of Illinois would pay me a monthly stipend and cover my tuition. I think I probably got \$150 a month or something. That's good. That's pretty good in 1960. I was very happy, and then we were all prepared to come.

Just a story here: I went to say goodbye with my father's friend, Mr. S. T. Liu [劉世達], whom I always called "uncle," *liu bobo*. I said, "I'm saying good bye to you before going to the States, to the University of Illinois." And he says, "Good!" and he was very happy. And he said, "Well, wait a minute. Wait for me." So he went back to his room, and he came back with an envelope with 200 U.S. Dollars inside. That's lots of money. I said, "Oh, no, I don't need the money." And he is just also a civil servant, I know. not a wealthy person at all. He said, "No, you just take this money. If you don't have to use it, then treat it as a safety. OK?". He added, "If you don't need to use it, after you are in the United States, and then you can send it back to me. I just give it to other who may need it. So it will just line your pocket for a while and give you some added confidence." I still remember his kindness. He's still in Taipei. His son, Lawrence [劉遵義] is now the president of Chinese University in Hong Kong. Our families go back a long time.

I have forgotten how much an airplane ticket cost, but it was something that I cannot afford. Some friends of mine, we're together; were able to find out that some cargo ship – small, not like the ocean liner—but a freighter that carries goods from Taiwan to America, was able to accommodate maybe 10, 12

students besides the cargo. I was very lucky to get one of those spots. Again, this was another opportunity to meeting some old friends again.

05-00:28:29

Li: Because only students could come to the U.S. at that time. You had to be a student or a merchant?

05-00:28:33

Lin: Yes, not everybody could come to the United States. You had to have an approved reason. And of course postgraduate study was one of these reasons that the government would allow. Actually, for men, you had to finish your military service first.

05-00:28:51

Li: I know America had restricted immigration laws, but did Taiwan restrict your ability to leave?

05-00:28:58

Lin: That's right. We all talk globalization now; but, at that time, we don't believe in that.

05-00:29:04

Li: So it was all students on the boat together?

05-00:29:06

Lin: Yes, all. And some of the students were my high school classmates; some were my university classmates. Very interesting.

05-00:29:18

Hamilton: I assume that then you ended up in—

05-00:29:18

Lin: No, I have not answered your question.

05-00:29:20
:29:21

Hamilton: You must have ended up in California, then. So how did you get to Illinois?

05-00:29:27

Lin: Yes, that's right. Yes. But the interesting thing is that, before the trip, I knew the itinerary: the freighter would stop in Japan. Yokohama, then come to California—actually, we would stop at Los Angeles. Then it will go to Panama, the canal, and finally stop at New York. The ship took a route like this. I had an option. I said, "Well, you know, I will buy tickets from Taiwan, Kaohsiung—Kaohsiung is in the southern part of Taiwan, it's a seaport—to the West Coast U.S., first. Then, if there's an option, I will continue on the Panama Canal to the East coast. I was given that option.

My father was very happy that I was able to come to the States on scholarship, so [he was] very happy for me. He took me to Kaohsiung, and had a good gathering with friends. Before I left and get onto the boat, I was told that the

boat was not going to Yokohama now. Instead, it is going to Manila, because they had received a business order and have to carry something to Manila first. "Well, but I had bought a ticket which says to Yokohama and to—." They say, "Well, no matter, because if you don't want it, you don't have to take it. It's your choice, right?" We finally figured, "That's OK." It will just take several days. It would take us to Manila, so we had an opportunity to know Manila in the 1960s.

At that time, Philippines was a very forward-looking country; people's lifestyle was pretty good. We were able to get onshore to do some sightseeing. It was beautiful compared to Taiwan. I'm saying that after fifty years, today, the largest export of the Philippines is regretfully probably housemaids, how pathetic! You ask why? At that time Taiwan was poorer than the Philippines, but Taiwan now is in a much different position.

At Philippines, the boat took up some cargo from Manila and went to Kobe. And so it stopped at Kobe, and after Kobe, it went to Yokohama. At Yokohama, it unloaded and loaded, and then moved over across the Pacific to United States. It was a forty-five day trip. I told my family later, "Well, I never need to take another boat trip again."

05-00:32:57

Li: So did you leave in enough time to get to school—because I'm assuming you had to start school in Illinois on a certain date?

05-00:33:02

Lin: Yes.

05-00:33:03

Li: So did you know that it might take two months to get there?

05-00:33:07

Lin: Yes. No, we didn't know it would take that long, so it was very close. Well, we didn't have a chance to pick our dates, because that's when the boat will leave. We knew when this boat would leave; we knew when it gets to the United States approximately a couple of months ahead of time for school. So be it, because we didn't know when the next boat would be available. We kind of have to take it or leave it; it was simply like that.

05-00:33:32

Li: So did you dock in L.A., then, from—?

05-00:33:35

Lin: Yes, we docked at L.A. Actually, it's an island outside of L.A. It's the port of [San Carlos?],—some of those little islands, you know, outside L.A. And when we docked at L.A., the journey was already too long for me. I didn't want to take this option of going to Panama. Although I kind of miss the opportunity seeing how the canal operates.

There are a few people who wanted to take the other leg of the trip and say, "Oh, Otto, can you post these couple of letters for us?" They wanted to send a letter back to Taiwan, to their home. I said, "Sure!"

When I got on the shore with just very simple luggage, then I saw there this box along the pier and quickly put the letters in the box. It was a green colored box. In Taiwan, the post office boxes are green, so it's kind of obvious. Green—there it is! So I put it in there. And then I said, "Wait"—I talked to my other friend on the shore, "Did you see it say mailbox?" He said, "No, we just put all the letters in the green box." My companion is Robert Yuan [袁立人]. Robert, now he is a professor of architecture engineering at University of Texas. He said, "No, we just put the letters in there." So I said, "Well, now that I come to think of it, I did not see any writing as the mailbox on it," or any sign like this. And then it occurs to me that it might not be the mailbox at all. It was a trash can!

05-00:35:41

Li: Oh no!

05-00:35:43

Lin: We had to go back and dig the letters out from the trashcan. Luckily, they did not empty it yet. Later we know the mailboxes here are painted blue; it's a blue box, right? Usually? Yes.

05-00:35:56

Li: So did you have to go through an immigration interview when you arrived?

05-00:35:59

Lin: Yes. Interview—you mean Taiwan or here?

05-00:36:03

Li: Here. Or both.

05-00:36:04

Lin: Yes. I mean, here, it is simple. But in Taiwan, it is difficult. They ask you questions. I think the most important thing is that the consulate office just wanted to make sure that you would return to Taiwan.

05-00:36:18

Li: Oh, so they interviewed you at the American consulate in Taiwan?

05-00:36:21

Lin: Yes, yes.

05-00:36:22

Li: To make certain that you would not—?

05-00:36:25

Lin: That you are not a refugee who wanted to stay here and become an immigrant.

05-00:36:33

Li: So then how did you get from L.A. to Illinois?

05-00:36:38

Lin: That part we already kind of planned. We [Robert and I] took the train, Santa Fe train. Have you taken the Santa Fe train? No?

05-00:36:51

Li: I've seen it.

05-00:36:52

Lin: No, no. "Santa Fe, all the way!" I took the Santa Fe train. This was by design. Robert was a friend of mine. Robert Yuan Li-ren [袁立人], but no relation of Yuan Shi-kai. He was an engineering student from Cheng Kung University, which was in the Southern part, and then we were in the Army training, ROTC, together. Then we said we wanted to come to the States to study, and it turns out we would both go to Illinois. Naturally, we were [traveling] together. So when I know about this opportunity of buying a ticket on the freighter, I also told him, so he was very happy. We came together.

We planned our trip together. We don't know anybody in LA., and so how do you get from L.A.? – We would take the train to Chicago, that we knew. I had a teacher who taught me conversational English, and [in whose class] was also how I got my name "Otto." I told you about that part. She was able to tell us, "Perhaps you can contact some church group. The church group may be able to help or give some assistance upon your arrival." So we did. We went to a couple of church groups and met some people. This was amazing – I think this created a lot of good feelings about America. This family in LA had post a little card in the church expressing their willingness to assist foreign students.

05-00:39:03

Li: And was it in Chinese, or in English?

05-00:39:05

Lin: English. English, yes.

05-00:39:06

Li: Was that a Methodist church, or what kind was it?

05-00:39:08

Lin: I only know it's a Protestant church. It's a central place where you would find out about people who are offering assistance with that kind of thing. You could get some information there. So Robert and I went there, and we said, "Wow, this is our family!"—the Garrison family. Their names are Mr. and Mrs. Thomas Garrison. They have later moved away from LA, but we have kept contact by letter for many years. Mr. Garrison ran a gas station in L.A. So when we get onshore, he picked us up. We stayed the night with their family.

05-00:40:05

Li: So you made contact with him in Taiwan?

05-00:40:08

Lin: In Taiwan.

05-00:40:09

Li: So he knew you were coming?

05-00:40:10

Lin: That's right. That's right. They were kind of anticipating that we—

05-00:40:14

Li: So they'd match you with a family at your destination, the church group in Taipei would arrange for this family to meet you?

05-00:40:20

Lin: That's right. Now it escapes me, how did he know what day we would arrive? Oh, probably when we got there, we called him or something. I think probably that's what happened. When we get onshore, then we called him, and they came to pick us up, and we stayed a night with their family. Because there was a long delay, nobody knows exactly when the ship was going to get to L.A.

We stayed at his home that night. It's in the suburb of L.A.—you know, one of those typical communities. It was so cold. It was January. That's cold. And he said, "Well, if you are cold. You can use our electric blanket." So he showed us the electric blanket. It was the first time that we were exposed to the electric blanket, so he said, "All you need to do is just plug it to the wall and turn the switch on, and then it's warm." And then it was indeed pretty warm. But I was worried to death that I could get electrocuted in the first night in U.S.A.!

The next day, we took the Santa Fe train. They took us to the station. I have forgotten which station now.

05-00:41:53

Li: What was your impression, though? This is the first time you've been in an environment where it wasn't mostly Chinese—you know, where you look around, and people don't look Chinese. How was that experience?

05-00:42:04

Lin: We saw enough movies.

05-00:42:10

Li: So you were prepared?

05-00:42:11

Lin: We were prepared. At least I think we were, even though language is a difficulty. And then there are also many other friends already here, so we know there is a period of transition.

05-00:42:25

Li: You heard stories about—?

05-00:42:27

Lin: We were fairly prepared, yes. The train went to L.A., and then got to the Rocky Mountains and we saw snow, big snow. I woke up on the train and looked out of the snow. It was so amazing, because the Rocky Mountains were unlike any mountain that I knew before. You know, in China, it is always trees, landscapes, sceneries and everything, but here the Rocky Mountains are all just red. No trees. So I was kind of disappointed, but then when the train moved in the snow into a little town and along the railroad track, there were some parking spaces with cars neatly parked. Most of the cars are covered with snow. It's just like opening a big refrigerator and you see some ice cubes nicely laid out there in the tray. It was amazingly beautiful for the first timer.

Robert and I were together, it was very good, and then went to Chicago. And Robert's sister came to pick us up, and then can send us to Champaign-Urbana. Robert later on would graduate from the architectural school in Illinois, and then took a faculty job and ended up in University of Texas, UT-Arlington. I met him only twice—only once or twice in this last forty years.

05-00:44:20

Li: So he didn't go back to Taiwan?

05-00:44:21

Lin: He did not go back to Taiwan. He taught. He got a job at UT, and then he stayed here, [but he visited Taiwan to lecture a number of times].

05-00:44:27

Hamilton: Did you have a place to live in Champaign?

05-00:44:30

Lin: No, no. We did not think of that. But then luckily, because I went into Chemical Engineering, the Department staffs knew that I was coming. So again, the foreign student service was very good. They had some places for us to stay overnight. I stayed in one of the brotherhoods, the—what do you call—?

05-00:45:03

Li: Fraternities?

05-00:45:03

Lin: Fraternities. Fraternity house, yes. Overnight. And then we started looking for houses to live. Robert stayed in one place; I stayed another place. The next day, or the next day or two, I moved to an apartment in Urbana.

05-00:45:27

Li: With Robert? Did you live together?

05-00:45:29

Lin: No, not with Robert. Robert moved to another apartment.

05-00:45:33

Li: Did you live with other Chinese students?

05-00:45:35

Lin: No, no. I lived with an American,—Ronald Hoffman. I have not met Ronald in these last forty years. Ronald was a very interesting guy. He was much older than I am. He was an American in the service, military service, and was once actually stationed in Taiwan for several months. He liked Chinese food. He was looking for a roommate. We [Robert and I] went to the student center, and tried to look for housing. There was this postcard that said “Looking for roommate?” so I just called, and he said, "Yes, come in." It's in the basement. It's not very attractive. We could not see the scenery outside. But it's warm and he was a nice guy. We talked to him. I've forgotten what his subject of major, but he is interested in having somebody from China, from Taiwan, as roommate so we can cook together. He liked Chinese food. Actually I was a big disappointment to him because I didn't know any cooking at all.

And so he [kind of taken aback] said, well, uh. But then I was fairly smart and promised to share the cooking. So he said OK. On the day I cook, I would offer soup a la Campbell. I opened cans of Campbell's soup, and put hot dogs in there. In one bowl, you have a balanced meal! He was not very happy with that. He then showed me how he cooked. He smashed ground beef and snow peas together, and then here you are: you have Pea with Beef. Yes. We kind of tried to work with each other on Chinese cooking.

05-00:48:00

Li: So you learned Chinese cooking from him?

05-00:48:02

Lin: That's right. That's right, yes.

Basically, you have run through most of the questions that you wanted to ask now?

05-00:48:15

Hamilton: Yes.

05-00:48:15

Lin: Then I can talk a little bit about Illinois now?

05-00:48:18

Hamilton: Yes.

05-00:48:19

Lin: I have a scholarship from Illinois. At the time, the Chemistry and the Chemical Engineering department are together. There were very few universities in the United States at the time that was like this – Berkeley was like this. I had a scholarship, actually, a teaching assistantship, from a Professor Kenneth Van Holde. Anyway, the department chairman was Professor Herbert Gutowsky. I remembered him well. I think he probably is gone now, but he had been writing to me during the process.

He has introduced me to Professor Van Holde, as his teaching assistant. I came to Illinois in February. You know, most students came in September and that was when most graduate courses started. It would be difficult for me to pick things up from the second term, since I have missed the first term. Also recognizing the language problem, Professor Gutowsky felt that it would be better for me not to go that fast, but just to take a few courses—you know, two or three—Advanced Chemical Physics, Organic Chemistry, and Advanced Calculus so that I have a kind of a break-in [period]. I think it's very good for me.

I took these courses. It was so difficult, particularly the Chemical Physics. You're a Physics student, right?

05-00:50:28

Hamilton: Mmm hmm.

05-00:50:29

Lin: Even in National Taiwan University, I took Physics and Physical Chemistry, but when came to atomic and molecular structure, the class just ended there. We just learned qualitatively atom, nucleus, and electrons, and that's it. We know that then one can build up the molecules from there. We did not talk about how an electron works, or a nucleus, and in any kind of detail. I never heard of wave equations. I never heard of the name Erwin Schrödinger, you know? So here we are talking about chemical physics. It started with the valence theories and Schrödinger equations, you know – it's so difficult.

05-00:51:14

Hamilton: And in English, too.

05-00:51:15

Lin: In English! I was so frustrated. I think, really, that's probably the time that I wondered whether I should or should not have come to the States.

05-00:51:27

Hamilton: Did you find that your American classmates were prepared for these classes, or did they also struggle?

05-00:51:38

Lin: I think they were also struggling, at the time. We are talking about 1960, and '61-62. And fortunately, I think my reading ability was pretty good, so finally I found a book that I can read, that's easier to understand.

05-00:52:01

Hamilton: What book?

05-00:52:02

Lin: It was a book “*Valence*” by C. A. Coulson of the Oxford University. I was so pleased to read this very good textbook, I think it's very important for me. It started very simple. You see, in wave functions, you have to accept some assumptions. Then slowly after the first two months things would get better. One time I wrote to my father. I said, “I don't know whether I should have come, it's so difficult. Nothing is like what I learned in National Taiwan University.” My father just wrote to me, and he said, “Well, you just relax. Do the best you can. If you want to come back, it's OK, but do the best you can.”

05-00:52:56

Hamilton: Was any of the material not only academically challenging, but philosophically challenging? I mean talking about probabilities and that sort of thing, was that—

05-00:53:09

Lin: Well, yes. Once I learned “ $h\phi = \frac{e\phi}{m}$ ” [See Appendix 3] and found out the meaning of that, I got very interested in it and liked to explore its implications. The difficulty is that previously, we knew electrons as particles, but they also have the properties of the wave. How do you balance these two? The concept is difficult to accept, I think.

05-00:53:41

Li: One thing that I'm interested in is you spoke a lot about the importance of balance in all parts of life as you were growing up, and I'm interested that you use that term again, and whether that was something that you struggled with more than your American classmates. Maybe not. It's a difficult thing to understand that and to be able to accept that.

05-00:54:03

Lin: Yes. Well, I did not know it started as an assumption. I was given this equation I wanted to understand why. Why is this an assumption? I think the difficulty is in the mindset. You know that you have to start with some postulates. From these postulates, then you'll follow through it. I have difficulty with my religions for that same reason. I'm a Catholic, Roman Catholic. I become a Roman Catholic when I was about 40 years old, you know, there I also struggled with this problem of why Jesus can walk on water.

05-00:54:54

Li: As a scientist?

05-00:54:55

Lin: How can Virgin Mary have Jesus? You know? Then one day, one time, the priest told me that well, you just have to have faith. Right? You have to accept it. Once you have the faith and accept Mary a virgin mother, then you can accept Jesus' walking on water. Then you can accept feeding all those people with that loaf of bread.

05-00:55:35

Hamilton: Before you came to the United States, did you study Euclidian geometry? I mean, did you have that—?

05-00:55:42

Lin: Geometry? Yes!

05-00:55:44

Hamilton: And the Euclidian form of having the proofs and the postulates that are assumptions in the beginning? I'm curious if that was part of your math education.

05-00:55:53

Lin: Well, I think geometry, you always start with the very basic points and lines, and surfaces and triangles, and the rectangles, and that kind of thing. So—

05-00:56:07

Hamilton: So common sense assumptions—

05-00:55:08

Lin: —the relationship there, you can see. You write them down, you can see,—so it's something that you accept. Like $a^2 + b^2 = c^2$. I mean, it's something that you can work out in the piece of paper. So when you have this number of basic things that you can—you follow through, that you can do some other very complicated things— $\{\sin^2 a + \cos^2 a = 1\}$. Like that kind of thing. So it follows. It's logical. You have some logic. Mathematics is about logic and reason, right? The methods, methodologies, come from that.

But it was the first time and was so difficult. Illinois is the first time I have to deal with wave functions. So I think that was a difficulty.

05-00:57:06

Hamilton: How did you feel about the course by the end of it?

05-00:57:10

Lin: Oh, it was great. It was great. I think after I read the book, this book by Coulson was very valuable, I was able to follow through his argument. Then I was able to do some calculation to prove some of the points to myself. I found it was so satisfying. It was very satisfying to learn something new.

05-00:57:37

Hamilton: And this was in the spring semester, so then—

05-00:57:41

Lin: This was spring semester.

05-00:57:41

Hamilton: —did you do something in the summer?

05-00:57:43

Lin: I think there are several impressions here. I mentioned Professor Gutowsky. He was one of the best chemical physicists in the field. And being a department head of Illinois in that day isn't easy. And one day, I was sitting in Gutowsky's office, and then another visitor came in, and he introduced me. And he said something that made an impression on me—Actually, I was not very happy about it at that moment, or I was kind of curious about it. He said—introducing me, "Professor Hamilton, this is Otto Lin. He is coming from Taiwan. We are trying to make him useful for us." That was very kind of natural, right? We'll make him useful for the organization. But as I heard these words, it created some different twists or different meaning for me. I was not used to it. In the Chinese way, a scholar will always think about high ideals and the likes ; I have never thought of myself being used, useful for somebody, or useful for an organization in that sense. But obviously, it's so natural. You have to be useful for your company, or useful to the university, right? So I think Professor Gutowsky meant to say "Otto is a man that will become useful for us." He was appreciating my work, expressing appreciation of my work, and also with the expectation that my work to be useful. But the concept of a scholar being useful to someone else did not come through so sharply before.

Begin Audiofile 6

06-00:00:09

Hamilton: So I think that we've talked a bit about your coursework that first spring. And then what courses did you take the next year? Were you still at Illinois the next year?

06-00:00:18

Lin: Actually, I took three courses altogether. One is Chemical Physics, and also Advanced Organic Chemistry. This is the spring term; two courses. And then I stayed for the summer taking Advanced Calculus. Those three courses. I must say, I got straight As, three As. I have never gotten straight As anywhere but at Illinois.

I must talk about Professor Ronald Fuson, Professor of Organic Chemistry. I would say both Gutowsky and Fuson were famous; everybody would know about them in my age group. Fuson is an organic chemist, and he co-authored a book called *The Systematic Identification of Organic Compounds*. It is a standard classic for the field. When I met Professor Fuson, he was already

about to retire. And he said he would retire back to Nevada later on. He is a native Nevadan, I think. And organic chemistry is very interesting to me – new things and new reactions, that kind of thing. Professor Fuson has taken great interest in people. He talked to students. And students talked to him. I had, asked him many questions. I felt that he was always very good to me. One time, he was working on a new book, and he showed me what a galley proof is—the first time I see a galley proof. And then he showed me his work on the book.

Professor Fuson is also important in my career. He had many students. One of his PhD students, graduated and worked for DuPont. The name is Fred Stacy. Fred, after working with DuPont for some years, became a person to visit campus and recruit students, recruit graduates. And he came to Illinois. Prof Fuson, for some reason, said that this is a new guy you may want to know. And he kind of introduced me to Fred. But of course, I had only been at the University of Illinois for about six months.

I really wanted to work for Professor Fuson, and it would change the field of my research. In a way, I feel very—kind of bad, because the fellowship to me is from Prof Gutowsky, and was from the area of physical chemistry. And yet, I wanted to work for Professor Fuson. Then basically, they had to do some paperwork there, because the money would come from a different source. If I am going to do research for Professor Fuson, I am not supposed to use this particular pile of money. University bureaucracy again, you know?

So at that time, I decided to go to Columbia, because Ada, my girlfriend, was at Columbia. So it's kind of natural for me to change school. But anyway, Professor Fuson told Fred Stacy. And when I was at Columbia, Dr. Stacy came to see me several times. Well, over his trips there at Columbia recruiting students, he usually called me up and said, "Hey, Otto, how are things going? When will you be finishing up?" That kind of thing. So I had a good impression of DuPont. And of course, DuPont at that point in time was the number one company in this field, in the world, so I always had an interest in working there.

So I want to make sure that I talk about Professor Fuson. He later on retired and went back to Nevada. I did not have another chance to see him; this is really a regret, later on. He would be very happy to know what I have done in the later days.

06-00:05:49

Hamilton:

So did you go to Columbia after—

06-00:05:56

Lin:

I went to Illinois in January or February, [1962]. I started from February, and then stayed on to take another course, Advanced Calculus, in summer. Then I

went to Columbia after the summer and made application to Columbia. By that time, I know how to do applications.

06-00:06:18

Hamilton: And they offered you financial aids, too?

06-00:00:00

Lin: Yes, they offered me a scholarship. I worked for Professor Charles O. Beckmann. "O" is for "Otto." Charles Beckmann. He is a physical chemist. In the field of chemistry, there are several different branches—organic, physical, analytical, bio—you know, these type of things. So I am a physical chemist.

This was the second time I went to Columbia. The first time was when I first came to the United States and stayed in Illinois. During Easter holidays, I quickly took a trip to New York to see my girlfriend and inquired about the possibility of coming to Columbia in some future time. But at that visit, I have an argument with a department officer. She was the director for grants or something. And she knew a lot about politics in Taiwan. And I had a heated discussion with her. She was very much against Chiang Ching-kuo, while I was a strong supporter. I think our first meeting did not go too well. It gradually became a very heated debate on Taiwan politics. So I learned my lesson: not to go into too much discussion of politics with strange people.

But anyway, I came, now after studies at Illinois. I had to go through an application process, and then do some tests. They gave me a test for scholarships there, and I did very well. Then I was very lucky to meet Professor Beckmann. I indicated I wanted to study polymer chemistry or macromolecules. There is a fine difference between macromolecules and polymer. Macromolecules—"macro" meaning big, gigantic molecules. Most polymers are big, and with polymers you are usually talking about synthetic polymers that we can build. We can—say, take a monomer, and then try to reproduce that to become "polymer," you know? A natural macromolecule is DNA [deoxyribonucleic acid], for example. This was a big molecule, a polymer of some sort. But they are also mostly random polymer, because each unit can be different from the other.

I was interested in polymers, and Professor Beckmann was a polymer chemist, physical polymer chemist. So I naturally worked with him. And he became my thesis professor.

06-00:10:04

Hamilton: I'm glad you defined "polymer" for the tape, but could you also just give a definition of "physical chemistry?"

06-00:10:13

Lin: Physical chemistry is a branch of chemistry concerned with the structure of atoms and molecules, and the behaviors and interactions in that scale.

06-00:10:42

Hamilton:

This might be a difficult question, but what made you interested in polymers?

06-00:10:47

Lin:

What made me interested in polymers? Polymer was of interest to me – I was in the Army, after graduating from university. You see, the Army is made up of people, right? Individuals, then group of people. When you have ten to twenty, it becomes a platoon, and then a company, and so on. If you study the behaviors of the individual and the group, you will find they are very much different. There are some basic relationships, but the fact that you have different people linking together makes it a different entity with unusual behavior altogether. When I was learning about polymers, I studied an article about predicting the build-up to a polymer from monomers, and showed that the final behavior can be quite different from what the monomer is. I think there are similarities there with what I saw in the Army, so I became intrigued with the properties of polymers. I am not so much interested in how to make polymers, but I'm interested in the properties, the interactions, the dynamics of polymers, or macromolecules.

06-00:12:39

Hamilton:

Before we get into *your* work, what research was your advisor doing, Professor Beckmann?

06-00:12:47

Lin:

Professor Beckmann was a physical chemist interested in polymers such as polysaccharides and starch. Starch, it's a big polymer. It's a polymer. He is a person in that field, and he is one of the people who established a method to study polymers. Well, the method is called "ultracentrifugation" You know centrifuge, right? *Big* centrifuge. Not just big, but one with ultra high rotational speed. It is a method to study polymers; at that time, it is a very important method that people are using. You put these molecules in the solution, and you spin them. When you spin them, the molecules will move by centrifugal force. Each one will move with different velocity in proportion to its mass. The bigger the molecule, the faster the motion.

So you put in the solution in a cell with different molecules. And you spin the cell very fast, then the molecules in it are subject to a large centrifugal force. The bigger the molecule, the larger the force that it would experience. And this is a way to separate the molecules by the size.

Centrifuge today is still a very important method for biotechnology. We use centrifuges a lot. When you do a blood test, you have to use centrifuge to separate out the different components of things.

So the ultracentrifuge is used to study the molecular behavior of polymers, and Professor Beckmann was one of the people pioneering in that area. This field of polymer science actually has produced a Nobel laureate, Theodor Svedberg—in the fifties. Svedberg got his Nobel because he invented the

ultracentrifuge, and it has become an important scientific method. His name, "Svedberg," became a unit for how fast molecules move under that kind of situation, the svedbergs.

06-00:15:34

Li: What was your wife studying at the time?

06-00:15:37

Lin: My wife is a biochemist, also from Columbia.

06-00:15:50

Hamilton: So you were working, I assume, in Dr. Beckmann's lab?

06-00:15:55

Lin: Yes.

06-00:15:56

Hamilton: Did your research relate to his?

06-00:16:00

Lin: Yes. My research was actually on DNA. Now, this is 1963. I went to Columbia in 1962. So it was still fairly early for DNA studies. [James] Watson and [Francis] Crick's model had been published maybe just five or six years [earlier]—I think they are getting their Nobel prize about that time—and people are starting to recognize the importance of the double helical structure of DNA. I had become very interested in DNA as big molecules. At the time, we are interested in knowing how big the molecule really is. So ultracentrifuge is a method to study the size of DNA through its hydrodynamic property, or hydrodynamics.

When you're looking at the DNA, it has two strands—double helix, right? My question with Prof Beckmann is that since they are big and it would be very difficult to separate these two strands. And when you have DNA in the replication process or in the duplication for the second generations, how did it unwind itself? If you braid your hair, you know how difficult it is, right? And then you are talking about millions of turns. Say you wanted to unwind it, but how did the two strands unwind itself and not getting tangled.

06-00:18:25

Hamilton: Would you say that immediately after the publication of Watson and Crick's [work], people accepted it?

06-00:18:30

Lin: Up till the publication of Watson and Crick, there was already a lot of study on how DNA was used to make protein. DNA work through the RNA [ribonucleic acid], the messenger RNA and which will then produce protein. I mean, you know the sequence.

So a lot of people became interested, and it was a highly motivational subject in science. In fact, I think in modern—and I'm not the only one who says

this—that in modern technology advances, there are three basic elements: quantum physics; molecular biology; and computer sciences. These are the three major elements that are important for everything that we learn today. Computers, communications, materials, nanotechnology, bioengineering—whatever. So at that time, the science of molecular biology, I think, started with DNA, with the understanding of the double helical structure of DNA.

Naturally, there are all different aspects of that. One thing that at that time figured importantly is the mass of a DNA molecule, presumably about two million or three million. Two or three million is already a very big molecule. To give example: water— H_2O ,—is 18. Oxygen is sixteen [atomic mass], and you've got two hydrogen together is eighteen. Now you're talking about millions, that means you must have several hundred thousands of molecules strung together to become a big molecule, to become a molecule like DNA. So how did our nature produce DNA of this size? How did our body produce DNA of this size? Going back to the genomes and chromosomes and everything here –

I think there are so many intriguing questions that people can ask. So I am interested in—and Professor Beckmann was interested in—the replication of DNA, and one of the key questions we felt was the size of DNA. Really, how big is DNA?

Whether you are chemist or biologist, when you try to study DNA, you have to make DNA. We have to get a DNA sample, usually from natural sources. One of these is from calf-thymus, for example. Calf-thymus is popular and from that, you can extract the DNA. Pneumococcal DNA is another. These are the most common sources. To do that, you have to grow the bacteria. So I have to learn to do all those!

Actually, I worked with scientists in Rockefeller University. Professor Beckmann became interested in DNA largely because his friend Prof Roland Hotchkiss at Rockefeller University. Hotchkiss is a famous scientist. Professor Beckmann's second wife, Muriel, Dr. Muriel Rogers, has worked with Professor Hotchkiss. So the two groups have good working relationship. Muriel Rogers was very good at making DNA, and I was able to learn from them in preparing DNA samples. With same DNA samples their group can do biological studies and we can do some physical studies. That's our work plan.

I also have gained an experience of how to isolate DNA and prepare DNA samples. I think few physical chemists have done that now. What you do is that you take the liver, beef liver, and then you grow some bacteria in that, and the bacteria will multiply very rapidly. Then you kill the bacteria and separate the bacteria, take the nucleus, and then extract the DNA from there. It's a fairly long process, but Muriel had done that much better than I could.

Preparing the DNA samples requires a lot of chemical and physical repetitive processes. It's a long process overall. So depending on how you handle the DNA samples, a lot of time you can also cause some damage to the DNA molecules. One of the common operations involves using a syringe to take up the solution and to transfer the solution to another sample or something. Then, when you push the solution through the syringe, you might actually create cleavages to the DNA molecules. So the DNA that we do study may not be the real DNA that exists in the natural stage.

So I think to understand the size of the DNA has many major implications. So I was a person who wanted to study the size of DNA. Another method to study DNA—physical chemistry-wise—is by light scattering: use some light, and to see how it scatters the light. Another way is by a viscometer, viscosity. You've heard of the term "viscosity?"

06-00:25:24

Hamilton:

Mmm hmm.

06-00:25:26

Lin:

Let's look at water, water flows, right? And then it shows friction. The friction is basically a reflection of viscosity. And when you have a suspension of some sort, a solution of some sort, you will increase the viscosity even more. And one of the early scientists that work on viscosity is Albert Einstein, among others. Yes, he did, that was before his relativity studies. Albert Einstein is among the first who studied the viscosity of suspension. When you look at suspension, there are Brownian motions in the solution, and therefore it creates some friction in there. So Einstein's fundamental work is important in theory of viscosity. It is not simply good to mention his name.

Viscosity is a phenomenon that we can use to understand DNA molecules. At that time, one way to study the viscosity of DNA is to use a capillary viscometer. There the solution is forced to pass through a very fine glass capillary. So glass blowing is important here. You pull the glass to make a very thin capillary. You push the solution through and try to see how much time it takes for a certain solution to pass through a certain section of this capillary, then you can calculate the viscosity. My contention—and Beckmann's contention—is that because the capillary is so small, and DNA is such a big molecule, when it goes through the capillary, it has a tendency to arrange in a certain way, or orientation, to pass through. In this process, actually the shear force might also cause some damages, or degradation to the DNA. So the right way to study DNA, to try to find DNA at the natural stage is to use a very low shear rate viscometer. When DNA goes through the capillary, it experience some shear force in the molecule. So you want to create a situation with very low shear force to the DNA.

But we need to know the viscosity. So are there other ways of studying the viscosity for DNA? Then we said, "Well, instead of doing a capillary flow,

which can cause alignment and degradations, perhaps we can study DNA viscosity by rotational flow.”

I demonstrated this concept in washing dishes. I am not the first one to say this, but I showed that this can be done. If you wash dishes,—you would have glasses of different sizes. Sometimes you will have large water glasses together with juice glasses, which are smaller, right? Sometimes you will find small glass inside the big glass. And if you adjust the water levels in both, such that the weight of the juice glass will float freely inside the big water glass. Then the natural force will make the small glass concentric to the large glass.

[Editor’s Note: Lin gets paper and begins to draw a diagram. See Appendix 4 for a diagram showing the concentricity relation]

In other words, if you have a small glass with water placed inside the large glass, the small glass can’t go anywhere. Sometimes, it can float if too little water; or sink if too much. But if you adjust the weight by putting just so much water in the glass—then the small glass can float evenly inside this large glass. Then you look from the top, the large and small glasses will be perfectly concentric. In other words, the small glass will not stick to any one side. It will be just in the middle, right in the center, if the weight is just properly adjusted. This is because the surface tension will make the center of the inner cylinder to be in the center inside the larger cylinder.

To make this happens, you have to adjust the weight, and you to make sure that it’s clean. And then if somehow you can make this center one rotate, then you can study the viscosities of the liquid in-between.

It’s a simple method. If you are going to study viscosity by pushing the molecules through a capillary, and to figure out the time from here to there, you have to use pressure to push it. Once you apply the pressure into it, you might actually break the DNA molecules inside. But you let the DNA kind of float around, the DNA molecule will be so happy with itself, you know?

You are not disrupting it. So when you rotate the cylinder with very low rate, you can get the true viscosity of the DNA solution, and therefore the true size of the molecule.

06-00:32:50

Hamilton:

And were you the first person to use this technique?

06-00:32:54

Lin:

No, but I actually designed a viscometer based on this concept [for macro molecules like DNA]. Yes. So using viscometry this way, and then coupled with ultracentrifuge, we have two important scientific methods to study the physical chemistry of DNA.

Before our study, the molecular weight of DNA was—you know, I say water is eighteen as a reference, one or two millions – wow, it's big! But after this study, the molecular weight of DNA is determined to be in the ten millions range, depending on the species.

And then, afterward, there were some DNA that was found to exist actually as a ring. The molecular weight can be hundred millions. I think what we had done was to provide an experimental method to study DNA, so that we can get the right picture of DNA. So my PhD dissertation was on the hydrodynamic properties of DNA; this new viscometer is very much a part of that, to couple with ultracentrifuge sedimentation studies.

06-00:34:35

Hamilton:

Could you summarize "the hydrodynamic properties of DNA?" I mean, what did you find?

06-00:34:48

Lin:

Define hydrodynamic properties?

06-00:34:59

Hamilton:

Define that, and then also, what did you find in your studies?

06-00:34:54

Lin:

Oh, I see. You want me to do that, to write—

06-00:34:59

Hamilton:

Summarize.

06-00:35:01

Lin:

In a few words? Oh, OK.

Hydrodynamic properties of DNA is to understand characterize the properties of DNA motions in a liquid environment. And the importance is that the DNA in our body, in the natural state, is in a liquid environment. To understand the hydrodynamic property is to help us understand how DNA performs in the natural state. I think that's one thing. And secondly, by knowing the hydrodynamic property of DNA, we are able to know the DNA itself better: the size and the shape.

Sometimes, it is in the form of a random coil. But at other times, depending on the situation, it's shape can be like a rod, a rigid or extended rod. Because with each DNA pairs, there are some electrostatic charges. You can adjust the charge to change the shape. The charge can be changed by the ionic strength of the solution. In general, the charge of the DNA molecule is negative. The pairs will try to repulse each other. So the whole DNA will be like a rod with some rigidity. You can adjust the ionic strength to reduce the repulsion force, so they can collapse like a ball, or so like a random coil. And you can imagine that either as an extended rod or a random coil, if the two strands are to

separate, it is going to involve quite different mechanisms of the separation. So that's basically what we tried to study at the time.

06-00:37:28

Hamilton: Would you say that you are more interested in the physical motion of the DNA rather than something like signaling or methods of coding?

06-00:37:38

Lin: [Yes.] Well, at the time, different people looked at it from different perspectives. You know, the biology people obviously using other kind of approach. Here, Professor Beckmann and I are, basically, physical chemists, so we tended to look at it from this angle.

06-00:38:00

Hamilton: And how are you able to apply this work later on? Did it end with your dissertation?

06-00:38:07

Lin: Well, I think my work on DNA itself, the contribution probably is to give us a better understanding of the size of DNA. I did not contribute to further understanding of how the strand separates or how it replicates. No, my work did not say much about that. But at that point, I already graduated, got my PhD and work for DuPont.

06-00:38:48

Hamilton: How much did you publish when you were in graduate school?

06-00:38:51

Lin: A few paper. A couple of papers. Not a lot of papers.

06-00:38:54

Hamilton: On this DNA research?

06-00:38:58

Lin: On the hydrodynamic properties of DNA.

06-00:39:02

Hamilton: Do you remember where those articles were published?

06-00:39:04

Lin: I could find out. [Narrator Note: This work was reviewed and quickly published by the scientific journal *Macromolecules*. Later on I was also awarded an invention patent by the U.S. Patent Office.] A lot of interest later was in the findings of the signaling, as you said, the DNA transcription, the interference.—There's a lot of studies in that area, and that became much more important. And also in the DNA, there are some dummy codes, and it's not the entire molecule that works as a whole. It's a certain part of the molecule that was involved in the replication process.

06-00:39:49

Hamilton: You talked a bit about having to make assumptions, and I'm curious when it was general consensus that the DNA molecule was a double helix structure. Was that immediate?

06-00:40:01

Lin: No, I didn't have to make that assumption there. When I got into the field, Watson and Crick's model was already published.

06-00:40:10

Hamilton: And it was accepted across the board?

06-00:40:11

Lin: Yes, it was already accepted [Watson and Crick were later awarded the Nobel Prize for the work]. Yes, yes. Well, you know, and the history should show that Watson and Crick did not have that model all by themselves, because there was a lot of other evidence leading to it. You know, Erwin Chargaff of Columbia University, for example, had already substantial proof that A [adenine] equal to T [thymine], and G [guanine] equal to C [cytosine], in terms of quantity. In the early stage, these are the kinds of things that have contributed. I think this give them the idea that in the DNA molecule, A,T and G,C are each coupled. The number of A has to be equal to the number of T. We are referring to the number of molecular pairs [the nucleotide]; they have to be linked together, so these two must have some kind of reason to be equal. So I think all of these were clues to helping them finally put out this model of the double helix.

06-00:41:08

Hamilton: Were there other graduate students in the lab that you were working in?

06-00:41:13

Lin: Yes, yes. Some people studied polypeptides and proteins. I studied DNA. We have students of Beckmann's who studied proteins.

06-00:41:30

Hamilton: And do you keep in touch with any of those people?

06-00:41:33

Lin: Not that much anymore. Afterward I started working for DuPont. After I finished writing up my work, Professor Beckmann felt that I had already done enough and could graduate, with my PhD degree. Throughout that time, Fred Stacey had kept asking me, "When are you finished?" And he was arranging interviews for me with DuPont.

So I had to make a career decision at that point; whether I was going to have a career in the academia or industry. I recognized that if I wanted to go be academic, I had to do some post-doctoral work to learn more about the biology and physiology aspects of DNA. Because just by working as a physical chemist, I would not be able to get to the core problems, the major problems of biology. So I would need to do some more research in that, and

that would take some time. Although I was interested in that route, many factors also came into play here. And DuPont made offer to me, so then I just took it. It's a kind of an either way—.

06-00:43:14

Li: Could I ask you a question about life in New York then? Like how much time were in you the lab versus how much free time did you have. Were you able to see your girlfriend very often?

06-00:43:24

Lin: Life in the lab, it's pretty much that.

06-00:43:32

Li: So were you there every day?

06-00:43:33

Lin: Yes, almost every day. Well, because my girlfriend, and we usually have some time together; we can see some movies, go to Chinatown for a good meal; we can do a little bit of walking. Some relaxation, yes. But mostly, graduate student life is tough. It's tough.

06-00:43:57

Li: So when you would socialize, would you socialize with friends from the lab, or with other Chinese students?

06-00:44:03

Lin: Well, no. I did not work too much with any Chinese student. I advise my students to come to the States nowadays and I would say, "Stay away from Chinese." Why? When you go to the States—or to any foreign country—you want to learn as much as you can about that country. And to interact, associate with the people there. You don't go there just to work with Chinese. You want to learn as much variety, get different backgrounds, different understandings, different knowledge, know different culture, and that will be very useful for you. In my career, I have a lot of help from my American friends. As we go along, you will recognize it.

06-00:45:05

Li: How was it to negotiate the legalities of staying in the U.S. as a student? Did you have to renew your visa every year?

06-00:45:11

Lin: Well, when you are attending the university, there's no problem.

06-00:45:17

Li: They can help you with the paperwork?

06-00:45:17

Lin: Yes. The university prepares the paperwork; then we can just send in, once a year, or twice a year—I forget.

06-00:45:23

Li: And did you go back to Taiwan at all during this period?

06-00:45:25

Lin: No, no. I did not go back to Taiwan until I worked for DuPont and 13 years after I left Taiwan. Unlike so many students now, their life's much better. They come and the next year, they would be going back to see their parents, and their parents also come here. But I didn't have the money to buy the air tickets.

So was my wife, we already married at that time.

06-00:45:55

Hamilton: What year did you get married?

06-00:45:57

Lin: We married in 1963 at Columbia.

06-00:46:01

Hamilton: So pretty much right after you got to Columbia?

06-00:46:10

Lin: I got to Columbia in 1962 and got my master's degree in 1963. We got married after I have the master's degree.

06-00:46:22

Li: So did you move into married student housing?

06-00:46:25

Lin: No. Actually, we just rented an apartment outside. I don't think there was too much married student housing at Columbia.

One time, we live in an apartment building which was kind of associated with the university. The university owns many buildings. It was number 70 Morningside Drive. One day, a friend come to see me; he knocked on the door and I opened it. And he said he had just gotten to the wrong building. He went to number 50 Morningside Drive. Number 50 is the official residence of the university president. I said, "Well, it will be a while yet."

06-00:47:18

Li: And so over vacations, would you and your wife stay in New York?

06-00:47:24

Lin: Basically, very little vacation when I'm in my graduate student days. I worked very long hours.

06-00:47:34

Lin: Yes. I mean, we did not go back to Taiwan. So I think we just worked our way through.

- 06-00:47:43
Li: And your wife continued her studies after you got married?
- 06-00:47:46
Lin: Yes. She continued. We married in 1963, and she finished her post-graduate work in 1966.
- 06-00:47:56
Li: With her master's or PhD?
- 06-00:47:57
Lin: PhD. I finished in 1967, so she is smarter and quicker, right?
- 06-00:48:03
Li: She started earlier.
- 06-00:48:05
Lin: Yes, thank you for mentioning that.
- Then I worked for DuPont, and we moved from New York to Philadelphia. The Du Pont laboratory in Philadelphia is principally a research lab to support commercial activities. DuPont then has over seventy, eighty locations, but I worked in Philadelphia. My wife was then a post-doc at University of Pennsylvania at Philadelphia.
- 06-00:48:37
Hamilton: Did you live near the University of Pennsylvania?
- 06-00:48:40
Lin: Yes, very close there. The first apartment we lived in Philadelphia was at Spruce Street near the U Penn campus.
- 06-00:48:52
Hamilton: I lived on Spruce Street for a while.
- 06-00:48:54
Lin: Really?
- 06-00:48:55
Hamilton: Yes.
- 06-00:58:55
Lin: My apartment house is at 4401 Spruce Street, Spruce at the corner of 44th Street.
- 06-00:49:04
Li: So should we stop here, and then pick up tomorrow?
- 06-00:49:08
Lin: Yes, perhaps so.

06-00:49:08

Hamilton: Sure.

Interview 2: December 19, 2007

Begin Audiofile 7

07-00:00:07

Li: This is Friday, December 19, 2007 with Professor Otto Lin, in Berkeley, California. Emily Hamilton and Robin Li interviewing, tape seven.

07-00:00:16

Lin: It's a much better day today. It's the sunshine—a very pleasant walk for me this morning from the BART station over to the campus.

07-00:00:25

Hamilton: Truly California.

You mentioned yesterday that you were aware that you would probably be courted for a job at DuPont. Were you thinking of any other options while you were a graduate student, or was that really it?

07-00:00:45

Lin: Yes. I actually did some interviews with General Electric. I went to a location of General Electric; also there is another company, Allied Chemicals or something, that had some job options. And, another line of opportunity for me is to go to post-doc at Rockefeller University with the research group of Ronald Hotchkiss. They are very, very much in the molecular biology area. I really needed to make a choice between whether to pursue on the molecular biology area, or go into DuPont and do industrial research. That was the major decision at the time, and I was not too sure about it.

07-00:01:33

Hamilton: How did you make the decision?

07-00:01:34

Lin: Well, I was thinking that going to the DNA field, I will be basically a scientist. But I was thinking that I am more interested in the applied area. I tried to pursue technology to help the society. Very much what I was thinking about was in the future, how can I help the society? At the time, DNA, we did not understand its overall ramifications. We did not foresee at the time that you can go into DNA engineering, gene splicing, all those technological opportunities like that. At the time, we did not see this. I pursued the line of working with DuPont. It was a conscious decision, yes.

07-00:02:31

Hamilton: And why did you pick DuPont over General Electric or the Allied Chemical job?

07-00:02:35

Lin: Well, I think DuPont was the number one company worldwide, number one company in the chemistry area, and that's one thing. Secondly, because of this relationship established through Professor Fuson and Fred Stacey.

07-00:02:59

Hamilton: When did you accept the job?

07-00:03:01

Lin: I accepted the job in the early 1967. I finished my PhD dissertation work around new year time. And I have an oral defense sometime in the spring. So actually, I think I went to work on the April Fool's Day. Yes. Or close to on that week.

07-00:3:36

Hamilton: And where was this job?

07-00:03:38

Lin: This job was in Philadelphia. DuPont has many locations of laboratories and factories. The central area for research and development was in Wilmington [Delaware]. It was called the Wilmington Experimental Station. DuPont arranged the corporate structure along product lines. Textile fiber, which is the major one, is the largest department of the company. And then it is the Plastics, Elastomers [that produces industrial rubbers and that kind of thing], Fabrics and Finishes [that produces painting and coatings and adhesives], and Films. So these are the major product lines and industrial departments. I worked for the F&F. We called it "Fabrics and Finishes" department. And their major R&D laboratory is in Philadelphia. Right across the Schuylkill River from the University of Pennsylvania. So that's why I worked there. Philadelphia is a nice city.

07-00:04:57

Hamilton: It is.

07-00:04:58

Lin: It is a beautiful city, and it is very historical, and the river, fascinating.—. So we went to the city, and we liked the city very much. I think it's a nice place. My wife, Ada, also got her PhD from Columbia, in about 1966. And she got a post-doc at the medical school at Columbia. I think the reality of family is usually unfair to the career women, because they always have a husband to worry about. I had to find a job in the big city, in the area, that there will be opportunity for her. So that's why, again, we picked Philadelphia. And indeed, Ada worked for University of Pennsylvania in the medical school as a post-doc in the medical school. So that's why we moved to Philadelphia.

07-00:06:01

Hamilton: Did you spend any time at the Wilmington facilities?

07-00:06:04

Lin:

Yes, very much so. I actually have a lab in the Wilmington Experimental Station. And the lab is by the Brandywine River. It's a very beautiful campus, and all the industrial departments have some laboratories there. Of course, CRD, the Central Research and Development is the centerpiece of the compound. It's like a university compound – great library, great facilities, and so on. And people can rub shoulders with each other; it's a very nice place.

07-00:06:48

Hamilton:

How were the facilities in Philadelphia different than the facilities in Wilmington?

07-00:06:53

Lin:

Well, Philadelphia facility is basically limited to the needs of fabrics and finishes. It focused on coating, painting, and the variety of paints. So that's more limited in scope. It did not have a big libraries or all the other engineering equipment, that kind of thing. So it's much smaller compared to the Wilmington—the CRD experimental station facility. But among the operational departments, the Marshall R&D Labs in Philadelphia is a big one. I think at one time, it has more than 1,000 technical people. And it also has a plant, manufacturing facilities, in Philadelphia.

07-00:07:47

Hamilton:

One thing that I'm interested in is the social structure at both of the facilities, and by that I mean how labs are run and how people interact. Was there a difference between the Philadelphia and the Wilmington sites?

07-00:08:01

Lin:

Well, I would think that the people in the experimental station, Wilmington area, they work on more basic problems, you might say, or the problems that that may be aiming at the future, longer term projects, and they are supporting each department's operating sites.

For example, like the films department—polypropylene film and other industrial films – they have factories and labs in Red Bank, New Jersey; they have facilities in Clinton, Iowa. Those sites basically are for manufacturing factory. And if they have longer-term problems to be solved, they will send their problem to the experimental station, the Film Department laboratory at station. So those laboratories of the various departments in the Station serve as a focal point for their departments. In addition to the Marshall Lab, the F and F Department also has a laboratory in the Central Station, but Marshall lab is the largest next to the Central Station laboratory.

07-00:09:32

Hamilton:

So the Wilmington is a central area, and the other laboratories are more specialized?

07-00:09:37

Lin: They are more specialized, yes. And they are more involved with customer service or manufacturing service.

07-00:09:45

Hamilton: And just to clarify for the tape, you're discussing Wilmington, Delaware?

07-00:09:50

Lin: Yes.

07-00:09:50

Hamilton: And the Marshall Lab is the laboratory in Philadelphia?

07-00:09:53

Lin: In Philadelphia, that's right.

07-00:09:56

Hamilton: I understand that you held a number of positions throughout your time at DuPont. And could you tell me about the first one that you had?

07-00:10:03

Lin: The first one is Research Scientist. That is when I got my PhD and the offer from DuPont. If you do not have a PhD, then the starting offer is normally with the title of "Scientist," or "Engineer". If they have a PhD, it's will be "Research Scientist," or "Research Engineers."

07-00:10:26

Hamilton: You get a word—

07-00:10:27

Lin: Yes, that's right. The next level up is Senior Research Scientist. And then the next level is "Staff-", such as "Staff Scientist". Another level up is "Research Associate". I was in that position later on. Then the highest level is "Research Fellow". And I think for, the whole company of DuPont, it might have about twenty or thirty Research Fellows among all these departments at that time. Each Department have maybe one or two Fellows.

That is the highest technical level you can go. Du Pont ran a "dual-ladder" system: the technical ladder, and then in parallel, there is the administrative ladder. Technical ladders was with levels most like university; that's like assistant, associate, and [full] professor, that kind of thing. And the administrative ladder is like for department head, the deans, the directors of various operations, VPs, so on. I am just describing the technical ladders, and for those people who are interested in administrative duties, or in marketing or sales, they have a technical ladder of sales, or in manufacturing, some technical ladder of manufacturing. But if you want to be in the management, then at certain points the ladders can cross over like this. It's a big organization. At that time, we did not know about "delaying", you heard about the delaying, right? There's a lot of layers in this. I moved fairly quickly through the levels in the technical ladder. In fact, when I joined

DuPont in 1967 as a research scientist. And in two years' time, I made staff scientist. That's a fairly fast track.

That's around the time when the Vietnam War was about to end. You only know Vietnam War in the history book, right? It had about ended, and there were some unemployment problems in the U.S. You know, people come back, and they are looking for jobs. And also because with the war ending, the industrial demands became smaller. So the economy was kind of slowing down. A lot of people are worried about losing jobs, even at DuPont. At coffee break time, some colleagues would talk about, oh, you know, this guy may be leaving, or this guy may be fired, this guy may be laid off—that kind of thing. So I talked to my boss in a discussion about morale in the lab. He said, "Otto, you know, those guys who worried about their job, should." What a word of wisdom, you know? I was promoted during that period of time. Indeed, a couple of people were laid off and dismissed. It's interesting.

I remembered another colleague, a true gentleman, Herb Lowell. Lowell, he is the brother of the poet, [Robert] Lowell. Herb was my senior at the time. When I first joined DuPont, I had some problem working with a certain manager. Being a very caring person, he said, "Otto, don't worry." And he continued, "Bosses are like measles, they come and go; refrain from rubbing, and leave no marks on the whole." Yes, so I'd say I had a lot of fun, working in those days.

07-00:15:13

Hamilton:

I'm curious about DuPont's role in the Vietnam War. I know that DuPont as a company was under a lot of scrutiny for their role in World War I and World War II, and I'm wondering if that was at all a discussion among employees, among the administration—?

07-00:15:28

Lin:

Actually, very little. DuPont was very much in gunpowder at the start of the company. That was back to Thomas Jefferson's time. I understand the company founder was a friend of Thomas Jefferson. They brought in gunpowder technology, and that was very instrumental later as the U.S. was going west, to California! In the wilderness, you needed to build the railroad; you needed go through the mountains. Gunpowder and explosives were very much important for the development of United States during that period. But very soon, that became a very small part of the DuPont business. And DuPont was, during the wartime, the Second World War time, very famous for nylon. Nylon stockings? You know, I think nylon stockings helped Americans conquered Europe. I think the DuPont motto is "Better chemicals for better living."

DuPont had very little to do with the war in Vietnam, as I understand it. What stood out in memory was the Stanford Research Institute which reportedly had a lot of projects dealing with that, and caused a lot of uproars among students.

Then SRI later on was divested from Stanford University, and renamed SR International. I recall that was something because of the war. But DuPont was not part of that.

07-00:17:35

Hamilton:

And DuPont played a role in the Manhattan Project, but that wasn't anything that was on the forefront of people's consciousness there?

07-00:17:45

Lin:

Well, chemistry and chemical engineering, plays a role of everything. I don't know to what extent DuPont had participated in the Manhattan Project, that would be in the forties, – As old as I am now—I don't think Du Pont had a major role. But perhaps it had to do with how the reactor was constructed, or that kind of thing. Then it's conceivable in that sense, but I don't think DuPont had very much there at all.

07-00:18:28

Hamilton:

So no one was talking about it?

07-00:18:28

Lin:

No. No one was talking about that. Regarding the Manhattan Project, people would talk about the role of Columbia University; they would talk about the Argonne National Lab, University of Chicago, Princeton University—. You know, I think these are the number of organizations that were very much a part of the Manhattan Project. And I think the Columbia Physics department, was very key to it. The number of scientists there were very important for the project. So I think that is obvious.

DuPont, let me think about it. When I report to work at DuPont, the first day I came to Marshall Lab, I sat down with Dr. Orville H. Bullitt, Jr., who was the laboratory director – He was a very gentle person, a gentleman, a scholarly gentleman. He introduced me to my boss, my supervisor, who is Dr. Charles DeBoer. Chuck DeBoer was a PhD chemist from the University of Chicago. This was a very good university for chemistry.

Excuse me. Let me get back to—you asked about my jobs. I was a research scientist and later promoted to staff scientist and, later, research associate. And then I also held some administrative positions; was a task force supervisor on the administrative level, later on. Just to complete the question that you just asked me about the number of position that I held in the department.

So I reported to work at DuPont, in Marshall Lab, so I met Dr. Orville Bullitt and he introduced me to my supervisor, Chuck DeBoer. I sat down with Chuck in his office and I said, "Well, Chuck, what do you want me to do here?" He said, "Yes, we, Orville and I did talk about this, and we'd like you to do a new project." Most people in Marshall Lab were working on automotive coatings for General Motors. At that time, in the Sixties, about

half of the automobiles on the street are manufactured by General Motors. I think Toyota or Honda was not heard of at the time in the automobile field. Volkswagen, yes. Most of the automobiles were American made, and General Motor was the number one manufacturer. And I would say about half of the General Motors cars were painted with paints from the F&F Departments. So DuPont was very big in the automotive painting business. At Marshall Lab, most of our colleagues were working on designing new systems for General Motors, or trying to help General motors use the paint, that kind of thing. Generally speaking, Marshall Lab was mostly a paint laboratory, was a coating lab.

Chuck told me that, "We want you to work on a new area." I said, "What's that?" And he said, "Rheology". I said, "What's rheology?" He laughed, "I don't know, either." He continued, "Du Pont has a company consultant, Professor Herman Mark of the Brooklyn Polytechnic Institute. He advised us to work on this field." Prof Mark was one of the granddaddies of polymer science in the United States. I also became acquainted with Herman later on. Herman told the company executives that rheology was very important for DuPont, and DuPont had only a few people scouting in this area at the time. So they feel that particularly for F&F, it ought to know, understand to make use of rheology. "So we want you to work on that, and tell us what's important, and how we can take advantage of rheology."

07-00:23:08

Hamilton: I'm assuming that now, you know what rheology was. And can you explain that?

07-00:23:13

Lin: I hope so.

07-00:23:14

Hamilton: Explain what you learned about it?

07-00:12:15

Lin: Yes, yes, yes. It's very interesting.

Rheology is a part of physics. In physics, if you recall, in the Newton mechanics, we make an assumption that material can be represented as a rigid body, like a piece of solid rock. Thus, in mechanics, we assume everything can be represented by a point, and that it moves with a certain velocity, momentum, energy, and that kind of thing. But real materials are not rigid bodies. Real material like water is not a rigid body, toothpaste is not rigid body, the Jell-O that you eat is not rigid body, an elephant is not rigid body. If you tried to push an elephant down the slope, you cannot assume that it is just a rigid point with all that weight. In reality, it will slide and roll and twist and scratch the ground with complicated profiles of velocity, right? A rigid body is something that has no relative motion inside. Rheology is the science of

deformation and flow. So rheology is a branch of physics, and it deals with deformation and flow, or relative motions inside the physical body.

Just take this example here: the pencil. If you drop it to the floor—from here, and to the floor—it's a rigid body, you drop it—it will stay there, on the floor. Now, if this is a rubber ball and you drop it, it'll bounce back. Then it falls again and will bounce back. So after a few bounces, it would just kind of tired and stay on the floor. So you can see the behaviors of a rigid body and an elastic body are different in this experiment. Now, if I pour water from the same height, the same amount of mass, it will kind of splash and flow. If it is a pudding, the same mass—and drop from the same height, when it touches the floor, it will just crumble. Now you have seen the difference in mechanical behavior of real materials. The flow and deformation – real material is like that, is rheology.

So rheology is the science of deformation and flow. My example of the rubber ball is elastic, characterized by the elasticity. The second example, of water or coffee, which splashes and flows is about viscosity. And the third example, of pudding or toothpaste, it kind of deform, is called plasticity. So elasticity, viscosity, plasticity—are the three major forms of rheological behavior.

And why did Du Pont ask me to work on rheology? Because this new guy has been working on hydrodynamics of DNA, which is big molecule. And thesis had to do with the viscosity of large molecules. So if anybody can work on rheology, “You will be the person to do it.” Although the term “rheology” was new to me at the time, I must admit. All I have been thinking about was molecular properties and that kind of thing, not in terms of rheology. So that's how I started.

So they said, “Well, we thought that it could be important. So [they said] “You will find out, and tell us how we should look at the rheological properties of paint, and how we can make use of the property or behavior to make a better performing paint” And basically my contribution to DuPont was to be in this area.

07-00:27:54

Hamilton:

It seems that one of the big things that you were working on was automobile paint. Would that involve things such as temperature of the car affecting how the paint—

07-00:28:07

Lin:

Precisely.

07-00:28:07

Hamilton:

—what the viscosity is?

07-00:28:08

Lin:

Yes. Well, then very soon I learned why rheology is important. When you are thinking about painting an automobile, you take the paint and spray it out. When the paint hits the body of the car it stays on the surface, sometimes it runs on the surface. But then with the time, as the solvent evaporates, or water evaporates, the coating becomes thicker [more viscous], so it will stay there. But then when you push the car into the oven, the furnace, to bake it, with high temperature inside, the coating material will kind of flow and may run down the side. As it flows, the coating builds up its structure, coalesces and solidifies. When it comes out of the oven, it's already become a very tough, flat, and, hopefully, smooth film.

So you can see as the paint hits the surface, which is then at ambient room temperature, and then there's some evaporation which changes the visco-elastic property. When it gets to the oven, and you have a different but elevated temperature environment there, it will have experienced another dimension to it, since with the changing temperature, you create some physical or chemical reaction in the paint itself. That's another dimension of changing the viscoelasticity, or rheological property of the coating. So in the process of application, in preparation for the paint to perform what it is supposed to perform, it went through these dynamics, these several competing transformations which affects the final material property and performance. This complex process is why rheology is very important. And I think my work at DuPont is basically to try to define this process and see how the several reactions affect the visco-elastic properties of the coating.

07-00:30:28

Hamilton:

Now, of course you weren't spending your days painting cars and baking them, so could you tell me a little bit about what your daily life in the laboratory was like?

07-00:30:37

Lin:

Well in this work, I am kind of different from most of my colleagues. Most of my chemistry friends, they are in the laboratory for polymer synthesis. They will be mixing—ingredient A, ingredient B together and try to synthesize, or, cook a new polymer. Or they will have a new polymer from some sources and try to formulate this polymer, or, resin, together with some other components to make a paint system. Some of my other colleagues would take this formulated system and try to spray it out or paint it out on the substrate, and to see how it will look like. And some of my colleagues will take the painted specimens and trying to scrub it off, or subject it to a battery of tests to see how good it performs. These would be the different types of work most my colleagues will be doing.

My job was to study the rheology of paint system and the painting process: How the viscosity, elasticity, or plasticity will affect the formulation, application, and performance of the system. So I have to do a lot of studies. It tends to be more scientific, you might say. I have to understand the basic

polymer: acrylics, epoxy, or other different types. The different molecular structures will show different types of rheological properties. If I am using different solvents or different ingredients, how would that affect those properties? I do a lot of studies. I talk to a lot of people, not only in the F&F department, but also with other people in DuPont. And people in the universities.

07-00:32:59
Hamilton:

Which universities?

07-00:33:02
Lin:

MIT [Massachusetts Institute of Technology], UC Berkeley, Stanford, Minnesota, Delaware—those are the universities that I interacted with the most. I had to go to meetings a lot such as Society of Rheology meetings. Yes, there is a Society of Rheology, which was part of AIP: American Institute of Physics. I have stopped going to the meetings for many years now. But at the time, the Society of Rheology held about two meetings a year, and probably you would see 100 people from university and industry at the meeting. I understand now there are thousands of people attending the meeting. But during those early times, scientific conferences are where I met a number of people who later has become friend—Ken Smith of MIT, Bill Showalter of Princeton, and Mike Williams of UC Berkeley, and a number of people in this field. We would talk about how to change the rheological property of many different things.

07-00:34:17
Hamilton:

It sounds like these people that you mention are all from the United States. Were there rheologists elsewhere in the world at this time?

07-00:34:23
Lin:

There are rheologists in other parts of the world, Europe and Japan, notably. Generally speaking, when you see a more industrialized country, then you will find more rheologists there. So a lot of good scientists were from Japan. In Europe, people are studying dough and making bread. You take the flour, mix with water, and you prepare the dough, and then you can make cakes or pastas out of it, right? You can see the processes of how the rheological factors play there.

The process matters. I give you a formula that says starting with ten pounds of dough, and then two liters of milk, and then some of the other good ingredients. If you give it to different people, they will make widely different quality breads because the quality of the bread will be determined by the process of making it. I'm sure you have this experience. Even with the same ingredients, depending on how you do it, you can come up different results. That's precisely what we're talking about here.

The food industry is very much concerned with rheology. The ice cream people wants to make smooth ice cream; salad people wants the crisp lettuce;

this all have to do with rheology. And people making plated glasses is interested in knowing if it will sag. A steel beam like this beam, it looks like very hard and strong, will also sag in time, with use, because it will develop unbalanced stress-strain spots.

When talking about deformation and flow, it's basically concerned about two factors: the stress and the strain. When you apply a stress onto this material, it will create strain in the material. It's all in the stress and strain relationship. And from this we can say that nothing is permanently unchanged. I think the Bible says, mountain flows. Over ages and eons, even mountain will flow.

07-00:37:12

Hamilton:

Because these stresses and strains can be things like gravity and temperature, and—?

07-00:37:17

Lin:

Gravity, temperature, magnetic, electric,—anything external you impose to a body will create some changes inside in due time. The material will feel the strain. So rheology is a big field.

One time, I published a paper [See Appendix 5] which was fairly good and people wanted to read it. It was nominated to get a prize. So they asked me to write a CV [curriculum vitae]. And at that time, it was before the PC [personal computer] age. So I long handed it, and gave it to my secretary, then she typed it and sent it out. A few months later, I get a lot of mail from seminaries, churches or school of theologies, all that kind of thing. Religious group ask me to give lectures and seminars. I said, "How come I got all these weird letters?" As it turns out, my secretary had mis-typed the word "rheology" I was a member of the Society of Rheology. She's typed it as "the Society of Theology"!

07-00:38:58

Hamilton:

Could you tell me a little bit more about your role in the laboratory? It sounds like you did lots of reading and talking to people, so—

07-00:39:04

Lin:

Reading and talking, and I consulted with people. My chemist friends would come to me and say, "Well, if I make polymers out of methyl methacrylate, or, if I use another ingredient such as butyl methacrylate, for example"—you know, the four—there are different numbers of carbon—"how would that affect the viscosity? How would that affect the elasticity, for example?" And my friends in the application area would come to see me, and we'll talk about if he uses a different spray gun, with different stress and pressure, how would it affect the viscosity and spray atomization of the paint? So I talked, I consulted with a lot of people like this. And in return, I get a lot of feedback from them, too, so it helped my understanding of how rheology can affect the coating system.

Well, I think perhaps, give me a piece of paper; I can write something for you. One thing that you might say was my early "claim to fame" is in a very simple formula which defines viscosity η [writes diagram]—we call it " η "—as a function of many variables. The concentration, for example. Here we in making a paint system, you have to consider the concentration, x . Depending on how much polymer you are putting into it, then it would change the viscosity of paint, right? It has to do with the shear, it relates to the pressure that you push it through during application, so you have another variable, y . You may have some other affecters there; say, together x , y , and z . So the viscosity, η , was in a very complex situation. So how do you characterize the change of viscosity over time, as it goes through this process? This is the question.

[See Appendix 6]

So basically one thing that I have done with DuPont in the early days was that, well, this looks complicated, but let's try to separate this out into its sources and reduce the complex phenomenon into individual parameters that can be measured. So let's just say take viscosity as a function of concentration, and shear. And one method of application is by spray nozzle. Another major method is by rotating disc: the paint goes through the center of a spinning disk, and spun out by centrifugal force. So it's like this, so we say, well, you write it up in a partial differential equation, find the change of η viscosity with respect to C , the concentration, while holding the stress constant. Then you look at the viscosity with respect to shear rate at constant C . Right? I mean, this is simple. Now, you want to look at the change with time, just bring in the term $[dt]$, $d\eta/dt$, and dC/dt .

So these four parameters can be measured experimentally. And I showed people how to measure these four parameters in different systems. Then you can understand how to change the viscosity with time. People, chemists, or chemical engineer, usually do nothing this way. So I think I was able to say how to break up a difficult problem into many elements, and these elements can be handled in the laboratory, and by relatively simple experimental techniques. That's basically what I have done.

By using a simple approach like this, people in the automotive paint areas can use the methodology, so can people in the industrial paint area, and people in the house paint area. So I think a lot of studies can come from that. So I became a resource center, a resource for my other chemist and chemical engineer friends.

07-00:44:23
Hamilton:

So it sounds like most people there were working in applied chemistry, which makes sense, but that you were the person who was using mathematical analysis to sort of direct that. Is that—?

07-00:44:33

Lin: Yes. Some mathematical, but basically, physical chemistry—how do you measure those elements? This came back to my understanding of physical chemistry, polymer science, and rheology.

07-00:44:47

Hamilton: What kinds of instruments were needed to make these measurements?

07-00:44:50

Lin: First is a viscometer, a rheometer.

07-00:44:53

Hamilton: What's the difference between those?

07-00:44:54

Lin: Well, rheometers measure more than just viscosity. Yesterday, I discussed dishwashing and the invention resulted from washing dishes. This is to measure viscosity at very low shear. And sometimes you want to measure viscosity at variable shears, and indeed, at very high shear. We had to get into methods of instrumentations, and sometimes after a coating was made, we're thinking about some chemical transformation, cross-linking, or structure building up during this process, and you want to see how it affects this final performance. Then you have to take a cross-section of the final system. You need to study the system by electron microscopy, microscope. I brought electron microscopy: scanning electron microscopy [SEM] to look at the surface, transmission electron microscopy, [TEM], to look at the inside. Superimpose to this are many identification techniques. For example, we used x-ray to identify the chemical elements in a certain area. And so all of these different methods can be bundled together in trying to solve a problem.

07-00:46:14

Hamilton: Would particular people at the lab be more fluent with the use of particular instruments, or did everyone really know how to use all of these different—?

07-00:46:24

Lin: Well, not everybody knows how to do it so we have specialists in the lab,—microscopists that know how to interpret electron micrograph. Then we have to bring some other specialists to help them. But how do you organize these people? How do you mobilize these people and structure them together to solve a problem? That is usually the key.

Another aspect of my job is to bring all this knowledge to bear to help General Motors, for example, in their premises? Or to help General Electric, who makes refrigerators and use our coatings.

Now, look at coating system. What you like to see is that on the top of the flat substrate-, metal, you want the coating to be a flat, perfectly smooth surface. But actually, if you are looking closely at coating surfaces, usually it's not perfectly smooth. The surface is like this.

[See Appendix 7] So the appearance of ridges or orange peel related to, what we called "the leveling problem." The surface is not flat and smooth because of the ridges. And sometimes you see some bubbles, pops. And sometimes the bubbles break open a little bit, like this—so you have poppings. When you have a large area like this, it's called "cratering." If you are looking at coatings, you will scrutinize the coatings, as a user or as a salesperson, and can become critical to the roughness of the coating surface. You don't want your automobile to have anything like this. How and why would the painting in the application systems create problem like this? That is because it trapped air; it trapped water which did not get a chance to come out before the coating solidified. The water was trapped inside, so it did not come out properly.

These are the kind of things that we have to study: how to get rid of a problem like this. You see, during the process, there are different phases of viscosity change and visco-elasticity change, so you try to see whether you can do enough measurement or formulate differently so that you can come to a condition that you can make a flat and smooth coating. This is the question that paint chemists or end users would like to see answered. And that's how I helped people to solve problems in this. And that's why I was fairly welcomed by DuPont colleagues in the field like Flint, Michigan, which has a big Pontiac manufacturing' factory and a DuPont's factory. They wanted to talk to me and see how can I help minimize problems like this in the operations.

07-00:50:52

Hamilton: Did you have people in the lab working under you?

07-00:50:55

Lin: Yes, yes, I had several.

07-00:50:56

Hamilton: And how did you structure that?

07-00:50:58

Lin: Well, some are instrument people, some are very good at certain application techniques. Application techniques in the automotive coating area are mainly spray by nozzles under air or airless condition. In industrial coatings, spray is also often done by rotating disks. Have you seen a disk, how they spray paint?

07-00:51:25

Hamilton: I haven't, no.

07-00:51:26

Lin: You haven't? It's a rotating disk. You feed the paint from the bottom, and the paint will overflow on this disk, and you spin it. So the paint will come out like a mist of droplets. So different pieces of the object will get painted at the same time, if hung a distance around the peripheral.

Obviously, to be sprayed by nozzle, you will be using a high pressure gadget. You are applying a lot of shear to it. When you are spraying by rotating disk,

you do not apply shear. So these are very different methods of spray application. Another method is applying pain by dipping. You will have a bath of paint here, and then you just put the object inside, and pull it out. The paint will stick on the surface. Another method is by electro-coating, which is similar to electroplating. That's when the object is in a bath, you apply a certain electric voltage between the object and the bath so that you can move the paint particles onto the metal. This is called electroplating. So there are many different ways of applying paint.

Of course, even house paint—I don't know whether you have painted your house or kitchen. You would use a brush or a roller, right? When you are using a brush, paintbrush, you are pushing and spreading the paint out on the wall by force. When you are using roller, you kind of rolling it out similar to industrial calendar. Again, you are spreading the paint out, by force. – What I am saying here is that all these different methods are involved with different shears, different ways of spreading out the paint. The stress and strain relationship are important here.

07-00:53:44

Hamilton:

Did you work on all of these methods?

07-00:53:46

Lin:

Basically yes. We have different people working on different methods.

07-00:53:50

Hamilton:

About how many people did you have working under you on average?

07-00:53:54

Lin:

You know, in the related area, there are about forty or fifty peoples in different laboratories in different cities. We have a factory; we have a laboratory, large laboratory in Troy, Michigan targeted at automotive applications. You know, Ann Arbor is on the west of Detroit; Troy is on the east close to Warren, Michigan, the GM Research Laboratory. We have a group of twenty or thirty people working on spray applications in Troy.

At that time, during the Sixties and Seventies, the country is very much into non-polluting coatings. A big problem with General Motors was that when you send car into the oven for baking the paint, there is 's a lot of volatile compounds coming out of the smoke stacks which polluted the air and made the environment murky and smelly. General Motors wanted to change the paint system to non-polluting. What are the approaches to do that?

So basically, it will require a very drastic change in the formulation of the painting system. Previously, organic polymers are dissolved in organic solvents. And organic solvents usually are smelly and toxic to certain degree. Some are not good for health. So now we have to displace the organic solvent, or use much less organic solvent at the least.

I'm talking about developing non-polluting finishes systems here. There are several approaches. One is high solids: meaning that you tried to formulate a system so the polymer or the major ingredient can exist in high concentration, thus less solvent to come out of the stacks.

07-00:56:35

Hamilton: Would this also make it less likely to be dispersed in the air if it was this highly concentrated?

07-00:56:42

Lin: Well, you make the polymer coiled up in the system. We are talking about using more random coil polymer than extended polymer. If the polymer is kind of extended here in the solution, it becomes very "thick" [viscous]. If the polymer became coiled up, then it does not have high viscosity, or will be "thin". We call this high solids system.

Begin Audiofile 8

08-00:00:06

Hamilton: Well, this is Robin Li and Emily Hamilton interviewing Otto Lin at Berkeley, December 19, 2007, tape eight.

08-00:00:11

Lin: And my son always asked, "Gee, dad, what do you do in the lab? Just paint things, and then come home to paint more for the house?"

08-00:00:20

Li: So you would practice your paints on your house?

08-00:00:22

Lin: Just sometimes. Yes.

We are talking about around the middle of sixties. Pollution is a very severe problem, and the Los Angeles County of California has implemented a landmark State Legislation Rule 66 placing limits on the quantities of volatile organic compound that a source can emit to the outside air. So the automobile industry has encountered overwhelming pressure to clean up. Accordingly, they just gave the pressure to the paint supplier. And the paint supplier, obviously, gave pressure to the people who work at their company.

So there are several approaches. One is to use less solvent, so that the amount of VOC emitted will be under the limit of the government Rule 66, as we had just talked about. This is the high solids coating system.

Another approach is water-based. If you change the solvent to water. Then what came out of the stack will be water, which is harmless. That should be OK, right? But it creates other problems, because now you try to have organic polymers inside a medium of water, which does not go together. So you have

to change in the polymer itself to make it dispersible, or to make it stable with the water-based medium of the aqueous system. So it's a whole range of new chemistry that you have to work with.

The number three major system is powder coating. Instead of high solids or water, now you just take the polymer and everything together and make it in powder form. And now you spray the powder onto the automobile, and then let this powder stick on the automobile for a little while, get into the oven, and bake them and coalesce, and that makes it spread to become a smooth film. This is Powder coating. I would say these are the three major systems. There are also certain combinations of these.

These created different chemistry, and different engineering problems. So my job was really to look at these areas, and to consult with our chemists specializing in polymers, or solvents, or painting, and so on, to formulate a system that worked. Some of these will come up with leveling problems; some with cratering problems; some with popping problems.

I can not work on all these problems myself. I also work with external consultants. So I have friends like Ken Smith, who was then a young professor at MIT, a very good Chemical Engineering professor. And I talked with him, and Ken helped put these problems in a form that we can analyze. And so it's very useful. Mike Williams is another example. At the time, Mike is a professor of Chemical Engineering in UC Berkeley. He and I became good friends, he is more on the polymer side while Ken is more on the engineering side. Likewise, I also worked with Bill Showalter, who was a Chemical Engineering professor at Princeton, who later become department head, and then dean of School of Engineering at the University of Illinois.

So I think these faculty members liked to work with me because we can communicate. I understood their language, and then I can transform the language that General Motors wants to a language that we scientists can deal with. So I think I played that kind of role. So this has been very much the pattern that I performed, that I did my work in DuPont all those years.

08-00:05:55
Hamilton:

Well, it sounds like you talked to a lot of outside people. And then how did you transmit this information to the people at DuPont working for you? Did you have weekly lab meetings?

08-00:06:06
Lin:

Oh, yes. We have a lot of informal meetings. And then sometimes I get these people coming from outside DuPont, and with the people in DuPont, to sit together. So we discuss problems together. I make arrangement for the faculty to visit the laboratories in DuPont, and for DuPont people to visit laboratories in the university. So I very much tried to build bridges, bridging these two fields together.

08-00:06:40

Li: Between academia and—

08-00:06:41

Lin: Academia and the industrial—

08-00:06:42

Li: —the corporate world?

08-00:06:43

Lin: And the corporate world, yes. Yes.

08-00:06:46

Hamilton: And were you talking to clients at GM and—?

08-00:06:50

Lin: I talked to peoples in GM, yes. Very much so. GM has a very large laboratory, the "General Motor Research Lab" in Warren, Michigan. I went to them and talked to them, to understand their problem. And also to understand their view of the future automobile, the trend of the design, etc. Because there's a lot of changes occurring: from steel to aluminum, aluminum to plastic, trying to decrease the weight for lighter and cleaner cars—and this can have different opportunities and problems.

You see, looking at automobile, the overall performance requirement is very stringent. In Michigan, where, in the wintertime, the temperature can be sub-zero, right? You bought a car, and then say you move to Florida, and in summertime, so there's a temperature change of maybe a hundred degrees' difference, but the car surface should look the same. So the automobile has to be able to withstand that kind of temperature changes. And when you take the automobile to get fuel, the gasoline sometimes drips and leaves marks on the car. In the old days, if you look at the gas tank area, there's usually some paint that has been washed off. The car just looked terrible. And when the car gets out into the countryside, sometimes you have sand or gravel hitting into your car, and the paint should not chip. You want the paint to look very shiny.

So there's a lot of requirements: aesthetic requirement and performance requirement on the coating. So these are the kind of thing that we talk to automobile people, and to see what are their views. You know, and sometimes, you have to accept trade- off. It's better for them to know what will be the better trade- off. So I got to talk to more and more designers, or in the higher level, people in the client's area.

So this is about the first half of my career at DuPont, working in the rheology of paints. It covers automobile painting, house painting, and then industrial painting. House paint is easiest to understand. One of the problem areas is dripping. You take the paintbrush in there, and before the paintbrush can get to the wall, a lot of paint is already dripping to the floor. And then when it

gets onto the wall, it kind of sagging down, making a mess of things. It will not be called good quality coating for this to happen.

So these are some of the different problems. For industrial coatings, like I mentioned refrigerator coatings? We are not coating the refrigerators individually, but coating aluminum metal coils, which are generally miles long. This is called coil coating.

[See Appendix 8]

The metal coil can be several meters in diameter and several tons in weight. Usually, you let the metal sheet out from this coil, and fit the metal through rollers, and get coated. Then it goes through a big furnace.

So there are different ways of coating. So the major components are polymer, formulation, painting methods, and then thermal treatments. So these are the major steps in controlling the application of the coatings.

I worked with Ken Smith in developing an understanding on the orange peel appearance of coating surface. Looking at the automobile coating from the top, sometimes you see the structure like this

[See Appendix 9] Here are very fine cell-like structures along the coating surface. It's very fine, but definitely you can see a pattern like this.

This is called Bénard cell. And how do you characterize this? Ken pointed out that this has to do with the Marangoni effect. He said when you drink wine—cognac, for example; a strong wine will leave strings of teardrops' mark on the inner glass surface. When you look at the glass, usually you see strings like this. This is Marangoni effect. It has to do with the viscosity, the surface tension, and a little bit of elasticity there. But controlling the surface tension is the most important. You have to adjust the surface tension to minimize the surface tension differential here to get a system clear of Bénard cells. So then the question is that I will have to come back to the colleagues and explain, "What is Marangoni effect, and how do we characterize that in your system?" And how do we control the surface tension of the coating in the application process? [Narrator's Note: I have written a short piece paying tribute to Ken Smith in celebration of his 70th birthday. The piece is shown as Appendix 10.]

So I think my years, about half of the time in DuPont was spent on rheology of surface coating, or painting. That takes me to about the late seventies. And then in the late seventies, I started working with the electronics people.

08-00:14:49
Hamilton:

Before we move to that, was it common for other people in DuPont to be going to these academic conferences as frequently as you seemed to be?

08-00:15:00

Lin:

I would say DuPont is a company that very much focuses on research also, so there were a lot of DuPont people going to various kinds of conferences: chemistry, polymer, physics, mathematics, engineering, you name it. But I think for DuPont people to come to the kind of conferences like I did, even at that time, is fairly rare. Inside DuPont, we have a group of people that were focused on rheological problems. We have seen rheological problems in plastics systems, in elastomer systems, in polymer films and others. Similar situations come up all the time. So we do have a small group of Du Pont colleagues go to similar meetings. But for most of the industrial scientists, I don't think they go to meetings like I did. It's difficult at times to capture what were said with academic people in many meetings.

08-00:16:15

Hamilton:

What were the background of most of the people at DuPont? Did they have PhDs?

08-00:16:20

Lin:

Well, I would say in DuPont at that time, they might have about maybe 10,000 technical people. I would say probably ten or twenty percent of them had PhDs – a few thousand people. It is a substantial number. I would say people who go to scientific meetings constantly and have that level of interaction are relatively rare.

08-00:16:58

Hamilton:

So you were tuned into the academic side of this. Were you doing similar recruiting efforts like Fuson did with you? Were you looking at graduate students and keeping your eye out for—

08-00:17:08

Lin:

Yes, yes.

08-00:17:09

Lin:

Yes, indeed. Indeed I did. We were also looking to recruit people from time to time. One time, I have helped direct a student, a PhD student with the University of Tennessee. It is in the Chemical Engineering Department. This student was very interested in the work that I was doing, and he wanted to work with me. So I said, "Well, talk to your advising professor and see how we can work out. " His professor is Dr. Don Bouge. At the time, I was working on thixotropy. I don't know you've heard of that, this term.

08-00:17:51

Hamilton:

Could you define it?

08-00:17:53

Lin:

Thixotropy meaning "change with touch," when you touch it, you change its rheological property.

08-00:18:05

Hamilton:

So honey and mayonnaise, and that sort of thing?

08-00:18:09

Lin:

Honey and mayonnaise, yes. Yes, mayonnaise is very much like that. And there is an element of time, also. With touching and time, yes. So it goes back very much to the formula that I just put out earlier for you, this change of time. Well, I tried to interpret this phenomenon, and try to interpret this in terms of molecular properties. I published a paper on that, and I think it was fairly well received. It was in the *Journal of Applied Polymer Science* in 1975. [See Appendix 11]

So this guy was in Tennessee. He read my paper, and he very much wanted to work for me with that. So I discussed with his professor to help supervise this student. So that is an example. There are several examples like this. But in this case, it was not a very successful recruit.

08-00:19:17

Hamilton:

The student was still at his university?

08-00:19:21

Lin:

Well, the student, he graduated, and then Du Pont interviewed him with my recommendation. But he did not get a job offer for a very weird reason. He was a religious enthusiast. He was very much in the campus crusade.

08-00:19:43

Hamilton:

Not the DuPont style, I guess.

08-00:19:44

Lin:

And when he interviewed with our scientists and the managers and the director, he always brought in the subject and talked religions, and tried to save the person he met. I say, "Well, this gentlemen is very good intellectually; is very sharp and knows rheology " But finally, people were very much concerned with his other attitude. If he comes in the lab, and all while he does is trying to convert people, that would be a pretty tough situation to handle.

08-00:20:26

Hamilton:

By the time you left work in rheology and the paint industry, what position were you then? You were a staff scientist?

08-00:20:34

Lin:

I was already a Research Associate. I mean, it's fairly high—I guess senior—in the technical level there.

08-00:20:46

Hamilton:

Did you have an administrative position at this point?

08-00:20:48

Lin:

At that time, I have an administrative position: task force supervisor.

08-00:20:56

Hamilton:

What did that mean?

08-00:20:57

Lin:

The Company assigned a group of people together, trying to solve certain application problems, for General Motors, for example. Then we formed a task force. And this can be ten to twenty people in different laboratories, and they are of different backgrounds. You needed somebody to organize this. The jobs are not typically just for chemists, or chemical engineers. And there could be both. And at times there are can be mathematicians in the force. So this involves several types of people, not the kind of organization that the general bureaucracy of DuPont can handle, so we formed a task force. Like the Manhattan Project, you know? You need someone to organize that kind of thing. Then I had projects like this.

08-00:21:43

Hamilton:

I'm interested in the types of people that you worked with, and I think we've covered a lot of them. But did you have to work with the government? The Environmental Protection Agency? Did you have to work with lawyers?

08-00:21:55

Lin:

Not particularly with that. Well, we didn't work too much with the government. Other groups, other members would be working and have liaison responsibility with the government. But I myself did not—

08-00:22:19

Hamilton:

So other people in DuPont would, but not you?

08-00:22:20

Lin:

Yes, others in DuPont. Yes, that's right. I would say the one time that I worked with the government is on the patent application of an experimental project. The U.S. Patent Office, this is in the suburb of Washington, D.C., had inclined to reject many claims of our applications. Well, more accurately, they had raised serious questions about our patent application. So I requested to see them. I talked to the patent officer; not one and two, but several on the issues, explained what we were trying to do. I guessed I was able to convince them that yes, the claims are in a different field and valid. Afterward o three patents were awarded to my group in the end. You know, the Patent Office has a tough time themselves, too. With the very rapid change of technology, they don't understand fully what might be involved. So you will have to re-educate them a little. So that's a situation when I worked with them.

08-00:23:24

Hamilton:

What did you get patents for?

08-00:23:25

Lin:

The patent I'm talking about, it's actually something in the next area, in the electronics area. Again, it has to do with polymer formulations for electronics. Yes. Polymer systems can be useful for certain type of printed circuits applications, and that was in the electronics area.

08-00:23:47
Hamilton:

So how did you move into the electronics area?

08-00:23:49
Lin:

I was involved in the electronic area because of the printed circuit boards.

Printed circuit. PC—not "personal computer," not "pressurized concrete," either. You know, there is a lot of jargon in my work. Printed circuits. Well, you look into your computer, you see some boards, right? Those are printed circuit boards. Circuitries are printed on the board. And these are the basic element for any equipment, computers, in home, office, big and small. And sometimes in airplanes, you open up this big box, or this small box, and then all you see is a lot of boards mounted with many electronic components or modules. A lot of those array of boards, is what we call "electronic packaging."

So the printed circuit board was something that electronic devices were attached to. It was a major part of the miniaturization effort for electronics. In the old days, or now at the science museum, you would see some television or radio sets containing many vacuum tubes. Vacuum tube has the function of on and off; it gives the on and off signal and magnifying it. And later on, as electrical and electronic instruments get more complicated, we tried to compact the things together in a piece of circuit board. And inside the board which one can't see, there would be wires running in X and Y directions, and you put certain elements in certain key positions within the circuit board. PC board is the basic element of machineries, instrumentation, toys, appliances and weapons.

Now, back to the printed circuit board. If you look at the cross-section, it is usually multi-layered.

There are layers of metal, layers of polymer with fibers—glass fibers, for example—and then you use polymers to hold the sheets or layers together. This is a matrix containing polymer, fibers and metals [as conductors]. You drill holes at selected positions through the matrix, and take a part away. And then we electroplate certain area to electrically connect the specific parts and devices. So you are able to connect the metals in this part, this layer, to the other part of the second layer, and the third layer, and so to other layers in a multi-layer structured matrix. Sometime, you will have to skip the fifth layers, skip layer five, and then re-connect at layer six again depending on what the design is. So a multi-layer board is when you have multi-layered metals, and depending on how you drill your holes, you can connect the different layers at certain strategic points. So this is a very complicated structure with computer-aided design and computer-aided manufacturing.

08-00:28:12
Hamilton:

Do the polymers work as insulators in that system?

08-00:28:14

Lin:

Yes. In that system, polymer films are very much used to hold metal layers together, as adhesives. They are also used as insulators, as dielectric insulators. They provide the basic structure with the integrity needed for the board. How do you put this thing together? You take the fabrics—these may be glass fabrics—and put polymers in there. It becomes a source of cohesion. And then you put metal layers to it, and then another layers of fabrics and polymers, and then another metal layer—it looks very boring, but it constitutes the multi-layer board. Sometime it can go up to ten layers, twenty layers, or thirty layers. So it's very complicated technology at work.

Next to bind them together, you put them into a hot oven like baking pizza, and press the layers together. Of course you apply pressure and heat and with time the polymer will flow to do its work. How well did this flow take place is the key of the technology. You need the flow but if it flows too much the layers will collapse. You cannot allow this to happen. So flow property is very important for the printed circuit board. Since I have made my name in the flow property in coating; the electronic people knew about this and asked for my participation, in this area which is new for DuPont. So that brought me to the electronics field.

And then later on, my department—F&F department—also has acquired a business making printed circuit board materials in Saugus, California. It was in the north of Los Angeles County. DuPont acquired the plant in the late 1970's from somebody. And it turned out that this plant had some facilities that can make printed circuit board materials. In L.A. county, you have a lot of weaponry industries there: General Dynamics, General Electrics, the Rockwell International, Hughes Aircraft and others. So with this factory Du Pont could make the materials to serve the customers in that area. So the DuPont high-level management was very much interested in that, indeed.

And at that time, U.S.A. was very much in the space program. In the spacecraft, Columbia or shuttle, there is not very much room for physical devices needed. Actually, before that, let's talk a little about the aircraft industry. At that time, the major players are McDonald-Douglas, and Boeing. In the cockpit, there are a lot of instrumentation panels. In the back of the panels, there is only a small room for these devices. So these circuits, they are all built in multi-layer circuit boards. And sometimes a rigid board in a crowded area needed to be connected to another board in the neighboring area. Because of space limitation, the boards have to be in different orientations, or one has to be designed to wrap around the other. So in-between the boards, you have some flexible connectors. You still run electronic circuits into the flexible connectors, and then sometime, you have to couple it with another board of different shape. So this is rigid- flex combination of multi-layer boards. This can be easily twenty layers, some up to fifty layers. It's very complicated and, obviously, high added value. This is

the realm of high value-added circuit boards. Unlike household equipment such as washing machine, which circuitry is relatively simple.

So in making rigid-flex the flow property is very important. And that's how I got involved with the Saugus Plant. DuPont supplied rigid-flex circuit materials for companies like Boeing, McDonald-Douglas, Hughes Aircraft. And these are also the backbone industries supplying parts to the spacecrafts. So this took me from automobile clients like General Motors to aerospace clients like this group of people, and of course IBM, Intel and Microsoft.

08-00:34:30

Hamilton: And you were still working at the Marshall Lab?

08-00:34:32

Lin: I was still basically at the Marshall Lab. But I had a laboratory, as I said, in the Wilmington Experimental Station. When I worked a lot with the General Motors people, I had an office in the Troy laboratory, which is next to Warren, Michigan. So I had several offices. People would have to track me down between one office and the other. Along with working with different universities, I traveled a lot. Of the fifty states in America, I think I have visited over forty.

08-00:35:14

Li: So this whole time, was your family in Philadelphia?

08-00:35:17

Lin: My family is basically in Philadelphia and later, Cherry Hill, New Jersey, across the Delaware River from Philadelphia.

08-00:35:20

Li: And could we just back up? So when was your first child born?

08-00:35:24

Lin: Ann was born in 1967.

08-00:35:27

Li: So the same year you moved to DuPont?

08-00:35:29

Lin: Yes, that's right. Ann was born in July 1967, after we moved to DuPont a few months later. Ann was born in the Hospital of the University of Pennsylvania. Ada was then working as a post-doc at the School of Medicine, at the Biochemistry Department. And Gene was born in September 1970, when I worked for DuPont, again in the U Penn Hospital.

08-00:36:05

Li: And was Ada still working then?

08-00:36:07

Lin:

Ada, worked for U Penn for a year or two, and then she worked for the Cancer Research Institute at Fox Chase in Northeast Philadelphia. It's a very beautiful place. And actually, we moved from our apartment on Spruce Street to Fox Chase After Gene was born, we moved to Cherry Hill, New Jersey, on the other side of the River. And Ada changed her job. She worked for the Philadelphia Naval Hospital. It's not the hospital where you get an extra bellybutton, but it serves the very big Philadelphia Naval Base. At the time, it was about the time of the Vietnam War, the Navy has to maintain a large hospital in the Philadelphia area.

08-00:37:26

Li:

What was she doing at the Naval Hospital?

08-00:20:48

Lin:

Ada was a biochemist, working with enzymes. She is an enzymologist. Enzymes are proteins, and enzymes are very important ingredients of our body. In the human body we have hundreds of chemical reactions taking place all the time. And in human bodies, all reactions are taking place at room temperature, and under normal atmospheric pressure. This is unlike industrial reactions, where you can have high temperature, high pressure working to facilitate chemical reactions. So the enzyme systems are very important for our human body. Ada was specialized in the enzyme tyrosinase and others. Tyrosinase catalyzes a chemical reaction in the body that has to do with color. And then she moved from Columbia to Pennsylvania for a post-doc position on similar enzymology work, and then to Fox Chase. Later we moved to Cherry Hill. I forgot when she moved to the lab at Fox Chase, to join the group that works with hepatitis. I think the group of people in Fox Chase were highly regarded for their active research with hepatitis. However, we wanted to move to a larger house, and Fox Chase is too far from Cherry Hill. So she found a job in the [Philadelphia] Naval Hospital, which was in South Philadelphia. South Philly was closer. So Ada worked for the Naval Hospital in the clinical research area. She saw a lot of sea-men, the U.S. Navy is there. They had a lot of liver cirrhosis problem. They were drinking a lot of alcohol! It kind of all makes sense.

08-00:40:01

Li:

So would you talk about work, discuss the problems you were working on?

08-00:40:05

Lin:

Sometimes too much. Sometimes, there was too much chemistry at home.

08-00:40:13

Li:

So would you talk through problems you were dealing with at work with her?

08-00:40:16

Lin:

Yes, we talked about my problems, although I didn't like to talk about work at home. But sometimes, that's kind of natural that we touched upon it. But

fortunately, we had a lot of friends. She had a lot of friends, and I had a lot of friends, so we socialized a lot with other people. After Ada worked for the clinical laboratory for a few years, she branched out into the area of industrial hygiene and occupational health. So the nature of Ada's work changed from clinical research to occupational health and industrial hygiene. And for the next half of her career, it was basically in that area.

08-00:41:15

Li: So did you have someone helping with the kids?

08-00:41:17

Lin: Yes, yes. We have someone helping with our kids, yes.

08-00:41:19

Li: Did you have someone live in your home?

08-00:41:23

Lin: You know, in the beginning, when Ann was young, we had somebody coming in—in Philadelphia, it's easy to get people for that. We had Japanese, and African as nanny—so Ann was very lucky. She was exposed to different cultures, interacted with different cultures very early. I think it's good for Ann. And actually—you know, I am very happy with Ann. She's very bright and sweet, everything that a father could look for in a daughter. And very loving—she's good at reading, I took her to a bookstore at age of four or five, and then she just stick her hand into the bookshelf, take the book and read it herself. She was very good at writing and reading. And then Gene arrived at 1970. So at that time we moved to Cherry Hill, we had to have a full-time person to live at our home.

08-00:42:45

Hamilton: Did you hire a Chinese—?

08-00:42:47

Lin: Chinese, through Hong Kong. A part of the package was that I have to apply for her immigration papers, and then she was able to make application for her family—finally her three children and husband all were able to come from Hong Kong to stay in the United States. The lady worked for us for three or four years. We were very happy and worked very well together.

08-00:43:27

Li: The friends that you were seeing, were they Chinese or non-Chinese, both—?

08-00:43:30

Lin: Chinese and non-Chinese both. You see, my interaction with the university faculties, and then with DuPont people, a lot of them are non-Chinese. But I'm also very much with the Chinese community.

08-00:43:47

Li: Because there's a large Chinese community in Philadelphia.

08-00:43:50

Lin: In Philadelphia, and in Cherry Hill, for one reason: this has to do with education—teach children Chinese. At this time, Ann is about eight or nine. And Gene was three years younger. We'd like them to learn Chinese. It is a very tough job for the parents and for the children at that time. Because the kids go to normal school Monday through Friday, and on Saturdays they wants to play, play balls, or do things with their friends, that kind of thing. But the parents say, "No, you shall go to Chinese school." I don't know whether you went through that kind of thing.

08-00:44:40

Li: So all day Saturday, Chinese school?

08-00:44:42

Lin: Yes, this is a Saturday Chinese school. Actually, a half-day. So the children have really no motivation to go there, except pressure from their parents. At the Chinese school, they have many difficult problems: there was no textbooks or standard educational material. Further, whether you should teach Putonghua [Mandarin], or Cantonese, or Taiwanese, is an issue. If you have decided on s teaching Mandarin, then are you using the Mainland system, or the Taiwan system? Wade-Giles or Pinyin? And you don't have professional teachers; the teachers were all volunteered parents in the community. It is little wonder that the student has no motivation: there are no textbooks, there are problems with the teaching materials or methods, and no teachers. And usually, you do not have a permanent place as school. You can just rent space from a community center or a school for that kind of thing.

So running the Chinese school was a very difficult challenge, but we felt that we needed to teach the kids some Chinese. So in that sense, I am among the pioneers. I was a leader of Chinese schools in Cherry Hill and in the Philadelphia area. I got together with my friends in Philadelphia, Princeton and the neighboring cites, and said, "Let's talk about our problems, common problems, to see whether we can learn from each other, or teach one another" How do you handle the problem of motivation? How do you handle problems of teaching materials? So we formed an organization called Association of Chinese Schools.

08-00:46:36

Li: A task force?

08-00:46:39

Lin: Yes. That was back in the 1970s. I remembered at that time, there were about seven or eight schools in the Cherry Hill, Philadelphia, Princeton, and other, all within the Northeast corridor region. And this Association actually helped each other a lot. For example, on the question of Putonghua or Cantonese or other dialect, a friend of mine in Princeton University, Professor D. D. Chen, [陳大端] a very famous linguist, said, "Don't worry. If your community wants to teach Putonghua, so be it. If the community wants to teach Taiwanese, so

be it." He said, "All the Chinese dialects have similar structure—grammatical structure is the same." Like for example, *Ni chi fan le ma?* 你吃飯了沒 "Have you eaten yet?" You know, the Chinese custom was very much concerned with eating. In the sentence of "*Ni chi fan le ma?*," the subject, the predicate—these are at the same place. So once the child learns Putonghua or Cantonese, basically it will be easy to understand other people speak. So instead of spending time trying to fight between systems, you just do it the community wants. It's the easy way out." So I think it helped, really.

08-00:48:16
Hamilton:

When did you decide whether the children were they ever going to live in Taiwan, or live in Hong Kong? Did you think about going back?

08-00:48:24
Lin:

No. At this time, I felt that Chinese, if the children were able to read Chinese, they would be open to this world of treasures, culture, histories. You know?

08-00:48:38
Li:

So you wanted them to learn not because you thought you would necessarily move back?

08-00:48:41
Lin:

No, no. It's not that. The way I was thinking about it, the value is for them to be exposed to this wealth of knowledge. And that's number one. Number two is maybe able to communicate with their grandparents. And from the grandparents, they also learned the value of the culture. So I think that's important to the children. So that's basically it, you know?

08-00:49:09
Li:

So you did all this while you were traveling for DuPont?

08-00:49:11
Lin:

For DuPont. DuPont, yes.

08-00:49:13
Li:

So you were very busy?

08-00:49:14
Lin:

Very busy, yes. It's so funny—many years later, when I was working in Taiwan, and one time I led a group of people to have a meeting in L.A. and we stayed in the Marriott Airport Hotel. And then I saw *big* banners announcing a big meeting was taking place in the hotel. It was the Association of Chinese Schools, the 20th anniversary celebration or something. I felt very happy about that.

08-00:49:50
Hamilton:

It's still alive and well.

08-00:49:51

Lin:

I think it's very much alive and well. 1970s, you know? Thirty years now. It's much easier now, because the community is larger, bigger, so there are people who are dedicated to the subjects, and there are also publications, books, videos to teach kids spoken language and spoken Chinese. It's much easier now.

And the motivation is greater because a lot of students in the university now want to learn Chinese. It has become more popular in the universities so the kids can associate the language with their future.

08-00:50:37

Li:

Because the Chinese economy has risen?

08-00:50:38

Lin:

That's right. So there are so many people now learning Chinese, taking Chinese as their second language. Certainly, it has helped. So I think the situation is much different now.

08-00:50:53

Hamilton:

Can you tell me a little bit about your friends that you had in Philadelphia/Cherry Hill?"

08-00:50:58

Lin:

I mentioned I had a number of friends at work. And I mentioned a lot of academic friends: Ken Smith, Bill Showalter, and other. I socialized with my friends at DuPont, and Ada's associates. We were fairly active. We had a garden and invited people to barbeque, and party. It's easy. So we usually did this at our home, or we went to their home, and we brought the children together. So we had a fairly active social life there. And a number of people were Chinese. With the Chinese group, we would have more common issues to talk about: choosing education, and lost relatives, and then at that time, we are concerned about what happens in China, and what happened in Taiwan, so we had more common issues like that. I have to say that I think we are very happy in Philadelphia, in the northeast corridor.

And so a number of friends I might e-mail to you. There are a few who we saw most often. Charles Yong-Pin Wang and wife Sylvia [王永平、陳世薇]. We were classmates in high school, at Jianguo Middle School. Having graduated fifty years now; we have met each other a couple of times every year. That's unusual, come to think of it. They lived in the Washington, D.C. area, so a lot of times we drove down to Washington or they came to Cherry Hill. Charles was among other friends who are considered "his", meaning my friend at start. My wife has another group of friends, as "hers". Ada also went to a school in Taipei, First Girl's High in Taipei—and supposedly the best. So she has a network for herself.

08-00:53:15

Hamilton:

Were there alumni associations, like for Jianguo or for her high school?

08-00:53:19

Lin:

Yes, yes. Well, that's right. It was not so formal, but there are always gatherings. And then she always had a few very good friends that are keeping constantly in touch to each other. So a few of them is in Philadelphia area. There is the Fou family, Marcus Cheng-Ming and Theresa Xiao –yun [傅振民 吳曉雲]. Marcus was an alumni of my high school in Hong Kong and later a Professor of Physics at University of Delaware. Theresa is Ada's high schoolmate. Naturally, we came very close together.

08-00:53:55

Lin:

And then there's a family in Washington D.C.- Daniel and Angela Jih-Tang Hsu [徐用卓 劉志潭]. Angela is Ada's classmate in First Girl Taipei. All the Hsu children are friends to ours. Now after this interview session, I'm going to see them in Washington DC. So these are among the people whom we saw often and whose friendship have been very precious to us.

08-00:54:07

Li:

So would you discuss the situation in China, what was happening in Taiwan with these friends?

08-00:54:13

Lin:

Yes, yes. We talk about that.

08-00:54:15

Li:

About whether to go back, or what you should do?

08-00:54:18

Lin:

Yes, we are very much concerned with the situation in China. My concern was not only that my mother was then still in China. I went through very difficult time to get her out of China. We talked a little about it this morning. The Communists—because of my father's situation, past work, my mother was considered a public enemy. So she had suffered a lot of prosecutions and tortures. At that time, I hoped very much that my mother could come to United States. And many of my friends had similar situations like this, so we talked about that a lot. And specifically in my own situation, I wrote letters to my home, asking for my mother to come to the U.S. And this is totally the village level, they can not handle this situation, they can not issue permits. So they said, "This is a matter that should go to the city." So I wrote letter to the Shantou—the city of Shantou. "No, this is a problem that's we can not handle." So I wrote a letter to Guangdong province. "You know, this is a national problem!" So I wrote letter to the state council in Beijing, at Zhou Enlai's time. Now, they had a response to me and the letter said, "No, how do we know about this person? You have to go back to the county—everything start from the bottom." So it's big circles like this.

Now, at that time in New Jersey, I wrote letters to Senator Harrison Williams. I would say he's a very responsive senator. Many years later, he resigned his post because of some other thing, but as far as being responsive to constituents, he was outstanding. And so Senator Williams made inquiry for

me, with Washington D.C. Liaison Office of Beijing. So I think in a way, we had already put our names in the waiting list; that these are the scientists in the United States that have family members separated for so many years, and wanted to make an application, for them to get an exit permit.

But the liaison office, the Chinese liaison office in Washington, D.C. did not really respond to that. They just said, "Well, we have recognized and we will try to help." You know, just like that. Until the time when Deng Xiaoping came to visit. Actually, in 1979, I went back to Taiwan. We're jumping a little bit, because of the family situation.

We were trying to get my mother out, right, because of this difficult situation in China. My relatives in Hong Kong tried to arrange a smuggle,—you know, this is quite normal at the time. If you can pay somebody to do it, he will manage to go to China, get her, go through different channels, and come to Hong Kong – we had thought seriously of this. But finally, I kind of ruled that out because my mother was in very poor health, so we felt that she would not be able to sustain that kind of thing. So we had to go through the normal, formal application route.

So finally, in 1979 or so, Deng Xiaoping came to Washington, D.C. and visited with [President Jimmy] Carter. And Carter, knowing there were a lot of pressing family situations similar to mine. He made request to Deng Xiaoping, "Why do you want to keep the families separated for so long, particularly for those that are already of old age?" Deng Xiaoping took note, and when he returned—actually, I heard a report that he said "Well, how many people do you want? I can give you a million or two." So when Deng Xiaoping returned to Beijing, he let a group of people leave the country. And that's the time my mother was able to come out. So timing is everything.

Begin Audiofile 9

09-00:00:06

Li: All right.

09-00:00:07

Lin: Yes. My DuPont career was—you know, I think, very good. I was promoted to staff scientist, and then research associate in record time. Relative to—my colleagues, my peer, I think I was doing well. I recognized that one day, I will be a Research Fellow of DuPont. And this is a very distinguished position in DuPont.

I have interests in management. I think I am good in problem solving. For any of these paint problems, I was able to organize the people and the help to solve them. I feel my colleagues have recognized that too. But I don't think in DuPont, there is opportunity for me to be in the corporate management. I can see that. For electronics companies in the California area, it will be different. But if you look at these traditional blue chip companies. You don't see a lot of

people of Chinese origin making it to the executive level. In a way, I am feeling that I can see my career with DuPont in the course of time. And what the final outcome could be? I think I will be very comfortable, with fairly good pay and everything, but that's basically it. But I think—that there are more in me than being just that. So I think this is the situation and I ask myself, "What do I want to do?"

And then at this point, I have my Taiwan connections. I did not talk about this, but—this is for another time. We have a big issue here. There's a lot of things that we need to talk about. The Taiwan people has recently come to me and said, "Would you come back to Taiwan and be this? And be that? And do this? And do that?"

And also at this point, because of my interaction with outside, I have some academic offer. I was fairly active in—I went to university from university for seminar frequently. At one time, University of North Dakota was looking for a head of the department of polymer and coating. And I was formally interviewed with the dean and the vice president before they are putting a package of offer to me. It's interesting I recalled at North Dakota, dining with the vice president, and I talked about my life style on the East Coast. And he said, "Do you like seafood?" I said, "Yes, I do. We ate seafood a lot." He said, "Well, if you like seafood, North Dakota is the place to come." "Why?" he said, "It's equidistant to the three Continents!" And we had a good laugh.

Well, because people have recognized that—in a way, I have established myself a name in the polymer field, industrial applications, and in rheology and its problem solving. Further, I have established a good network. They came to me for that kind of opportunity.

09-00:04:20

Li:

Were you tempted to enter academia at this point?

09-00:04:23

Lin:

Yes, I was tempted. I was thinking basically if—in DuPont, my next career position would be research fellow, and I may be working on, if not paint, then electronics, but basically just that. Since I have a strong interest in people, helping people, and doing things for the society, that kind of opportunity would not be in DuPont. So I always feel that perhaps I can do more things with my time, you know? I recognize that it's just a matter of time to take its course at DuPont, in—getting to where I am supposed to be at.

So when a headhunter comes to me, I was open to it. And I think there is this offer, and there is some other industrial offer as well. We talk earlier about how a large chemical company offered to make me a lab manager. It's from Shell, and the laboratory is in the Houston area. Then I was thinking that, why do I want to go to another industrial laboratory? If I was to go to any industry, then might as well stay in DuPont. So I was interested in making a career path

change at this point. So my career in DuPont was winding down, based on a voluntary feeling on my side.

09-00:06:09

Hamilton: This is the late seventies?

09-00:06:12

Lin: This is the late seventies. I went to Taiwan and become Dean of Engineering. This was in '68-69. I request a year leave, sabbatical leave, from—

09-00:06:27

Hamilton: This is '68-69, or '78-79?

09-00:06:30

Lin: '78-79 is correct. DuPont has never granted sabbatical leave. Sabbatical leave is normal from university, right? But I wanted to request for a leave. At that time, several reasons. One reason is that my mother—because we has been working on this, and at this point, my relatives in Hong Kong was working on a number of options that through this other approach, smuggling, may be able to come out. So there is an interest for me to be closer to—keep closer tab with these activities. So I wanted to be in this area. And the National Tsinghua University in Hsinchu wanted me to help set up the polymer institute.

With all these reason emerging, I asked for a year leave from DuPont. And DuPont was not very happy about that, because I was doing very good work for the company and there is no shortage of problems for me to work with. And if I leave, then they will have to get somebody to pick up the work. Finally, the vice president of my department asked me about my plan to come back. Basically, my choice is that if you do not give the leave to me, then I will just quit. Finally he said, " OK. We will give you a year leave, but you have to return." So we have reached a mutual agreement and commitment. So I took a year leave from DuPont in 1978-79.

And indeed, my mother came out from Mainland in February of 1979. It's also the month my son Dean was born. So Dean was actually born in Taiwan.

09-00:08:41

Li: So you hadn't seen your mom since 1949, right?

09-00:08:43

Lin: Yes, yes. I left my mother in 1949, thirty years ago.

09-00:08:48

Li: You hadn't seen her in thirty years?

09-00:08:50

Lin: Huh?

09-00:08:51

Li: You hadn't seen her at all in thirty years?

09-00:08:52

Lin:

I have not seen her at all, yes, in thirty years. I couldn't recognize her. Yes.

But I think to kind of wrap up the DuPont situation, I was very happy with my DuPont experience, and I think it helped me a lot in several ways. One is that—it gave me the opportunity and experience to use my knowledge to solve industrial problems. You know, I start working on DNAs, making molecules, and become—it was this association in rheology, in solving a number of problems for DuPont: the painting area, coating area, electronics area, and so on. So I think that gives me a good understanding of what does it take to bring these things together, to link things together. I think that's all because of DuPont.

The number two, second point that DuPont provides me is the ability, the opportunity for management. Although I was basically in a technical position, but I am always doing the management kind of work. You know: different information; different people; different activities—that kind of thing. So I think I have some interest in that area, and it gave me the opportunity to practice and develop under the DuPont system. Du Pont is a big organization and a very ethical company. Everything's by the book. And also it's a forward-looking company. So I know the philosophy, and how do they do planning, human resource development, management. I think I learned a lot because of my participation in these other activities. So I think DuPont has helped me in that.

Number three, I think DuPont also gave me an opportunity to think about my career. I was sent out to do a lot of management training when I was in DuPont. I distinctively remember in one session that I—it was out in the mountains somewhere, in Catskill or something, you know? I forgot, but the manager—well, the expert, the facilitator—said that the session will start tomorrow, but tonight your assignment is to write your obituary. Obituary, Why? The question is that how do you want other people to remember you after you are gone? It has struck me greatly. I appreciated the opportunity to sit down and reflect—that after I am gone, how do I want people to remember me. My obituary, how should I do it?

09-00:12:1

Li:

What did you write?

09-00:12:20

Lin:

What did I write? Yes. Well, of course, unfortunately, I don't have a copy with me anymore, but I think I basically, wrote that I liked myself to be remembered as a man that helps people,—somebody who helps, nurtures and mentors. And "to help people" meaning that to help people to improve their quality of life, and "mentor" meaning that to help young people to become a useful person, and to be able to fulfill their own potential.

09-00:13:05

Hamilton: How did your work at DuPont contribute to those goals?

09-00:13:09

Lin: A little bit, yes. For example, I did train a number of sales persons in the electronics area. You know, when our salesmen talk to people in Hughes Aircraft or McDonald-Douglas, or General Dynamics, they have to talk about technology, and they have to—you just cannot ask them, "How much do you want to buy my product?" And so you have to show that your product can help the clients solve their problems, so it has values, and can be taken as their values. So I help; I train a couple of technical sales representatives, and I think they are now doing quite well, as far as I know, in the business.

And I also trained my peer, scientists and engineers that you have to—it's not just that you want to do a certain things. But these things are useful to the organization, and can contribute to the organization. So I was doing that quite well, but it's not on a very large scale. It's a small scale.

09-00:14:18

Li: So did this exercise help you understand that you wanted to make a change?

09-00:14:22

Lin: Yes. I think this exercise—and this is one opportunity, but I remember this. There are some other opportunity there that gave me the opportunity to think about what do I want to do, to achieve in life? So—. All this time, I come back to it: I want to be a mentor; I wanted to be something—a contributor—this kind of thing. I have never really thought myself as somebody that want to make money; that I can accumulate a lot of wealth, that kind of thing. This is not my—not the value that I am seeking.

09-00:15:02

Li: What did you think that you could do with your background? So what did you think that science or engineering or technology could do for those goals?

09-00:15:12

Lin: The technology, science and engineering background and technology is a vehicle. It's a vehicle; through it I can achieve this thing, this end. So that's why next time, we can talk about Taiwan: it's that I feel I have what they very much needed at the time—knowledge, experience, and foresights, for the situation. That's why I feel I can be helpful to Taiwan when I make a drastic change in my job.

09-00:15:48

Hamilton: When you were thinking of this type of career change, was it fairly clear that you wanted to go back to Taiwan and use your skills there?

09-00:15:53

Lin: Yes, yes. It is fairly clear. Because in DuPont, as I said, I can see myself in another five years or ten years getting to my final position; then I can see I will be playing golf every weekend, or, doing similar kind of thing. So that's

probably it. But I think I could do much more in Taiwan, in that setting, and be helpful to more people in that setting. And I also see Taiwan will be undergoing a big transformation, and China as well, even though I did not foresee so much and so rapid the change in China and in Taiwan. To me, China and Taiwan are basically the same group. My background, you see. I was born in China, I came to Taiwan, and I have relatives, family connections in China. So to me, I do not see myself as a Taiwanese. I think of myself as a Chinese, in that sense.

So actually, people thought I was crazy when I finally submit my resignation letter. I am getting a salary in Taiwan about one-third my salary in DuPont. I have to cut 70 percent my pay to get my job in Taiwan! And at that time, Taiwan and China are still talking about war. The natural environment is very poor. Living standard, you know, in Taiwan, Hong Kong, and China is like is the third world. Moving from the U.S. to there is against conventional logic.

09-00:18:00
Hamilton:

Unless you wanted to help people.

09-00:18:02
Lin:

Unless you have another goal you know? So Ann was asking me, she said, "Why do you want to make this change?" I told Ann that I see the next ten or twenty years will be the most important period in the history—for China. And I said, "Ann, I don't want—you don't understand it at this point—, but I don't want to turn a blank page in my career during this period." I wanted to be able to do something during this period for China.

09-00:18:51
Li:

Did you feel a sense of responsibility for China's future? To contribute what you had learned to help China become stronger, become more successful?

09-00:19:00
Lin:

Yes, I think that's a responsibility, and that's also an opportunity.

09-00:19:05
Li:

So it's both a desire and a feeling of responsibility?

09-00:19:09
Lin:

Yes. And yesterday, I talk about Sun Yat-sen being a role model, so these are the kind of thing that I think one should do if you are given that opportunity.

09-00:19:26
Li:

Did you pass these values on to your children? And if so, how did you—? Did you talk to them about Sun Yat-sen or about your father?

09-00:19:33
Lin:

Yes, I talked to them about Sun Yat-sen, and of course, all my children are U.S. citizens and consider themselves very much American. A class-mate once s asked Ann, "Ann, where are you from?" Ann said, "I'm from Philadelphia." You know? And the classmate says, "No, I really mean where

are you really from?" She said, "Philadelphia! I was born in Philadelphia!" So I told Ann that while you are American—OK, you are American—you are also Chinese. You are both. I said you have to be assertive about your American citizenship. But also, you have to know you cannot change your face color, skin color, so people are going to ask you repeatedly about questions like this. So you have to have a strong feeling about yourself. Know exactly where you are yourself.

So I told my children that my feeling about the countries. I love this country, no question about it. But I love also China, and I think there is so much—the culture can be—so much in common. Like Sun Yat-sen's view in the Three People's Principles,—is taking the Chinese ideal of democracy and the American style democracy together. So I think that model should work, and I'd like to help to build this picture for the future.

09-00:21:15

Hamilton:

Let's say you had taken the Fulbright scholarship and had to return immediately. Would you have been able to do the same for China's future?

09-00:21:26

Lin:

I don't think so. I think my years at DuPont helps me better than if I just get my degree. You know, the education gave me a label, this—I'm a doctor. It didn't do much else. Because I learned something about the United States, I built my network here, so when I—you know, as we will talk about later, I made use of the network here from time to time when I was in Taiwan, and HKUST, you know? My connections in America are resources, a very important resource for me. And I bring people closer, between United States and Asia. So if I just got my Fulbright scholarship and I returned to Taiwan the next year, I would not be able to do that. You know, I don't have that kind of relationship here.

09-00:22:41

Hamilton:

Well, unless you have any other questions, I think that we might want to save questions like what it was like to move back, and how your children felt, and that sort of thing until next time, but.

09-00:22:51

Li:

You had mentioned talking about the nature of American universities, and your perspective on that. Did you want to wrap up with that?

09-00:23:00

Hamilton:

Yes. You've talked about having an idea of a world-class university.

09-00:23:05

Lin:

Yes.

09-00:23:07

Hamilton:

And my guess is that that has changed a lot from when you first came to the United States to when you left. First, how would you sort of situate the

American university in your definition of world-class university? And then how has that changed in the twenty years?

09-00:23:24

Lin:

Well, I think there are a lot of people getting into university ranking. In China, these last twenty years, they changed so much. The economy has grown so big so quickly, and they want the university to be world-class. Jiang Zemin has set a goal that in the 21st century, they want one hundred university in China to be world class. Everybody was talking about “211”.

And unfortunately—and this last five years—there is a lot of university ranking organizations. Well, I think *Business Week* has been doing it for a long time. But there are more and more organizations jumping into this field. And in a way, that's good and bad. "Good" meaning that people recognize that we have to build good universities as—universities is a major institution for the country. You know, say America was strong as an economic power, as a political power, and military power. But this position has eroded. But the U.S. is an educational power because of its good universities. Good universities like UC Berkeley, Stanford, Columbia, Harvard. I think U.S. still, despite a lot of thing that we know about, has excellent university, and will be strong for that.

University is an institution that generates people, human resource; it's an organization that generates technology; it's an organization that still—that can breed new idea, new concepts for the society and humanity. I think that is the kind of institution that you—that are building here.

But people will say, "Well, what is a world-class university?" And when you want to rank organizations of different cultures, across national borders, it became a very difficult task even just to talk about it. So then people resorted to using parameters like, faculty/student ratios, tuitions, the job student gets, students employment, number of papers publish, or the SCI citation index, engineering index, and other different indices, etc. And then you put these things together, at different weighting, and then you get a ranking. And the top twenty or fifty would be world class or something. My university arguably is getting some benefit out of ranking schemes like these. HKUST [Hong Kong University of Science and Technology] is a young university—it's only fifteen years at this point—and I think we are ranking in the top fifties. That's not easy. In a way, we feel happy about that, but I don't think it's right because we are—you know, in no way can compare with some of the of the universities that is in the hundreds, for example, because I know—I recognize that. So there is a lot of flaws in ranking universities according to a number of those parameters. But many people likes to play the numbers game.

This comes back to the question of what is a world-class university? And we talk about this a lot in many different locations. While good ranking is welcome, the meaning of a number of indexes are debatable. For example, in

China, people hold close to the number of faculties who are members of national academies, or Nobel Prize winners? I think those are superficial indicators, especially the former. If you do have a number of faculty who are members of certain national academies, and they are doing nothing scholarly in the university, what good does it do to the university really, and to the future?

I think all these enable people to play the numbers game. And it's very difficult to rank university just because of that number. How do you rank Caltech [California University of Technology] in comparison with University of Texas at Austin, for example? Caltech has about 4,000 students: half post-graduate and half under-graduate. And there about 600 or 700 faculty members. It is difficult to compare the small Caltech with the huge UT Austin or UC Berkeley. But most people recognize that Caltech is a top university. My contention is that we do not have a set of numbers that fit all universities, so it's a very dangerous game and misleading game to rank university according to those numbers.

I look upon this issue from three perspectives. I would say a world-class university is a university where it can attract good students from anywhere in the world- the best young adults world-wide would like to make application to the university. A world-class university is one that can attract best intellectuals from everywhere in the world to *teach*. A world-class university is one where its student graduates can get jobs anywhere in the world.

So I say, well, if MIT or Harvard can only attract students in the New England area, if their faculty members are mostly coming from the area, and if its graduates can only find jobs in that area, then I don't think either university is real world-class university. In this day and age, we have to take a global view; you also have to think about what your university want to have—under the global framework. Thus a university should structure different curricular focusing on different places and issues of concern world-wide, instead of just trying to play those number games.

I think this is my simple criteria of a world class university. Some of these can be easy indicators. You ask yourself, how many foreign student do I have? Or how many of my students can spend time in a foreign university, you know, and do exchange programs? Or how many faculty members do I have actually coming from other countries – that bring culture, different values. And when my students graduate, can they go elsewhere to find jobs? Inbreeding is a very serious problem for academia, right? You want your student to go out and train and contribute in other places.

I think these are the kind of measure that you sometime can look at. That's my view of the world-class university.

09-00:32:04

Hamilton:

Do you think that the role of the university in the United States is different than the role of the university in China?

09-00:32:12

Lin:

The university altogether is changing its role. In the old days, universities were elite schools. Only a small portion of the population can go to university. I think with democracy, people like to go to university to get knowledge, because through the knowledge they can get better job for themselves. They can make better contribution to society. So this changes the complexion of the university. So a university, you have to be able to be able to—accessible by a larger population of people.

And the university has to be affordable. Running university is a difficult problem because of its financial situation. It's more difficult nowadays to attract top students to the university because these top students are widely recruited by many competitive universities. Like the business world, UC Berkeley is competing with the ivy leagues for top students. Similarly, it is also competing with the ivy leagues for faculty. So it's more difficult to have the kinds of resources for all these. It may be difficult for the university to afford that. On the other hand, can the student afford to pay the ever-rising tuition and fees?

You know, just a few days ago, I saw a report by Harvard that says that if an entering student's family income is under a certain level, the student will only have to pay so much for tuition. And Harvard also has an endowment for needy student of different backgrounds. I think basically, the assumption is that, well, so long as you are good enough—intellectually and academically—to come to the university, the university wants to attract the student and to enable him to come. It takes a lot of financial resources to do that.

I think the universities are concerned with accessibility, affordability, and accountability. How is a university held accountable that they have done the job that they are supposed to do? Why is that a difficult question? Of course you always need some hard data but you cannot lose sight on the hard data alone.

09-00:35:03

Li:

Yes. We'll probably return to this discussion, I imagine, when we talk later about your going to Hong Kong University and what you did there.

09-00:35:11

Lin:

Yes

[End of Interview]

Interview 3: May 5, 2008
Begin Audiofile 10

10-00:00:00

Li: This is Robin Li and Emily Hamilton on May 5th, 2008. This is tape number ten speaking with Otto Lin. This past March was a critical election in Taiwan, in which the Kuomintang candidate, Ma Ying-jeou, defeated Frank Hsieh with 58% of the vote. Why do you think this election was significant for Taiwan?

10-00:00:32

Lin: It is a very, very important election. Because the last eight years of DPP rules, with Chen Shui-bian being the president, has basically, I would say, almost destroyed Taiwan. The economy is down. People are restless. And Chen Shui-bians' corruption was notorious. I know Chen Shui-bian when he was a member of the parliament, in the legislature. I was president of ITRI at the time, and he was invited to ITRI, to give a seminar at a function of the employees. At that time, he was recognized as a good law-maker. He worked diligently and dug up a lot of defense data, being a member of the defense committee of the Legislative Yuan, which is the parliament in Taiwan. His view on advocating Taiwan independence was well-known. I felt that we should listen to him, to see what he had to say. So I knew him back at that time. But, putting independence as a front, he is just a crook. He used public money to serve personal interests. There's a budget for the President to support certain covert activities in the national interest. As it turns out, he used that money to do anything that he wanted to do for his pleasure, including buying diapers for his grandson!

He was aided very much by his wife. His wife at one time was also a revolutionary in Taiwan, pro-independence. She was hurt and partially paralyzed in a car accident, and Chen Shui-bian carried her in and out of the door every day. As it turns out, we know now that the TV photos showing him carrying her in and out was just a kind of campaign ploy. He just wanted to show how dedicated he was as a husband, and therefore could be as president. And Wu Shu-chen, Mrs. Chen, was a very greedy person. I heard stories saying that she used to comment to other people like, "Wow, how beautiful are your earrings!" and drew people up close because she cannot move very easily. So people will take jewelry to her house and let her examine in private. And sometimes at stores she would say, "Okay, well, I can't decide. I want to think about all these." Then, people would be thinking of offering her more jewelry—earrings or something, to choose from. And then she would simply keep almost everything that were presented. Well, there are a lot of stories like this. Some are substantiated, some are not—some may not ever be substantiated. Chen Shui-bian was proud of being the best law doctor from the National Taiwan University.

The family has set a very poor example. That is the personal aspect—even the DPP people were very angry at him. Shih Ming-teh was one of the founding

chairmen of the DPP party, and he was so disgusted that he organized a group of people to stage a “Peaceful Protest” demonstrating against Chen Shui-bian and ask Chen to resign. He said seriously to people “If you want to participate this protest, send in \$100 to fund this protest.” He set up an account and people sent him \$100. I sent him two \$100s for me and my wife. [In a few days, he has more than 10,000 people signed up].

This saga occurred about two years ago. And immediately they set a date for people to demonstrate by a “sit-in” in front of the Presidential Office. For more than two weeks continuously, people sat in peacefully and demanded Chen’s resignation. The people all wore red shirts, thus they were all called the Red Shirt Troop. There were nearly half a million people participating. Well, some report said a million, but maybe half. Chen was so thick-skinned, he just hid inside his house and did not move. I think, personally, he’s a crook without shame. This was why people, including DPP members, were disgusted with him.

Another thing that Chen did was to use “Independence versus unification” as a political ploy. Anybody who was against him, you know, he would brand them “Red sympathizer” or “People eager to be united with the Mainland China.” And he would raise the Mainland China issue and called those are not born in Taiwan as traitor. So Ma Ying-jeou was branded a traitor. Ma Ying-jeou went into Taiwan in the 1950s—he was born in Hong Kong and brought to Taiwan as a baby. So he was labeled as a traitor. This last eight years, Chen was always placing various kinds of label on his opponents.

That’s what he did. I have talked about globalization. This is a very globalized world, and Taiwan has to strive in the era of globalization. Very early in the game, Taiwan knows that it has to be integrated with the rest of the world for growth. You want to sell products to the United States and rest of the worldwide. You are depending on the world for markets. Not only that, Taiwan is also dependent on the world for capitals, technology and people. There are people going out of Taiwan to sell and other people returning to Taiwan to work. Taiwan has a long record of globalization, that’s why Taiwan has become vibrant in the world. And the economy was good over several decades.

Take language for example, Chen Shui-bian says, “No, we want to speak the Taiwanese dialect.” He wanted people to speak Taiwanese, the native dialect, in business and all the public places. Actually, dialects are prevalently used in China. In Canton, people like to speak Cantonese; Shanghainese in Shanghai. When you come out of Mainland China with your family, you speak your home dialect with your relatives, naturally. But in the classrooms, in business meetings—you speak one language, which is Mandarin, or Putonghua, so people can communicate with each other. [Editor’s Note: Beijing dialect, known as Putonghua, is considered “Standard Mandarin.”] “No,” he said, “no, we should speak Taiwanese.” Anything related to China, or “*zhong hua*”

should be replaced with Taiwan. Thus, The China Steel Corporation needed to change to become “Taiwan Steel Corporation”, and so forth—many things like this.

He started to put a wedge to divide the people and the society. Therefore, he highlighted—the division of ethnicity, political view, ideology of pro-unification or pro-independence. This is all that was behind his presidency.

When he first came to power, he was elected unexpectedly. He did not expect himself to win in 2000. When the election time came, the majority was torn between Lien Zhan and James Soong, so Chen Shui-bian was elected president by a minority. There were three candidates: Lien Zhan, James Soong, Chen Shui-bian. The first two were KMT members competing for about 65% of the votes, and Chen Shui-bian got about 35%. The two KMT candidates were fighting with each other so fiercely, that the number three edged out as the winner of the three. But the DPP constituent that he represented was actually a minority.

He got elected unexpectedly to become president, and he did not know anybody knowledgeable to govern. His cabinet was called “Boy Scouts.” I’ll give an example. In ITRI, I was president and the Institute would have executive vice presidents, vice presidents, and then Laboratory/Center directors. Within each laboratory and center, there were different groups. One of our managers in this group—the sub-center level—was made Secretary General of the Prime Minister’s Office. That kind of office was usually held by people that have served as Minister. Since as secretary general, you need to liaise with the various ministries to help the prime minister make decisions. I’m just giving an example here. You know, I’m very happy that one of my former colleagues was positioned in the high place, but I worry about the government. You know, and that’s just the situation. The first several years they are called a “Boy Scout Administration.”

The second term, he used only people who are Green. Green, you know, the pro-independence group. So long as you are Green, that’s fine. And then the final years, I would say he just used people who were basically subservient, those would just obey his order. You know, even if you are Green, if you do not agree with Chen Shui-bian, then you are out. The entire government became a very corrupted structure—it’s bad news for any country.

I have talked about the importance of globalization for Taiwan’s survival. Taiwan products had to meet world standards. A lot of Taiwanese manufacturers went to China. They set up operation there because of low costs, and then they strived to be globalized. By the way, I talked about the “Global Chinese, Inc.” model previously: designed in Taiwan, manufactured in China, and marketed globally. This is what has developed in the last ten years and proven mutually beneficial.

Chen Shui-bian, wanted to restrict the cooperation and to keep the capital inside [Taiwan]. But the business people found ways to do it [anyway]. Chen was bucking the trend of globalization, and that's why the economy got bad. I think people are very tired, very weary of him. That factored into this election.

Ma Ying-jeou, versus the DPP candidate, Frank Hsieh, in this election, has received 58% versus 42%, of the vote. I think Ma Ying-jeou got about 7.65 million votes, compared to 5.27 million votes for Hsieh. It's a difference of more than 2 million votes. It is a huge margin. So it was not a close election at all. Remember the first time Chen Shui-bian was elected, he won by a margin of less than 1 percent. But this time, the DPP candidate was beaten by this big margin. I think people are very happy with the result.

10-00:15:18

Li:

What does Ma Ying-jeou represent, do you think, for the future of Taiwan?

10-00:15:21

Lin:

I think Ma Ying-jeou says that there will be “no unification, no independence, and no war” during his reign. He wants to keep the status quo between Taiwan and the Mainland nurture an environment for [business] and cooperation. This is the major issue of China and Taiwan. I think he is basically pro-unification. But he knew that the process would be filled with complexities and would take a long time to do. During his administration, he did not expect this to happen. He wanted to let people think about this. He wants to promote collaboration, exchange, business, travel, and everything [conducive to peaceful competition]. On the issue of cross-strait travel, for example, if you want to go between Taipei and Shanghai, like a lot of businessmen do right now, you would have to take a flight to Hong Kong, and then, wait in the airport for a couple of hours for a change of flight to Shanghai. You may think that I was joking. If you were looking from the outer-space, you know, and you believe that the shortest distance between two points is a straight line, you would be amazed at how irrational earth people are; almost like playing Ping-Pong ball all the time. You have to bounce to this place, Hong Kong, and then go to the other place.

Businessmen will take one whole day to travel that should normally take about two to four hours, okay. And the reason is that Chen didn't want the space to be open; he wanted to make it difficult for people to travel. I think direct travel between Taiwan and Mainland China will be something that Ma Ying-jeou will do immediately. Ma Ying-jeou said this would start in July this year. Actually, a couple of days ago he was in the local television, and people asked—Ma Ying-jeou was asked how he could be so sure. He said, “Well, actually, there's a lot of work that's been ongoing—“ you know, between his shadow cabinet and Mainland China.

10-00:17:38

Li:

But prior to the election?

10-00:17:40

Lin:

Prior to the election, KMT has already started private discussions there. So the preparations are being made at this point to open direct traffic, direct flights, in July.

I think this is one thing, we'll soon see whether this happens or not. But, I think it's very likely that it's going to happen in July. This will certainly make it easier, much easier for businesses and for tourists.

As far as the independence-unification [debate]—there's a lot of very emotional issues behind [it]. I think it will take some time to sort out. You know, I have a very strong view regarding unification too. We can talk about this later on. We'll come back to this issue of Taiwan and China.

And back to the governing issues, in a way: Ma has announced his choices for cabinet members. All his cabinet positions have been announced. And based on the people that have been nominated, I think it's good overall, I would say there is a much better pool of talented candidates for the new administration.

10-00:19:22

Li:

Do you think this—the election will affect your work and your wishes for China's future?

10-00:19:29

Lin:

No, I think it will not affect my work, because I'm retiring. But I'm very pleased at what has happened. Because prior to this election, I didn't even want to think about going back to Taiwan anymore, after what Chen has done in these last several years—I felt so sad. But now I think there is hope. I strongly believe that there is a value in having a strong Taiwan for China. The simple existence of Taiwan, and the KMT, under the principle of Sun Yat-sen, has set up a democratic process. This is different from what Mainland China has practiced. I think people are very impressed—I was very impressed—with how fast China has changed in the last ten years. Certainly it's a tremendous improvement. But China today is still not a democratic country. It is under a one-party rule. The ruler is the Communist Party. Everything goes back to the small leadership of the Communist party. It's not a democracy the way we know it. I think China has to go back to basic, to the direct election at which the people can decide who should be given the power of the government, and the presidency. This kind of democracy may not be the best system, or the best model, but I think probably it's the best we know and best available. The people have no political choice now in the PRC.

I think the fact was enlightening that the Taiwan economy was able to grow, from very primitive agriculture to become a technology-based economy. At the same time, with the rise of the SMEs [Small and Medium Enterprises], the growth of the middle class, the democratic process proceeded steadily. There are very few places in the world that you can see that growth in economic strength in parallel with the democratic process. I think that's what Taiwan

has accomplished under KMT and the Sun Yat-sen principles. There were many difficulties, but it seems to me a much better route than what we have seen earlier in the Chinese Mainland.

10-00:22:10

Li: Maybe tomorrow after your talk, we'll come back to this and talk about the Taiwan-China relationship.

10-00:22:18

Lin: Yes.

10-00:22:20

Li: Just to go back a minute, in talking about Taiwan, it reminds me of our last conversation that mentioned how important your relationship and connections in Taiwan were in the seventies, when you were thinking about leaving DuPont.

10-00:22:34

Lin: Yes, yes.

10-00:22:35

Li: I wanted to talk a little bit about how those relationships developed and how they affected the career choices you made.

10-00:22:41

Lin: Yes. Now we go back to basically the two-China situation. I'm connected in both sides. I spent some ten years in Taiwan—high school, college, ROTC, and then left Taiwan to U.S.A. But my mother was trapped in China, and the family was separated to two households. I'm kind of a typical person who has ties on both sides. I'm very much interested and concerned with what goes on both. That's why, even though I lived in Taiwan—I have always dedicated some time to find out what was happening in China.

China went through a very difficult time. I mentioned that my mother was tortured, during the reign of the Mao period. And even in the seventies, much like the sixties, they were in dire poverty, or destitute. We have to send them provisions, rice, or that kind of thing, from Hong Kong. I don't know whether I told you about this. Instead of sending rice—bags of rice, we send them the dried, cooked rice.—When you go to a restaurant, okay, more often the Sichuan restaurant, one famous dish was the “kuo-ba” This was formed by purposely overcooking the rice to leave a thick layer of rice burned, and lined on the bottom of the pot. Have you ever had that?

10-00:24:35

Li: Yes.

10-00:24:38

Lin: Well, that's called kuo-ba, [鍋巴]. *Kuo* means pot and *Ba* means “scale,” okay. And usually we would send those kuo-ba, in big bags home. If you send rice, in transit somebody would punch the rice bag and let the grains leak out.

Thus when the person gets the bag of rice, maybe—he will be lucky to get even half of the bag. But with kuo-ba, you can just keep it. And people also sent vegetable oil or frozen animal fat, etc. Life in China was very miserable at that time.

I always wanted my mother to come to the United States, so I wrote letters to the State Council of China. And the State Council would say “No, your mother is in Guangdong, so you have to apply with the province government in Guangdong.” So I sent letters to Guangdong Province. The Communist party official would say it need to goes to the county. So it’s from the state to the province to the county and to my village. And then of course I wrote a letter to the village—they said, “No, this is something that we have no authority.—To let somebody go out of the country is a matter totally out of our control, our jurisdiction, our authorization. You have to go to the State Council.” It kept going in cycles, like this.

A lot of people in my part of the country, Guangdong, which is fairly close to Hong Kong, would escape or be smuggled out of China. At the time, we have many relatives and friends in Hong Kong who have some connections in this—to help people to get out of China. It was like something that you would see in movies or stories—refugee stories.

We had not been very successful in any of this. And finally, I approached Senator Harrison Williams to help to inquire with the Chinese Embassy. At that time it’s not the embassy: it was the Representatives’ Office of the People’s Republic of China in Washington, D.C. But again they were unable to do anything—this is basically national policy. I think I was one of those guys who was continually harassing the office with a petit family problem, you know?

I want to put this aside for the moment and talk about the other side. By working with Taiwan, I have friends, relatives, teachers, professors that go back, in and out. We were keeping in touch with them. During that time, the mid 1970s—I left Taiwan to the United States in 1961—, I had an opportunity to return to Taiwan. I took a trip to see a friend and relative of mine in Indonesia, who invited me for a visit to Jakarta. [While in Asia,] I went back to Taiwan, and I had a chance to see many of my old friends in Taiwan. Then I went back to Taiwan to participate in the government-run, “National Construction Conference.”

10-00:29:15

Li:

This is 1974?

10-00:29:19

Lin:

It’s 1977. I participated in a “By invitation-only” Conference initiated by the government to talk about the future development of the Taiwan. At that seminar I presented my view on R&D and industrial growth. I tried to show

the lessons learned from America; that leading companies in the U.S.A., DuPont, General Motors, General Electric—were able to sell their products and become leaders in the fields because they have devoted resources to research and development. Hence they have developed new technology and formulated new products, and so on. In Taiwan, there's no resources other than people. Therefore I think the way we can get ahead is through R&D and education.

I think this view was very much in agreement with the vision of Chiang Ching-kuo and his administration. Certainly I was not the first one to say this; other people had been talking about this many times. But I think, coming from the industry, I was able to present success stories supported by data. It's not from the government's view or any macro-economics, but from the view of the industry and the firm level. I think the participants were quite impressed with my presentation.

One of my friends, Kao-wen Mao, my classmate in Taiwan and a graduate student of Berkeley, went to Carnegie Mellon and received a Ph D degree. By the way, he was a student of Prof Judson King at Berkeley. While I went to Columbia. In 1977, Kao-wen was teaching at the National Tsinghua University in Hsinchu. He actually was dean of engineering at the time.

Let's back track a bit. Kao-wen went back to Taiwan earlier than I did. Right after I graduated, I worked for DuPont. Likewise, Kao-wen worked for General Motors for a couple of years, and then returned to Taiwan and became Dean of Engineering. Then, in the National Construction Conference, I met Kao-wen again. And he said, "Why don't you come back and help to set up the Polymer Institute...?" Because we were talking about how much was the need for polymer science in Taiwan. Polymers is my field of expertise. Polymers science is the one that has to do with plastics, textiles, elastomers, coatings and others. It's the science of macromolecules, big molecules. It figures very importantly for Taiwan—for the United States, and many other countries. Listening to his request, to help set up the Polymer Institute. I said, okay, I would.

All these factors kind of came together. And then there was my mother's case. There were some relatives and friends who were organizing some activities so that she could be smuggled out of China. I wanted to be closer to the activities there. I should say that I've always been interested in Taiwan and its relationship with China. When I'm talking about Taiwan or China, I'm talking in the context of Taiwan and China being one. So here's an opportunity coming up so I could do something different to help Taiwan and China. At that time, polymers were still fairly new for both places.

So I said, "Okay, I will try to work things out." During all this discussion, and when I came to participate in the National Construction Seminar, I have the

opportunity to know quite well a number of people including Minister Sun Yun-Suan [孫運璿]. Y.S. is a very important person who affects my career. He was an electrical engineer by training, graduated from the Harbin Institute of Technology of China. He was twenty-some years older than I am. And when he went into Taiwan, he was already a reputable engineer. He then worked for the Taiwan Power Company and later was the chief engineer of TaiPower, which was the national—the state-owned electric company. And then he became a highly accomplished leader. He, at one time, also led a taskforce to help Nigeria building its electric power plant. When he returned to Taiwan, he was made President of TaiPower and later, Minister of Transportation and Minister of Economic Affairs. So at this time of 1977, he was Minister of Economics Affairs.

So when I went to join the National Construction Conference, I was assigned to a sub-group headed by Minister Sun. You know, if you are placed in the science sub-group, most likely the group would be headed by the National Science Council Chairman. There are other sub-groups, education, health, etc. So I was in this group of economy focused on—economic affairs and innovation. So this gave me a chance to work with Minister Sun. I will write his name in Chinese for you. Many years later, I had written a couple articles about him, too.

I feel that, you know, the environment to work in Taiwan appeared to be pretty good. So I want to spend a year in Taiwan.

10-00:37:26

Hamilton:

And this is when you took a sabbatical from DuPont?

10-00:37:28

Lin:

That's when I took a sabbatical from DuPont. DuPont was not very happy with my leave. Because at that time, I was quite successful in my career and was quite well demanded in several fields. And they said, "Well, this is the where your career belongs and DuPont has never had sabbaticals." But because of my mother's situation, I explained to them that why I was needed there. I want to be closer to Taiwan and Hong Kong and be able to monitor the situation.

So over many discussions with Dr. Orville Bullitt and others, they basically have agreed to my leave. But he said, "Well, you have to come back afterward." So, you know, that's a deal. So I took a year off in 1978.

10-00:38:28

Li:

And your whole family went with you?

10-00:38:29

Lin:

'77.

10-00:38:28

Li: And your whole family moved to Taiwan, then, for that year?

10-00:38:33

Lin: For that year I moved to Taiwan.

10-00:38:36

Li: With your family?

10-00:38:37

Lin: With the family. At that time, at that year, I have two children, Ann and Gene. Ann Chih [林安之] was born in 1967, so at that time, she was ten years old. Gene Chih [林敬之] was born, 1979, and was 7. They really had tough times to go through. And I love them very, very much, because they're so good and worked very hard. Their time was tough because both went to local Chinese schools. After this year, Ann was very good at basic Chinese. Gene, I guess has forgotten most of the Chinese that he learned; but I think he can pick it up easily.

At that time besides the two children, the third one has not arrived yet. Since we were talking about going back for just a year, we were all fairly happy in a way. Just take a year off, you know, from the normal life. So we stayed on the beautiful Tsinghua campus at Hsinchu. I was receiving a grant from the National Science Council—they gave Tsinghua the money so that I can work as a visiting professor of polymer science. The funding from the National Science Council also allowed me to help set up polymer institute, and to teach polymer science and polymer engineering.

When I was about to take off, I got a letter from the president of Tsinghua University—Professor M. C Chang, [張明哲] in which he said, “As soon as you return, come to Taipei to see me before going to the university at Hsinchu.” It was summer time and he was basically living in Taipei. So when I arrived at Taipei, we settled down at my father's home and I went to see Kao-wen and then Professor Chang. I wanted to know what was happening. He said, “Well, we want to make you the Dean of Engineering.”

As it turned out, Kao-wen, who had been Dean of Engineering-Tsinghua, had accepted an assignment to be President of Taiwan Institute of Technology in Taipei. It's a four-year college and specialized in science and engineering. Now that the position of deanship has become vacant, naturally a number of people inside the University were vying for it. But the president of Tsinghua University did not like any of them. At that time, international search is not institutionalized yet. He looked at the people who are available and felt that I am the one most qualified.

Professor M. C. Chang—was a chemical engineer. He was an adjunct professor of chemical engineering at NTU when I was a student. He knew me, although just by reputation. We did not have any close relationship.

Apparently he had also heard of my work in DuPont, probably read my papers and realized my work in polymers and rheology. He talked to Kao-wen, and then looked at all the candidates and wanted me to be the Dean. Hence, I have never become the director of the Polymer Institute, but was professor and then the Dean of Engineering. That's the Tsinghua situation.

10-00:43:46

Li: Now, at this point, your citizenship is—

10-00:43:48

Lin: U.S.

10-00:43:50

Li: You have U.S. citizenship. And your children have U.S. citizenship.

10-00:43:52

Lin: Yes, my children have always [been U.S. citizens]—but my wife is also a U.S. citizen.

We moved to Tsinghua, in Hsinchu. At that time—this was back around in 1978, the living standards in Taiwan was fairly poor. We don't have milk in the grocery, for example. The milk has to be delivered to our home every morning, on special order. There's no grocery store anywhere nearby that we can go to buy milk or daily provisions that we are familiar with. And in my dormitory—which is, you know, deans' dormitory is supposed to be very good, right? Yes, it was good, by the local standard, but the hot water goes through one of those gas burners on demand. One day Gene was taking a shower, and it was very cold. "There's no hot water!" So I said, "Okay, I'll turn on the hot water for you." I went there to lift the burner, and suddenly I was caught by a burst of flame, explosion-like. Not an explosion, but a big flame gushed out. And it licked all over my face. Though the skin was not burned, I could feel all the facial hairs were shaved off. At that time the daily life was difficult compared with the comfort in the U.S.

10-00:45:45

Hamilton: Very different than New Jersey.

10-00:45:47

Lin: Yes you know, it was different. My wife, at that time, was pregnant, and was carrying the little baby. And she'd have to cook, and, the stove was kind of low, so she felt that she was warming the baby as well as the food. It was funny.

These are the kinds of things [going on] in 1978 in Taiwan. It's nothing that we have dreamed of. Life was relatively under-developed.

10-00:46:36

Hamilton: Did you just hold that position for the one year?

10-00:46:38

Lin: For one year, officially. Actually, it was one and a half years counting the transition.

10-00:46:42

Hamilton: Were you involved in picking your successor for the dean job?

10-00:46:47

Lin: I was involved in picking my successor because then we do have a number of candidates, and counting those possible to come in, okay. We had to set up an interim dean when I left. And the interim dean was Professor C. J. Lee [李昭仁] from the Tsinghua University. Also a chemical engineer. At that time, chemical engineering was, I guess, usually the largest and the most established department, you know, during that period of time. Because petrochemicals are the major supporting pillar of the economy. Petrochemicals, polymers, and petro-fuel, are like today's IC, right—IT, or computer related fields. But during that time, it was petro, okay.

At that time, I must tell you this, is that—we also—I know also a number of good candidates are coming in. One of them is a Dr. Li from Honeywell.

10-00:48:04

Li: My great-uncle?

10-00:48:06

Lin: Your great-uncle! Your great-uncle. Although I did not know him at the time. But, you know, there's—because we would discuss with the President and a few other people on—you know, who can be my successors? Okay. And they said, well, you know, so and so is coming—may be coming in a year or two.

10-00:48:33

Li: Choh-hsien Li?

10-00:48:35

Lin: Professor Li—Li Choh-hsien [李卓顯] followed as dean, but then he only served for about a year on the position.

10-00:48:56

Li: Small world.

10-00:48:57

Lin: Yes.

10-00:49:02

Li: Did you want to go to back to DuPont, or did you go because you had made the deal?

10-00:49:06

Lin: I had received the permission to take the sabbatical with the understanding that I have to return. And also, about the time I spend this year, you know, it's

a very eventful year and we need to talk more about this year. But before I about to go back, I get a call from relatives in Hong Kong that my mother was about to leave China. You know, the smuggling concept did not work out. Because I thought it would be too dangerous for my mother. It's good—maybe good for somebody like James Bond, not my mother. You know, I have relatives that swam out of Mainland China to Hong Kong, by tying himself with a basketball. And one was tying with a belt of Ping-Pong balls, about twenty to thirty Ping-Pong balls, wrapped them around like a float to help swim out of the boundary line. At that time, people used different methods to come out of Mainland China. That's in the sixties, seventies, okay. So then—so therefore—and of course, this is a very eventful year, 1979. In February, my son, Dean Chih [林定之]—you know, my number three and last child—Dean Lin—was born. And—my mother was able to come out in summer and then we returned too to the U.S. Very happily, I went to Hong Kong to receive my mother after thirty years of separation. I cannot recognize her at all.

10-00:51:04
Li:

Where did you meet? When you went to Hong Kong?

10-00:51:08
Lin:

Yes.

10-00:51:08
Li:

Was she at a family member's house?

10-00:51:10
Lin:

Yes—we have many relatives in Hong Kong. So she came out, and the relatives already took her from the border, and then to their Hong Kong residence. So I went to see them.

What happened is credited to Deng Xiaoping—you know, all the things came together. Deng Xiaoping visited the United States—I think it's in '78, you know, at that time—it was probably Jimmy Carter's presidency. Yes, Carter. At the time, there were so many people like myself, you know, in the situation. So as he made a request—speaking for these people with separated families in the United States. He said, won't you consider to let their family out? So Deng Xiaoping—as the story goes, at the time I was in Taiwan, said, well, how many do you want? You want one million, or two? I guess after he went back to China, he let those people on the docket go. So my mother was very lucky, came out.

Not only that, when she came out, she came out with my brother. My youngest brother. Because—

10-00:53:08
Interviewer:

What's his name?

10-00:53:09

Lin: Chui-Hui [林垂輝], also known as Ken. He now lives in the Los Angeles area. You see, when I first made application for my mother, the brother was very young, okay. But then over the years—over this period of about ten years, he grew up, and married. You know, married—and he had kid. So when my mother was about to leave China for Hong Kong, I have requested that my little brother to accompany my mother, okay. Because my mother was a farmer and illiterate: she cannot not speak any dialects other than the native tongue. Also, she was in poor health. So I asked permission to let my youngest brother go out with her. As it turns out, it's not only the brother but also his wife and his kid! They all came to Hong Kong. Alleluia!

10-00:54:19

Li: Did they all move to Taiwan, then?

10-00:54:22

Lin: Into Hong Kong, not Taiwan. They basically parked in Hong Kong. In the summer of 1979, I returned to the United States, after the year in Tsinghua. Then, several months later, my mother also came to the United States. Then, it was followed by my kid brother, his wife, and his daughter. It's kind of family reunion in that sense. And my father was parted from my mother for about thirty-some years.

10-00:55:12

Li: Did they all move to New Jersey?

10-00:55:16

Lin: Then they moved to New Jersey for a short while.

Brother Ken was later trained as an accountant and has been working for the state of California. The little girl—the daughter, you know, Susan,[林信之] later graduated from—Jefferson Medical College in Philadelphia and is now practicing medicine in Davis, California. Ken and Lily have another daughter Sarah [林作之] and is studying at UCLA. When my mother came to New Jersey, Ken and his family stayed at Fresno with big brother Eric and his family, wife Katherine and two sons, Elmer [林懷之] and Elton [林樂之]. So you can see the importance of family safety net.

Now, back to my work in Taiwan. The year of 1978-79 was a very important and eventful year for Taiwan. It is the year then U.S. President Jimmy Carter declared to sever the formal relationship between Republic of China [Taiwan] and the United States. Yes. It was Nixon who earlier went to Beijing set things up and tried to work things out under a very complex situation. So in 1976 or '77, the Republic of China [Taiwan] was replaced by PRC for the seat at the United Nations. I remember that time, because my father, who was a loyal KMT member and had worked years for KMT government, was visiting us in the U.S. When the news broke that—the news broke that Kissinger went to China, and that the Republic of China was being displaced by Mainland China

in the UN, he was so angry. He simply said, “Buy me a ticket and I’m returning to Taiwan at the earliest possible time.”

So, barely a few months after I went back to Taiwan to teach in Tsinghua in 1978, formal diplomatic relation between U.S.A. and the PRC was set up. It was the condition between the United States and the Republic of China that U.S./Taiwan diplomatic recognition be terminated at the same time.

Begin Audiofile 11

11-00:00:02

Li: This is Robin Li and Emily Hamilton, interviewing Otto Lin, May 5, 2008, tape eleven. You were talking about 1978?

11-00:00:13

Lin: So I came out from China, and my son, Dean, was born. There’s a lot of things happening, during that time.

11-00:00:27

Li: Right before we changed tapes, we were talking about Carter.

11-00:00:39

Lin: Yes.

11-00:00:41

Li: —and his decision to cut off diplomatic ties with Taiwan.

11-00:00:48

Lin: Okay, yeah. That decision was a very abrupt one and it came as a big shock to the people in Taiwan. The story was that Chiang Ching-kuo was told in the middle of the night, you know, and just a few days ahead. Then, a few days later, the State Department sent Christopher—

11-00:1:27

Li: Warren Christopher?

11-00:01:29

Lin: Warren Christopher, yes, to Taiwan to explain this situation from the United States perspectives—why Carter’s taking this position. And Christopher was greeted with eggs from angry crowds in Taipei. This was also the time when James Soong made himself known in the media. He was a spokesman for the government. At this depressed time, people had a very good impression of James Soong because of his assertiveness and the display of dignity for the country.

The news was a shock to all of us. When this happened, many people tried—to go back to the United States, you know, because of a big scare like this. But I think Chiang Ching-kuo was holding very firm, and Sun Yun-suan, who was the Minister of Economic Affairs, at a few months before, has just become the Prime Minister. This cut-off of formal diplomatic relationship, took place

about three months, I guess, three of four months after he was made Premier. So the Carter action was a big test to Sun Yun-suan.

But as in many crises before, the government is able to handle the complexity quite properly. Quickly it calms the people. I think Chiang Ching-kuo and Sun Yun-suan both are doing very good at this critical moment. They asked people to remain calm, confident and vigilant.

I was Dean of Engineering at the time. At Tsinghua, I should say one of the major projects was the development of Electric Vehicles. We'll come back to this particular point, all right. But I joined Tsinghua sometime in '78 in the fall. Or in summer, all right. When I come to Tsinghua, the electric vehicle project was already on going for some time. The project was funded by the Science Council.

11-00:04:08

Hamilton:

Taiwan Science Council?

11-00:04:09

Lin:

Taiwan, yeah. The National Science Council, which also funded my visit. You know—at that time there are not too many scholars that was able to get fund from NSC. When I came to Tsinghua and become Dean of Engineering, the EV project was under my leadership. There are of course many project leaders. Well, this EV project was initiated by K. W. Mao who obtained the financial supports from the National Science Council. Kao-wen was, as I mentioned before, a chemical engineer and worked for General Motors. So he knew about, automobiles. He was able to convince the Chairman of the National Science Council, Professor SHU shien- Shiu [徐賢修], that there is great future in electric vehicle.

Petroleum is the source of our daily necessities but is depleted with use. However, electricity can be generated by many different ways. So it's better to use electricity as energy source for cars,—electric vehicles. Burning gasoline, furthermore, pollutes the environment. So it was a pioneering idea at the time, back 30 years ago. Soon, and of course, Kao-wen was able to put this group of people together and produced two or three models: Tsinghua 2 and Tsinghua 3 EVs. The team has demonstrated the principle, by using lead-acid battery. The experimental models were test run by the Post Office on normal city streets.

So I came to Tsinghua and became the overall leader of this program. We are organizing faculty members of the Engineering School from several departments. Chemical Engineering people worked on the battery—not only the electro-chemistry, but also the manufacturing of the battery. The objective was to study and make high-density battery, lead-acid battery, which is the heart of the vehicle. People from the Electrical Engineering Department was to study the motors and the transmission. Now, a different transmission and control system will be needed, obviously. People from Mechanical

Engineering would work on the motor, chassis and various components. And again people from the Industrial Engineering Department would work on the process, materials, control data and put all these different elements together in the production line.

It was a multi-disciplinary and inter-departmental project. Obviously the Dean of Engineering would be the one to oversee this. And of course, I have worked with DuPont in an industrial setting, so I have some experience going from product concept through development to final commercialization. I think probably that's one of the reasons that I was picked to be Dean of Engineering, because this project was just then coming together and was the major focus of the University.

Today is 2008. When I looked at this project, in November 1978, the electric vehicle was not commercialized even in the United States. And at that time, I immediately picked up a number of problems. One is that the battery technology was inadequate. Because the energy density of the lead-acid battery is nowhere comparable to, you know, gasoline. So there's a lot needs to be done in terms of battery research and development, not to mention manufacturing. Second, a new battery different from lead acid would be needed. Low energy density aside, lead acid battery is very heavy. Have you ever changed the battery in the car? You know, it's very heavy. And for the electric vehicle, even with the smallest model, requires 24 of the battery units. Nearly half of the weight of the car will be from the battery. So the electric vehicle models were far from commercialization. The existing models are only good as prototypes for demonstration of the principle; that is okay.

At that time, the project calls for producing 200 EVs—to be in a large scale test-run by the ROC Ministry of Communications which runs the Post Office. The postmen were persuaded, albeit grudgingly, to use the vehicle for mail delivery, at their own inconvenience and risk. There were resistant to this, quite understandably.

When I took a more objective review of this project, you know, the science, engineering, technology, applications, services, infrastructure and everything, and tried to put things together, I found the situation was simply impossible. I could not overlook problems in the battery, transmission, performance, maintenance, and all. Strictly speaking, from the production point of view, professors are very creative, but totally unrealistic. They have little notion in terms of production. For production, everything has to be there, or always ready. But, in reality, the battery's not ready, because Professor X would have a better idea of the newer battery. Likewise, other faculty would have better ideas of the control electronics, or something else. So I say, "Well, now you want to make 200 vehicles. Show me the blueprint and the performance specs. We cannot make 200 different vehicles on 200 different blueprints." I want to finalize the schematics to just one. Two hundred units but one model. So that we have quality standards and can test out how good it is, right? Most faculty

members do not have the concept of manufacturing. Everything was treated like a new gadget, in the laboratory. I think this does not support manufacturing ability.

I very soon recognized that working on important products such as EV, and to produce in such scale, 200 electric vehicles, is a job too big for the university. Within a few months working with faculty members, I came to the conclusion that the manufacturing of EVs cannot be done in a university. Basically, we would need to structure the program differently using a proper operation model. Yes.

So I told Dr. Shu, Chairman of the National Science Council my assessment. I told him, “Professor Shu, this program has to change. We have to get a company, or organize a new company to take over.” Dr. Shu was unhappy about my suggestion. Because he was a Tsinghua person and felt that the program needs the participation of the top people in their fields. “Tsinghua got the talent and the people for everything.” After all, where else can you get the best battery scientists? Tsinghua. The best automotive control person? Tsinghua. But I say, “Now we are not talking about a scientific project but an industrial project. You have to think about the performance, the cost, the quality, the servicing and the marketplace in addition to all technology issues. These jobs are things that the university cannot do well.” Hence, the program has to be transferred, out of the university, to the industry for further development.

Finally he agreed with me. I was very gratified talking with him in-depth on this. At this time, Prime Minister Sun Yun-suan, who has had major industrial exposure, also agreed with me on the approach. Because this was a national project and many in the leadership are concerned with its further progress. So in a way both of them understood me better as a result. My disagreement with the conventional view gave them a better understanding of my perspectives and the way I do things. Finally we found a company specializing in manufacturing and metal works—a famous company in Taiwan—to take over this program. In other words, we let this company take over the job of manufacturing 200 vehicles and further commercialization of the EV. And we let the university faculty members focus on research and work with the company as consultants on need basis, to help them put the car together. But the program would be a company-run project instead of a university-run project. The end of the story for the project is that we told the company that the vehicle may be useful for special applications but not as passenger car as yet. The company needs to find new markets for it, not relying on the Post office. It would also need to establish a new infrastructure for charging and servicing. Because for cars that run on gasoline, you just go to the gas station and fill it up. But if the battery’s run down, how are you going to charge it? You have to have supply stations, with the infrastructure to maintain, and recharge, and replace, etc. You cannot just plug in at home for these 24 batteries; you have to have a special setup for the charging. Those are the kind

of the infrastructure that you really have to set up. We outlined the problems we knew for the company: technical, marketing, service, and the like. They have hands full of problems to work on. Not the least is to identify the right kind of customers. So the Tsinghua EV program was taken over by the industrial company.

And eventually, of course, technology, especially battery technology was not up to it. The battery system used have never been able to generate the same type of power and power density needed. You see, for a tank of gasoline, you have a lot of power coming out from it and fast. For the battery, the power is just inadequate; there is really no comparisons. And people always knew that you need a new battery, and the new battery will be higher cost. And until the price of petroleum goes up to may be \$40 USD per barrel, EV will never be economical. Regretfully, we have seen the oil got to over \$100 USD per barrel, but the EV is still not economical.

11-00:16:09
Hamilton:

Was there ever any discussion to make these changes to the infrastructure, or was it just determined this would be impossible?

11-00:16:16
Lin:

Well, to change the infrastructure is such a big job. It's beyond the scope of the National Science Council. Actually, one time we proposed to make an area within a number of street blocks in downtown Taipei as an electrical vehicle zone. There the taxicabs will be running on electrical vehicles, and then you will also set up charging station, within that area. But then that involves so much changes in zoning, planning, urban development, transportation, etc., and a lot of interest groups. The proposal was never seriously considered. It's very difficult to do.

11-00:16:56
Hamilton:

And were there any security issues in terms of—while you were running this project, I'm sure that there weren't security issues. But then you went back to an industrial setting in the United States. Was there ever any concern that all of the work that you had been doing with the university and with this metalworking industry would be taken back to DuPont?

11-00:17:22
Lin:

No, that issue never came up.

11-00:17:24
Hamilton:

Okay.

11-00:17:24
Lin:

The IP issue has never really come up. I think they trust me. You know, if they don't trust me, then—I trust myself, you know. I expect myself and my colleagues to be person of integrity. This was not an issue at that time, you know.

11-00:17:41

Hamilton: And was this a project that involved securing patents?

11-00:17:46

Lin: Well, I think there are some acid battery patents, different ways of making lead acid electrodes for higher density. I think there's some patents there. And the fuel controls patents. But, this is thirty years ago.

11-00:18:10

Hamilton: Right.

11-00:18:11

Lin: I think EV technology was still in the early stage even in the United States. General Motors might have tried it a couple of times, but was not successful. There's no technology available at the time. Everybody would be starting in the very beginning. So there's no competitive technology anywhere at that time.

11-00:18:38

Hamilton: Could you talk a little bit more about the National Science Council? I'm interested how that works.

11-00:18:44

Lin: Well, the National Science Council was a government agency that supports research and development of science and technology in the university.

11-00:18:54

Hamilton: When was it established?

11-00:18:58

Lin: The National Science Council was established in Taiwan around the early seventies. I can look at my notes. I think that was in the early '70s. Chiang Ching-kuo had the vision of building up technology to change the Taiwan's competitiveness. Among the important areas was human resource and technology development.

11-00:19:40

Hamilton: Okay.

11-00:19:41

Lin: You need to help the university, and the way to do it is to give the funding to the university professors, so they can do research. The organization to run that is the National Science Council.

The National Science Council has the funding to support science projects. It also has the funding to recruit established scientists, professionals from outside Taiwan to go to Taiwan. There are many Americans, foreign experts, who are awarded visiting scholarships or visiting professorships to come to Taiwan, for a year or two, much like the kind of job that I was holding. But I

didn't know anybody [else] who was under that program and became Dean of Engineering!

11-00:20:54
Hamilton:

Right.

11-00:20:55
Lin:

So that was the National Science Council's job.

11-00:21:00
Hamilton:

Are you able to compare that to the National Science Foundation in the U.S.?

11-00:21:05
Lin:

The National Science Foundation [NSF] here focused more on basic research. I don't know the NSF now, but I guess for the 70-80's period, the U.S. NSF supported basic research. Industrial or applied research in universities like UC Berkeley and Stanford, get more funding from D.O.E. and D.O.C. and other agencies. NSF also supports basic engineering research.

But the National Science Council in Taiwan supports projects in science, engineering, medical and health sciences and also in applied research and large-scale technology projects. In a way, it is more like China. In China today, China has a Minister of Science and Technology—MOST. It is probably the largest-scale national science council and funds multi-university projects, a lot of big projects.

11-00:22:34
Hamilton:

Do you think it's a benefit to have one central organization, or do you think it's a benefit to have numerous organizations putting money into different projects?

11-00:22:45
Lin:

Taiwan is small enough, [so that] if you just have very small fragmented projects, it will not amount to anything. You have to have some kind of coordination and organization. So I am in favor of big projects, in the setting of Taiwan.

11-00:23:03
Hamilton:

Mm-hmm.

11-00:23:04
Lin:

Yes. Look at Taiwan. It's a small place, compared to not even the size of California. Human resources are very weak, the technology base is weak. That's why the government has to take a stronger position in organizing R&D and help putting things together.

This is a subject I talked about in my lecture, about an effective national innovation system. [It's] very much a subject that we were always talking about: the synergistic relationship between the government, university, industry, and the technical organizations. It's an innovation system like this,

here. And actually, people in the United States do not really see the role of the Institute. That is because in the United States, the universities are very strong. Berkeley, Stanford, MIT, they are very strong organizations. Under this setting, you have faculty that are doing basic research, and you also have faculty that are doing applied research. And being a free economy, a lot of faculty members are very close to industry. You have a lot of innovation through this interaction. But in Taiwan, the universities are weak. You have to have somebody to link university and industry together, and that is the Institute's job. We'll go back to ITRI's position later on.

The role of the Institute is very important, in Taiwan, but also in Europe, in Russia. There are many institutes that are independent from the university, and also independent from the industry, but positioning in the middle. They play a very important role in the innovation systems.

Okay, going back to the Taiwan situation?

11-00:25:33

Hamilton: I just had one more question along those lines, is that you had said earlier that after graduate school, you had sort of come to a crossroads, and you had to decide if you were going to go to the Rockefeller Institute or DuPont. So making this choice between industry and academia.

11-00:25:49

Lin: Yes.

11-00:25:51

Hamilton: And you chose industry.

11-00:25:53

Lin: Yes.

11-00:25:54

Hamilton: So then, in some capacity, you went back to academia. And I'm wondering if that is simply because of this different structure that you have in Taiwan, that there's more of a blend, or if you decided that it wasn't so much of a crossroads anymore. That you could sort of have both.

11-00:26:11

Lin: Well, I went back to academia—I guess I have really very seldom do basic research [after Columbia]—most of the work that I've done is in the applied area. The work that I've done with DuPont, you know, rheology is application oriented. And, you know, people can study the mathematics, these partial differential equations, you know, of the materials. And those can be very mathematical.

But my interest basically is on how would this affect the performance, or how does the structure affect the properties. My interest mostly is in this other area, so that makes me more of an applied science guy, you might say. And because

of that, I have a natural tendency to work with industry. When I was at Columbia—[I] was [working] on DNA at the time. I could have been working with the Rockefeller University and then go into the molecular biology area, and I guess we could study all the good things about DNA. But even if I do that—probably I will still be working more on the applied side. How does DNA structure affect a certain disease, or how do we detect, or how do we cure, that kind of thing. So that is applied science, too. I guess my interest is basically more on the applied science side.

11-00:28:07

Hamilton: So even if you are housed in a university, you would say that your role there would be applied science, working with industry?

11-00:28:16

Lin: Yes. I think it will probably be more [fitting for me] this way. And I think most of the College of Engineering people—School of Engineering people are in the applied sciences [aiming to benefit the society at large]. A lot of universities have a college of applied science and engineering, they're together in that sense.

11-00:28:35

Hamilton: And this goes along with your goals of helping people with science.

11-00:28:39

Lin: I think my inclination, you know, conscious or not conscious, is fairly clear: that I am not a person who studies why the apple falls from the tree. But more, what use can we make of this phenomenon?

11-00:28:55

Hamilton: If I could also just back up a little bit, I'm curious about what the situation was for you with the announcement of Carter's complicated diplomatic situation. Was there a concern that you would not be able to return to DuPont, or was that not ever an issue?

11-00:29:12

Lin: No, that's not ever an issue, because I know the United States well enough at that time. I understand the situation fairly well. I also recognized that I always favored establishing a relationship with the Mainland. Because after all, it's a country of billions of people—how can you not recognize China? My problem is the de-recognizing Taiwan. I think the existence of both are facts. You should say, well, "Yes, there's a billion people there, but here are twenty million people too, you know." And twenty million people is not that small. Compared to Singapore—that's a full-fledged independent country that is three million people plus at the time. Today, I think, it's not even four million, Singapore. And if you're looking at the member countries in the UN, I would say half of them are less than ten million, population-wise. While I recognize the U.S. has to establish a relationship with Mainland China, I'm hoping to find a way that you can also establish a relationship and maintain the relationship with Taiwan. [Note]

Narrator's Note: My early letter to President Carter in May, 1978, [Appendix 2] summarized my views at the time when China was still under Mao's tight control. My grave concern for Mao's anti-humanitarian records was based on his track records: the great Leap Forward, the Cultural Revolution, etc, which has brought so much misery to tens of millions of the Chinese people, including many loyal CCP members, scholars and innocent bystanders. I was hoping that Carter's action would not help create another tragedy and bloodshed between Taiwan and China. I was not against recognizing China per se. In fact, I have attempted in my own way to help China to be an active contributor of the global community.

I'm a Roman Catholic. I think the Vatican today is facing similar situation. It's that, how can you not recognize Mainland China? But on the other hand, there's still a lot of Roman Catholics in Taiwan. You cannot say, "Okay, I want to recognize people on the Mainland, and just forget about those in Taiwan." This is always a dilemma.

It's never in my mind that I'm scared or worried about my own safety or anything, you know. I was always trying to think, how do we work out situations so that they will have—you know, so they can have a good relationship with both sides? And I have also recognized that the existence and success of Taiwan is, too, a motivator for Mainland China.

Don't forget the factor of time, it was about 1980 at this point. You remember that in China, in Mainland China, they have just gone through a very difficult cultural revolution. Prior to that, it was a great leap forward, which turned out to be the great leap backward, you know. Millions of people died of starvation and the country was destituted—I explained to you how we shipped food to help my relatives. So the country is very poor. It's underdeveloped. It's all because of Mao's insistence on his concept of Communism. I think it's going the wrong way. So what we have done in Taiwan is a better way to do it.

The existence of a strong Taiwan will provide motivation for the Chinese Mainland. I think what happened in this last ten, fifteen years, proves that this is the case.

We always felt that [we had to] try to let America know the real picture from different perspectives. And, you know, I think we have to give credit to Carter, in a way. While he cut off diplomatic relationship between the U.S. and Taiwan, he also engineered the Taiwan Relation Act later. The Taiwan Relations Act is the lawful legislation in the United States passed by the Congress in 1978/79 which says that the U.S. will sell weapons to Taiwan to maintain its defense capability. I think that's the key element in there. Of course, this makes the military industrial research complex happy. But I think it's important for Taiwan. And also, some representative offices of Taiwan are set up in the States. There's an office in Washington, San Francisco, Houston, and Chicago, from Taiwan, so that they can still service their people here, and

maintain a channel of communication. The U.S. set up the AIT—American Institute of Taiwan in Taipei, providing much of the functions of the old embassy and the consulate general.

Formally the diplomatic relationship is cut off, but in reality it is still living. The U.S. maintains the basic relationship with Taiwan by law. So I think Carter, in a way, is okay. [Narrator's Note: My letter to President Carter before all this happened, and many similar letters from other concerned people, did not stop him from severing formal relationship with Taiwan, but may perhaps help consolidate his thoughts on establishing the Taiwan Relation Act. This is a subject for future interested historians to find out.]

11-00:34:57

Hamilton:

Your comment on selling weapons makes me wonder what the status of weapons development was in Taiwan. If technology and development, research and development, was so important, I'm curious about what the role of weapons were.

11-00:35:15

Lin:

There are several levels we can talk about. The weaponry—if we're talking about weapons—traditional weapons, this includes chemical technology, electronic technology, computer technology—, etc, these do exist in Taiwan. Everywhere in the world, you know, every country that has chemists, biochemical engineers, electrical engineers, they are pursuing their own goals related to weapons. And I think in that sense, Taiwan has the capability of making cannons or guns or, computers that controls machines, that kind of thing. So that is sure.

Taiwan, at that time—people in the leadership had debated about nuclear.

11-00:36:11

Hamilton:

Okay.

11-00:36:12

Lin:

Okay. Taiwan, at the time, Chiang Ching-kuo was in charge. He very much wanted to grow nuclear power. And the first it was nuclear power for electricity. That was with the assistance of the United States. Nuclear power is everywhere in the world. In Taiwan it is a small percentage of the total power generation—I will say about 10 to 15% of the electricity was generated by nuclear, and with very severe control by the United States. The question was whether Taiwan had ever tried to develop nuclear bombs. I would say, from what we learned today, there was a period of time that Taiwan was interested in that. Both Chiang Kai-shek and Chiang Ching-kuo were interested in that, especially when Mao Zedong, in the 1960s, was successful in test firing nuclear bombs. So the Chiang's were given this serious considerations. And of course, the United States has taken a very strong view that "Thou shalt not have any nuclear power,"—except for the United States, of course, which has hundreds or thousands, nuclear weapons abound. But no other countries

should have them, right? And, of course, unfortunately, the Soviet Russia has had many nuclear bombs. So the two have agreed to stage “Non-proliferation” as a firewall. But non-proliferation was not very successful for Israel, India or Pakistan. Now it is known that North Korea and Iran are establishing nuclear capability. Even for today, I think there are still monumental issues requiring public debates with this question.

But going back to Taiwan. I think Chiang Ching-kuo felt that he wanted to have nuclear power, and, nuclear weapon. And there were heated debates among the high-level people at the time. In Taiwan, there was an institute dedicated to weaponry research which was under the Defense Department. Unlike ITRI which was basically for civil use or industrial technology, this institute is dedicated to weaponry research that was under the auspices of the Ministry of Defense. Yes, there’s an institute like this. And it’s a fairly very large-scale operation.

For nuclear technology applications, it was the focus of one of the laboratories under that institute. And at one time, I thought they are talking about nuclear fuel enrichments; there are several key elements of that, and they have been working on some. But in the high level, very highest level of decision-making, it was decided not to pursue that. And I would say that this is very much indebted to a great scientist, Professor Ta-yu Wu [吳大猷], a famous physicist. One thing he was famous for, was that C. N. Yang and T. D. Lee, both Nobel Laureates in Physics, were formerly working under his guidance. And Prof Wu was President of the Academia Sinica—which is the Academy of Science in ROC. Actually, around that time, 1970s, he was a professor at the State University of New York. And then he went back to Taiwan from time to time as an advisor to President Chiang Kai-shek. Okay. Chiang Kai-shek, at this time, was about, you know, already in his eighties. A lot of power, political power, was slowly transferred to his son, Chiang Ching-kuo.

Chiang Ching-kuo, in his younger age, spent ten years in Russia. And he was a contemporary of Deng Xiaoping. They knew each other while in Moscow. After Chiang Ching-kuo returned to China, he fought with many other rivals to come to power and make a name of his own. And, as I said previously, he very much wanted to have the nuclear technology so that he can have the ability to produce nuclear weapons, a way of counteracting Mao Zedong.

A lot of arguments ensued. But, I guess, finally, the argument of Prof Wu has persuaded the old man, Chiang Kai-shek, to lay the issue at rest. Wu asked even if we have the design and everything associated with it, where are you going to have a test explosion in a small island as Taiwan, with all eyes focused on you. You know, for test run, the United States can go to Nevada or Wyoming, or can do it underground in its vast territory—but Taiwan is a tiny place. It’s basically impossible to run a nuclear test as a weapon [escaping international surveillance, assuming the government has all the resources to support its development]. This is a very convincing argument for Chiang Kai-

shek. So it would be safer for Taiwan not to pursue nuclear as an option. You know, you can dedicate study and work to produce nuclear for power, for energy and peaceful application. But if you are recognized to have the ability to make nuclear bombs, then yourself will become an easy target.

I think the situation now in Iran is pretty much like this. Iran wanted to make nuclear weapons, because Israel has the power and capability. [This is a core reason for the instability of Middle East, I think]. But in the Taiwan situation, I think Professor Ta-yu Wu has convinced Chiang Kai-shek that it's not the route to go. Taiwan has never, to my knowledge, had any significant activities in developing nuclear power.

There might be some people who were interested in doing enrichment, trying to save some fuel from power plants, so you can reuse the fuel. The disposal of nuclear waste is a tremendous problem. There is research, in this field, on trying to handle nuclear materials or nuclear waste and things like that, and how to control that kind of thing with the right reactor.

Tsinghua University had the first nuclear reactor for education, academic nuclear reactor—the only one in Taiwan.

11-00:44:48
Hamilton:

Is it still in operation?

11-00:44:50
Lin:

It is still in operation, but it's all out-dated. Its establishment was well before my time. When I went to Tsinghua, the President was President Chang, before him was S. S. Shu, before Shu was K. C. Chen, The first president of the Tsinghua in Taiwan was Professor Mei Yiqi [梅貽琦] who was a very important educator in China. He was the President of Tsinghua during the 1940s and 1950s. When Mao took over China, Mei was already President of Tsinghua in Beijing. He brought a group of senior faculty members and the seal of Tsinghua University to Taiwan. The seal is the official credential and is the symbol of authority and legitimacy of the University. The seal is the representation of power to be stamped on any formal declarations or important announcements or assignments. With these in his hands in Taiwan, he simply find a place in Hsinchu and with some meager resource, established the Tsinghua University. He has the legitimacy.

Mei was educated in the United States. He was a graduate of Rensselaer Polytechnic Institute. And he knew that the Argonne National Lab at the time has a small nuclear reactor that was going to be obsoleted. So he worked with Argonne National Lab, and brought it for education purpose for one U.S. dollars. Apparently as a U.S. government property, you cannot give it to people, but you can sell it at a fair, depreciated, price. He bought it for one dollar, and then shipped it to Taiwan, and set up the School of Nuclear Science and Engineering in Tsinghua. Most students who later graduated from

the School worked for the TaiPower Company. They are the core group that runs the nuclear power plants in Taiwan. So it's a very important aspect of the science, technology and education in Taiwan.

11-00:47:11

Hamilton: When—do you remember exactly when the nuclear engineering program started?

11-00:47:17

Lin: Early 1970s.

11-00:47:19

Hamilton: Okay.

11-00:47:21

Lin: Or late sixties, I think. Probably late sixties.

11-00:47:26

Hamilton: Mm-hmm. That's when most of the department sprung up here, too. So contemporary with that, I would say?

11-00:47:30

Lin: I don't know about Berkeley. Did you say Berkeley?

11-00:47:34

Hamilton: Berkeley is one of the earliest ones. I think Berkeley was around before that, but—

11-00:47:35

Lin: Yes. I'm not familiar with the history of that. But certainly that was a small reactor—students learned what a nuclear reactor was all about, so it was a good thing.

It was very useful. As I said, students trained in the nuclear and science school—most of them work for the TaiPower Company, and it's a very important part of the Taiwan economy.

11-00:48:09

Hamilton: I know here in the United States, a lot of these university reactors were used for industry in their off hours. Do you know if that happened in Taiwan?

11-00:48:21

Lin: No, no. I think—I think in Taiwan, there's no nuclear industry. No industry that would need to use that.

11-00:48:26

Hamilton: Okay. Mm-hmm.

11-00:48:30

Lin: No. Well, not the Tsinghua reactor, [which] I know well. The only industry that used it is the TaiPower Company.

11-00:48:40
Hamilton:

Mm-hmm. Was there any—I mean, biomedical research going on?

11-00:48:43
Lin:

No, not at that time. No.

11-00:48:46
Hamilton:

Okay.

11-00:48:48
Lin:

Not at that time. Yes.

Well, right now, Taiwan has set up a Synchrotron Radiation Laboratory with facility for scientific research, you know, much like the Lawrence Berkeley National Laboratory here. Actually it is more like the SLAC, the Stanford Linear Accelerator Center. You have a big ring with different beam ports, of different frequency and energy. Some can be used to study microelectronics, you know; some can use it for biochemistry or biophysics research. Taiwan has that facility now in Hsinchu.

11-00:49:34
Hamilton:

So just to go back: then you went back to DuPont for a year. Was that sort of a letdown? It seems like so much was happening in Taiwan at that time?

11-00:49:46
Lin:

Yes, yes. Well—let's just say a few things about that year, and then we can go forward. One important project is the electric vehicle project. And then comes Carter who has changed the macro- and political situation. Immediately, the government increased funding for university research to pursue programs in many different advanced technology fields. Because, people in Taiwan recognized that they cannot rely on the United States for technology, so they have to develop the technology capability on its own. I think that during this time, the government also allocated more funding for university research to work with the industry.

11-00:50:49
Hamilton:

In reaction to Carter?

11-00:50:50
Lin:

In reaction to Carter, yes. I think the conception is that you cannot rely on the best friend that you have, which is the United States. Taiwan has to rely on the Taiwan people, and Taiwan itself.

I was Dean of Engineering. My colleagues in the Material Science and Engineering areas very much wanted to set up a project to work on specialty steels. You know, steels are of many kinds. You have steel that are used to build bridges or houses, carbon steels. And they are stainless steels for equipment and appliances.

11-00:51:38
Hamilton:

Mm-hmm.

11-00:51:39
Lin:

And there are specialty steels—high-strength steel that can be used as cannon, and rockets, and that kind of thing. And—well, actually, an important group is for machine tools. In the industry, if you want to build high strength machine parts; you need to build the machine tool first. For example, in metal stamping, you want to manufacture machine parts, you got to have the stamping tools. And the tool requires a special type of steel for strength and performance. It belong to a class called specialty steel. They usually can withstand high-strength, high temperature, high pressure, high corrosive environment, and the like.

This category of technology is in the high end. In Tsinghua, the material science and engineering Department has a group of scientists specializing in specialty steel. Hence, I applied with the Executive Yuan for a major funding to set up a laboratory that can produce specialty steel. At that time this is a big science project and has to get the approval of Prime Minister Sun Yun-suan. I was very happy about it because the purpose was to help education and research, and the tool industry, but also the defense industry. In the manufacturing of bullets, cannons, that kind of thing, high pressure and high temperature will generally be required. In short, we wanted to establish the capability to make specialty steel. And the technology that we used in Tsinghua is vacuum-induction melting—VIM.

I put together a project and applied to the Executive Yuan for the special R&D fund, which was established at the Jimmy Carter aftermath. It called for a fairly large [sum of] money, nearly twenty million NT.D. This is certainly not big money in the U.S. scale, but very big in Taiwan at the time. The application went through the review process, and finally reached the Premier for approval. In the final meeting, my faculty presented the story and all the people involved looked to Premier Sun Yuan-suan for his decision. Of course, the Premier had already read the paper and knew me quite well.—I mentioned earlier that I first met him in the National Construction Seminar, and then the electric vehicle project—EV project. So he said, “Professor Lin, the project is good. The objective is good. The structure is good. But I don’t think it would work as presented.” This coming at the last minute of the final review time! I thought to myself, “No, what are you talking about? We have gone through all this time and all the details. He then explained, “In your project—the budget you proposed would not be able to support what you want to accomplish.” He said, “You want to set up this VIM and requested this amount to buy a vacuum-induction furnace from Austria. And then you have to conduct many test runs. In the test runs, you need to use a lot of materials, so that you can make sure that this VIM will operate properly. So you need money to at least cover the material costs during the test run period. It should allow more time, more materials which will mean additional costs. Without that in the

forecasting, I think this project will be just academic.” So actually, he ended up giving us more money than we originally requested. I think this is something that is unheard of. This is basically the style of Premier Sun. He has the actual experience of running engineering projects in practice.

11-00:56:43

Hamilton: How much money did he give you?

11-00:56:46

Lin: Oh, nearly 20% more. But then, you know, it was already a big project, you see—big money at that time. We worked the details out pretty well with Tsinghua faculty and cut the budget to bone. Because of my leadership with the EV project within the university, I made faculty members do more research before they can extend it to help the industry. I let the industry to be the manager of the EV program, which would appear to reduce funding to the university. But on the other hand, I was able to get more funding for the faculty members to set up this other major material science project. I think they felt my dedication to Tsinghua was genuine. I think I have established a very good rapport with the faculty in Tsinghua there.

11-00:57:39

Li: Should we continue, maybe 20 more minutes? One more tape and just finish off that year?

11-00:57:44

Lin: Yes. So I think that was—then after 1979, culminating in 1979, I helped organize a number of the projects under this special grant, because of the cutoff of the formal diplomatic relationship. The government had more grants helping to set up R&D projects. Then my mother came out from Mainland China. I felt I should return to DuPont, because of the prior commitment there. So I returned to DuPont. Was it a letdown? In a way it may appear so. The decision to keep a promise was indeed a difficult one since I was very much in the middle of all these activities in Taiwan. But I had to return to DuPont.

Begin Audiofile 12

12-00:00:01

Li: Robin Li and Emily Hamilton, with Otto Lin—tape twelve.

12-00:00:04

Lin: That year, 1978, is very important for me. As I mentioned earlier, I went to Taiwan, led the EV project, and helped the university get this grant for [another major] science project. I was making myself known with many of the decision-makers: the Premier and the National Science Council chairman, and many others. I think they realized that I am a person able to run major projects.

In a way, I established myself within the Taiwan community—scientific, industrial, university, government communities. So although I had to return to DuPont, the relationship is there. After I return, I still go back to Taiwan for that period of two years, several times a year—as a consultant, participating in meetings, and things.

Another major project that I needed to talk about is establishing the policy on polymers science with the National Science Council. At that time, everybody knows the importance of polymers for Taiwan, but did not know how to go about setting up educational and research projects in the universities. Therefore at the request of Chairman Shu, I organize a “Blue-Ribbon” group of academic and industrial experts to lay out a game plan for establishing polymer science and engineering in Taiwan. That was s another major project that I did. [A summary chart is shown as Appendix 12.]

12-00:02:08

Hamilton:

Could you just comment a little bit on your day-to-day responsibilities? You’re talking about the bigger projects that you are organizing. But what did that mean on a daily basis? What were you doing?

12-00:02:15

Lin:

Well, day-to-day in Tsinghua, I was Dean. The school has five departments at the time: Chemical, Mechanical, Electrical, Industrial Engineering, and Civil—these are the five departments in Tsinghua. Most of the work of the departments is run by the department heads, so there’s very little work that the Dean needs to do with the departments. But I do need to meet with the department heads, every week. Sometime meetings, or other times, lunch. We get together and review and discuss. Most of the time, the subjects involved with two important things: one is money, one is people. People, meaning that we know good people in the field whom we can recruit to the department.

12-00:03:16

Lin:

And are there research dollars we can get from somewhere? These are the most [important] concerns, day-to-day, as dean with the department heads.

There are a number of other interesting things in Tsinghua. I was very much working with the National Science Council at the time because of these other projects, but I still have some functions in the university level. Within the university, I am a member of the senior management committee. I should say that the Dean of the School of Science is Professor Shen Chun-shan [沈君山]. C.S. is a famous intellectual. He is young—I mean, is a bit older than I am, but is in the younger generation of the leadership in Taiwan. He is also a man of literature—he writes essays for the newspaper and is famous. He is thus recognized as one of the younger-generation scholars on the rise. The Deans of Engineering, Science, and Nuclear Sciences three schools within the university and the Dean of Students, and the Dean of Academic Affairs constitute—the top leadership of the university, under the President. So these six have to meet regularly to consider all the major matters for all the

university departments; one of them will naturally be human resource management, and unfortunately disciplinary actions will be involved as needed, even if only rarely.

As it turned out, there was a case with a famous scientist whose name is Wang Chi-xiang [王奇祥]. In the early years, he was in Mainland China, and somehow came out of Mainland China and went to Taiwan in the early 70's. At that time, Taiwan and China were rivals and a scientist “defecting” from one side to the other was treated as a hero on the receiving end. The press certainly made a lot of coverage of this. Hence this scientist came to Taiwan was adored and became a star in the media. Then basically, whatever he wants, he gets; and if he does not get, he cries it out loud. Soon he became a headache for every academic institution that took him in. In a few short years, he went from the Academia Sinica, to Taida [NTU] and finally had nowhere to go. So Prof Mei Yi-chi felt Tsinghua should give him another chance. Although no longer President at the time, he persuaded the university to take him in.

So Dr. Wang came into Tsinghua, and worked in the Institute of Molecular Biology. Then he felt he had discovered something very important in the laboratory and wanted the University to call a press conference to make big announcements. But the university did not like to do things that way. Because it felt that any alleged major achievement should be proven and substantiated before making public announcements. Dr. Wang, who knew some reporters quite well and had a tendency of speaking to the press freely, was thus unhappy with the university and he started to find faults with the administration. And then one year he was applying for a grant with the National Science Council. And National Science Council, as routine review process, sent his proposal to a few experts in molecular biology outside of Taiwan. Among them is a world re-known scientist in the University of California. And the reviewers replied to the National Science Council stating that the project is not worthy of support. As a result, the NSC did not give him research fund on this proposal. Dr. Wang was very angry at this. He was a star, or used to be treated like a star. And now, the National Science Council dare not support his research. So he made big waves on the ground that he has been victimized by prejudice. He spoke to certain senior but ignorant member of the Legislature to put pressure on the NSC. Professor S. S. Shu, who was Chairman of the NSC, explained to the Legislator the peer review process. And the Legislator forced him to say, who makes that recommendation—or, indeed, do you have any prejudice against this scientist? So I think Professor Shu probably made a mistake here. He let the Legislature see the reviewers comments in confidence. At that time—this is before the National Information Act era. Now, you can ask to see the review and comments. At that time, it is not generally practiced. So the Legislator, and quickly Dr. Wang, knew who was the reviewer. Shortly following this incidence, Wang lodged a lawsuit against this scientist in the University of California. Although the case had

little merit on its own, but has caused a lot of red faces since the scientific review is understood to be confidential and the NSC should not have revealed it, not the least the identity of the reviewer.

Li: Against Professor Li? My grandfather?

12-00:10:31

Lin: Yes—yes, your grandfather. Your grandfather, right?

12-00:10:33

Li: Yes. Yes.

12-00:10:35

Lin: Yes. And Wang also has lodged a lawsuit in Taiwan, against the President of the Tsinghua University and the Chairman of the National Science Council.

Have you heard of this from your grandfather?

12-00:10:51

Li: No, I hadn't heard about it.

12-00:10:55

Lin: Anybody in your family talk about this?

12-00:10:56

Li: No, I'll have to ask them about this.

12-00:10:58

Lin: Yes, you ask them.

12-00:10:58

Li: Yes.

12-00:10:58

Lin: Yes, probably they may remember—he actually sued your grandfather.

So as a newcomer to Tsinghua, I usually lunched at the faculty club. Unknowingly I was sitting next to Wang—and was impressed by his skill as an orator. He said to all colleagues around that all he wanted to do now was to dedicate himself to the lawsuits. He wanted to sue the university president, the reviewer, and the chairman of the National Science Council. I was astonished by his logic, judgment and fervency. It made me wonder about the values and conflicts, and, the role and responsibility of a scientist, scholar, and faculty member within a university. What should a fully paid member of the university, and the university, do? It kind of aroused my interest, and internal curiosity.

And I found his advocacy very disruptive. Of course people complained and bitched about everything, but not to the extent of malice. Junior faculty members listened to his oration with amazement and bewilderment.

Then the time comes when the university leadership felt necessary to discuss his performance. There were reports of his work, performance and personal behavior. There are suggestions ranging from counter lawsuit, dismissal, terminations or acquiescence. Finally the discussions focused on whether the University should continue his employment contract for the next year. I supported the suggestion that the university will let his employment contract end on its expiration date. To sum up, he was not doing any research, any teaching, and he proclaims his job is to sue as he repeatedly pronounced. With this as a role model, people will wonder, how can the university continue to sustain and, furthermore, strive at the search of excellence? Well, should he be allowed to do that because he has a halo—as a hero running out of Mainland China? The University finally decided not to give him employment contract. When the renewal time came, it was not renewed.

This case was really unusual in Taiwan, because the university almost always renew faculty member's employment contract. But at this incidence, Tsinghua University stands firm on the ground. And of course, he has raised hell with all the Tsinghua colleagues. He has threatened to sue the University, the Dean of Science and again the President. Sometime later he recognized that I was also a member of the committee and did not support him and he vented his angry. He was kind of surprised at this because I was a newcomer and probably would not want to make difficult decision, which may be un-friendly or un-popular. But I did not give him any benefit of the doubt because I had thought about it before the committee's discussion. So, you ask me, what did I do on a normal day? This is one of the normal days' work. Or, many days' work.

12-00:14:24
Hamilton:

Did you have any interactions with the students?

12-00:14:28
Lin:

Ah—good point. I would say—I taught a class. I taught a class in the university, always, all this time. And I have some interaction with the students—with my class.

12-00:14:44
Hamilton:

What class?

12-00:14:46
Lin:

But then, not as the dean.

12-00:14:49
Hamilton:

What class did you teach?

12-00:14:50
Lin:

I teach polymer science. What else?

12-00:14:55
Hamilton:

Just once, or did you teach—?

12-00:14:57
Lin:

Just one class, yeah—one class. I'm so busy with everything else already. I think it's probably fair to say that few deans of engineering or science accomplished as much as I did for that year.

12-00:15:14
Hamilton:

One year, yes.

12-00:15:16
Lin:

Yes. I was involved in many other projects. One project I only said very briefly was with the NSC on polymer. It was on the Planning and promotion of polymer science and technology in Taiwan. I think that has a lasting academic and economic impacts, even today. In Taiwan over the last two decades, many scientists were funded and research supported in the polymer field—it can trace back to the Planning.

12-00:15:48
Hamilton:

So just with the five minutes left—so you returned to DuPont, and you returned with your mother—

12-00:15:54
Lin:

Yes.

12-00:15:56
Hamilton:

—went back to New Jersey?

12-00:15:57
Lin:

I returned to DuPont, and then my mother came to the United States after several months' time. It did not come, you know, at the same time with me. It is interesting that at that time she was staying in Hong Kong and I had to apply for a visa for to enter into the United States.

12-00:16:21
Li:

For her?

12-00:16:22
Lin:

Yes, for her.

12-00:16:22
Li:

All right.

12-00:16:24
Lin:

She was able to leave China, but now she has to come into the United States—has to go through visa application. And I had to return to Hong Kong to prove [the relationship] since there's no birth certificate. My mother and father, they were married so long before, they don't have any marriage certificate. With no marriage certificate nor birth certificate, the American Consul was very curious and skeptic about it. How can I say that this applicant was my mother?

It was a long and complicated story. But finally, I explained to the consul that “the fact is this.” Of course I have to get written supporting evidence, and affidavits, from many people who know our family and would attest to that. And then we went through a blood test. Not DNA test—at that time DNA tests was not invented. But I guess that there are some blood tests that can show exclusiveness, that for a mother and son, there are certain indicators in there that will not exist. Luckily, we passed that negative test, so my mother was able to come to the United States.

She first stayed a few months with my brother, Eric, in Fresno, and then came to New Jersey and stayed with us, for a few months. And then my father came from Taiwan, and he brought her back to Taiwan and stayed in Taiwan. This is kind of long and drawn-out process of reunion.

12-00:18:09

Li:

How long were you in New Jersey, then? For two more years?

12-00:18:17

Lin:

I returned to New Jersey before summer, 1979. In the rest of 1979, I have to travel back and forth, helping the university to find another replacement for the dean. So I would say, I was totally in my mind back to DuPont in 1980, the spring of 1980.

Before 1983, I returned to Taiwan for good. I think probably we have to wait for the next time.

12-00:18:59

Li:

Yes, we’ll get to that next time.

12-00:19:03

Lin:

Yes. A lot of things that happened during that time: ‘78 to ‘79, my stay in Taiwan, was so eventful—so many things happened, so I can establish myself as somebody that can do work in this field. And I established my network with the government leadership, industrial leadership.

After I returned to the United States, I was constantly getting offers, people asking me to work in Taiwan. It took two more years to go to the ITRI position.

12-00:19:49

Li:

All right, so we’ll pick up there tomorrow.

12-00:19:51

Lin:

All right, yes.

Begin Audiofile 13

13-00:00:09

Li: This is Robin Li and Emily Hamilton with Otto Lin, and it's May 6th, 2008. This is tape thirteen.

13-00:00:18

Lin: I want to sum up the discussion yesterday about a number of people who were very important to me during the period of '78, '79. The first is K.W. Mao, who was my classmate in Taida. He came to the U.S. and pursued graduate degrees at UC Berkeley and Carnegie. He returned to Taiwan after working a few years at General Motors, and joined the Tsinghua University as the founding Dean of the School of Engineering. Kao-wen and I were close friends and we had contacts all along. He invited me to go to Tsinghua to set up the polymer institute. And as I went back, he was promoted as president of another university, so I basically took up his position as Dean of Engineering. In that position, I got to know many people and established working relationship in the leadership and paved the way for my career in the later years in Taiwan.

The second person is S.S. Shu—Professor Shu, who was formerly President of Tsinghua. But at that time, he was Chairman of the National Science Council. I had contacts with him first through the electric vehicle project. He was a supporter—in fact, he was the initiator of the project. He was a mathematician, but was very much applied-oriented. He was a visionary and always looking ahead. He felt electric vehicles would be very good for Taiwan, so he started the project. When I became Dean of the School of Engineering at Tsinghua, and naturally become the EV project leader. But later I persuaded him that carrying out a major commercial project in the University was not the right way to go. We finally agreed on transferring the project to the industry while the university continues to focus on research and development. Because of that, he felt I spoke honestly, and I have a good judgment of the situation. So we became fairly good friends. He asked me to institute a planning program for Taiwan on polymer science and engineering. And I was able to draw people from different sectors: government, industrial and academic, to work on that. The Group had presented a good framework for Taiwan in terms of developing polymer science and engineering. It became the blueprint for the next decades [see Appendix 12]. Professor Shu was to be very helpful in promoting my working at ITRI.

The third person is Y.S. Sun. Minister of Economic Affairs. Actually, I knew Y.S. Sun through my father-in-law who was an economics professor in Canada and previously worked for the ROC government as a vice-minister of finance. Mr. Sun was one time on a mission to the United States and came down with a minor heart attack while visiting Washington DC. I visited him while he was recovering in New Jersey. This was the first time I saw Y.S. Sun. We had a very good exchange of views on the future industrial

development of Taiwan. I met him the following year at the National Construction Conference in Taipei. There I presented an analysis of the major U.S. technology companies—how they make use of R&D to gain and maintain a leadership position. Y.S. was very impressed we established a good connection, at that point.

When I returned to Taiwan the third time, to Tsinghua, he [Sun] had already become Prime Minister. At 1978, Jimmy Carter cut off formal diplomatic relations between U.S.A. and ROC in favor of PRC. And Y.S. Sun, under President Chiang Ching-kuo led the government and the people to overcome this political crisis. Many important measures in nurturing human resources and developing indigenous technology were instituted. At Tsinghua, I was able to work with the faculty and propose a major project on developing specialty steel, which received the needed support from the Prime Minister's office.

Soon after I led the Tsinghua EV project, I have decided to move the project to the industry. This turned out to be the view of Y.S. who has always felt that [the EV project] should be run by the industry, not university. Our similar views in national innovation system and the innovation process have reinforced our relationships.

As a recap, K.W. Mao, S.S. Shu, Y.S. Sun—these are the three persons who are very important in the development of Taiwan and my own professional career.

The time comes in 1979, when I return to the United States, to DuPont to fulfill my prior commitment. For about six months' time, I have travelled between U.S. and Taiwan to help recruiting a Deans for the School of Engineering at Tsinghua and to for some consultants work.

During that 1978-79, Professor Shu, as Chairman of NSC, had gotten approval from Chiang Ching-kuo to build a science park in Hsinchu which I know only from the newspaper. And one day, S.S. called me, and he said, "Oh, Otto, are you interested in seeing the science park?" I said, "Yes, absolutely." I thought he would never ask!

13-00:08:42
Hamilton:

Absolutely.

13-00:08:44
Lin:

"Obviously." He said, "Okay, I will come to pick you up and visit together." So one Saturday, his came with his car, and then we went to the site which is not too far from the Tsinghua University. It is actually in Chu-Tung, about 5 kilometers east of Tsinghua campus. At that point, the road was not paved. It's just a muddy road, laced intermittently with some gravel and sands. So we got out of the car. He holds me by the hand, and we walked through the path and climbed up a little hill. And I asked quite hastily, "Prof Shu, where's the

science park?” He said, “Well, this will be the science park.” And I looked around; it is nothing but rice paddy, except, on the far end, rows of army barracks. He said, “Yes, this is going to be the science park.”

Looking back, I was amazed at his foresight. He is indeed a person of great vision.

13-00:09:48
Hamilton:

Mm-hmm.

13-00:09:50
Lin:

It was very much in the beginning phase of the Hsinchu Science Based Industrial Park and I participated through comments in its design and schemes of operation. Professor Shu, at the time, was chairman of the National Science Council. The science park program was actually under the vice-chairman of the NSC, Dr. Irving Ho. Irving is graduate of UC Berkeley and Stanford and has worked for IBM for many years. Upon retirement, S.S. invited him to come back to Taiwan, and to work in the National Science Council with building the science park as a major objective.

With Irving was director of the science park, S.S. very much wanted me to be deputy director. Well, there appear to be a great deal of complementary strength between us. Irving was an electrical engineer, well versed in IT, had worked for IBM; I am a chemical engineer, specialize in polymers and material sciences and worked for Du Pont. Prof Shu felt that with himself, Irving and I, the three of us will be able to cover a lot of grounds for different industries and technologies, and to entice companies to participate in the science park. Also, the three of us have backgrounds that are very close and appear to fit with each other. So he very much wanted me to stay in Taiwan and become the deputy director of the science park. But I told him that I have to go back because of my commitment with DuPont. So I returned to the U.S.

Once I returned, then S.S. asked me to go back to Taiwan to be an adviser and to look at other projects, and made me several offers—at the National Science Council itself and universities, and so on. But I said, well, I am sorry, I really have to be with DuPont for a little while and declined his offers.

S.S. actually came to New Jersey to see me one time. I think it's in the summer of 1981. I accompanied him to a meeting at Washington DC and he pleaded with me again to go back to Taiwan. I'm really very indebted—grateful to S.S. It is a special feeling that a man of his stature and accomplishment recognized me. Afterall, I am only a newcomer.

And then come 1982, he told me that, “Well, ITRI is setting up a new laboratory in material science.” I showed the organization chart of ITR in the seminar. The addition of material science as a Thrust National Objective was a result of the National Science and Technology Conferences. After the Conference, the recommendation is for government to set up a material

science laboratory and then hire a new director. S.S., as Chairman of ITRI, recommended me to the Prime Minister Y.S. Sun.

As it turns out, Y.S. Sun had known me quite well. [S.S. might not know my relationship with Y.S.] And Y.S. was very happy and felt that I can do this job. So, I made a trip to Taiwan, and Y.S. Sun talked to me and said “I have already accepted the ITRI offer for you to be the director of the national lab.”

At that time, my reservations are basically that Ann and Gene are still in high school. I think it will be much better for me if I wait another two or three years: after Ann goes to college, and I will have a big burden off my shoulders.

I talked to Y.S. Sun and explained the situation. He said, “Oh, if you want to come back, it’s better [now] than later. Time is of the essence.” Time is of the essence, indeed, because he is in the position now and needs my service. If he was not in the position, a lot of things cannot be done.

A little background here, while S.S. Shu was chairman of the National Council, he had difficult time working with another minister, K.T. Li [李國鼎]. K.T. is a very well-known minister. A lot of people had associated K.T. with science and technology development in Taiwan because he had previously served as Minister of Economic Affairs and Minister of Finance. He was a physicist, and some post-graduate education was from the University of Cambridge. He always felt himself rightly to be the leader of science and technology. At that time, he is a “minister without portfolio.” In the Taiwan government system, this is a minister-level position. While it does not carry a specific portfolio: education, economic affairs, or science, etc, it has the responsibility of liaising or coordinating the businesses of several ministries. Thus the position is given to people who has senior standing or people who has good potential and awaits a permanent assignment in the minister level.

K.T.’s job is to coordinate science, education and economic developments. In that capacity, he did not see things eye to eye with the Chairman of the National Science Council and had questioned the feasibility of science park. It became known that conflicts often existed between K.T. and S.S. But K.T. was very well connected with people in the industry. His view on technology development was often at odds with S.S.’s. S.S. was feeling isolation with some frustration.

The net result was that at 1982, S.S. submitted his resignation as Chairman of National Science Council. A strong supporter of S.S., President Chiang Ching-kuo appointed him chairman of ITRI.

I’m sorry, I think S.S. was ITRI chairman already—a short time before. And S.S. wanted to resign both positions, but Chiang Ching-kuo told him, “Even

though you resign as chairman of the National Science Council, but ITRI will remain your responsibility.” So S.S. Shu still was the chairman of ITRI. Further, his successor at Tsinghua University, President M. C Chang, was appointed Chairman succeeding S.S. again at NSC.

ITRI, as I explained today, it’s a national laboratory, but also it is a non-profit organization. It’s run by a board of 11 to 15 directors. The chairman and the president are appointed by the prime minister. Under the president are 5 technology laboratories. When ITRI set up this new materials lab, S.S. wanted me to be the director-general of the materials lab. And he talked to Y.S. Sun, and Y.S. immediately agreed. That’s why the two of them worked out this position for me, in ITRI.

I felt obligated to both these gentlemen, so I went back and told my wife, “Well, we are going back to Taiwan again, and this time for good.” Ann was very surprised. She said, “Dad, why do you want to go to Taiwan now?” You know, at that time, just a year or two after the cutoff of formal relationship between Taiwan and China, and there’s a lot of talk about wars across the Taiwan Straits. A lot of companies pulled out of Taiwan. It’s in a precarious position. And I wanted to resign my position from DuPont. My boss and friends, all said, “You are crazy.” And really, look at the kind of salary I am getting—this pay package. I am getting about one-third of what I got in DuPont. I am taking a more than 60% cut in my salary.

13-00:21:05

Li:

What did Ada think? What did your wife think?

13-00:21:09

Lin:

Ada did not—I don’t think she was very happy with that. But again, on the other hand, she was trying to respect my position—my feelings.

Ann and Gene asked me, “Why do you want to go again? We have already spent a year in Taiwan, at Tsinghua.” And it is not a place where much can be bragged about—you don’t even have fresh milk there. I told them, with a sense of apology, that—“ I think these next several years, or next decade, will be a very important period for the history of China. And I don’t want to turn a blank page in my life at this period. You know, I hope you will understand one day.” With a deep feeling about China, I want to participate during this important transition of China.

And I’m very happy that, Ann, and Gene, and my wife, Ada, were very supportive of that. That’s why we packed up and prepared to go to Taiwan in 1982.

There is a personal side of things. Yes. Of course, my mother was already out of the Mainland back in Taiwan, so it’s also an attraction for me to be back with both parents together while they make up for the lost time. But I think the basic reason is that I feel I have an obligation to do something in Taiwan. I

feel that although I am doing well in DuPont, but after all, DuPont is only a corporation. It did not give me the kind of opportunity in comparison to Taiwan. In Taiwan I can do so much more—accomplish more, and have an impact on society, and the future of China. That's why I decided to go back.

Although after I returned from Taiwan to DuPont, my job changed. And it changed to a very interesting aspect. Previously, I was working with mostly General Motors and the traditional manufacturing industries. A lot of industry needs coatings, paints.

13-00:23:41

Lin:

Working with General Motors, General Electric, companies like this.

When I returned to DuPont in the 1980s, I was still working on rheology, and the company assigned me to work with the electronics business group. Because processing of electronic circuit boards, Du Pont products, have shown up rheological problems.

You know every electronic control or device has circuit board as its major structural component. Different levels of sophistication of processing will be involved. For example, in a computer, there are rigid boards, flexible boards, and flexible cables all linked together. And spacecraft—missiles, The Columbia, or shuttles, including of course Boeing 747s, all high-technology devices or appliances have a high level need for electronic circuitries. So the company asked me to work on that.

I was interacting with companies like Boeing, MacDonal-d-Douglas, Hughes, General Dynamics, IBM. I came to visit California a lot, particularly Orange County. It gave me another segment of technology businesses that I would be interacting with. It was also very interesting work, a different kind of rheological work than in the coating and paint area.

Automobile coating was interested in: how shiny, how glossy, beauty and integrity,—with focus on the decorative and protective aspects. But now in the electronic industry, they're talking about weaponry, high-tech products—it's more on the performance and reliability of the coating aspects. I worked very much on that.

Although I still feel the need to go back to Taiwan.

13-00:26:10

Lin:

Also, during this '82 period, I have many other offers. I was interviewing at Shell Chemical Company which offered me as a research manager in the new laboratory in Houston; at one time I was invited to interview to become a Department Head in North Dakota State University—Fargo, North Dakota. And there were some other places.

13-00:26:42
Hamilton:

Did you ever consider any of those jobs?

13-00:26:45
Lin:

I just considered it as an opportunity to interview and to meet people. In DuPont, I have worked very closely with university people. Some are consultants to DuPont. To name a few: Ken Smith at MIT. Ken was later to become the Vice-President of Research at MIT. Bill Showalter at Princeton, who was Head of chemical engineering, and later become Dean of Engineering School dean. In UC Berkeley, Jud King and Mike Williams—and many others. I maintained a fairly strong network with my academic people and friends. I think that's why sometimes I get some offers from universities. Again, a very important part of me is working through a network of people.

But anyway, I cannot refuse the offer of ITRI and of both Y.S. Sun and S.S. Shu—perhaps it was one of the few thing that the two of them were working on together. So I decided to go back, and resigned from DuPont. If I stayed at DuPont for another two years, then I could have gotten all my retirement benefits, insurance and everything. But because of the timing issue, I really did not get much of anything in terms of early retirement benefits from DuPont. But that's the deal, given my concerns at that point.

Luckily, Ann was admitted to Princeton, was getting some financial aid. So I think it all helps.

13-00:28:54
Hamilton:

Yes.

13-00:28:57
Lin:

And I was very happy with my children, Ann and Gene both, at that time, and of course they're doing well and showed great love and understanding to me.

13-00:29:06
Li:

Ann had to finish high school in Taiwan, though, right?

13-00:29:10
Lin:

When in Taiwan, she was about high school, junior high. She came back and finish high school in Cherry Hill.

13-00:29:19
Li:

Oh, okay.

13-00:29:21
Lin:

Yes. So she was a graduate of Cherry Hill High School.

13-00:29:24
Li:

Okay.

13-00:29:25
Lin:

And then got admitted to Princeton, right at that point.

13-00:29:30

Li: Okay. So who did she live with, while she was—

13-00:29:34

Lin: Well, while she was at high school, she lived at home with us.

13-00:29:37

Li: Oh, okay.

13-00:29:39

Lin: I think it was that she was an early graduate.

13-00:29:40

Li: I see. I see.

13-00:29:40

Lin: I think she graduated ahead of normal schedule—you know, I think it was the wrong policy. I have joked to Ann, “You should stay in high school as long as you can, you know, it’s all free, right? And cut off the university, because it is expensive.” But actually—Ann finished high school early, and also finished Princeton early, in three years. 13-00:30:03

Li:

Mm-hmm. Yes.

13-00:30:05

Lin: Yes, but Ann did stay at home during high school.

13-00:30:09

Li: I see.

13-00:30:12

Lin: And the year that—in Taiwan, that I was in Tsinghua, both Ann and Gene went to Taiwan and studied at the high school and it gave them a good Chinese background. A good Chinese language and culture background—it was very important for them. They learn who Confucius was, and some of his teaching. And I think Ann can also read Chinese newspapers today. So it was fun.

13-00:30:44

Hamilton: One thing that I’m interested in is how the physical landscape of Taiwan changed with all of these new developments. You talked about going and seeing the site of Science Park before it was there. And then, of course, that land has changed—it no longer looks like rice paddies. Especially in these first few years, how much has Taiwan visibly changed? Maybe your family’s reactions between ‘79 and ‘82 would be a good way of talking about that.

13-00:31:16

Lin: Yes. The traffic is getting busier. There is a tremendous landscape change, as you said. These ten national project that I referred to, one of them is the highway, the north-south highway. And that has a lot to do with building up the economy for Taiwan. Among the ten [major projects]: the north-south

highway, international airport in Taoyuan, China Steel Company, China Petroleum Company, and the 3rd nuclear power station, are the most successful. All these finished around '78, '79. They started to show economic impacts much faster than expected. The Taiwan infrastructure, landscape, economy, changed very rapidly during that several years. The rice paddy that I saw in 1979, when I went back to Taiwan in 1983, it was no more to be found. Already, all the grounds are prepared, and you can see buildings coming up. Yes. It's very much different now.

When I went to Taiwan in 1978, I brought my little Ford with me. A Pinto—I don't know whether you've heard of Pinto. It's a small compact car. It was probably the only Pinto in the whole Hsinchu city. Every time I drove that car around, people will know it. Well, it was like I drove a Lincoln Continental. And I think at that time, there were only about two or three Pintos in the whole Taiwan. On the car, there's a very cute little emblem on the trunk door,—it's a galloping horse of sort. And somebody stole that, so I went to a Ford Service shop hoping to buy a replacement. And the shop attendant said, "Well, it was a rare piece here and we can order through the United States with the Ford Company. It will take about three months, okay." Then he said "But wait. Perhaps you check back with me in two weeks, see if I can find one for you." And in two weeks he found one for me. I did not understand it at the time, but I suspect possibly the poor owner of another Pinto would be in the market for another emblem.

But that was 1978. At the time, the changes were very rapid. You can see unmistakably, big buildings, factories, cars emerging on the landscape. In 1995, say, the traffic in the Hsinchu area was getting very bad. It would take me about half an hour to travel the five kilometers' distance by driving, at rush hours.

And I think that, also, we have underestimated the vitality and agility of the SMEs. If it was all by planned economies, probably it would move sluggishly if at all. Now, it is all up to the individuals—there's all these people, with money in their pocket, they want to buy a car, they want to build a house—that's what builds up the economy. It is the multiplication of factors.

13-00:35:42
Hamilton:

How widespread is this development? Is it all across Taiwan? Is in small areas that are very industrialized?

13-00:35:51
Lin:

Well, I think it's all across Taiwan, although mostly in the western part, the major city area, Taipei. You look at the map and it's Taipei and then Hsinchu, and Taichung, and Tainan, and then Kaohsiung. The major cities along the west coast of Taiwan, they move much more rapidly than the east coast. And luckily I think we can still visit the east coast for natural beauty without incinerators at this time.

13-00:36:24
Hamilton:

Yes.

13-00:36:25
Lin:

Yes. Also, another major project that Chiang Ching-kuo has done is to build the cross-island highway. You look at Taiwan, it's like a leaf. And the center is the mountain—the mountain ranges. The plain area is in the west: most of the economic activity is the western island. On the east, the mountains pushed very close to the Pacific Ocean. There are very narrow strips of land on the eastern coastline. Most of the activities on the west coast are what I'm talking about. And Chiang Ching-kuo, when serving as Vice Minister of Defense, he organized a group of the veterans—people retired from military service—particularly those people that went to Taiwan from the Mainland with the Senior Chiang. They are now retired, with nothing to do, and no family. This has become a social problem. They are not educated, and with very little retirement money to count on. Chiang Ching-kuo then organized a company to build a cross-island highway to tackle the difficult and challenging nature. Basically, you have to cut through mountains to build the road. This highway links the east and west coasts of Taiwan and becomes a very important conduit of economy. And also it passes through forests, rivers and very scenic places and soon turns into a major tourist attraction. You can also grow apple, grapes and peaches and flowers along the highway that would be impossible for other parts of Taiwan. So I think Taiwan's agricultural products are becoming more versatile, more delicate, and higher value now. This is part of the transformation to a “value-added” focus culture.

In terms of economic changes, what I have reported in the seminar today should basically capture the gist of it.

13-00:38:37
Hamilton:

How much has the scientific structure looked at issues like environmental issues with this rise of industry? Has science played a role in that since the '70s, '80s, '90s?

13-00:38:48
Lin:

ITRI was setting up a pollution-control center back in 1988, '89, so that was very early. [The focus then was abatement, or end of the pipe control technologies.]

13-00:39:07
Hamilton:

Okay.

13-00:39:11
Lin:

We are concerned about pollution. At DuPont, I was working on projects out of concerned with pollution problems. Since the economy is expanding very rapidly, the government rules on pollution control, I would say were not tight enough. Therefore industrialization has caused many environmental problems. Air, water, that kind of thing. And if we could go back 20 years, I certainly would want to emphasize more on the pollution-control area. Yes.

But today, I think it's much better—but it's not enough. It's not enough.

13-00:40:00

Hamilton: ITRI's involved in some green energy and pollution things—

13-00:40:05

Lin: No, ITRI is not working on green energy, per se, but on pollution control.

13-00:40:22

Lin: Control of waste water [from various types of factory and farms].—

13-00:40:23

Hamilton: Mm-hmm. Mm-hmm. Yes, I was thinking about that—yes.

13-00:40:24

Lin: Control of solid waste, control of air pollution—ITRI was teaching people how to make end-of-the-pipe control.

And then gradually we are going back toward the source of pollution with specific industrial group. How to change their process: adopting more green process concept. Nowadays, working on pollution is, well, if you want to have this final product, can you start from different raw materials so that it will show less environmental footprints? I think it's slowly working back.

But at the time of 1980s and early '90s, I guess most of the focus was on the end-of-the-pipe control.

13-00:41:05

Hamilton: Could you talk about where ITRI falls into the story of science and technology coming into a part of the economy of Taiwan? Today, in your talk, you put the beginning of that in 1975. And you showed a timeline, which should be available here. Looking at some of the first conferences, some of the first legislation, and ITRI comes in very quickly. Can you comment a little bit on the early development of ITRI?

13-00:41:42

Lin: Well, ITRI was established in 1973, when Y.S. Sun was Minister of Economic Affairs. I think this is all, you might say, a coincidence. At that time we did not talk about innovation systems. This is a term getting popular nowadays, as we talk more about it. At that time, we have focused on technology transfer—developing technology and transferring it to the industry to produce industrial products. That process—it's the innovation process.

I In 1973, there are three government laboratories. One has to do with the chemical industry; one has to do with the machinery industry, and one has to do with minerals and mining. These three government laboratories are not doing very well. Y.S. Sun, being the Minister of Economic Affairs, felt that the government should not be in the business of doing research.

13-00:43:02
Hamilton:

Why?

13-00:43:06
Lin:

Well, if scientists become government bureaucrats, the job is secure. You don't really have to do anything creative or proactive. You can spend your time reading newspapers and sipping tea. And then if you do research and publish any paper—the result does not necessarily have any impact on the economy. Y.S., I think, is very smart—he recognized that it is better for the government to be out of the research business. Research business can be with the university, or it can be with the independent institute. The scientist, the engineers, have to be accountable for what they do, and be rewarded commensurate with performance. In the government, bureaucrats are paid by the grade, the seniority or the levels. You get paid automatically, every year, every month. But R&D personnel should be rewarded according to their performance. [Sun] felt that that's what industrial organization is all about.

Y.S. wanted to privatize these three government laboratories. So they set a process and a date for the conversion. Basically, they would say, from now on, you are no longer civil servants. Of course you will still have whatever you earned in your retirement. But from now on, this laboratory will become a private laboratory. The government will still give the lab all the fixed assets; the land building and equipment—will be a government donation to this laboratory. But the laboratory management is under new rules of game and would have to think about its performance, show its value for its own survival.

But the government made another promise: to cover the staff costs and, the salary and benefits, as of that date. The government's budget will include the fixed staff costs—and give it to the laboratory as a donation. For the machinery laboratory, it would be the same thing. But if you want growth, better pay? You have to do it on your own. This is the idea of privatizing laboratories, okay.

So [Sun] formed the ITRI with these three laboratories as the foundation of ITRI. And he went through the Legislature for the establishment, outlining its mission and operation and the government donations. That amount of staff costs is a government guarantee for ITRI.

This amount, in 1973, was 100% of the ITRI budget. The percentage slowly decreases to about 70% in 1980. In other words, these laboratories started to earn something on their own. ITRI started to work with the industry, help the industry and show its value. But the out-reach effort, represented by the added funding, is still very small.

Come 1983, when I came to ITRI, it was about ten years already in existence. It has established some reputation, but it has encountered a lot of problems. Many problems, really, have to do with its past history and culture. There's a

morale problem for the people, because their job is not secure. And they are not very motivated. Since ITRI is still receiving some government subsidy annually, so industry is looking at it with different eyes. Often the industry looked upon ITRI people like government officials or civil servants, and do not trust them [for performance].

So there is a morale problem, an image problem, and the execution problem. I was given a job to run a new laboratory, inside—the ITRI organization.

To answer your question briefly, ITRI has a very different complexion in the '70s. Although they are privatized, they still have the mentality of a government laboratory. Yes, a major management re-engineering effort for ITRI would be needed.

13-00:48:57

Hamilton:

Here in America there's a very strong perception that the scientist cannot communicate with the non-scientist. Were there similar perceptions at the start of ITRI? Have they changed in Taiwan?

13-00:49:06

Lin:

I think very much so. For scientists, they are the same—scientists take pride in their work; they feel they are very smart, they feel they are intelligent, they are experts in a very specialty field. They are self-motivating. I guess all scientists are the same.

I think you have to let these scientists be accountable for what they do. As if their life is also endangered like the ordinary folks.

13-00:49:40

Hamilton:

Mm-hmm.

13-00:49:41

Lin:

Yes. I think that's why privatization has come a long way in helping that. They are forced to understand the real situation of the industry. I have talked about a national innovation system, when the Institute has lost touch, or the university has lost touch with the real world—they will be like isolation in the ivory tower, right? We all have heard of this word, okay. But now, if you have forced them, structurally, to be interacting with the industry, they have will have to change their feeling and sense of reality.

And actually, there's a misconception that working on actual practical problems was no motivation. It's wrong. A lot of the time, you get fresh ideas, good input—input from the people out in the real world, because they have problems that need solve. And solving this problem can be, at times, creative—that's where creativity is coming from. There are many instances like this. In the IC field, you know, making electronic circuit, I talk about the line width of the magnitude of micron, millionth of a meter, and so on. One of the big problems is that in a piece of silicon, if you want to cut out a line, right

on the surface, with precisely that width. How are you going to do it in the micro-scale. Okay, you use chemicals such as hydro-fluoric acid, to etch out the silicon. But then you have to clean it afterwards; otherwise there will be chemical corrosion. So there are ways of trying to overcome this problem.—Most frequently, this would be based on refinement of the liquid lithography technology.

There are new methods, certainly one wants a solution which will not—become a problem for the future. Wet etching is a problem, and particularly, cleaning after etching is a problem even more. This is an issue of very much concern for companies like IBM in the 1980's when the interest was getting into thinner lines. Because the lines are getting closer and closer; obviously there is limit when new chemicals cannot get in. So a new method of etching is developed.—Instead of using wet chemicals, you use dry chemicals, or plasma. Basically you activate the molecules, let them carry electric charges and move with ultra-high speed, so when you bombard the edge of the silicon with this, the un-protected silicon surface will be milled off to form a line. And after this etching process, there's nothing left behind to clean. There's no residue in the line. This very ingenious approach is called “dry etch,” or plasma etch.

13-00:52:50
Hamilton:

Mm-hmm. This is just using charged ions?

13-00:52:54
Lin:

Yes, charged ions.

13-00:52:55
Hamilton:

And can you explain how that would be a better solution?

13-00:52:59
Lin:

Okay.

13-00:52:59
Hamilton:

I understand that there's no need to clean, but what can a charged ion do to etch a small line into a piece of silicon?

13-00:53:07
Lin:

Well, I think now you see the ion as a particle, as I mentioned, of very small size, in the range of Amstrongs. When you want to have the actual liquid to go into a line, micron sized, or submicron sized lines, but when you are talking about this etching agent, it's a molecule. Then you are talking about a hundred times smaller—a thousand times smaller scale. They will be able to get at this line much more precisely—it is a more accurate method.

13-00:53:50
Hamilton:

Is this directed with magnetic fields?

13-00:53:54
Lin:

It's not magnetic fields, but it's plasma.

13-00:53:56
Hamilton:

Okay.

13-00:53:59
Lin:

Plasma is charged ions. It's charged molecules.

13-00:54:01
Hamilton:

And how do you direct the charged molecules to the edges of the silicon?

13-00:54:06
Lin:

This comes back to physics, a lot of physicists participating in this field. They have to find a way to generate the plasma, and to control the plasma, and to direct the plasma to those areas that you want it to. That's the interaction of science and industrial problems.

13-00:54:29
Hamilton:

Right.

13-00:54:30
Lin:

Science and industrial problems. Because of this interaction, we are able to bring up the technology much faster. The scientists by themselves, or industry people by themselves, will not be able to move the technology that fast. It is the interaction and understanding of each other's problems that counts.

13-00:54:52
Hamilton:

I mean, with this tradition in Taiwan of the marriage of industry and science, do you see a rivalry between so-called "ivory tower science" and the pure science and applied?

13-00:55:02
Lin:

Yes. Obviously—yes.

13-00:55:06
Hamilton:

Has it changed since 1973?

13-00:55:09
Lin:

No, at that time, scientists looked down at practical problems. Meaning that they maintained a high profile; they want to work out the problem with a certain hierarchy in mind. All looked up to understanding the nature as the utmost priority. They did not want to solve problems that have to do with money. They always felt it was beneath their dignity, in a way.

13-00:55:37
Hamilton:

Mm-hmm.

13-00:55:40
Lin:

There is a mentality problem, and of communication between science and industry. But once you let them recognize that—the industry people felt that scientists have no interest in their work, because they are always thinking about life or above life. It's up to the institutions to reach out to each other for communications—the industrialists were confident to discuss their problem

with the scientists, and the scientists showed an interest in helping to solving problems. I think this will really catch fire.

13-00:56:17

Hamilton: Would you say that the structure of ITRI is what makes that possible?

13-00:56:22

Lin: ITRI is a catalyst here. For ITRI, it's an organized effort, trying to get the scientists, the engineers, to be interested in the industrial problems. For the university, basically it's the individuals' effort. But for ITRI, it is institutional. I mentioned that the criteria of success for the individual in ITRI is not the number of publications that you have. It's whether you have helped the industry: solve their problems, obtain new patents to provide new product or process, help to establish a new business or something. We will talk about some of these criteria tomorrow. If the leader in an institution see this as important, then he can guide the people to work toward that. Previously, there are no, or very few, patents for ITRI. The patents were about single-digit, over those ten years. But as I have showed in the seminar today, ITRI was able to generate relevant patents almost one a day.

Begin Audiofile 14

14-00:00:00

Li: Emily Hamilton and Robin Li, speaking with Otto Lin, May 6, 2008. This is tape fourteen. I actually had a question, because I was thinking about Emily's question about the basic research scientist versus the applied scientist, and it reminds me of kind of a classic Chinese tension between the scholar and the merchant. And I was wondering if you could say something about traditional Chinese values, where you were supposed to pursue knowledge for its own sake and not be concerned with material things, versus—it seems like now Taiwan and China need to think about accumulating material things, building up strength as an economy, as part of its national agenda.

14-00:00:45

Lin: Well, you know, it's a very complex question that you are asking. But you have touched upon what I think a very unusual feature in the Chinese culture. Chinese science is very much applied oriented. In Western culture, you have pure scientists, you have Galileo, you have Newton—actually rheology was a branch of science that was largely invented by Newton—calculus, and that kind of thing. In China, looking at the history—thousands, several thousands of years—there are several scientists become very famous, you know, in seismology, in mathematics, and medicine, that kind of thing.

But overall, Chinese scientists are very much applied-oriented.

14-00:01:48

Li: It's true.

14-00:1:52

Lin: Okay. And the Chinese word [xue yi zhi yong]—I will write it for you 學以致用—always asks about what is the use of learning? Yes. What’s the use of this? So in the traditional—in Taiwan, there is more engineers than scientists. The university takes in more engineering students than science students, because it’s easier for the engineering students to find jobs, to apply their knowledge that they gained from the university. It’s less of use for people—students of anthropology, or people of pure physics. So the society actually is very much applied-oriented.

14-00:02:36

Hamilton: Mm-hmm. What about in medicine? Are there large pharmaceutical industries in Taiwan?

14-00:02:45

Lin: In the eighties, no. Most of the pharmaceutical companies in Taiwan in the eighties are companies that are making chemicals, and those chemicals can be used as generic drugs.

14-00:03:00

Hamilton: Okay.

14-00:03:02

Lin: They are very little in original drugs or anything like this coming out. And a lot of chemical companies are making the chemicals for drug companies in the United States, like Merck, Eli Lilly, Hoffman-LaRoche, companies like this. I don’t know specifically what the percentage is. But I know some good chemical companies are making generic drugs for, you know, these big pharmaceutical companies.

There’s no pharmaceutical company with a Chinese brand, so to speak. There are some, not very big. I think now, you’ve heard of traditional Chinese medicine. This is going to be a very big field for Taiwan and Mainland China, because the traditional Chinese medicine has been used for thousands of years, and some are very effective. They cannot cure AIDS or cancer, but some traditional Chinese medicines are very good for improving the metabolism, or neuro-system, and for maintaining good health. I think there’s a big trend now in these last twenty years to learn more about traditional Chinese medicine, and try to prepare Chinese medicine with good quality assurance. Most of the Chinese medicine is from herbs. Trees, tree leaves, tree barks, roots, fruits, and that kind of thing. And they can be fine differences from their origins. There’s a cough medicine, 枇杷膏 [*pipa gao*]. Pipa—I think it’s in the apricot family, mix the extract of it in a syrup is a good cure for cough. My own experience is that this cough syrup is as good as Robitussin.

14-00:05:32

Hamilton: From New Jersey, yes.

14-00:05:37

Lin: Yes. But the Chinese has long had cough problems too, right? They cured their cough problem, with apricot, or pear extract. And they are some very effective prescriptions like that. The effort is to identify the active ingredient from pear or apricot effective in curing this particular health problem, then trying to learn about the chemistry or physiology of the active ingredient, and to produce the ingredient consistently and in larger quantity.

So I think it is a major undertaking in trying to modernize traditional Chinese medicine. And this is a big field in Taiwan and China now.

14-00:06:41

Hamilton: Is this also a remnant of globalization as a lot of the globe is rejecting things like Western medicine more and more?

14-00:06:50

Lin: No, actually, no. I saw a combination or synergism of east and west medicine. Some German firms have been buying ginkgo fruits from China. They were able to get the ginkgo fruit and make powders out of it, or sort out the active ingredients and spice it onto a capsule with other neutral, ingredients, or in tablet forms. And sold then as food supplement to improve dementia. I think these are the kind of things that the Chinese can do very well.

14-00:07:26

Hamilton: Right.

14-00:07:28

Lin: Yes. They have to use modern chemistry, chemical engineering processes, and pharmaceutical methods in doing that.

14-00:07:35

Hamilton: In making traditional medicine.

14-00:07:37

Lin: Yes. There also is a tendency combining traditional Chinese medicine and molecular biology. Some neuro-diseases, such as Parkinson's disease, multiple sclerosis, etc.,—the physician may treat the patients with some medicine. And it's known that some medicine may be effective to Caucasians, but not to Orientals.

14-00:08:12

Hamilton: Hmm.

14-00:08:15

Lin: Okay. It happens. And why? There are some genetic differences. This is a big field. There are now research in identifying genomes, with the probability of linking to certain genetic diseases. All of them are different by the positioning of a very small code, permutation of one of the four codes. I think this is called bio-informatics, trying to analyze our genomic structure and to identify whether this person is prone to certain types of disease. In the future, when

you to see the doctor, he will most likely ask to see a DNA analysis of your certain genome, to facilitate his diagnosis and treatment of you. There may be several medicines to choose, and one of them may be more effective than the other. I think these can be associated with bio-informatics. It is making medicine more personalized. So this is what personalized medicine means. And I think Chinese medicine is another type of personalized medicine.

This is how we are looking to the future. When I was at ITRI, I did not have a section on bio-medicals, you know. The interest was scattered in many labs. But now there is a biomedical center in ITRI.

14-00:09:57

Hamilton:

Could you talk a little bit about the actual structure of ITRI when you came to ITRI?

14-00:10:03

Lin:

Okay. When I came to ITRI, there are two types of first-level organizations under the president. Take the university as an example. There will be school, or college: College of Science, or School of Science.

14-00:10:34

Hamilton:

Yes.

14-00:10:35

Lin:

Okay. And then departments: Department of Physics, Department of—you know. So there's the college or school, and then the departments. In ITRI, the college level, you know, in the first level, there are 11 sections. Some we call laboratory, and some are called center.

14-00:10:52

Hamilton:

From the beginning, or now?

14-00:10:55

Lin:

No, not from the beginning.

14-00:10:56

Hamilton:

Okay.

14-00:10:57

Lin:

The beginning—the first level is called laboratories. And there are four laboratories, and two centers. All these laboratories have different organizational structures. Each has their own staff and different levels of administration. These laboratories are serving a certain groups of industry, they have to work with more or less in line with the industry norm. The laboratories all have their origins in the government structure. They usually have a very weird—a very complex structure. Every laboratory is different. It's very difficult to communicate between the laboratories, not to mention, to try to transfer one person from one lab to the other.

14-00:12:01
Hamilton:

Mm-hmm.

14-00:12:05
Lin:

You must recognize that for high-tech industry, one of the first characteristics is multi-disciplinary. Taking a laptop computer for example: electronics, mathematicians, materials, energy, mechanical, they are all coming to that laptop computer.

There are times that you need different people to work together. It becomes very difficult to manage multi-disciplinary projects in the old ITRI. The first thing that I did is to look at these different laboratories, and try to set out an organizational structure that will be common for all the laboratories. The center is the same as the laboratory, but only on a smaller scale. The laboratories are usually larger in that they cover an industry, or several related industries. And the centers will be more technology-focused. They do not have an industry, or very obvious one yet. When I was laboratory director in the Materials Research Labs [MRL], I had a group working on optoelectronics, more accurately, on optoelectronic materials. And their job is study red LEDs. You know about LED [light emitting diode]? I promoted that lab, made it a center to grow that segment of the business, so that they are not only making red LEDs, but also have the ability to branch into green LEDs, blue LEDs, and LD [laser diode]. These are very different technologies from the red, the science is much more difficult. And also in actual applications, you do not use just LED by itself, you always put it into certain devices. Okay. You don't use the material, you use the device, right?

14-00:14:19
Hamilton:

Mm-hmm.

14-00:14:20
Lin:

You have to learn the interaction of the engineering materials in the system. Finally I set up an optoelectronics center, and then later we created a laboratory called OES—optoelectronic systems laboratory.

While I served as president, I set up a number of new laboratories in ITRI. First, let's look at ERSO- Electronic Research Servicing Organization. It's one of the earliest centers established in the late 1970's. It has been working on ICs and was very successful, so it has grown rapidly to become a full-size laboratory. When I joined ITRI in 1983, the Institute has about 3000 employees. And ERSO has about 1000, becomes the biggest laboratory. It was very successful because its spin off in 1980, United Microelectronics Corporation [UMC] has become the pioneering leader in the microelectronic industry in Taiwan. The second spin off in 1986, Taiwan Semiconductor Manufacturing Corporation [TSMC] was positioning to be the flagship of the semiconductor industry. But I saw ERSO was facing major problems: diffused technology focuses and erosion of technical personnel. Because of the timely injection and versatility of the microelectronic technologies, the IT industry in

Taiwan started to grow and expanded rapidly. It became apparent that people making computers have needs very much different from those of ICs. Responding to these diverse needs has stressed ERSO's focus and capability. IC is like steel. A computer is like automobile. The IC is the basic material or fundamental element for the IT. But the appliances—the computer, printer, fax machine, the telecommunication devices, are the downstream which cover a much wider spectrum of businesses than IC. I feel there is a need to separate ERSO to two organizations, so that ITRI can properly service the growing industries. Thus I re-structured ERSO which is still to focus on its core business, the VLSIs and formed a new laboratory called Computer and Communications Laboratory [CCL] which will place focus on supporting the growing downstream industries of computer, communication and consumer electronics [CCC].

Today, the rationale for such separation, I guess, would be pretty natural. Obviously computer and communication are different from electronics. But not so at that time. In the early years of 1990, it was a major undertaking to convince people that it's better to separate [the two]. That way, the laboratory directors can study their industry, the clientele, much more closely, and see the needs of the industry clearer and can try to service them more rapidly.

This quick response to society needs is one aspect ITRI is different from the government. Before we go further, I have to lay out the organizational structure in ITRI so that you can understand different laboratories when you're looking at the organizational chart.

[A typical organization chart of ITRI is shown in Appendix 13.]

The Laboratories have a common administration structure. Professional people will be paid similarly, when they're in the same level. And people can aspire to moving up the organization. If one gets a promotion, one gets into another level, and people know what it means. It's much easier for organizational management. Therefore unifying and systematizing the organizational structure across ITRI laboratories is one of the early things that I did as president.

14-00:18:26

Hamilton: You were involved with the material science lab?

14-00:18:30

Lin: Materials lab.

14-00:18:32

Hamilton: Materials lab?

14-00:18:32

Lin: Yes.

14-00:18:33

Hamilton: Could you tell me a little bit about how you got involved with that—what your job was with that lab?

14-00:18:42

Lin: I think in the 1988, at the first National Science and Technology Conference, one of the recommendations is for the government to designate funds for to develop four technology as national thrust objectives.

14-00:19:06

Hamilton: Mm-hmm. This was '78, right?

14-00:19:09

Lin: '78.

14-00:19:06

Hamilton: Okay.

14-00:19:11

Lin: '78, yes.

14-00:19:14

Hamilton: Yes.

14-00:19:15

Lin: During the time when I went to Taiwan. It might be '78 or '79.

The four are: electronics, energy, materials, and automation.

14-00:19:36

Hamilton: Okay.

14-00:19:36

Lin: The conclusion of that conference is that these four areas will be the key technology area for the future. So it will be important for Taiwan to build up capability in those areas. Electronics—we already have the ERSO, so that is fairly well taken care of. Energy is a big question mark. Materials is a question mark. And automation is given to the Mechanical Laboratories in ITRI as its focused objectives.

The government did not know how to tackle the issues of energy and materials. But ITRI was asked to put these into its agenda to work on them. They have the notion of setting up the Materials Laboratory and seek the advice of many material scientists worldwide for advice. A very famous scientist is Fred Seitz who is a former President of the National Academy of Science in the United States, and, President of Rockefeller University. Seitz, among others, is adviser to the Executive Yuan at the invitation of Premier Sun Yun-suan. It's not only Seitz—there are a few other people. I should talk

about this. It's a digression, but I think I should talk about how major science and technology initiatives had come about.

The Executive Yuan, which was the Prime Minister's office, runs a science and technology advisory group. The Group [referred to as STAG] consists of advisers who are very distinguished and with established record of accomplishments, mostly from outside of Taiwan. They are also willing to dedicate part of their personal time, on pro bono basis, for Taiwan. Professor Seitz was one of them. Others included ; Dr. Ramos of TRW, Dr. Haggerty of Texas Instruments, Dr. Norman Hackerman of Rice University, Dr. Pierre Aigrain of Thompsons [France], Dr. Pandergast of Phillips [The Netherland], and others. This is a high-level group of scientists and executives and, responsible only to the Premier. They can advise on all fronts of science and technology. They are very well-respected and made great contribution to Taiwan. Their focus are basically: what kinds of science and technology will be suitable for future industrialization of Taiwan? What does Taiwan need to do in terms of human resource development and establishment of fundamental technical capacity?

When they meet, they always have some local counterparts: ministers, university presidents and professors, ITRI leadership, major company executives, and so on. On the issue of forming a material science laboratory, they felt that the best place to do it is not National Tsinghua University or National Taiwan University, but ITRI. Because the purpose of this laboratory is not only human resource development, but also to have impact on the development of industries.

So the government set up this laboratory, and is recruiting for someone to head up this laboratory. And before the full-time person is in place, they ask the vice president of ITRI, Dr. T. K. Kwei [桂體剛], to head that office on provisional basis. In the process of recruiting, Y.S. Sun and S.S. Shu came to me.—I am not a metallurgist [synonymous with material scientist at that time], but I am a polymer scientist and also have industrial experience and proven to work well under the Taiwan environment. I keep abreast of what goes on in the academic world. So they feel that I am the right person to be heading that laboratory. That's why I become the first director, full-time director of this Materials Research Lab in ITRI.

14-00:24:55

Hamilton:

Could you talk a little bit about the types of research projects that happened in the lab?

14-00:25:00

Lin:

The typical materials research lab during that time is metallurgy. If you look at the materials science and engineering department here, UC Berkeley, most are metallurgists. Steel, stainless steel, carbon steel, specialty steel, the

different elements in the process of making steel, and the property- structure relationship.

But when I become MRL director, I felt there are several components are missing in most of the existing materials labs, especially in the perspectives of the Taiwan's future development. One obvious part is polymer. Polymer covers plastics, elastomers, textiles, coatings, etc. I think this is an area is important for Taiwan's economy.

Another missing component is ceramic-.engineering ceramics. At that time we were thinking about structural ceramics such as engine parts and also functional ceramics for devices in the electronics area. There are a lot of ceramic packages, components that are important.

14-00:26:45

Hamilton:

Did you work with sensors? I know a lot of those can be ceramic.

14-00:26:50

Lin:

Sensors, yes, sensors. A lot of sensors are ceramic. That's a part of it. Sensors are a combination of things: ceramics, metals, polymers and optical fibers—they can be made of composites of different materials.

14-00:27:05

Hamilton:

Right.

14-00:27:06

Lin:

Thousand different kinds of sensors.

14-00:27:07

Hamilton:

And a lot of that would happen in the materials lab.

14-00:27:11

Lin:

Yes. Material is a major part of that. There are three elements: materials, actuator, and servo- mechanism, for any sensing device.

So I thought in addition to metallurgy, probably you need a section on polymer, ceramics, and electronic materials, recognizing that electronics would become big in the next decade. Of course, we do not make silicon wafers. But we need to know how to characterize and process silicon. Another part is optoelectronics, which figures very importantly for Taiwan.

14-00:27:52

Hamilton:

Could you define that—optoelectronics?

14-00:27:55

Lin:

Optoelectronic material is a material that generates optical signals when it is exposed to electric voltage difference. Lights. When you put electricity into the silicon semiconductor, you don't have light coming out, although the electrons move. But in optoelectronic materials, electromagnetic waves of various frequency [lights] will come up under similar conditions. We can

produce red lights, blue lights, that kind of thing, with proper semiconductor materials.

14-00:28:20

Hamilton: Mm-hmm.

14-00:28:22

Lin: Basically, in terms of most basic chemistry, it has to do with the atomic structure of the elements. In the simple atomic model, Si atom is the Family 4, has four electrons in its outer shell. When the Si atoms link with one another they fulfill the most stable condition in an octet electronic configuration. Most optoelectronic materials are 3-5 compounds—compounds constituted of Family 3 and Family 5 elements. While satisfying the octet configuration, there also exists an energy band gap. When electrons fall from one level to the other, it will emit light with an energy corresponding to the band gap. The wave may be in the visible light region, red, green or blue. This, in the nutshell, may I say is Optoelectronics 101.

At that time, technology-leading countries are also talking about using optic electronics as a computer—an optical computer. So when I set up the lab, I broadened the scope of typical traditional material science laboratories to include optoelectronic materials.

And another important part is corrosion. Corrosion of a metallic compound is very important. The United States National Bureau of Standards [NBS] has conducted a study which shows that the loss due to corruptions of metal is about 3% GDP [in the U.S.A.].

14-00:30:07

Hamilton: Okay.

14-00:30:09

Lin: Yes. In Taiwan's situation, it's humid, it's hot, so corrosion is very important. Therefore, in the Materials Research Laboratory, I set up groups for metals, polymers, ceramics, electronics, and corrosion. These become the five technology components of the materials lab.

14-00:30:37

Hamilton: Mm-hmm.

14-00:30:39

Lin: And I try to build MRL a model of modern research lab, really. I am concerned with communication among scientists and for scientists with the society. Because everybody in the technical world share some common interests in the materials field. Materials science has a wide-reaching scope. It is difficult to get scientists to discuss with people not in their own area. The metallurgists tend to see the polymer scientists as foreigners. Because, in a way; scientists are prone to take a parochial view of things. But by sharing common values and setting goals for the long term, we were able to bring

these people together and work on projects together. [Narrator's Note: I put a lot of efforts in training the scientists to communicate, making written and oral presentations, for example.]

14-00:31:20

Hamilton: What backgrounds did people that you recruited for the materials lab come from? I would think you would have chemists and atomic physicists and scientists from all sorts of backgrounds.

14-00:31:32

Lin: Yes. They are from chemistry, physics, mechanical engineering, electrochemists, corrosion. There are all kinds.

14-00:31:47

Hamilton: Did you have statisticians, mathematicians?

14-00:31:50

Lin: Yes, that's right. They are essential to study, for example, the fracture of materials—when you have a piece of material and then you have fracture points, that point can serve as a center of fracture which propagates rapidly.

14-00:32:05

Hamilton: Would it—

14-00:32:03

Lin: And this is mechanics.

14-00:32:06

Hamilton: Were they mostly Taiwanese, or Chinese, or—

14-00:32:12

Lin: Most people in the laboratory are ethnics Chinese. To me, I make no distinction of whether Taiwanese or non-Taiwanese.

14-00:32:17

Hamilton: But in terms of their education, would they have been educated in Taiwan, or—

14-00:32:24

Lin: Most of the people have their education in Taiwan at the undergraduate level. But, you know, they come to the United States or Europe to pursue their post-graduate studies.

14-00:32:34

Hamilton: Mm-hmm.

14-00:32:36

Lin: I think it's good to talk now about recruiting. I started with the MRL, and then later I recruited for ITRI and selected positions of other laboratories as well. Every time I can manage it, I always want to meet with the candidate in person. Not only the candidate,—I would try to have some contacts with the

spouse, and find a chance to talk to the professors or the boss, to the extent possible. Sometimes it's confidential.

I remember at that time, in the eighties and also the nineties, the GDP of Taiwan is still in the thousands. In comparison, the GDP of the United States would be about 20 to 25 thousands—at least three or four times' difference. It would be interesting to understand his/her incentive or motivation of coming to Taiwan, and to ITRI. So I usually ask the candidate, why is it you are willing to come, or come back to Taiwan?

People have different levels of interest, of course. If he is coming to ITRI—I'm just say "he"—with the thought that it would be a easier job, or a better lifestyle, better environment, more comfortable life—he will be disappointed because these are the wrong reasons. Very soon he will be so disappointed that he will leave—or will be asked to leave.

If I want to recruit somebody from the United States all the way back to Taiwan, I better make sure that he is the right person with the right job. I want to minimize situations like the above. It would be a waste of time for the person, and a waste of time for the lab or ITRI.

So I want to know his motivation. Qualifications are obviously [important], and more easily seen. Motivation is more important and difficult to assess. If somebody wants to go back to be with their family—their parents, or need to take care of their parents, that's a good reason. If he want to get married with some Chinese, that's a good reason, male or female. If he has children and he wants to give them some Chinese culture and education, that's a good reason. If he sees his career as diminishing or stagnant in the United States and he wants to seek growth or other potential opportunity, this is good. If he is interested in going into business himself one days, that is a good, because we do have a lot of opportunities of helping colleagues going into industry. If he wants to contribute to the advancement of Taiwan and China, that's wonderful. So I tried to understand the motivations and the needs of a person.

For the second categories that I talked about, I think it is easy to find a way for them to stay in Taiwan and there are plenty of career opportunities. For the first category: those who like higher pay, easier life, better environment, etc. It is no way. For those people, I try to discourage them from coming.

14-00:36:24

Hamilton:

Mmm.

14-00:36:28

Lin:

For the Second group, we will work with them, and try to find out what does it take to get this person to come to ITRI. If it's about finding a job for his wife or for his husband, then we'll work with colleagues in other universities or other companies to find opportunity. We would ask, would you be able to offer this person's spouse a job? We help do that. If there is a problem of

school-age children, and they don't know any Chinese, we would set up American schools for them. And we work this out with the Science Park. Because in the Science Park, they are also have many returning expatriates and very much in need of a bilingual school.

I can take some credit for set up a bilingual school in Science Park. Because back in 1978 when S.S. took me to see the future Science Park, and I said to him immediately, "One thing that you need to do is to set up a bilingual school." I'm thinking of my own situation—I don't want my children to get short-changed in the relocation process. The move to Taiwan for the children can be taking as a good opportunity to learn the Chinese culture or language. But eventually it's a good possibility for the children to go back to the States, for college. So you need to have a good school for them to pursue that kind of thing, and not giving up their progress in the English language as they will definitely need it.

14-00:38:20

Li: It's interesting, because you also had a hand in starting a Chinese school in Cherry Hill.

14-00:38:23

Lin: Yes, that's right. For that American school in Science Park, it's equally full of headaches. In the very beginning, student numbers are small. You might say it would be 50 or 60 or 70 in the whole school; and they are scattered all over different classes. The economy of scale is not there. The Science Park Administration did not have a lot of funds to recruit teachers. And there are a lot of other additional expenses—so we have to work with the Ministry of Education for extra funds for this school. Dr. Choh-hsien Li, Director of the Science Park [great-uncle of Robin Li], at times ran into some arguments with me. He said, "Otto, I am here to run the Science Park, not to run an education business." And in a way, he is right. But I told Choh-hsien that "if you do not run a good bilingual school, you may be losing people from the Science Park."

So there are running debates like this. But in the end, we all worked together to find teachers and supports for the bilingual school.

14-00:39:58

Hamilton: Your discussion of the school, as well as talking to the scientists about how their families will fit into this just reminds me so much of how Los Alamos was set up.

14-00:40:12

Lin: Uh-huh.

14-00:40:12

Hamilton: Since it needed to be a place for scientists to live and work.

14-00:40:17

Lin: Yes.

14-00:40:19

Hamilton: I'm curious if that was any sort of inspiration—of a consideration in developing this model of a city within ITRI.

14-00:40:29

Lin: Yes. Well, at that time, you know, I did not know about the Los Alamos model, but there is very much a real problem. I feel the problem myself, and I feel my colleagues—they all have the same question. They say, “what about my children? When I go to Taiwan, would they be able to go to a bilingual school, so that in a few years they can go back to UC Berkeley, or Princeton? So I think this is the question—a very important question. You cannot post this question to the bureaucrat, to the typical Ministry of Education. This is a different school, a specialty school.

14-00:41:08

Hamilton: Was it open to anyone, or only children of—?

14-00:41:13

Lin: Only to children of the personnel associated with the companies in the Science Park, ITRI, and the two universities in that community.

14-00:41:20

Hamilton: Okay.

14-00:41:22

Lin: In principle, if you have a need, if you are a faculty professor in Taida, which is in Taipei, we would not refuse them outright, but it would be more practical for him to send his children to bilingual schools in the Taipei area.

14-00:41:43

Hamilton: Right, right.

14-00:41:44

Lin: Yes. Of course—now in Taiwan, there are several bilingual schools, most are private. Bilingual education is very much needed and can be profitable.

14-00:41:53

Hamilton: Right.

14-00:41:54

Lin: Yes. I take recruitment very seriously, because the cost of failure is too big. You would suffer loss for the person, and the loss of precious time. Especially because we cannot pay American salary, we are asking him to cut his pay, just like myself. With time, the salary is catching up. At present, it may become half of what they've got in the United States. But still, a half is still a half, right?

14-00:42:40
Hamilton:

Mm-hmm.

14-00:42:41
Lin:

So you have to have some additional compensation or motivation for him. When he comes here, although he may get only half of the salary in the United States, but in the local situation, costs are lower. And you might be able to convince him that he's really not that worse off for the package. But then, on the other hand, he has gotten an opportunity to contribute to the society—to help Taiwan, to help China, to push technology or build a career for himself. He knows the business and then, in a few years, if he wants to set up his own company, we'll help him do that.

You have to put a package together.

14-00:43:29
Hamilton:

What was the typical experience level of the people that you recruited? Were they right out of Master's programs, PhD programs? Have they worked for ten years?

14-00:43:41
Lin:

Mostly they would like the people to have work experience, even with a PhD. We do not recruit Master's-level people in general.

14-00:43:51
Hamilton:

Okay.

14-00:43:53
Lin:

Master's-level people will be just local. You know, Tsinghua, Jiao- Tong—they are good schools. They have good students there, and they're not as expensive. So, recruiting somebody from the United States to go to Taiwan, we're usually looking for PhD level or in the manager level. If, he is not at the manager level, but one on technical level, then we are looking at his professional experience—five to ten years' experience, mostly.

14-00:44:21
Hamilton:

Mm-hmm. Did you recruit from DuPont?

14-00:44:24
Lin:

I recruited from DuPont. Yes. We don't go there to raid people, but some came naturally. When I come to first work at ITRI, the entire ITRI is about 3,000 people—it has about 50 PhDs. When I left ITRI in 1994, the organization has 6,000 people, and it has over 500 PhDs. I'm putting emphasis on professional experience part and on the senior level. Because I feel that we need senior people, experienced people, to be team leaders, so that can move the old institute more effectively. That's the level that we've hoped to put our focus.

14-00:45:24
Hamilton:

I'm interested, too, in your decision to really push patents.

14-00:45:32

Lin: Patents, yes.

14-00:45:35

Hamilton: That those working at ITRI did not need to publish, but did need to secure patents. I'm interested both in why you decided pretty quickly that this was important, and then also just the technical details. Who had the patent? Did the individual scientist have it? Did the lab? Did ITRI? Did the government?

14-00:45:53

Lin: Okay. I think I was a pioneer in the recognizing the innovation system concept and in that you have to have a clear position and role. For a very practical reason: the Institute cannot compete with the university for fame. And, the Institute cannot compete with the industry for money. Because the university usually give scientist more impressive titles and industry usually gives them stock options. [So what can distinguish ITRI professionals is mainly their reputation as innovation leaders and the benefits they can bring to the industry in technology application.] In other words, what do we have that makes us special? Think about our position in that system is to help the industry. Think about our channel which technology is key and, innovation is key. And when you're talking about technology, obviously it is about patent, know-how, trade secrets and so on and so forth. But it all builds around the importance of the patent.

And when you want to transfer a technology to a recipient, you say, "Well, I will show you how to make a [new] product." They will ask whether they get any special protection for the product. If you do not have that kind of special protection, conveyed by patents, then I think the marketability will not be the same.

We see this trend coming up. So more and more, the recipients of our technology transfer will need something special, a niche advantage—something special for sale, freedom to operate—this is true for all kinds of industry. And I think in that aspect, my DuPont experience probably helps me. Because my understanding of need for niche advantage came from working with DuPont. University people will not have that kind of acute feeling for it.

Take the materials industry. If the project leader wants to do this specialty steel project for vacuum induction melting—I will ask him, "When you finally finish and are able to make this specialty steel, can you claim that you are the only one, or the first one that can make this magical steel by this magical method?" They will always say, "Yes, I am the only person in the world that can do this." Okay. Then I will say, "Well, show me. Go do a patent search, and see how many patent you can find in this area and tell me yours will not be the same." And the scientist usually comes back and says, "Well, yes, there are other people working in this area." Then I will say, "Well, okay, then. Out all of these patents, can you find a gap that you give you a unique position and with economic advantage. If so, go focus on that?" You see?

After he did this work, after a year or two, then he comes up with something that is unique, and we can put it up as a patent. We call it patent-mapping, or strategic planning on patents. It is a very important part of [ITRI] way of identifying research topics.

This works for almost every situation. I think the Laboratory Director can really show his commitment to this and ask his colleagues to do the same. When I become president of ITRI, I asked my Executive Vice Presidents and VP's to do it as a part of their administrative duty. As ITRI president, I am very much an administrator—70—% administration.

But laboratory director has a very interesting job. It is a very stimulating job, the five years as materials research lab director was very fulfilling for me. Because I also get the excitement of new technologies. I think my background is fairly unique which enable me to appreciate things in a wide spectrum. Because my polymer and electronics exposure, I was able learn metallurgy very easily. I learned corrosion first hand by working in DuPont and with automobiles- we know what kind of corrosion people were talking about there. I have a fairly broad background that already prepared me for that job. Therefore, I am able to guide the people, and so the MRL is recognized as a very forward-looking laboratory. So it becomes a model.

In each lab, I asked the laboratory director to review patent status for each group periodically. And of course, in the electronics era, the need and usefulness is very much felt. If you do not have a patent, you will end up paying license fees to somebody. It's not that we don't want to pay a license fee, but I think it's more likely to convince our customer to accept our technology when we do have patents of our own.

14-00:51:00

Hamilton:

Right, yes. And who owned the patents?

14-00:51:04

Lin:

The Institute owns the patent.

14-00:51:06

Hamilton:

Okay.

14-00:51:07

Lin:

Okay. Now, all the inventions are owned, registered under the name of ITRI. But the inventor is clearly so recorded for the individual. So, Emily Hamilton is the inventor. Or, Robin Li is the inventor. But that does not mean much financially, except that we will give the inventor a piece of certificate, and just a small monetary award. At DuPont we were given a dollar, a silver dollar for a patent. You know, a certificate and silver dollar. When the patent was used in a commercial product, and that part of the business makes money and clearly we can identify the profit that's made, then the inventor will get a bonus. This patent and award system is also used for ITRI. ITRI owns the

patent, and the individual who has this patent gets an award. A token award. It's more praise than raise, really.

14-00:52:08

Hamilton: Mm-hmm.

14-00:52:11

Lin: But then if a profit comes in, then we'll share. We transfer this technology to the company, the company pays a royalty to the ITRI, and ITRI will share this profit with the inventor. But I must say to you, the reward will come only slowly. When I left ITRI, this policy was only practiced for about five years. Or, ten years in MRL. It should be recognized that it takes time, some several years for a business to starting make money and is able to award any bonus to the inventor.

14-00:52:56

Hamilton: Mm-hmm.

14-00:52:59

Lin: When a sizable amount of money comes in, and we try to reward the scientists, [it might be difficult] because the scientists already may not be in the same job. He might have left ITRI, or he might have been transferred. For internal transfers, the situation is easier because most probably we can still trace the inventors. If he works in another company, then there may be situation that calls for no reward anymore. So there's a time factor for the patent and reward.

14-00:53:33

Hamilton: Right.

14-00:53:34

Lin: When the profit comes back to the Institute or the university, a lot of the time the faculty is no longer there or the scientist has left and worked elsewhere. So I think there's a time lag there.

We realized that there are situations when we need to reward more quickly. So we just put some royalty money in the pool. When we see there is a good prospect of royalty, we may reward those scientists temporarily, if it warrants. Sometimes you cannot wait until five years later.

Begin Audiofile 15

15-00:00:09

Interviewer: This is Robin Li and Emily Hamilton, speaking with Otto Lin on May 7th, 2008. This is tape fifteen.

15-00:00:19

Lin: Okay. Yes.

15-00:00:00

Hamilton:

Welcome back. Yesterday we were talking a bit about the materials lab. And I'm interested in who made the decisions, in terms of what projects to look at there. Was it you, was it the researcher? Who did that?

15-00:00:38

Lin:

Well, it was a new laboratory, and I have a lot to do with picking the project. But actually, I was doing that with a lot of assistance from my friends in academia. We had an advisory committee, basically. Because I was Dean of Engineering at Tsinghua, and they also have a material science department, so it is not difficult for me to know who are the experts in Taiwan.

I have invited many people in Taiwan, in academia—Tsinghua, Taida, and National Cheng-Kung University to participate in this process. I also have invited a number of experts from the United States, France, and Germany at the time. I should mention several senior scientists. One is Dr. Alfred Cho. Al was a very eminent scientist in Bell Labs. He was considered the father of MBE—molecular beam epitaxy. And I think he's also been nominated as a Nobel laureate many times. Another is Dr. Gilbert Chin, also of Bell Labs. He is in the optoelectronics area, materials and devices. Also, Dr. Harry Gatos, professor at MIT and of Lincoln National Laboratory. And in the areas of metallurgy, material characterization and basic material science, I have Professor James Li from University of Rochester. James is a very well-respected material scientist in the United States and have played the role of Chairman of the Materials Advisory Committee of MRL. And then Prof T. Y. Tien from of the University of Michigan, a well-known scientist in fine ceramics.

In the area of polymers, we have as advisor Professor Steven Tsai of Stanford University. Steven was formerly Chief Scientist at Wright Peterson Air Force Base and is well-known in mechanics of composite materials. Later on, when we worked on the carbon-fiber composite bicycles, Steven was very helpful in providing many fundamental guidelines.

So these are the advisors to optoelectronics, metallurgy, polymers, composites. In addition to having advisors locally from Taiwan and from the United States, we also have from Japan Professor Hiroshigei Suzuki [鈴木弘茂]. Suzuki-san is a senior member of the Tokyo Institute of Technology and the leading scientist of fine ceramics in Japan. He was very helpful in arranging our contacts with the Japanese MITI, NIRIM and technology companies including Hitachi, Fujitsu, Sumitomo, etc. Many of the advisors have become my close friends over many years.

In terms of materials technology addressing to the present needs of Taiwan and industrial participation, I have established a group from local industries as well as some senior people from the outside of the country to help set up programs. My network established just a few years ago, with the National

Science Council on the polymer had been useful. From that, I got to know many people in the Taiwan industry. I think we have a good representation there.

Now, at that time, material science was established as one of the National Science and Technology Thrust initiatives. It was also endorsed by the STAG national meeting. In the executive Yuan—I have to explain later on about the structure of the Chinese government later, there is a steering committee on material science under the supervision of Minister K.T. Li. Whatever we have discussed in the MRL levels, we have to report it to the steering committee and awaits endorsement.

When I returned to Taiwan to become director of the MRL, I went to see Premier Sun Yun-suan to seek his guidance of setting up objectives for MRL—what kind of projects should MRL do? From what I can see, there are two choices. One is to address immediate industrial problems. At that time, Taiwan industrial level on material technology is generally very low. So we need to help the industry solving materials problem: material characterization, structure-property-performance relationship—that kind of thing. On the other hand, there is a lot of exciting, cutting-edge technology going on in materials field worldwide. We would have to look at those too. So, should we be focusing on one more than the other? And Premier Sun said, if you are only good at solving the materials problem for the industry at the present time, in a few years they will be on their own feet, what would be your position then? He said, “ You have to look into the long-term developments. MRL is a national lab and should always be on the lookout for the future.” I was very impressed with this vision. Therefore in MRL, we always have some projects aiming at the long-term, while the bulk of the projects were working with industry and focused on solving their existing problems. Yes. So I think this is the basic guidelines of selecting projects.

And Premier Sun wanted me to work on a national materials science and technology development plan for Taiwan. He asked me to prepare the plan for submission to the Executive Yuan. After it is discussed at the cabinet and approved, it will represent long-term commitment of the government with R&D funding and supports.

15-00:08:54

Hamilton:

What kind of programs did you propose?

15-00:09:00

Lin:

We would propose a national program in material science and technology. It will cover the needs of Taiwan for an extended period of time, targeting 10 years. If the government approves, it will become a major national project. And then there will be a budget, allocated for the program for several years. That is the basic concept. Human resource development will be an integral part and recruiting people from outside, say, the United States, will facilitate

the implementation. Previously, we have encountered questions from abroad, “What is the long-term plan?” If they know that the project is only for a year or two, you know, it’s not very attractive for people to make a major relocation and come back. If we can say—“This is a long-term project with many years in scope. And afterward, many opportunities that it nurtures will come to life.” I think it would be much easier to attract people to return this way.

So I think all the elements: people, technical project, technology diffusion, business innovations, cutting edge research, should all be pieced together. This is what Premier Sun has in mind. At that time, Taiwan already has a national project on electronics. The project on automation is emerging. A long-term project on material science is in order. So that’s what we would do. We place our focuses on both long- and short-terms, and, then at different mileposts and levels of execution, people can review the progress of the projects.

15-00:10:58

Hamilton:

How much did personal politics play a role in developing these long-term plans?

15-00:10:45

Lin:

Well, I think it’s actually very little. Because everybody was motivated to do things for Taiwan. I mentioned earlier, there’s some politics in the higher level, in the ministries level concerning the approaches. But it did not really affect the objectives and the targets. When I was recruited to take this position, I think people kind of respect me. After I was in place, I am the person in charge. After all, the ball is in my hands. There were many views and advises over the years, but I think I can say I am pretty much in charge of those projects.

And another thing is, if you look at the way we come up with projects, it is not just by one person’s view. It has already considered wide range of inputs, including from experts oversea. One important example is the corrosion project. I mentioned that metallic corrosion is a big problem for the United States. What can happen to bridges in the U.S. can also happen to those in Taiwan. That is very much a project that I have initiated myself. Because I felt it would be very important for Taiwan. And working at DuPont has given me the appreciation of new corrosion technology as well. So I set up this corrosion project. As it turns out, it is a key area of industrial concern even after all these years, for Taiwan. So I think people were fairly happy about it.

With that, we also get a lot of industrial participation, because many people are in the business of doing surface treatments and protection of metals. They wanted to know what kind of technology that would be effective? What would be needed in terms of painting system for specific application? And these give

limelight to the people in the coating business—so we gained industrial support for our continued work.

15-00:13:02

Hamilton:

How many people were working in the materials lab at the beginning?

15-00:13:04

Lin:

At the beginning, before I assumed directorship, there's a small skeleton group. It's under a hundred. And the acting director during that time is Professor T.K. Kwei, a very well-known polymer scientist who was also professor at Brooklyn Polytechnic Institute. Previously, he also worked for the Bell Labs. T.K. was very good at making people motivated. When I went back, then the lab slowly grows—and because of these different areas: polymer, metallurgy, ceramics, optoelectronics, corruptions and so on, it has expanded to about five hundred people in five years.

As it expands, one of the concerns is whether we can have talented and dedicated people to lead the projects. As I talked yesterday, about how recruiting of key, project leaders are made. At the same time, I also started a training program for the junior staff. In Taiwan, among the material scientists, there are adequate metallurgist and polymer people around. But optoelectronics, engineering ceramics, corrosion, these are areas that good people are lacking. Therefore I selected some younger people from the lab and sent them out of Taiwan for practical training. And some were out there to get a Master's or PhD degrees. I think there may be about 20, you know, such trainees during that time. Actually, we sent two people to UC Berkeley, with the material science and engineering department. They would also work in the Lawrence Berkeley National Lab. And we sent people to University of Washington with Professor Black, for study of engineering ceramics. With the assistance of Prof Suzuki, we were able to send staff to Japan to work at industrial laboratories of Hitachi and Fujitsu. This is very unusual since Japanese industrial laboratories, as a rule, do not take foreigners for training. But Prof Suzuki was a very well-respected scientist in Japan and has maintained excellent personal leadership in the field. So personal networking is very important here. But politics, luckily there is very little at that time, at that level.

15-00:16:48

Hamilton:

You've talked about individual project leaders, but could you outline the hierarchy of the lab? So there are different projects in materials lab. You were the director, there were project leaders—

15-00:17:00

Lin:

Yes. I am director—I am the director general. And then there are two deputy director generals for the lab. These three are the top-level management. And then each of the groups—metallurgy, polymers, optoelectronics, ceramics, corrosion, material characterization, was headed by a group director. And then

under each of these directors, there are several sections, headed each by a manager. Basically this is the organization structure.

MRL was unique at the time, at least in Taiwan, because there's no other materials laboratory with that kind of scope. You see laboratories focused on one area or two but few cover the landscape of material science like MRL.

By the way, Professor Morris Cohen of MIT, close to retirement at the time has visited MRL several times and has offered many advice to me. Morris was recognized a grandfather of modern metallurgy.

Another gentleman is Bob Jeffrey of the Electrical Power Research Institute in the Silicon Valley. He is an expert in energy management which materials science is an important component. Through Jeffrey, I was able to know some utility companies. MRL also worked with Lawrence Livermore National Laboratory on stress corrosion, a very important feature of power plant safety. At General Electric there are a lot of laboratories in nuclear power technology. We also sent people over there to learn about stress-corrosion cracking. Metals, like people—are prone to fracture after prolonged exposure to stress at work.

15-00:20:01

Hamilton:

Mm-hmm.

15-00:20:02

Lin:

Over an extended period of time, the stress under excruciating operation conditions accentuates around the defects in the materials [body] of machinery. If there are any microscopic defects, they will accentuate and propagate to become a big failure. Our question is how to detect, monitor, and prevent disastrous failure. This is a subject of much concern for jet engines of aircrafts or high-speed turbine in power plants. So I sent people over to advanced labs to study.

So you can see, there's a lot of legwork. And it is not only in the United States and Japan. I also work with people in Germany, particularly in the nondestructive testing field. If you want to know the strengths of a material, you can mechanically torture it until it breaks, this is basically destructive testing. But if you and I go to the hospital, we want to have a test to preserve, so obviously there's a need for non-destructive testing. And one of the major methods is based on ultrasonics. I guess you are familiar with ultrasonic testing for healthcare purposes. Here, scientists send sonic waves through pipes and tubes of high-pressure boiler and from the way the wave bounces and reflects, we can identify defects along the way. This is non-destructive testing.

Those are very important for long pipes, or small heat exchanger tubes. Through the use of this and other tests, we have added Chinese Petroleum Corporation to our clients' list. It is a useful method to identify oil leaks in

pipes. It's interesting to note that, often pipes buried underground do not have map or record for its location. People just know that between two positions, there are some pipes. But exactly where the pipes are, it's difficult to identify. Although some cities may already have good infrastructure and have underground tunnels to house the pipes like one often sees in the movies regarding New York City. But for a place like Taiwan, you don't have that kind of infrastructure. The pipes were just buried underground and they've moved over time. They moved naturally, or with vary construction work—they just moved. So when there is an oil leak, people don't know where the leaks are exactly coming from. With non-destructive testing, it becomes useful for the oil company to detect the leak. Similarly, when you have a big boiler in the power plants, there are a lot of tubes with water inside to do heat exchanges. And again, power plant has a wonderful environment for corrosion. Because you have high temperature- hot steam coming out from the boiler—from one part of the plant, and they need to be cooled usually with a large volume of seawater. The seawater usually contains a lot of salt—all kinds of fungus and micro organisms, all activated under elevated temperature. And then the boiler is usually built with different metals, carbon steel, stainless steel, copper and other alloys and at different electro-chemical potentials. All these physical and chemical factors speed up the corrosion process.

The work that we started in MRL on corrosion was soon in very high demand. And also, if you want to identify the tubes with leaks, ultrasonic and acoustic emissions are very interesting and important methods.

15-00:24:37

Hamilton:

Could you explain that? Acoustic emission?

15-00:24:40

Lin:

Yes, it's basically just like ultrasonic. It's just that you can play with the frequency and orientation. You send a selected signal through the materials to see the reflection. Acoustic emission is also important later on our carbon-fiber bicycle program. There, the material is a layer-by-layer fiber structure immersed in a matrix of epoxy resin. You do not have a big chunk of carbon fiber epoxy. Instead, you are putting this by layer. The single layer is called pre-preg, which is made by laying carbon fiber filaments according to certain geometry and direction and embedded in a matrix of epoxy, which also acts as adhesive. They are only partially -cured. In other words, there is just enough fluid in between to make it sticky. So when you have several layers piled together: a layer of carbon fiber pre-preg coupled with a layer of epoxy adhesive, as a unit, and put it into the oven and bake. The heat will cause the epoxy to cure enough to form a structure that gradually solidify. The resulting carbon fiber-epoxy composite, can be very tough in mechanical strength, even tougher than steel, but with only 1/5 of the weight. This material is useful for aircrafts, and other similar high value applications.

When you cure this, sometimes you could have air bubbles or water bubbles trapped somewhere. This often happens with the layering process. When you put the layers together, you might accidentally trap a very minor amount of air. And with high temperature, this air bubble can expand to cause delaminations, however micro the size. Acoustic emission is an important method to detect even if you cannot see; it can look into the structure.

15-00:27:14

Hamilton:

How often did scientists do fieldwork—would go to an oil leak, or would go to a nuclear power plant?

15-00:27:17

Lin:

The people in this group go to the field very frequently for periodic check-ups or problem solving. One time, in the summer of 1988, the number 3 nuclear power station in Taiwan, located in the southern tip of the island, was suddenly shut down due to mechanical problems. The blades of one its big turbine fell and cracked. It created a lot of publicity. Any accident in the nuclear power plant, you know, is major news. I called up the Chairman of the Atomic Energy Commission—you know, it's a regulatory agency, and asked if there's anything MRL can help. He was very happy, and said, "Oh, can you send a group of people immediately to the power station and examine why the turbine failed." I asked our Manager of the Corrosion Group to respond immediately. They were in the Power Plant the next day. The turbines are big machineries, much bigger than those of the jet engine. Maybe the size of this room. And each blade can be 5 feet long. It was noted that several of these blades just cracked and broke into fragments. A lot of people have to climb down to this big turbine housing and take pictures. You don't want to disrupt the scene—just like Sherlock Holmes or depicted in the TV series CSI [crime-scene investigation]. You can't disrupt those things. And just take pictures, and sometimes you take specimens out. If they fall apart, then you can just take some fall-outs and try to study for the cause. This is an example of our work—it takes many days, day and nights.

For the fieldwork in the oil company, MRL people are in and out their places all the time. Now, let me say one more thing on the case of the nuclear power station Number 3 of Taipower. One key question is who should be responsible and should bear the costs—the cost of failure. In this case, General Electric is the company that supplies the engines with the turbines. Naturally, they tend to say, "Well, It's an operation problem, your problem." However, the operating company, Taipower, will tend to say, "No, it's a material problem, associated with the manufacturing." So it's up to somebody in the neutral and authoritative position to come with an understanding of the fact.

So we studied this and examined carefully the phase diagram for the cracks structures. It's fairly clear that micro-cracks formed during fastening of the blades to the axle. It was thus a manufacturing problem. It can be postulated that a number of screws were displaced and had to be re-screwed. The screws

were too tight and caused minor cracks in some areas, which eventually cause the blade to fall apart. However, the operation people is not totally without fault. Because if they are careful enough and listen to the noise—listen to, you know, how it performs, the vibration will show clear symptoms of the instability. And they could have picked up the problematic signals at some point in time. So the problem appeared to start with General Electric, but aggravated by operational procedures.

The end result is that General Electric agreed to replace the turbine at no cost. New operational procedures were also implemented. I think this saves millions and millions dollars for the power company. When encountered by problems like this, most scientists actually like to do it. They felt some excitement because they can really make a difference, instead of just sitting in the lab. So don't underestimate that engineers and scientists, a lot of the time, they like to be challenged. They are motivated to do things useful for the society.

So MRL was a high-spirited lab, and people who visited always find it interesting and enjoyed their time. I think it was on the CBS News one time. CBS team sent a team to Taiwan and tried to interview some of the returning expatriates to see how they feel—I was not in the lab at the time, but I know they are coming.

I also set up a team to building the laboratory, you know, basically starting from the drawing board. In my tenure, I have built several buildings in ITRI. The MRL was, I would say, very nicely designed, very functional and with a beautiful courtyard. It, on my last visit, was still a beautiful lab 20 years after.

I think we had a very nice environment, good project, challenging work, people's spirits were very high.

15-00:33:33
Hamilton:

Could you talk a little bit more about the facilities that you had? A bit more about the facilities?

15-00:33:39
Lin:

In the lab?

15-00:33:40
Hamilton:

Mm-hmm.

15-00:33:43
Lin:

Well, I think they are just like any laboratory in the university. And of course, we were fortunate for having the budget to buy equipments, instruments—

15-00:33:54
Hamilton:

Where did you buy the equipment from?

15-00:33:58

Lin:

Oh, most of the instruments are from the U.S., Japan, and Germany. We bought the first MOCVDs. Well, MOCVD and then MBE. These are two, traditionally—with some difference, very sophisticated scientific instruments to study molecular thin-films, especially for optoelectronic materials. Or compound semiconductor materials. I bought the first units in Taiwan for MRL.

I returned to Taiwan not too long ago, probably a year or so ago. I was surprised to find that in Taiwan now, there are over five hundred MOCVD/MBEs. Most of these 500 instruments are in the factories—chemical companies, materials companies, optoelectronics company. In Berkeley, on the campus, you may have 5 because of the scientific work done here. But in Taiwan there's over 500! So the industry have become very technology-oriented.

The MRL lab is not luxurious, but is comfortable and functional. Traditionally, most of the university laboratories in Taiwan you go to are dusty, the light is dim. But our laboratory is maintained in the U.S. style. And it's like the university here, may be better. We also are concerned with laboratory safety and try to maintain the lab space a clean and safe environment.

15-00:36:01

Hamilton:

How big was the building?

15-00:36:08

Lin:

I can't tell the figures right now. But it is five stories plus a full basement, maybe about 130,000 square meters total.

15-00:36:27

Hamilton:

Okay.

15-00:36:28

Lin:

So, yes, it's a fair size. It's a fair size.

15-00:36:32

Hamilton:

Mm-hmm. Yes.

15-00:36:36

Lin:

I would say larger than Evans Hall.

15-00:36:36

Hamilton:

Okay.

15-00:36:37

Lin:

It's not as tall, you know, it's five stories, but the layout is like a square, and there is a courtyard in the middle.

Now, actually, there's a personal side before I go to MRL/ITRI. What I meant to say yesterday was that when I returned here in 1980, and there's a lot of job activities—Professor S. S. Shu came visit me in Cherry Hill and offer me this job and that job, and also there were many interviews. And at that time when I decided to accept the offer of Y.S. Sun and S.S. Shu, the ITRI position—I was sick. I had a bout of hepatitis B. I don't know where and when I have contracted it, but hepatitis B was a problem for Taiwan at the time. In the '50s and '60s, you know, everyone was very poor, and there's a lot of disease and epidemics. At the time I guess about 20% of the population are infected with hepatitis B. And what happens is that when there is a flu circulating, the Health Agency usually set up inoculation stations in the bus and train stations.—When they see students and passengers come out of the station, they would just give them a needle, for good measure. A flu shot. Free. And of course, people will take it naturally. But all these were before the time disposable needle was widely used. I think the suspicion is that this was a major route of transmitting hepatitis B in Taiwan during the 1960-70's. And of course other routes included childbirth, the mother will give it to her children. And there were people that go to the barbershop, and get a shave with the common razor. So this is the hygienic practices at the time that have contributed to all this problems.

So I have a bout of hepatitis B in Cherry Hill. And I was very frustrated, you know. I plot my SGPT, SGOT readings, the indicators of liver function, daily. For these two tests, normal people will have the number under 40s, but my readings went up to over 1000! In Taiwan, medical professionals are used to it and know how to handle patients. But my doctor in Cherry Hill was stunned and became nervous. I was kept in the hospital for about a month, and followed by a biopsy of the liver. And luckily, the numbers dropped marvelously down to normal and I was so pleased to return home.

At that time, Hepatitis B was a serious problem. Many of my friends came down with it. Although it was not like getting AIDS, but returning to Taiwan to assume the new directorship of MRL was certainly out of the question. And that's why ITRI, asked the vice president of ITRI, Dr. T.K. Kwei, to be acting director of MRL in the interim.

The position was held there for me for a year. Y.S. Sun, the premier, wrote me. He said, "Well, you should not come if you are sick, it's better that you take care of your health first." And he has certainly learned from his own experience; only a few years back, he was travelling in the United States then suffered a heart attack, fortunately a minor one. Probably I have mentioned this yesterday. He felt genuinely that, under the circumstance, I really should take care of my health first.

So there was about half a year that I was in a very low-spirited mood. All the grand plans that I have conceived have to be put on hold, kind of indefinitely. Everything seems to be so close, yet so far. But luckily, in 1983, I have

recovered well enough and I just announced my decision to leave Du Pont. As I said before, all my friends at DuPont, felt that I was really—really crazy. Because the compensation package is so bad and I have just recovered from a major health problem. This really appeared to be s incomprehensible.

Now, what else to add here? Yes—so this is the—MRL/ITRI position. Any other questions?

15-00:43:18
Hamilton:

Yes. In the building itself, did each project have its own floor? How much interaction was there between different projects under different labs?

15-00:43:29
Lin:

Yes. Well, because the equipment, the kind of instrument that you use will be pretty similar, the natural tendency is for them to be in a certain area. They are arranged, basically, according to the nature of the work. But there are some common facilities—electron microscope, X-ray diffraction, GC-MS, etc., these are instruments any material scientist will need to use. So those would be in one area, one floor, underground or in the first floor. The library will be, there also. There are some common facilities for everybody. Otherwise, there will be basically according to their need, the nature of the work.

15-00:44:27
Hamilton:

How did you fill the library?

15-0044:31
Lin:

Well, we did not fill the library. We, of course, did not get all the books. The library is mostly for reports and current journals.

15-00:44:42
Hamilton:

Oh, okay.

15-00:44:47
Lin:

And of course, ITRI—there were two old laboratories previously—they have a fairly good-sized library and we just work through them. But for a new lab, it is basic reports—current journals, periodicals, that kind of thing.

15-00:45:06
Hamilton:

Mm. Could you talk about that?

15-00:45:07
Lin:

Yes, and also how do you keep them interacting? Yes. We run seminars every week.

15-00:45:10
Hamilton:

Okay.

15-00:45:13
Lin:

Okay. I encourage professionals to attend the seminar. And the seminar usually is by an outside speaker, and sometimes an inside speaker—they

rotate. That is a very important issue, because you don't want scientists to just hide in their own cubbyholes. You want them to bring their work out. And by the nature of their working with industry people, a lot of times, there's some problem and they need to talk to other scientists, to get their help. I think that is a culture problem, but one is much better handled now.

And we've also published a number of publications. I think the publication today is still very popular. I like Scientific American, and I read Scientific American a lot, so I would like to publish one in Chinese language, on the material science area, like the Scientific American. So the MRL did that. It's a popular publication, that's the connection.

15-00:46:36

Hamilton:

Who writes for that? Do the scientists write that, or do you have a staff?

15-00:46:38

Lin:

Yes, the scientists write that. The articles are mostly from MRL scientists, but we also welcome and accept outside papers. But getting outside contribution is hard. So it's mostly by the people in the lab. And each month it introduces the major development and trend of a specific industrial technology. For example, LED was new—and packaging—electronic packaging was new, and specialty steels. You know, and those are issues of fairly wide interest. The industrial people very much welcome our journal. And I think that journal can now survive on its own financially.

15-00:47:31

Hamilton:

Mm-hmm. What is it called?

15-00:47:33

Lin:

What does they cost?

15-00:47:35

Hamilton:

No, what is the journal called?

15-00:47:38

Lin:

Oh. 工業材料, or Industrial Materials.

15-00:47:42

Hamilton:

Okay. And this was your idea, to start this?

15-00:47:45

Lin:

Yes, this was my idea. This was my idea.

15-00:47:47

Hamilton:

Do you know when it started?

15-00:47:49

Lin:

It was started in 1984 or '85. I was laboratory director '83, I think after a year or two it started that. Yes.

15-00:47:58
Hamilton:

Mm-hm. And who was the first editor?

15-00:48:03
Lin:

I was. But very quickly I turned it over to a committee consisting of key scientists of all technology groups.

Organization-wise, I also have a fairly large planning group for Project Planning and Review. This group works very close with me, because from time to time we have to write projects for Taiwan. I am talking about these national projects. This group will collect information, analyzing the data, and put together the project proposals to the government. And they also train other people to do project planning for their own group. That was a very important function. And they also did project reviews all in one group and external reviewers.

And then I have another group for Industrial Relationships. This group works with SMEs and also takes care of industrial services and technology transfer and diffusion. People will request that we do an analysis of product reliability and failure analysis. Or, we were requested to send people out to the factory to inspect their line and provide guidance. They worked with this group. To recap, in addition to the technology groups, I have a planning group, and also an industrial service group in the formal MRL organization.

And in this industrial service group again, it become the liaison for the other technology groups. And of course, besides all these technology- related groups, there are the financial service, administrative service, and so on.

15-00:50:03
Hamilton:

Ah. I'm—

15-00:50:07
Lin:

This is the structure of the laboratory.

15-00:50:09
Hamilton:

I'm curious—this might be a bigger question than I'm anticipating, but how much did ITRI get involved with government policy? You worked a lot with other industries, but then you worked as policy advisers?

15-00:50:26
Lin:

Yes. ITRI worked a lot with government in the formation of policies. ITRI basically functions as the technical adviser and support to the government—although the government has its science advisory groups, mostly just in name. You know, these government agencies are just a few people, doing official paperwork, and the higher-level communications. But most if not all the technical supports are coming from ITRI, I would say.

15-00:50:56

Hamilton:

Can you say something about the structure of the Chinese government at this time? How did it work in terms of the legislature?

15-00:51:03

Lin:

Yes. The ROC Constitution was based on the ideal of Dr. Sun Yat-sen. the government consists of five branches. Three of these are similar to the U.S. system: executive, legislative, judicial. Then there are two more branches of equal rank. One is called Examination yuan, the other, Control Yuan. You know, yuan is the highest level of the government. Yuan [院] means an academy, you might say. And so there's the Executive Yuan, the Legislative Yuan, and the Judicial Yuan, representing the three branches. And that Examination Yuan is a model from Chinese history. In the old days, in the monarchy days, the king generally inherited the country and the power from his father, until the time he was thrown out by some other people. So the king inherits the legitimacy. But what opportunity has for the common people to get ahead? The common citizen can become ministers and gain the glory, through examination. Every few years there is an examination at the local level, and then the province level and finally, the national levels. People, after go through the local and the provincial levels, can go to Nanjing or Beijing, for this national level examination. And maybe one hundred or so can be selected for the entire country at one time. These lucky ones will be assigned different posts in the bureaucracy and can work his way up to become ministers. And the top three selected will be honored and paraded on the public streets. The government, the king, will put these hundred or so new elites into the various agencies or the royal academy as trainees while they wait for their time or their turns to take on more permanent assignment. This is the way the normal people are getting to participate in the government. Dr. Sun Yat-sen felt that this mechanism to get ahead for the individuals and maintaining quality of the government official was very important, so there's this Examination Yuan.

And the other yuan is called Control Yuan [or 監察院, - Jian-char Yuan]. It was from the old days when the King can never do wrong. Whatever the king wants, the King gets. What he says becomes the law of the country. And there are times that a minister or official who dares to express a different opinion—or to say something that the King does not like to hear, what would happen to this person was to let go his job or his head, right? So there is this special group, a small group of people who are known for their integrity, courage, and views. Their job and responsibility is to say things that the king does not like to hear. They're called 御史, or Yu-shi. This system can be dated back to the Tang dynasty and the Sung dynasty. They were not held responsible for any negative comments to the king. That's the job, okay. Dr. Sun Yat-sen felt that this was very important for the Chinese leadership. So there is The Control Yuan.

There are still five branches of the government in Taiwan at this point. The Legislative Yuan consists of the legislators was elected from various jurisdictions, by the general public. This last January, The Nationalist Party, Kuomintang, took control of the Legislative, Yuan [defeating the Democratic Progress Party headed by Chen Shui-bian].

The Constitution also provides for another structure, which is basically above these five yuan, though mutually independent. It's called the National Assembly. The National Assembly members do not have normal duties except to meet to elect the president and vice-president, and, to impeach the president or vice-president, or to make Constitutional Amendments and pass special laws on request. While the President/Vice President is elected by a simple majority votes, adoption of Constitutional Amendments need a majority of three-quarters votes. This is another way of check and balance, here. This National Assembly, they only meet to elect, impeach, or if there's a need to make Constitutional Amendments. This is the Republic of China government in a nutshell. [I was a member of the National Assembly representing the KMT to complete a major amendment of the ROC Constitution. I have served one term in the Assembly.]

So the Yuan Zhang [院長], Head of the Executive Yuan, is the Prime Minister or Premier. And under the Executive Yuan, there are different Ministries in charge of: Internal Affairs, Foreign Affairs, which you will call the State Department in the U.S.

15-00:57:41

Hamilton:

Mm-hmm.

15-00:57:46

Lin:

Economic Affairs, Transportation, Education, Defense, and so on. And there are some councils, which is the same on the ministry level, but smaller. There is a science council, is like a ministry, but is a smaller ministry.

15-00:58:08

Hamilton:

Okay.

15-00:58:09

Lin:

And under the Prime Minister, he would also set up some task forces, to coordinate or to plan or to review certain things. So the Prime Minister's office, Y.S. Sun, has a taskforce they call Science and Technology Advisory Group.

Begin Audiofile 16

16-00:00:12

Li:

This is Robin Li and Emily Hamilton, speaking with Otto Lin. This is tape sixteen, May 7th, 2008.

So when we stopped, you were talking about the taskforce on science and technology?

16-00:00:37

Lin:

So basically the—the Examination Yuan ran all the civil servants. The civil servants for the government have to pass some kind of exams that the Examination Yuan conducts. For you and I, college graduates, if you want to become a civil servant, this is the normal channel to go through. Control Yuan has a special function here, [in reality, has the functions of the GAO-Government Auditing Office-and more]. The Judicial Yuan runs the courts of law with several levels. The first, second, third levels are just basically like the United States. The Legislative Yuan is to pass the laws and the budgets. The national budget is proposed by the Executive branch and has to go through the Legislative Yuan. The Executive Yuan has all these ministries, and one very important one is economic affairs, the MoEA. And the many councils—labor council, environmental council, that kind of thing. And one of the important ones is the National Science Council—which I have worked very closely. And the taskforce groups, there are many, and one of them is the Science and Technology Advisory Group. The members consist of high-level people—I have mentioned Fred Seitz yesterday, who was once President of the National Academy of Science in the U.S., and some corporate executives.

ITRI is outside of this bureaucracy. ITRI is an organization, an official NGO. But it is under the supervision of MoEA, because of the fact that ITRI was established by law, through the Legislative Yuan. The law says that the Institute is to raise the technology capability of the industry and that government shall make donations to ITRI. And therefore, it is under the supervision of the Ministry of Economic Affairs.

But ITRI, again, was working on several national projects. So it worked very much with the Science and Technology Advisory Group. Since ITRI also has been working on a lot of science projects, so it has to liaise a lot with the National Science Council. There are many bosses for ITRI, in a way. Most other government bureaucracy, like the EPAs or OSHAs, do not have technical capacity, they usually look to ITRI for technical supports. This is quite similar to in the U.S., they might be looking to the NIH or NSF organization to provide technical support for the programs.

So the fact that ITRI has electronics, machinery, materials, chemical, computer, communications, all these different laboratories and divisions, it was taken as a resource to any government agencies that needs technology to support their policy or programs. The government comes to ITRI—for technical information, for network, for data, etc. ITRI become very much involved with policy formation process. Not the final policy per se, but the data, the status analysis, the review, are, to a large extent, based on information from ITRI. Hence, ITRI's role figures very importantly for Taiwan.

In fact, I'll talk about next time—when I was president of ITRI, we are very much involved with the National Six-Year Plan, prepared by the Council of Economic Planning and Development under Premier HAO Bo-Chun [郝柏村]. I would say we provided the substance for much of the first draft. Out of that framework suggested, CEPD collected information and inputs from different ministries and put them together and it became the national economic plan. That's why ITRI's role is prominent in Taiwan at the time. It's not a government body, but it participates in government functions in many ways.

16-00:05:53

Hamilton:

You said that the government would go to ITRI. Who—I assume that you probably mean the bureaucrats in the Science and Technology Advisory Group. Who would they talk to at ITRI to make first contact?

16-00:06:07

Lin:

They will talk to my laboratory directors.

16-00:06:10

Hamilton:

Okay.

16-00:06:11

Lin:

Yes. When the Science and Technology Advisory Group [STAG] turned its attention to materials area—they will work with me at MRL. Under ITRI, there are several laboratories. I think I may have some literature here. I will send you some literature. So there is this materials lab, electronics lab, chemical lab, you know, etc. [Refer to the ITRI organization chart, Appendix 13]. Through the ITRI laboratory, the network of MoEA, National Science Council, universities, and related business groups becomes activated. So the laboratory directors of ITRI are really among the key players in the Taiwan innovation system. They are planners and also perform many staff function to the office of the prime minister.

16-00:07:14

Hamilton:

And would the relationship ever go the opposite direction? Would a director of a lab at ITRI go to the Science and Technology Advisory Group with information?

16-00:7:18

Lin:

Yes, yes. Very much so.

16-00:07:20

Hamilton:

Okay.

16-00-07-22

Lin:

A lot of the time. Actually, what happened is that many staff-level people in STAG or in MoEA, are people seconded from ITRI. Yes.

- 16-00:07:44
Hamilton: And I assume that the—that the president of ITRI would know how much interaction there was between the labs and STAG and—
- 16-00:07:52
Lin: Yes, yes.
- 16-00:07:56
Hamilton: Okay. So that would be monitored.
- 16-00:07:59
Lin: Well, monitor is a difficult word.
- 16-00:08:01
Hamilton: Oh, okay.
- 16-00:08:03
Lin: So, but—we were informed.
- 16-00:08:04
Hamilton: Okay.
- 16-00:08:08
Lin: We were informed. We provided guidance, direction, to them. And another thing here is that ITRI is very much involved with government policies in the Board of Directors level. The ITRI Board is usually made up of 11 to 15 directors. The ex officio members are the Minister of MoEA, Chairman of the National Science Council, one Minister without portfolio, and the Chief Auditors of the Control Yuan. Other board members are representatives from the education [usually two presidents of the national universities], representatives from the industry: the public sector [usually executives of two state owned industry, alternate between Chinese Petroleum, TaiPower, China Steel], the private sector [two or three, alternate between automotive, textile, electronic, computer, communication, machinery, chemical and other]. Sometime, an external technology specialist can be invited to the Board. Therefore many leading executives in the private sectors were invited as Board members. The list includes: Shuen-wen Wu [吳舜文], Stan Shih [施振榮] Matthew Miao [苗豐強], K.C. Chuan [莊國欽], Douglas Hsu [徐旭東], and others.
- The Chairman of ITRI and the President of ITRI are also ex officio members of the Board. The appointment of ITRI Chairman and President are directly from the Prime Minister. So in a way you might say they are ministerial-level appointment. And that kind of highlights the position of ITRI in Taiwan. The policy role of ITRI is also quite clear.
- 16-00:12:22
Hamilton: It seems like with all of the different types of representatives on the board, there would be different interests that these people should have for what ITRI should be—for what ITRI's long-term plan should be.

16-00:12:37

Lin: Yes, right. That's right.

16-00:12:39

Hamilton: How much of a problem was that?

16-00:12:42

Lin: Well, supposedly, with every change of the Executive Yuan, the prime minister, then some ministers may change. So this may represent the national interest anyway. The university presidents, usually represent long-term science and technology trend. With the major national and private industries represented in the Board, ITRI should be keeping abreast with the business and technology trends worldwide.

Now, this group of directors, they do represent different views from their different positions, as you mentioned. For example, Stan Shih, founder and CEO of Acer, is a famous entrepreneur. He usually holds the view that the government should not give all this R&D money to ITRI and that that this money should be given to the industry. Industry should have access to national projects. That's from his standpoint. And I think it's a valid point in the sense that ITRI should keep its unique role at the national innovation system and to provide added values to the private industry as collaborator, not competitor. So this will keep the president of ITRI and the chairman on their toes. The argument is that money in industry will be more efficiently used and as the result better utilized by the industry is debatable, even if lawful, in the realm of WTO. I think there is a good point there. I think this makes the president of ITRI humble and to maintain good communication with the Board. They need to understand the why and how and what. All in all, I think it's a healthy makeup. Yes. So there will be some—you might say, more private interest in the Board just as in the society at large.

16-00:15:27

Hamilton: Right.

16-00:15:28

Lin: But in the long run, they have no big problems.

16-00:15:31

Hamilton: Mm-hmm. I'm also interested in the presidents of the universities that are on the board. Did you see a restructuring of university programs—a restructuring of education? Because I'm assuming that ITRI was seen as a great place for science and engineering students to go and work. So would universities respond by tailoring their program to create students for ITRI?

16-00:15:54

Lin: Well, ITRI cannot take all those students.

16-00:016:02

Hamilton: Right.

16-00:016:02

Lin:

Actually, the universities don't want to be seen as in the ivory tower. The universities have to be aware of what real societal needs. And I think ITRI sits in the middle and help the university to interact with the industry. I think yesterday I showed you a chart, and showing the number of contacts that ITRI has with the industry. Almost every day there are meetings in ITRI with industry, with university participation. And almost every day there's a conference or training of some sort. ITRI knows very well what the industrial situation is, and what they do need. And I think these are the kinds of things that can be featured back to the university. Actually, there are many feedback interactions. When we have a conference, or training, usually we invite participation from the university staff, faculties. On that level, they already know. But I think the president should know.

I think this make-up is very good. Actually, in my last years of tenure, I proposed some changes to the board. I wanted to expand the participation of the private industrial group. Traditionally the influence was the most from the ministers, and then the university president and the state companies. I thought that we should listen more to the private groups. Not necessarily the bigger constituents, but certainly the ones that are market oriented. So I suggested to the MOEA to expand this group's representation in the Board. I understand there will be some vested interests from time to time, but overall, I think the direction will be a more balanced one and it will make ITRI more relevant to Taiwan.

16-00:18:19

Hamilton:

I assume that there's a symbiotic relationship between universities and ITRI. Can you comment a little bit on what the universities get out of a collaboration with ITRI, and what ITRI gets out of a collaboration with the universities?

16-00:018:34

Lin:

Well, first of all, by collaborating with ITRI, the university faculty can work on projects that are related to the needs of the industry.

16-00:18:56

Hamilton:

Mm-hmm.

16-00:189:01

Lin:

The university faculty usually goes to the National Science Council for funding support of their projects, including blue-sky projects. Most projects that collaborate with ITRI will be considered more relevant to the societal needs and with expert consultation. This is something that was very important.

University faculty can work as consultant with ITRI and get paid as a consultant. And also, the students get offers more easily because of education and scientific preparation. ITRI becomes an attractive place for students, because they get training for the real world. They get a lot of marketing trainings, industrial trainings, in ITRI. But ITRI does not pay high salaries for

those. There are also students that come out from the university and go straight to working for TSMC, you know, UMC, or Acer.

But for the students who graduate and work early for the industry, they become more involved with that company's goal, with that company's business. They do not have a broad view of things. So for a student to come to ITRI—they will get better trained, I would say, and better exposed to different kinds of career paths. That's why students that come to ITRI for several years become very marketable. And this is the problem for the mobility of ITRI—of the people. And we will talk about it next time. We want that kind of mobility, but we don't want the mobility so high that ITRI itself cannot have a stable organization. So, it's a balance of these things.

There are many insights to the issue of employee mobility. Very often I have tried to explain the problems associated with this mobility issue. Take ERSO, for example—because UMC and TSMC are very successful, there are a lot of spinoffs, second-generation spinoffs and there is high demand for the people from ERSO and from CCL. My concern is that when we propose a new project to the Ministry to get funded, they will ask, well, where do you have people to run those projects? Your people might have left for the industry. That is one aspect. And the other aspect is that a lot of times, the industry will complain that ITRI tends to hold tight all those good people. You should release them to us. So it's always a balance of things. On different occasions, people speak differently with vested interests. In a modern society I guess this will always happen.

In general, I want to keep an organization with some mobility. But then, on the other hand, I need to keep it as an organization with stability. So it is a trade-off, depending on how you run it.

16-00:22:34
Hamilton:

This talk about mobility makes me wonder who you would consider to be your competitors—competing institutions in Taiwan, in the rest of the world?

16-00:22:48
Lin:

Well, I think competition with institutions in Taiwan is very little. I think people—talking about institution—most of them considered ITRI as first choice. But ITRI does not offer high salaries—not compared to TSMC, UMC, Acer, Formosa Plastics or China Steel. In particular, private companies offer stock options that are very attractive. So it was a toss up in these cases. Just like here in the Bay Area, good students also want to work for Cisco. Or Yahoo!. Or Google. They do not necessarily come to Berkeley. I mean, this happens.

So we're competing with good organizations for good people. And in the end, people come to ITRI not because of high salary, but because of the opportunity to learn, to expose, to accomplish, to establish a network, and to

build a better career. I think each organization has to build up their own specialties in the field. And I never got worried about ITRI on that. Actually, I tried to maintain a 12 to 15 percent turnover in the organization. I feel that it's good. When I left ITRI as president, we have six thousand people. So maintaining 12 to 15 percent in overturn means that you have about seven to nine hundred people coming to the organization yearly—this is new blood. When you pick people, you can select people in the newer fields: biotechnology, nanotechnologies, or wireless, for each of these laboratories. Otherwise, they will be pretty difficult to get new blood for the new areas. For ITRI, a comfortable turnover is good and healthy.

I think some of the problems that you see for many technology organizations is that they're becoming stagnant and complacent. On my way to become the laboratory director at the MRL in 1983, I stopped at Japan to visit Professor Hiroshige Suzuki. Suzuki-san took me to a number of laboratories including NIRIM, Hitachi, and Asahi. In passing I asked the vice president in charge of R&D in Asahi "What is the your turnover rate?", He was surprised, "What?" It appeared that they had never heard of the term turnover rate. At that time, they said, "Our people, when they come to join us, they will join us for life." Of course for Japanese company in the 60s through the 90's, it is indeed that way. But, for now, no more. Mobility is very much a part of life.

If you have zero turnover, to me, it's not a good organization. The problem with some of the Chinese institutes is precisely due to that kind of mindset. In the end, they become bureaucrats. Stable jobs, good jobs, secure jobs—they don't want to leave. And this is called complacency. I don't want to have an institute like that. So purposely, I think to have 10 to 15 percent turnover is healthy. But you don't want to have too much turnover!

16-00:27:19

Hamilton: Right.

16-00:27:20

Lin: Yes. So this is the situation. And when we talk about mobility, the board usually was not very sympathetic to me. They said, "Well, they are all in Taiwan—what are you complaining about? You know, when people leave ITRI, they go to work for the industry. It's better for the industry to have good people."

16-00:27:40

Hamilton: True.

16-00:27:45

Lin: So I never really have very sympathetic ears.

16-00:27:44

Hamilton: How much did Suzuki and some Americans—what about parallel organizations elsewhere in Asia, like Singapore or Korea? Were you in communication with those? Did they have ITRI-like organizations?

16-00:27:54

Lin:

Yes, yes. Korea has KAIST and KIST. Singapore, they usually watch our work closely. KIST and KAIST are basically pretty much the same kind. And I think we are generally recognized as a successful institute, so they like to come to ITRI to compare note.

16-00:28:24

Hamilton:

So you would have communication with those institutes?

16-00:28:26

Lin:

We have some communication, yes. And the Singapore colleagues, they come frequently. And because of that, I have established a network in Singapore. In Singapore, they have an EDB, Economic Development Board, and they also set up many institutes. And later on, the EDB becomes NSTB, not become, but a different one. They set up a board called the National Science and Technology Board—NSTB. And NSTB runs many institutes. Institute of Microelectronics [IME], Institute of Materials Research and Engineering [IMRE], And GINTEC, Singaporeans are very good at acronyms, I forgotten what is the full name for this one. Of course, Institute of Systems Software Science [IS.S.S], and the Institute of Molecular and Cell Biology [IMCB]. It's things like that. I always say that Singaporeans work very close with Taiwan. They send their people to Taiwan to get military trainings. So we have a very good collaboration overall.

So the Institute is very important in the innovation system of Taiwan and Singapore. Singapore has comparatively few indigenous industry, most are multi-national corporation [MNCs]. So the Singaporean government wanted to work through the NSTB, and through the institutes, in conjunction with the university, to set up their own technical capabilities and own industries, you know, in addition to the MNC. This is a national goal.

Later on, Singaporeans, I have said, they are very good with acronyms—the NSTB become ASTAR. ASTAR, meaning Agency for Science and Technology and Research. ASTAR, right now, is very focused on biotechnology. They set up a huge compound called the Biopolis dedicated to biotechnology, bioscience, bio-nanotechnology, and so on. The Chairman, Mr. Philip Yeo told me one time that they have excellent facilities including a million or so, mice.

I have admired Singapore in its effort of building national innovation system. And Japan, yes. Japan has also—the MITI—Ministry of International Trade and Industry as the key player in industrial technology development. It is like the MoEA is in Taiwan. And I think MITI, now, also changed names. I forget what there is their name now, may be METI. But basically, it's the same. And the Japanese government also runs many institutes. Not like ITRI as a conglomerate of institutes, but institutes of different specialization. It includes: Institute of Inorganic Materials, Institute of Metallurgy, Institutes of Electronics, Institutes of Sensors, etc. A very large and high-level operation is

in Tsukuba, a very famous and important place of science and technology for Japan. So Japan has similar structures, like Taiwan.

I would say we also learn from, you know, from these institutes in the Asia Pacific region. Because they are of different flavor, and we work with each other a lot.

16-00:33:49
Hamilton:

I'm curious about whether university faculty can apply to ITRI for grant money. Does ITRI fund that sort of thing?

16-00:34:02
Lin:

Well, ITRI does not give grants. So they do not apply to ITRI for grants. But from time to time, university people work with ITRI people in joint projects to apply for grants from other government agencies.

16-00:34:14
Hamilton:

Okay.

16-00:34:16
Lin:

Okay, the projects look similar but really have clear differentiation with ITRI projects. In my talk about national innovation system, ITRI's position is in the middle, is for industrial technology. We do not do basic research. Purposely we stay away from that. But for industrial applications or industrial technology, there are certain areas that merge into basic studies. Like the MBE, for example, Molecular Beam Epitaxy that I mentioned—these are very basic studies. You are looking at the molecular levels, or the monolayer of materials. This is surface science and is in the forefront of materials and technology. We work with Tsinghua University, Jiao Tong University, and National Taiwan Universities in that area.

A lot of time, we invite that faculty as advisers, consultants to ITRI projects. I think we have really important collaboration that way. But ITRI people usually do not take joint appointments. It might do that only in very few cases.

Germany has an interesting innovation system. Max Planck is for basic research. And there is a big organization called Fraunhofer Institute. It is bigger than Max Plank and consists of about fifty laboratories all over West Germany. And after the unification with the East, Germany, they also took over some laboratories in the East. And now they have close to sixty institutes and laboratories, in Germany. They are working very much like ITRI. They are receiving funds—half of the funds now from various levels of the government and half from the industry. I signed a collaboration agreement with Fraunhofer when I was ITRI president, and became sister organization. I told the Prof Max Sybre, President of Fraunhofer that “my office is your office in Taipei.” And he said, “Mine is yours in Munich.” And I also signed MOUs for organizational cooperation with sister institutes in South Africa, Australia, and Singapore.

16-00:37:28

Li:

Germany has a long history with China—a cooperative history. I remember something about, you know, in the 19th-century Germany being in China and setting up—many Chinese students going to Germany for graduate school, and—so was there a sense of a long connection with the German scientists? A relationship between Germany and China?

16-00:37:50

Lin:

Yes, I think Germany and China, they are also working with similar work ethics. If you think about China as the Mainland China, I think that there's a lot of interaction here. And all true of Max Planck and true of Fraunhofer Institution. People are curious about Taiwan, and people, they are also concerned about whether they are working with Taiwan, whether that will put them in a difficulty position in working with Mainland China.

But, you know, I think I have an advantage of being in the United States for twenty years—twenty-two years. I was able to convince and persuade people that, you know, in science and technology we're all the same. And we're brothers. And in fact, I'm trying to work like brothers with these Chinese people in the Mainland.

And when I was the MRL director, I was elected president of the Chinese Material Science Society. This brings me to interact with similar societies in the U.S. and Mainland China. The Materials Research Society [MRS] is an international organization with its major presence in the United States. It holds two scientific meetings annually. One in Boston in the Fall, and one in California in the Spring. And being a president of CMSS, I participated in MRS activities. And many materials scientists from the Chinese Mainland also participated in these meetings. One year, the MRS wanted to set up chapters in Europe, in Japan, in many places around the world. So a plan was to set up MRS- China, and MRS- Taiwan. And so because of that, I also have to work with people from the Mainland. The relationship is tight but good. We fought a lot during that time because of the formal name. Basically their formal position is that “Only I can be called China.” My position is that “I am Taiwan, but also China.” I argued that “You cannot monopolize the name China.” There are good fights.

I also was president of the Chinese Institute of Chemical Engineers. And we're very close with AIChE—American Institute of Chemical Engineers. and the European Institute of Chemical Engineers. And there is a scientific society called the Asia Pacific Confederation of Chemical Engineering [APCChE]. It is a member of the World Chemical Engineering Congress, same as the American and the European counter-parts. The World Chemical Engineering Congress rotates to each continent for its meeting every four years—Asia, Europe, and America, okay. I'll talk more about this next time.

[Narrator's Note: I have many opportunities to interact with similar organizations in science and technology around the world. I was elected President of APCChE and have successfully brought the chemical engineering societies in both Mainland Taiwan to join APCChE as partners. It was the result of almost 10 years' efforts. I will talk more on this later.]

As director of the MRL, I organized a Conference on corrosion in Taiwan around 1986. And I invited many members of the NRC [National Research Council], NAE [National Academy of Engineering], and NAS [National Academy of Sciences] to participate. And we spend time to survey the corrosion problem in Penghu Island. This is a group of small islands located offshore to the south west of Taiwan. There are several islands connected by bridges. And what do you expect? The bridges have severe corrosion problems over time. The Conference participants have made some very good recommendations to the Taiwan government.

Earlier, you asked about how I set up the projects, and I mentioned a number of people who was in the United States as advisers. Actually, we have a technical advisory committee on materials science. I might have mentioned that the members include: James Li, Al Cho, Gilbert Chin, T.Y. Tien, Augustin Cheung, Steven Tsai, Frank Wang [Brookhaven] and others. They are members of the TAC-materials. And I have TAC—meetings every year, alternate between U.S and Taiwan. We invited people to come to look at Taiwan so they have a feeling of how their recommendation would be implemented. So they feel good.

So because of that, I established a good network, and also in the United States. Steven Tsai, by the way, he was a very famous material scientist—material, composite material. But he told me proudly recently, that he is not so famous any more, since the fame was overtaken by his son. He is known now as the father of—Ming, his son who was well known in the cooking area.

16-00:44:41

Li: Oh, Ming Tsai?

16-00:44:45

Lin: Ming Tai. Father of Ming—father of Ming Tsai. I guess his son is—

16-00:44:49

Li: He's very famous.

16-00:44:51

Lin: Very famous at Chinese cooking. Yes. Father of Ming, yes. Right.

16-00:44:59

Hamilton: Were there any other international conferences that you went to regularly?

16-00:45:06

Lin: I would say MRS is one that I usually go, to the extent that I can. I can't go to too many conferences. But MRS I try to catch once in a while.

16-00:43:37

Hamilton: How much did you speak with other—other directors? I mean, you had an administrative job as well, so I'm assuming that you had to have some sort of discussion with other—

16-00:45:50

Lin: With other laboratory directors?

16-00:45:53

Hamilton: Mm-hmm, yeah.

16-00:45:51

Lin: Yes, we have in ITRI monthly meetings, the executive meetings, and then all the directors will be together.

16-00:46:02

Hamilton: Did you talk to directors outside of ITRI?

16-00:46:05

Lin: Well, I think there are many informal occasions that would do, some daily. We also people together. You know, in the staff taskforce—

16-00:46:13

Hamilton: Right, right.

16-00:46:14

Lin: In the MoEA and STAG, we met people a lot, and also visited the university. I would say when I went back to Taiwan as material resource lab director—MRL directors—you see a kind of renaissance of material science community in Taiwan. I was elected president of CMSS, and we held material science conferences every year, and more small group meetings. So people were active because of all these activities. People are happy because MRL serves as a center, as a focal point. You know, it takes resource to run those meetings: staff, money and dedication. And we do that. And there's the focal point naturally, you know. It is more difficult to do that in the university, because you have classes, and other commitments. So I think it's natural for MRS to be the center.

16-00:47:29

Hamilton: You've talked a lot about your vision to have ITRI be a part of a knowledge-based economy. How much of that idea was implemented when you were director of the materials research lab?

16-00:47:49

Lin: Well, a lot, I would say. Because we're able to either help solve existing problems or to establish a new materials-related industry. There's specialty steel company set up—based on a transfer of MRL technology. There are

companies set up based of technology transfer on electronic packaging, and then this helps the electronics industries—not necessarily the material industry, but the electronics industry. They all need the up to date technology in packaging. Our technology transfer helped the coating company because of their corrosion studies—corrosion engineering. There are companies set up because they are work on electronic ceramics. You know, ceramic packages—there are a lot of ceramics using in electronic areas. And our work on precision casting, and product failure analysis—are very useful for diagnosing current existing problems: product problems, performance problems. We work very much along these lines. We are helping the associated industry to raise their technology levels. And I think they were able now to better serve their clients in the world market.

[Narrator’s Note: The work we did on red LEDs have blossomed and laid the foundation for the Taiwan optoelectronic industries.]

I was very happy with that. I think that in a few short years, Taiwan was able to provide those products and services to, the world market. And it’s not just the technology itself. It’s the teaching, or the way that we talk—the technology that we promoted and that get implemented in the laboratory—in the industrial company themselves. I mentioned MBE, you know. We set up the first MBE. We set up the first MOCVD. MBE, previously was duped as “Megabuck Evaporator.” It’s expensive! But now, there are hundreds MBEs in Taiwan industrial companies. This has helped built up the optoelectronic industry in Taiwan. Thinking about the company using those very advanced scientific instruments as a manufacturing tool—this is very impressive. I was surprised. I think Al Cho would be surprised. I have not met Al for a long time—if Al knows about it, he will be very pleasantly surprised. He is the father of MBE and he used to tell me “Otto, MBE can be a manufacturing equipment.” Yes, Al is right.

16-00:51:04
Hamilton:

Mm-hmm. Well, I asked that question as sort of foreshadowing to the—your philosophy of a business model and what science should be used for, as president of ITRI. But let’s move back a little bit. And what did you take from DuPont? What skills did you take from DuPont that you were able to then directly implement as director in the materials lab?

16-00:51:26
Lin:

DuPont is very helpful to me in several ways. One is scope of technology—DuPont is a very technology-oriented company. All the products DuPont has created values. It’s not a “me, too” product company. Always leaders in polymers, in textiles, nylon stocking, you know, garments, coatings, elastomers, electronics—those DuPont products are always leading technology products. And create new value to life. That is very much a process of innovation, you know, from knowledge applied into generating economic values. I think that model—the fact that I participated in research,

development, and technical service in DuPont give me a firsthand experience from the beginning to the end. That is very important for me.

Secondly, I think the experience of working and managing [different kinds of people]. Working with people—different scientists, different background, different motivations; the interaction of scientists, engineers, and salesmen and marketing people. That is an experience that I would not have gotten anywhere else.

And DuPont is also very much people-oriented. I met a number of good friends, good people, good managers in DuPont that are concerned about personal motivations, you know, in management. One experience that I don't know whether I have talked about it or not is that I went to a conference at DuPont—a management conference. Training. And the trainers, it was several days somewhere in a resort area. And he said, "Write your obituary." The assignment is to write your obituary. I don't know what he was talking about. Yes. It's—you know, it opens my mind. It's that—how do you like other people to think about you when you are gone? What's your legacy? I think that really hits me, thinking about, you know, what do I want to accomplish? I work with DuPont, I get my salary, easy life, accomplishment, helping the society—but is that really what I want to do, for my life? So I think, that is something that—so I think that kind of training, that kind of career planning, that make me think about my own values—it's very helpful to me from DuPont.

So I think the innovation process, the networking process, working with people process, and the self-reviewing—the management, the people management process are very useful. I think these are the type of thing that DuPont is very helpful to me. I did not get my full retirement check from DuPont, but I still feel very good about the company.

[End of Interview]

Interview 4: November 12, 2008

Begin Audiofile 17

17-00:00:00

Lin: Yes.

17-00:00:01

Li: This is Robin Li with Emily Hamilton speaking with Otto Lin, November 12, 2008 in the Handlery Hotel, San Francisco, California. This is tape seventeen.

17-00:00:15

Hamilton: Yes. Last session we talked about the recent election in Taiwan, and I want to come back and talk about that later. But I think that a good way to open this session would be to talk about how this recent election relates to ITRI. ITRI's always played a role between science, industry, and the public, and you've

talked a lot about that. And the government also plays a role, as well. If you were making the decisions for ITRI's management now, would there be any changes in the new governmental structure in Taiwan?

17-00:00:52

Lin:

Well, I think you have to change, obviously. For ITRI to play its leadership role. It has to be able to capture the need of the society at the time. And twenty years ago, 1980, obviously is different from the year 2000; the IC industry and the computer industry in Taiwan were non-existent. The IT world was just beginning. So by working in that area, ITRI was able to play a leadership role very rapidly. But now, today, if you continue to work with IC or PC, there basically is a low value on these things. So you have to go onto new areas. And so therefore, you need to be able to pick the right areas to work on. This is the technology side. But look at the management side—I think today the structure is very different from twenty years ago, again. And here, today, there's a lot of industries in Taiwan that are made up of small companies. And there's a lot of entrepreneurship, innovation, study, innovation activity out of these small companies. I think ITRI today should think about how to collaborate with these small companies and to take big use of the activity so that you can bring the result to the market much faster or much more efficiently. I think these are the kinds of things that you have to think about.

17-00:02:45

Hamilton:

What would be the challenges that ITRI would face in trying to develop partnerships with smaller organizations?

17-00:02:53

Lin:

Well, I think when you try to form a partnership, you always think about what can you bring to the party. So the company and ITRI, these are two types of organizations and there are lots of differences. Companies, big and small, are in the market. They are trying to make money. They are trying to push the product. They are very much concerned with efficiency and profitability, that kind of thing. And I think on ITRI's side, being basically a technical organization, it should be on the lookout for what's new or in the offing. How can you make these true technology improvements in the product or in the design or the in the manufacturing? You should try to bring one or two more percent yield to the companies. And actually, when you reach this point—the one percent, two percent over this point would be the profit that we can make. The two sides have to work very close together and to understand each other and to know the kind of competition that you have in the field. This is a situation that did not exist twenty years ago.

17-00:04:29

Hamilton:

With this new resource of the smaller industries, how does that impact, let's say, ITRI's partnership with universities?

17-00:04:39

Lin:

Certainly there are a lot of changes, too. Twenty years ago, in Taiwan, the universities are mainly concerned with undergraduate studies. Providing undergraduate students, and master level students, would be their major function and they're doing that very well. Many major universities, National Taiwan, National Tsinghua, and National Jiao Tong, for example, are becoming very well-known universities now in the academic community worldwide. Today these universities are also getting matured in the development of twenty years. Their technical capability is getting much better. Today they were able to work on nanoscale IC.

17-00:05:41

Hamilton:

Is that partly due to collaborations with organizations like ITRI?

17-00:05:45

Lin:

Not necessarily. Because the university has much better faculty now than twenty years ago. They are better equipped, better funded. They have the resources and the people to work in those areas.

17-00:06:02

Hamilton:

Why do you think that that has happened? You talked a lot about Taiwanese students coming to the United States and using our higher education and then being able to apply that back in Taiwan. Is it just a growing economy in Taiwan that's able to put money back?

17-00:06:19

Lin:

Well, these both interact. Because the economy based in Taiwan is much better, so they are able to provide job opportunities and career growth opportunity for these graduates. That's why a lot of students return from the United States to Taiwan. And the situation today is that you see less students from Taiwan going to the United States. This is a trend that was troublesome to me. I think the United States still is the place providing the best education and technology. I would say much better than anyplace else in the world—so it's a mistake. In the past ten years, I think the Taiwanese government did not encourage our students to go out to study—I think that's a mistake. Nevertheless, I think basically there is a change in the economic structure here. The university's getting stronger. The quality rises. They become competition to ITRI. Twenty years ago, no one else could organize to work on personal computer. No university. No university in Taiwan was working on that. ITRI is the only organization to do that so it easily became the leader. But today, all these major universities working on nanotechnology, optoelectronics and so on. They are also able to attract first-rate scientists. This presents a different competition factor to ITRI. ITRI has to find a way, just like with the entrepreneurs, has to find a way to work with the universities. Together they might be going much faster this way. These are all the change of times. I think a successful organization has to manage the change of time.

17-00:06:33

Hamilton:

In the Taiwanese academic system, is it seen as a conflict of interest for university professors to obtain patents for their work without working in industry? Is that something that ITRI can offer?

17-00:06:47

Lin:

No, no. I think the university people, faculty, they can apply for patents, no question about it. But the patent process usually is much longer than the publication process. With patent, we are talking about something that has the potential to create financial and commercial returns. However, there's a lot of uncertainty in there. Not only just the technology, but you have to talk about financial return. There are so many factors involved, and patenting is a much longer road to do. For the university faculty, a lot of them wanted to publish, because publication helps their chance of promotion. The university usually asks, "Well, how many papers have you published?" You know, publishing papers, right—the universities still focus more on publications. And so therefore, for a university's faculty to focus on patents does not go along with the university reward system in Taiwan. And I think, actually, in America it's basically the same. I think here the university is still talking about the number of papers and the quality of papers.

In ITRI, for example, when I become president I felt important to have patents because patents provide protection to our clients. Patents provide competitiveness for ITRI. So I put patents, the acquiring of IP rights, as a criterion for the measurement of success, among many others. It's one measure of success. That's why our scientists, our engineers, always ask, "It is my job to examine how can I get patents in this area?" And when you think about this, it changes your philosophy of working, of doing on the project. Because first you have to do a patent research to see in this field who are the players, the commercial players or technology players in this field, and what are they working on. If this field is already being filled up by big companies or big players, then perhaps you will think, "Am I still going to be in this area? Is there a niche or a missing link that I can provide?" If you cannot do that, then you're better not to spend time or energy in this area. You move elsewhere.

Patent search and patent strategy is very much a part of project planning in ITRI. This is why in a year or two or three years, when you have done this work, you are able to apply for patents. I showed you earlier this chart: patents awarded to ITRI. At least it's about one a week. One every week. Now, actually, it's more than 600 a year—it's remarkable! That is because we were able to put this into our thinking on doing research. For the university faculty, you can tell them about the importance of this. Faculty in the university like to have academic freedom. They want to work on an area that they like, to work on fields may not generate a clear value in the short-term. But I think this is important. Both long-term and near-term work are important. In the entire nation, there have got to be both types of work.

17-00:12:48

Hamilton:

Well, here in the United States, there are a number of people who find it controversial that university professors will work with industry, although it certainly happens here. There's no doubt about that. But some of the arguments include things like graduate students are going to be steered towards particular projects that will make money for the lab. Are those discussions happening in Taiwan?

17-00:13:14

Lin:

Same thing happens. It's not only in Taiwan. Almost every place.

17-00:13:19

Hamilton:

Right.

17-00:13:23

Lin:

Well, I think you have to understand in the national innovation system that I talk about, the university is a player, institute is a player, the company is a player, and so is the government, okay. Each player has its missions, and plays different role. For a university, what is the most important thing they will look for, the society look for in the university? It's people, the students. We are hoping that the university will provide first-class students that will become leaders of the society in all walks of life. Training, education of students is number one. And, of course, together with this is research. You say, "Well, nowadays, you have to teach the student to have an analytical mind." You want to give them training in how to handle the science, or new inventions, innovations in the society. They have to have that kind of training. And also, university wants to be able to advance the field, to create knowledge. I think that is very much a function of the university.

Now, by itself, it does not say that the work the university does, has to generate income for the university. It's not the purpose. And because of that, I think the government, state government, federal government, city government, all have an obligation to provide some financial supports to the university. And of course, also from student fees and everything else. This is what the university is.

The institute is not like that. The institute itself does not produce basic, theoretical scientific knowledge. They hire graduates from the university as workers, to convert the basic theoretical science into commercializable technology. Many people participate in this process, with the objective to see how fast they can convert scientific knowledge to become commercial success. So the nature of the organization is different. I think if the organizations recognizes each other's difference in mission and role, then they will be able to work with each other.

Now, the institute that I run, ITRI, did not go into commercial operation. ITRI prefer to let the industry take over, to be the leaders of commercialization. There are several reasons. One is that if ITRI were to go into

commercialization, then every year there will be so many people who have to leave ITRI, or turnover to run the companies. This then becomes a destabilizing factor for the institute. Second, and actually more importantly, ITRI people are not necessarily best for the business because, while they are interested and familiar with technology, they may not know the market, or familiar with the mode of business operation. So a lot of times the company may fail. Their probability of success in business may well be fairly low. And finally, if ITRI gets into the business field, commercialization field, this would defeat the purpose of promoting collaboration with the industry. Because then, if ITRI comes up with a good technology, are you going to transfer that technology to the client or are you going to keep that technology to yourself? Most likely, you want to keep the technology to yourself so that you can become more profitable, right? But then the industry people will say [ITRI] you are transferring only the second-class technology to the clients. I think this will defeat the purpose of trying to create trust for the institute.

When I was president of ITRI, I did not run technology transfer this way. We, on principle, will not get into the commercialization stage. We work with the industry to develop a commercializable process in the clients place, the factory, but we stay away from running it ourselves. This is called “strategic withdraw”—we work with clients to help them master the manufacturing process so that the technology transferred can be said actually commercializable. But then ITRI will withdraw from continually operating in that area. This is a way to respect each other’s position, to nurture mutual trust. I think this practice would also be essential for the sustainability of ITRI. I think operating under this kind of principle is a very important part of technology transfer in ITRI.

Now, let’s turn to human resource area. From time to time, in the process of commercialization, our client wanted ITRI’s help in assembling a team of professionals for them. Then ITRI will go to ask the engineer or the scientist, “Would you like to work for the company?” A lot of the time, there are people who would like to do that. Because, again, in the company you get much better financial reward, and easier, too, may be. But on the other hand, not everyone wants to join a commercial company. Because once you become a part of the company, your focus and the scope of work become limited. And a lot of scientists or engineers want to work for a much broader scope. An organization like ITRI was able to provide that kind of opportunity for them. So there are different lifestyles. Sometimes you work not 8 to 5, but 7 to 11—whatever it takes. Sometimes you need to go from one place to another. But in a research organization like ITRI, it’s different. I think many professionals like to have different lifestyles, different incentives, and different aspirations.

From time to time, we found—if an industry wants some people from ITRI, we’ll ask our people and say, “Well, would you like to go?” And if they do, we’ll make the connections. And the company have to talk with the people and negotiate the terms and conditions for them to go in. I think by doing this

that way, we respect the will of our professionals. I think an organization always has to consider your employee' or your colleague's interest as your first concern. In that way the people, the scientists, the engineers, will feel that in this organization they can have a career because the organization is always on the lookout for their interests. ITRI people have that kind of confidence. I think this was a very important aspect of our philosophy operating in technology transfer.

With technology transfer, we do also carry out strategic withdraw. We do transfer people, but, we transfer people on a voluntary basis. So I think these are the kinds of necessary things to do.—We make sure the company has the right kind of resources to implement the technology they had transferred to commercial success.

17-00:21:55

Hamilton:

You've talked a lot about the clear boundaries between academic laboratories and professional research labs and industry, and I'm not clear about whether there's any sort of overhead regulation to keep these organizations in their particular genres or if this is all self-regulation. If you really feel that commercial industry wants to stay commercial and doesn't want to go into the research lab. It just seems that there's so much overlap between these different areas that I'm not sure why they say so individual.

17-00:22:33

Lin:

Well, are you basically talking about the individual scientists, individual engineers?

17-00:22:42

Hamilton:

No, I'm more just trying to reflect on what you were just saying about how research labs would work with industry but would not go into industry necessarily.

17-00:22:55

Lin:

Oh, oh. Yes.

17-00:22:56

Hamilton:

And if there's any sort of oversight about that or if it's just simply self-interest?

17-00:23:00

Lin:

Well, I think basically you have to rely on the institutions themselves to make a judgment and to enforce that. Because if you do not, then pretty soon you lose credibility in the field.

17-00:23:25

Hamilton:

Have you seen examples of that happening in the past?

17-00:23:27

Lin:

Well, I think in the early days, you would see scientists in the institute, they come up with a technology, and instead of transferring the technologies, by

the book, they, might—in some instances, setting up operations on their own. And well, then, if the technology is really good, other people recognized it and wanted to transfer the technology as well, so there are conflicts. And we will not allow this. We'll ask the scientists to make a decision. If you want to set up a company, that's okay. [But then you have to leave ITRI.] Although he may be the person who actually worked on the technology, the IP belong to the Institute. We have to formally transfer the technology to him. And then it's possible [for him to pursue the commercialization]. But he cannot say, "I will do this on the side." There are also ways that he can join a company and be a consultant on the project. This company comes to ITRI to set up contract for technical assistance, ITRI can assign this person to be a consultant. But everything's on the table. I think this is very important.

Just one instance to illustrate this was in the time of 1988 or 89, with ERSO, Electronic Research and Services Organization. At that time, ERSO is a very successful laboratory in ITRI. And, at that time, the IC industry in Taiwan is booming. A lot of companies come to ITRI for people. We called it a raid, the raid on technical talents. And then the turnover rate of ERSO is like thirty percent. It's unbelievable. We have to do something. But in this one instance I'm telling you is that one day I received report that there are two software engineers, IC engineers, are about to leave ITRI to join a company, which is fine. But in the dormitory they stayed, they are moving boxes of documents, charts and schematics that clearly belong to the laboratory, to ITRI. So we reported to the police and they get a warrant to go into their dormitory to search. And, in fact, we found them. The question was how to deal with this afterward. I said, "We have to prosecute them." We filed a lawsuit against two men and against the company that they are going to work for. We understood that when the company offered these two gentlemen, they were clearly thinking about getting this certain information and the data. This is industrial espionage. They certainly did something that we cannot stand idly.

I had gotten a lot of pressure from the company. They say, "Why do you want to do this? You have tried to establish a good relationship with the industry, you have wanted to help us, and now you are taking us to the court. You are creating an enemy for ITRI." And then these industrial people, they have their connections through the government. I received calls, many phone calls and visits from higher-level officials. One night I went to a dinner. There a very high-ranking official was also guest and this industrial man, in front of all the guests said, "Well, we are all friends. Let's try to settle this case." I said, "Well, yes. I think I can settle this case quickly." I said, "Well, you come to ITRI and ask for a technology transfer. We will negotiate a technology transfer contract with you. In it you ask for certain information and request for certain technical help. Then we'll assign these people to work for you." But everything has to be by the book and on the table. And, of course, this company is really run by a legislator, a member of the Legislature Yuan, who was very powerful. He was making clear threats that, "Well, if you do not

settle on this case, next year you should not expect helps for problems in your budget.”

Well, we stuck to the principle and pursued the case in the court. Eventually it was clear that the court would send the two guys to prison. And then at that point, they came to us and we negotiated. Later on we dropped the charges and the case was settled out of court. But then they went through this legal process and everybody have to come back to this process. So this is a very important case for ITRI. After that people recognize that, when the leadership sets the rule, they mean it. This builds trust and confidence.” This is the culture that I want to build in ITRI. It relates to respect. You have to respect individual rights. You have to respect the institutional rights. And we’ll respect each other. These are the kinds of things you do when you build a culture out of ITRI, like in a university. Yes.

17-00:29:53

Hamilton:

Is that an example of simple bullying or were the lines blurry at that time?

17-00:30:00

Lin:

Yes. Well, it happened. I’m telling you about twenty, fifteen years ago. And, of course, at that time, luckily the government—after all, the official came to me and try to lobby for the industry. They have recognized the limits of their authority. He is friend to the industrial guy, and as friend, he want just to make sure that I know there’s an industrial problem like this.

17-00:30:34

Hamilton:

But they let it go to court, which is interesting.

17-00:30:37

Lin:

Yes, they let it. It went to court.

17-00:30:40

Hamilton:

It seems as if this case is perhaps even more important than you’re even letting on with this story. That it seems like this could be a precedent setting case.

17-00:30:54

Lin:

It was a precedent setting case. The lessons are two. One is to the ITRI people, employees. Well, we are very much for technology transfer. We very much concerned with the future of our employees. But you have to do things by the book. By the book is that you have to respect intellectual property rights. You have to respect the Institute. This is the kind of philosophy we believed. And we are giving a lesson to the industry that if you want to work with ITRI, this is the behavior model that we have to follow. And we mean it.

Again, there are other examples. When our scientists work for a case to provide technical service to a company, the company negotiated a contract with ITRI with a low price tag. Of course, we usually just cover the cost and then with a few percent of overhead, that kind of thing. But this company

really negotiated for a bare bones price, and in the year-end, they wanted to give the scientists a big bonus. Our scientists recognized that there is something fishy in here. He come to me and I talked to the industrial person and suggested that the better way to do is to make donation through ITRI as general fund or to support certain technical projects. Because our people are not allowed to take individual client's reward. They are fully paid by ITRI and were expected with good performance. If they are doing very well in the laboratory and are putting out new technology, good useful technology, patents, that kind of thing, they will also be eligible for certain awards. But they are not supposed to receive gifts from the clients. Small gifts are okay. But they are not supposed to get bonuses or any of that kind of thing. They have to report it. Eventually we told our industrial partner that they don't need to do that. The bonus they get, we put it into a pool of awards, to share it with the other colleagues. These are examples of what you have to do.

In ITRI, we're defining corporate culture and values. Here I was talking about ITRI value around I-T-R-I: Innovation, Teamwork, Respect, Industriousness. Besides working from 7:00 to 11:00, or sometimes overnight, you have to prepared to be working very hard. And then you want to have dedication. Dedicated to your clients, dedicated to the society. And, Excellence: to do your work with the search for excellence at all times. Thus, I-T-R-I-D-E. We call it ITRI DE. [DE means number one, hence ITRI Number One]. These are the values that we built. I talked about these values in some of my publications. I write essays and made lectures about that. And also put it into the performance and the objective views. We call it the appraisals. Before I was president, human resource management in ITRI was rather arbitrary. There are many reasons for this. The end result is that in the electronics lab, the materials lab, and the chemical laboratory, they have different HR systems, different levels of hierarchy, different pay levels and different reward systems. All the labs have their own history. Because the labs have their specific clients in the industry, they want to be able to communicate with the industry so they're structured in line with the industries. Oh, it's not good for the institute because for one thing, it is not compatible with most of the high tech industries. A high tech product is a product with multidisciplinary technology.

Take the iPhone for example. Your iPhones have ICs and are practically computers. Computers are made from different ICs, the integrated circuits, and thus different from one to another. I think it's different from communication devices. I think there are some material technology in there. There's energy technology could come into your iPhones. It's a multi-disciplinary technology. And for ITRI to be functional, you need to transfer people from one place to the other, or you need to get different groups of people to work together from time to time, say, a group of material scientists, IC scientists, computer designers to work together on a project. And if they are at different pay levels, or if there are different business structures, they would not be able to work together on a project congenially.

So one thing that I did is to standardize these laboratories, the hierarchy levels, organization structure, the pay levels. And also we have a standard scheme of appraisal, review of performance and objectives. That is for each scientist, each engineer, at the beginning of every year or when he/she join this project, or on the beginning of the year or the fiscal year, the supervisor or the manager will sit down with the person. “Okay, this is your assignment and we expect you to perform at these certain levels.” And I use ITRI DE as a guide. There are six categories of performance measurements. They would discuss, under each category, what kind of performance that will be expected. And the person can comment on what he/she feels that can be done. Take “Innovation” for example. Think about the technology in this field. You want to create a patent or you work out a method to increase the effectiveness of this technology. Take “Teamwork” for example. Can the project involve different resources? How are you going to draw other resources to come in to make the project more efficient? So with each category, there are certain performance levels in the examples. [Narrator’s Note: If you review in more detail with more specific project, market, client, etc., the list can grow and become more meaningful.]

I did this with both of my Executive Vice -Presidents. One of my EVP is an electronics expert, Ching-tai Shih. He got his PhD from Princeton and then he went to for a MBA at Stanford. He was the head of ERSO. So when I become president, I asked him to be my executive vice-president. When I left ITRI, Ching-Tai succeeded me as President. He is Dean of the College of Science and Technology Management of Tsinghua University. So Ching-Tai is a very high level person in ITRI. But I worked with him on setting objectives on this detailed level and the Blue Form. Ching-Tai, under his responsibility were the ERSO, Computer and Communication, Optoelectronics, and Materials. Six of the ITRI laboratories reported to him.

17-00:40:18

Li:

What’s this blue form? Could you say more? The blue form, what is that?

17-00:40:19

Lin:

The blue form is the form of annual objectives and is the base of annual appraisal. It has a blue cover. It’s the form that records formally what we [ITRI] expect of a professional, or, his job for the year.

I feel that the worst thing that can happen to a professional is the loss of respect. It’s after you work for a half a year or a year and you say, “Well, I have done so much for the organization.” But then your boss would come to say, “Now, what you have done may be good but it’s nothing that we need. It’s not what we have expected of you ” Take this as an example. If you have a child and you want to hire a babysitter. You need someone to look after the baby, to feed the baby, to dress the baby, to keep it warm. You don’t need somebody to clean your house. What if this guy comes in and just vacuums your floor, but leave your child in hunger. It’s not what you expect him to do.

He has been doing good things, you might say useful things, but it's not what you have expected of him as primary function. So the supervisor has to collect his ideas together about what he wants the professional to accomplish and what kind of resources that he can provide the professional to do these things. This way he can also pick the right people to do the right job. And we want the professional to know exactly what it is expected of him. Then when he enter into this field, he will be able to make use of his talents, his creativeness, everything. But we want to make sure that he knows what his job is for the year. So we put this in writing on this [blue] form. Every six months or so, he and the supervisor will sit down and say, "Well, let's see how far away we are from the goal we set." Because sometimes the goal might be changed for good reasons. You maybe working on this area and suddenly, now, Apple has come out with iPhone. You want to work on some aspects related to the iPhone. Or, sometime, you may be too late, right, so it might be necessary for you to change the goal. You need to have a review. And then after a year's time, then you want to say, "Okay, let's look at what have done this year in comparison to what we set out to do." And then after this, there is no mistake about miscommunications. I think if I want to talk about respect, in the ITRI culture, I should respect the person's work, the person's time, the person's dedication. To communicate this properly is respect. This is why this form of goal setting and form of appraisal is so important.

The appraisal process can be adjusted and changed. When the review time comes, then we can review and change the objectives. That's fine. But the supervisor and the professional have got to understand each other. That's why we call it the form of communication and commitment. I did this form with my two executive vice-presidents and they did it with the laboratory directors. And, of course, the two executive vice-presidents talked to me about what do we expect the IC lab, the PC lab, the Materials lab to do this year. The other executive vice-president is Anthony C. H. Ku, who was dean of engineering of the National Sun Yat-sen University at the time. He is a highly talented engineer and manager. I was very pleased to recruit him to ITRI to be my executive vice-president. And he took charge of Mechanical laboratory, Energy laboratory, Chemical laboratory and others. Basically this is how I put things together in ITRI. I worked very well with these two executive vice-presidents, Chin-Tah and Anthony. But I also interact with all the laboratory directors.

Typically, Anthony would discuss with me what's our expectations of the Energy lab. At the Energy lab, we work on geothermal energy, wind power, and ways to improve the energy efficiency of the transformer, the motor, that kind of thing. As an example, we work on a process to improve the processing and fermentation of oolong tea. To ferment the tea leaves, you have to get the proper steps and you have to control the humidity, the heat and the time so that you can bring out the best process for baking oolong tea leaves. So there are projects like this. During the years and at many meetings, we all discuss with the professionals, the stakeholders and the laboratory directors. Finally,

Anthony will make decision on the objectives and write down the expectation for the energy laboratory to do. This process of goal setting is carried out to each subsequent level.

17-00:45:46

Hamilton: So it goes all the way down? So everybody's doing that?

17-00:45:47

Lin: All the way down. Yes, All the way down. I would say it takes about three years time to implement this process. It cannot be done in one year, really. But it goes through about seventy-five percent of all people in ITRI.

17-00:46:02

Hamilton: And what year did you do this?

17-00:46:04

Lin: 1987 to 1990.

17-00:46:08

Li: And then by—

17-00:46:09

Lin: I was president in 1987. So immediately I think that this is one of the important things that we need to do. This is in the human resource development area. We establish measurable objectives and carry out performance review, an annual appraisal. An important element is the formation of the ITRI value.

17-00:46:35

Hamilton: We've talked in previous sessions about some of the hiring policies, but now is probably a good time to talk about something more unpleasant, which is the firing procedures. And I'm wondering, especially with all of your talk about respecting people's work, if ITRI had any sort of official policy about letting people go.

17-00:47:00

Lin: Yes. Simple answer is yes. And it's a very difficult thing to do. But we maintained a turnover rate of about twelve to fifteen percent. Out of this turnover rate—ITRI was a young organization, so the natural attrition, retirement, is very low, maybe one or two percent at the time. But then there is some voluntary turnover. People would jump from ITRI to an organization, to a company. But we want to maintain a turnover rate overall of about twelve to fifteen percent. And so as a rule of thumb, again, in any organization you have to get rid of three percent of their people.

17-00:48:00

Hamilton: Every year? Every year, three percent?

17-00:48:03

Lin:

Every year. Every year. And that's very difficult to do. Each year, the laboratory director will rate their people and they will be A, B, C, and D. The typical curve is always skewed to the A side. And always it's like this, and very few on the D and Es. But in an organization over a hundred people, you got to have three or five percent that's low performing. And our philosophy is that to a low performer, sometimes letting him go would be a favor to him. It is important to understand the reason of low performance: he might be disinterested, demoralized. Or, it may be a wrong area, different field. It's better to recognize, to understand why he is performing this way, particularly if it was repeated this way for a year or two. You can give him a year as an excuse, but two years of consecutive poor rating is reason enough to go. So we maintained it this way. I think maintaining a healthy turnover is very important.

When I was invited to ITRI, I was offered the position of Director of Material Research Lab while I still was in DuPont. I accepted the position. Then, on my way going to Taiwan to take this job, I stopped at Japan to visit many RD laboratories. One of the laboratories I went to is at Asahi Chemicals. Asahi Chemicals is a very fine technology company in Japan. They have a lot of very good technology in fluorine chemistry, for example. But anyway, I asked the vice-president of Asahi Chemicals, I said, "What's your turnover rate?" He said, "What?" I said, "Turnover. You know, how many people leave your organization a year, voluntary or involuntary." He said, "No. Zero. People come here and they will stay here for life." This is a chemical company. In ITRI, during eighty-six, eighty-seven, the turnover rate of some laboratory is like thirty percent because the business is so good and they don't have enough people, good people, to work with. The companies come to ITRI, want to get the best people. Of course, with better pay and everything, some people wanted to leave. There's no problem for the director to get rid of people. He just tried to keep the good people in. But we do have that kind of policy. And we figured out that twelve to fifteen percent is very healthy. It's good. It's also good opportunity for the organization to change blood, so you don't have any deadwood. You have a 6,000-person organization, ten percent is 600 people. You can have 600 people leave your organization, then you have an opportunity to get another six fresh people coming in and you can pick and choose the quality that you want. So it's a very good policy to have and we did that.

17-00:52:13

Li:

These management principles, where did you acquire them from? Were they from DuPont? Were they from reading you did elsewhere that you then applied to ITRI? What were the origins of some of these management principles that you were applying?

17-00:52:28

Lin:

Well, personally, I worked with DuPont and I think the DuPont experience was very important for me. I learned many management philosophies,

objective setting and the performance review from DuPont. I think one time in this interview, I have mentioned that DuPont was very important in my career. And it's a very ethical company. We know how to treat people properly. So some of these principles I learned from DuPont. And, of course, I also talked and learned from different experts. You accumulated knowledge as you go along.

I know one should be able to learn from the job and grow from the job—that is something you have to ensure. Any other questions?

17-00:53:42

Hamilton:

Well, along with that, actually, the management principles that you've talked about. You've mentioned respect a number of times. It seems that many of these principles are based on respect and ethics, and a lot of these also help the financial state of the company. Have you run into any challenges trying to run an ethical company that impacted you financially?

17-00:54:07

Lin:

The financial strategy and financial policy are very important for an organization, for ITRI. It may be good to recount a bit of ITRI's history. ITRI was started in 1973 as a government initiative. At that time, Taiwan, is full of very, very small companies and there is no or very low technology content. So the government tried to set up ITRI as an organization to help the industry to grow in technology. That's the intent. So Chiang Ching-kuo, he was son of Chiang Kai-shek and deputy prime minister at the time, talked to his minister of economic affairs, Sun Yun-suan. I mention Sun's name often: he is a tremendous personality in Taiwan. He felt that the way to cultivate industrial technology is really to work hard on it. You cannot rely on the big company. Well, of course, at that time, there are not too many big companies in the first place. The big companies are all state-owned companies. And when it is a state-owned company, like the big electric power company, it becomes more like bureaucracy and is not really technology oriented. Most of their technology department did was trying to do the service and to provide the maintenance needed. They lack the forward-looking attitude. Hence Taiwan would really need an organization dedicated to industrial technology.

And at that time in Taiwan, there are three government-owned laboratories. Government-owned meaning some are related to state business, some are traditional technology laboratories the government instituted. One is in the metallurgy area, one in energy area and one in chemicals. Actually, the name of the last one is the Union Chemicals Laboratory. And these three laboratories are under the jurisdiction of the Ministry of Economic Affairs. Minister Sun did not like their performance because technology laboratories are supposed to be made up of scientist or engineers, supposed to be very innovative. And yet these people become more like bureaucrats, mostly doing the 8 to 5 jobs and so on. Sun wanted to privatize these laboratories so that, under a business environment, to be more productive and efficient.

Basically, he wanted to set up ITRI and used it as a base for innovation. He went to the legislature because these three laboratories owned some buildings, some facilities, instruments, and they had some professional people. The people were under government payroll. Sun wanted to group the laboratories together and make it a non-profit institution. Sun orchestrated the legislation for the establishment of ITRI with the purpose to accelerate the growth of industrial technology. And instead of building new laboratories from the start, he used the three laboratories as a base to build from with promised government support.

Begin Audiofile 18

18-00:00:00

Li: This is Robin Li and Emily Hamilton, November 12, 2008, speaking with Otto Lin in San Francisco, California. This is tape eighteen. When we left off, you were just beginning to talk about the establishment of ITRI in 1973 and you talked about how they went to the legislature and established—

18-00:00:16

Lin: Yes, right. There's a duality in the nature of ITRI: a national lab and a corporation. As a national lab, the government wanted this institution to provide technology to help the industry, so it's for the public good. As a corporation, this lab also has to run with business culture and practices as with any private organization. They didn't want it to run as a government bureaucracy. So there is this duality. Now, today, it's very easy to understand because there are a lot of NGOs, right. But in those times, how to run an NGO is a difficult problem. People also had all sorts of idea. So Chiang Ching-kuo and Sun Yun-suan have encountered great difficulties in convincing the legislature to support this. The opposing view was that the government was trying to bundle up some government property: land, buildings, and people and equipment, and to give it to a private organization. Are you not benefiting a small group of chosen people? This is a question repeatedly asked of the government at that time. So of course, the government has to explain to them the intent and so on. And that's why when I was president, I felt it very important to respect the principle of just, fairness and openness in everything we do. Otherwise we'll run into all those kinds of problems. So there is the challenge of the duality of the national lab and also the corporation. ITRI has always been clear on its nature and always maintain these two views in balance.

ITRI was run by a board of directors. The board consists of usually 13 to 15 members. It's a fairly large board, and consists of government officials, academic people, and industry people. Of government officials, there are several cabinet members, as members ex-officio: the minister of economic affairs, the chairman of the national science council, and also the minister of state, without portfolio but in science and technology. These are the three ministers. If not the minister himself, it would be the vice minister. In the

Taiwan political setting, there are several ministers of state, which is a minister without portfolio, but with the responsibility of coordination of several areas. He is also a member of the board. This is a very high level board, the first group. There are usually four or five people. Yes. Another one is the minister similar to the GAO, the government accounting officer. Usually, this person was a member of the board and take charge of the finance committee to oversee budgetary matters and make sure all the books are properly kept. These are government representatives.

And then from the academy, usually there are two or three university presidents, either National Taiwan University president, Tsinghua University, or, or Jiao Tong University. They would usually rotate. And usually one or two scholars of exceptional standing would represent the technology community.

And then there is industry. Several people represent the industry. Usually this would include the chairman of the Taiwan Electric Company, the chairman of the Chinese Petroleum Corporation. I think either the chairman or the president of these companies. And there are two or three from the private sectors. For example, the chair of Yue-long Automotive Corp the oldest automotive companies in Taiwan, was a member for several terms. By the way, the chairman is a lady who just died not too long ago, at ninety-two or ninety-three. She is a famous industrialist, Mrs. Wu Shun-wen. I have to write down these names for you at some point.

And later on, I tried to expand this group of people, and brought Stan Shih, president of Acer, Matthew Miaw, president of Mitac, and people in other fields such as the machinery industry, China Steel Corporation, etc. I tried to expand the participation from the private sector. Sometimes when there's somebody in the Board for many years, then we try to find other for broader industrial participation. Overall, I'm explaining to you the board of directors of ITRI.

18-00:06:34

Hamilton:

And what would the board be responsible for? What would they do?

18-00:06:37

Lin:

The board is responsible to look at the institute budget, technology strategy and also the major programs of the institute.

18-00:06:50

Hamilton:

So they would be in charge of determining what programs would be going on?

18-00:06:55

Lin:

Yes, yes. Usually, they determine the program. The president will report all program status for the Board's approval. The board can make comments and suggestions. The board will say probably, "Well, you should focus more on this area than that area," or, "You should draw in the resource of the United

States or work with Germany." The board sometimes makes specific comments like this. The board often commented on program strategy and pointed out certain areas that we have missed, or issues that should be addressed. These are s very high-level participation. This is the board of directors, about fifteen people, all appointed by the prime mister. The prime minister also appoints the chairman out of this group and appoints the president. Since the ITRI president was by an appointment of the prime minister, usually carries high standing in Taiwan. So when I was president of ITRI, I saw the ministers all the time. That's why we get together.

18-00:08:18

Hamilton:

So the president of ITRI was a political appointment, then?

18-00:08:21

Lin:

It's a political appointment. Yes, it is. It is. For me, I was appointed a Director and President. The term was for three years. All the directors are not supposed to serve over two consecutive terms. And in the KMT times, this rule was strictly observed. Thus the board of directors made decisions on policy, strategy and budgets. Management of ITRI was the responsibility of the president. The president can organize the institute however he wants it so long as the board approves. In this connection, the president has to run [ITRI] like a company, like a corporation, and be judged by performance. The president was also judged by how well he interacts with industry, those kinds of things. To run the institute as a company, the president was assisted by several vice-presidents. In my situation, I had two EVPs and the laboratory directors also have the title of vice-presidents. Vice-president of materials, vice-president of electronics, energy, etc. These vice-presidents are led by the two executive vice-presidents. So the P, and the two EVP and the several VPs reported to the two EVPs and report to the P. And the P is a member of the board. So this is how ITRI is organized in its highest level. And usually the laboratory directors, VPs, will determine what is needed inside that laboratory. In reality, the materials lab will have some different details from the chemical labs, and so on with other labs, which is understandable.

But when I became president, different labs can have different job titles under a certain pay level. Some electronics labs may have software engineer while the chemical lab, may have research chemist. These will be in the same job level, the same pay level. This is standardization for cost and management. We have to look at each different lab, and view the performance and set standards. [Narrator's Note: This will go up and down through several adjoining levels.] Once you set up this system, then you can transfer people at the proper level and you can also promote people to the proper level and you can give people the proper level of pay. Salary administration will be fairer and easier. Previously, most laboratories, particularly the three government laboratories, the chemical, energy, and metal, could rarely work together. But now, gradually, by straightening out the organizational structure and salary administration, they're able to transfer, to talk and to work with each other.

I met with Zhu Rongji, who was the Prime Minister of China, in 1993. By the way, I have the scene of the meeting in one of the photographs. One of the questions he asked me, he said, "Well, Dr. Lin, in China we have many institutes, many laboratories: physics, applied physics, mathematics, applied mathematics, geology, astrophysics, chemistry, and so on. Should we build an institute like ITRI? What's so different about ITRI in Taiwan?" Of course, it's a loaded question. But I told him that Taiwan is a much smaller place than the Mainland. [Narrator's Note: Thus what we did in Taiwan might not be right for the Mainland] And I assumed you are talking about wanting to build high tech industry. Well, high tech industry really involves with multi-disciplinary technology. For example, the laptop: different types of scientific disciplines come into play. I said, "If you want to run a commercial project efficiently, your organization has to be able to do that." In China, all these institutes are surely there. But they are all individuals, and seldom talk to each other. That's why I think China was slow in developing major technology in the beginning. You have to build a mechanism of operation complete with reward system, so the people can work with each other synergistically. Then if you have a major project to work on, you can draw on different people to work on it.

18-00:13:57

Hamilton:

If you were asked that question now, would you answer it any differently?

18-00:14:00

Lin:

I would say for China as a whole, probably you don't need to have one institute like ITRI. But for each province, or each region, there's maybe a need. Because these regions are quite different. The northwest is very different from Guangdong. Sichuan is very much different from Shanxi. So how to make use of the resources of Sichuan. You remember the tree that we talk about, the different roots? Regional planning is very important. To plan for this region, I think probably you need different types of resources. And to organize the resources so that you use them more efficiently, I think an institute will be better at that level.

18-00:14:51

Hamilton:

And you think that's still true in 2008, even with increased communication, roots, and—

18-00:14:58

Lin:

Yes. Well, I think it's more efficient to assign people that way. Good, communication certainly helps. There's no question about it. And there may be a point where we don't have all these institutions, we just have individual consultants, and then we just have to kind of draw on them. But I think it's more difficult now.

18-00:15:21

Li:

So what—

18-00:15:23

Lin: You have a major project, you need to organize the proper talents to do it. An example is the Sichuan rehabilitation projects. They are drawing talents from different fields to work in certain locations.

18-00:15:37

Li: So in ITRI, would the labs share information or would scientists literally work face-to-face with each other across labs for certain projects?

18-00:15:46

Lin: Well, usually, before, it's difficult to share information. There's no mechanism to share information, and you don't know where to find the other resources that you need. After we set up this human resource management system, then it's clearer where the contacts are. We have seminars, each laboratory has seminars, and then people are invited from different areas to participate, so people are getting to know each other more. And we also set up some multi-disciplinary projects, gradually, more and more. Like the bicycle project I talked about. You need design people, you need materials people, you need processing people, so we draw people [from different labs] to come to this project.

18-00:16:40

Hamilton: So would you say that Taiwan was more ideal geographically than Mainland China to develop such a successful economic base?

18-00:16:54

Lin: Well, I think Taiwan is a smaller system to work with, so it's easier. And in China, it's more difficult.

18-00:17:05

Hamilton: Because of these different regions?

18-00:17:07

Lin: Yes, different. China is like Europe. You are talking about wanting to have people in Holland to work with people in Turkey. That's basically what you're talking about here. It's difficult. But I think for Holland for Turkey, for the Italians, they might have to think about what they need to do in its particular region for its development. That's my thought. Basically I am saying that if you focus on a certain region, it is good to have an ITRI- like organization. But it's difficult to have one ITRI that will cover China—I mean, it's impossible.

18-00:17:52

Hamilton: Well, I'm curious, too. For an economics based on something like agriculture, having a large amount of land, many different regions, different types of growing climates, that would be ideal, and Taiwan didn't have that. Was that a consideration in moving away from the agriculture based towards industry?

18-00:18:14

Lin:

Well, Taiwan in the sixties, in the 1960s and fifties, you look at the GNP curve. It's very small. Most of them are from agriculture. Industry is very, very little, just a little part of the total economies. When I was in high school, or even in college in Taiwan, I think at that time the largest export was sugar. Sugar and then rice. Sugar, rice, and perhaps some salt. Basically all agriculture natural and very small. And at that time, fruits. I'm sorry, fruits like bananas. And those account for at least fifty percent of the export. Today, I think all of these several things added together, probably will account for one percent of the economy. It's totally different and it's largely because of the development of industrial technology.

Now, don't misunderstand that all the industrial technology are attributed to ITRI. It's not. But ITRI was able to focus on certain areas which drive the economy. I think these areas happened to be very fruitful for Taiwan. The people who are really carrying on the commercialization work are the industrialists and the business people. That's why the society was able to move upward. One of the reasons that China was booming in these last ten years is because of the entrepreneurs, in the different regions. Deng Xiaoping has allowed different regions to develop their own. It's not the old-style planned economy anymore. So it's more a capitalist, market economy. Market economy strives in China during the last two decades. That's how it was able to become what it is today.

18-00:20:30

Li:

So in the trend of Taiwan from agriculture to a technology based economy, where would you place ITRI in that development? Is it an early entrant into the development of the technology-based economy or was it just perhaps an incredibly successful version of that transition?

18-00:20:48

Lin:

Well, I think ITRI was a technology leader. It is a leader of technology. It's a driver of technology, you might say, for Taiwan in the period that we're talking about, yes.

18-00:21:08

Li:

Because prior to 1973, they were small companies in technology—

18-00:21:11

Lin:

They are all small companies and they are all imitators. Basically, they just provided cheap laborers.

18-00:21:18

Li:

So it's a technology economy but not innovative?

18-00:21:22

Lin:

No, no. The technology, they learn how to make shirts, how to sew the buttons, how to do the design, that kind of thing. But mostly it's depending on cheap labor, low cost labor. Technology, a lot of metallic products, nuts and

bolts, hand tools, pliers, a lot of those are made in Taiwan. There is very little innovation, or new creativity. You don't need much new innovations to do that [kind of business]. It's early stage industrial products: plastic pails, plastic flowers.

18-00:22:23

Li: So do you think that ITRI DE, like that philosophy was critical for Taiwan?

18-00:22:27

Lin: I think it was critical. It was important. It focused people for the future. We're talking about innovation, teamwork, and the respect for each other to work, that kind of thing. And you have to strive for excellence. And for ITRI, we are not working for ourselves. ITRI is not working for ourselves. It's working for the industry, for the society.

18-00:22:51

Li: So did you put these principles into practice as soon as you arrived as president in 1975?

18-00:22:55

Lin: I can say I am the president who put this principle of ITRI values into practice, in 1988.

18-00:23:01

Li: And had you thought about it before you took on the role—

18-00:23:04

Lin: Before I was president, I was laboratory director. I was the director of the material research lab. I was five years in that job. I left DuPont and become the director of material research lab in ITRI.

18-00:23:18

Li: So you developed these ideas there?

18-00:23:20

Lin: Yes. And in this process, I learned something from DuPont. I learned from talking to specialists and scientists. I learned from these things. I also learned about motivation, about human needs. I am a student very much of Abraham Maslow—the hierarchy of needs. Maslow pointed out there are five levels of needs. The basic level is physiological needs, and then the next level is security needs. And then the next level is belonging, and so on. I was able to put these needs into ITRI's management practice. Take, for example, the physiological needs—you have to think about salary and compensation, right. You cannot ask the people to always show dedication without giving them a proper salary. You have to find a way to give them a good salary. The next level is security needs. You have to let a person feel that his job is fairly secure. It's not necessarily secure for ten years, but he did not have to worry about his job tomorrow. There's some continuity there so he will be able to work hard and to make use of that. He needs to have that level of security.

And you have to think about people, what about when you are retiring? I am the first one in ITRI to institute a family medical insurance plan. I learned from the United States. Previously in Taiwan, the workers usually have health insurance, employer provided. But I say, "Well, if you have a child or wife is sick, you have to take care of them too, right?" So we need to provide security, health security to your family. I used a system of matching contribution—the company pays one dollar, you pay a dollar. But these are the first, I guess, in my time in Taiwan. People felt that we cared about them, we cared about their security.

And their belongings needs—I'm very much a student of this. What it says was essentially, "Well, you need to be with a group. You can join the group which provides social and professional support. " Teamwork, these are the kinds of things that we talk about. I take this idea and incorporate it into the ITRI DE concept, and make it into this appraisal and becomes part of the performance review system. This is basically the principle of management by objectives. I think management by objective is a very good theory. But to a lot of people in the past, it's just becoming too formalistic. Performance review is a good system, but if you just fill in the number, it does not make sense. The key is communication. You have to talk and have a discussion. The piece of paper is a tool to provide meaningful communication between the person and the subordinate, and between the person and his or her boss. Performance review is communication. And with communication, you'll generate teamwork spirit, you'll generate respect, and you'll be able to do your job better, be more innovative. I think these are all related.

18-00:27:34
Hamilton:

It seems that from the first days of ITRI, it was an ambitious and possibly even risky project and I'm curious about what kinds of people were skeptical of the development of this organization.

18-00:27:49
Lin:

Well, when it was first established, the legislature was very skeptical about the motive of the government. Is Chiang Ching-kuo or Sun Yun-suan intending to take this resource and give it to his own clique? On the institute level, when I develop this technology, will I be able to give it, really dedicate it to society rather than to myself and my family. There's a whole lot of this speculation here, so it's not very easy to do. That's why in the first ten years, I must say the growth of ITRI is very slow and I would say the major break through came with the success of IC that we talked about. It was done 1974-1982, it took nearly ten years, the first ten years. And at that time, we still did not see how successful it could be. But it's just something that was going on, just catch the time, so ITRI was only a limited success.

The financing—let me talk a little bit about the innovation system. I talk about the industry, the university, and the government. So in the beginning, I guess Chiang Ching-kuo's and Sun Yun-suan's idea is that they wanted ITRI to link

the university and the industry together, to bridge the gaps. But they did not really know how to do it properly. First of all, this gap changes. Secondly, you cannot say just, "I want to link the gap." You have to do things to show that you can link this gap. You have to find areas of common interest and define areas of common needs. And you have to respect each organization's mission.

So ITRI would not institute any academic degree programs. If I were to open a degree programs for bachelors or masters, I think it would be very popular. But then I would be competing with my university friends. I think that's a job that they are supposed to do, so I think I will let them do it. I will not compete with my company friends, business friends. I would not go into running commercial process myself to be in competition with them. I have explained this earlier. Therefore, ITRI really develops the function of linkage. We kind of overlap but we do not duplicate. The overlaps are just to provide areas of linkage or understanding. But we do not duplicate or do not try to substitute each other. I think the national innovative system of Taiwan, ITRI's performed at the center stage and provided the linkage. You have to know your responsibility, a very clearly defined responsibility.

18-00:31:36

Li:

This isn't a value that you talk about, but it seems like there was a lot of discipline required in terms of not commercializing or not stepping into education.

18-00:31:47

Lin:

Indeed, indeed. You have to have a lot of restraint, when you see a good area. A lot of the times you'll feel that perhaps it's more efficient, I want to do it myself. So you really have to have a lot of restraints. Discipline. The word you use is good, yes.

Now, financially, because of the duality of ITRI—so I told the government why you have an obligation to provide a certain budget for ITRI. If you, the government, do not do that, then why would ITRI dedicate their best technology to the benefit of the industry?

18-00:32:32

Hamilton:

So the same model as the university?

18-00:32:34

Lin:

Yes, yes. If you want ITRI to take the technology that we develop and give it to the company, then I think who's supporting this work? Government has to support this work. You have to have certain levels of government funding. But we also want to have some private funding. Well, for some work that is helping the company, then I think the company should pay for it. And for this, it's a definition of research, development, and service and commercial work. For service or commercial, those are to be paid by the client, company or government agency. If the EPA wanted us to do a survey for them, then they

have to pay. That's not research, they have to pay, we'll consider them as our clients. But the research deals with more long-term research.

Then, I think at that time, people all recognized this. They all recognized a need, but they did not know what to do about it. I just set a policy. I said to my guys, "Well, let's have a one-to-one ratio. That for one dollar we get from the government for research, we have to have another dollar from industry, from the private sector, to do service or short-term research." Why one to one? Why not? ITRI says," We are relying on the government to provide funding to do long-term research, but we are to charge our customer for service and short-term technical work. " If the institute is totally funded by the government, 100%, then I think we'll become a part of the bureaucracy. You are government. If ITRI becomes 100% industrial job, then you lose your leadership. In a few years, the people will not come to you because you have nothing to show. You have nothing to provide them that they don't understand. I think there had to be a balance of long-term work and short-term work. And that part is from the government, this part from the industry, so we just said a one to one ratio. I put it into every laboratory director's objective/performance/appraisal form, that in three years, for you, you have to accomplish this one to one requirement. If for a certain laboratory that may take seven years to accomplish, one to one, then we should be thinking and reviewing their projects in details. They will have to put this principle into their head.

18-00:35:58

Hamilton:

It was the directors of the laboratories who were in charge of—especially in the early years—going out and getting money from the private sector? I assume that now there are more and more people coming to ITRI saying, "We want to give you money for this project."

18-00:36:11

Lin:

That's right. Yes, that's right. When I left ITRI in 1994, ITRI is an institute of about 500 million U.S. dollars budget. It's not big, but it's not small. And it's about 60/40 at the time. I think in 1996, the Institute as a whole have accomplished one to one. It's getting 250 some million U.S. dollars from the business, from the private sector. That's not a small sum. I think the goal that I set for ITRI, one to one, still holds today, I feel it's a very important one. For the ITRI directors, you say one to one, they all understand what it is.

18-00:37:06

Hamilton:

What percentage of this private sector funding comes from within Taiwan?

18-00:37:12

Lin:

I would say probably ninety percent,—most of it.

18-00:37:15

Li:

Oh, really?

18-00:37:16

Lin: Maybe ninety-five. Yes. Now, you understand, though, this couple hundred million dollars, some of them are just payments for service. This company, they want ITRI to do certain work for them.

18-00:37:34

Li: Would they come with a specific request, like we need a plastic for a calculator case that is waterproof?

18-00:37:41

Lin: Yes, yes.

18-00:37:42

Li: And so they'd have a specific task that you would just—

18-00:37:44

Lin: That we'd have to do, yes. I showed that there are a number of service [projects] a year, several tens of thousands service [projects] a year. They are part of this funding source.

18-00:37:57

Li: So it's sort of a lab for hire for companies that couldn't afford to have their own internal labs?

18-00:38:00

Lin: That's right, that's right.

18-00:38:05

Hamilton: And is it completely up to the head of the laboratories to bargain with these companies and figure out what a fair price is?

18-00:38:14

Lin: It usually is. And, of course, you have market forces operating. Say a company has to do the chemical analysis for a product. There are several laboratories within ITRI that can do that. And there are some universities that can do that, as well. So the laboratory director cannot say, "I want to set this price here." People will go to the other places. Eventually there's some kind of balancing factor there.

18-00:38:56

Hamilton: What's an example of a service that ITRI provides that couldn't be found elsewhere?

18-00:39:03

Lin: Well, failure analysis. Say when you have a chip in a package, electronic package, you put the package in place and it perform the function it is supposed to. Then you want to find out why doesn't it work. Usually you would take electronics studies, material analysis and surface analysis. You will take the package out, cutting it open and see how has the morphology changed. There is a lot of work like this, all multidisciplinary. This is important. I'm talking about the status of the first period [of ITRI]. It was

difficult, because at that time people did not know how to treat research people. I called them “sleeping tigers”—they are tigers. They are sleeping and you try to find their interest to wake them up. You need to do something. But you have to give them some rules so that they will not run haywire. This is difficult. And a lot of times, ITRI in the first ten years, the success is not very clear. I would say the impact was not clear at the time. A lot of the successes take many years to be truly recognized. It's not so clear at the time, in the short-term.

For ITRI people, there are all kinds of attractions. Occasionally, business people come to ITRI to talk with the staff and would offer them money or give them some profit incentives, so that they would work under the table. I'm really talking about that kind of thing. So it's incredible.

And also, at that time during the seventies and eighties, within KMT there are different factions. So at that time, the political pressure to ITRI is not so much from DPP, it's from different actions of the KMT, so—

18-00:41:42

Li: So you said the political appointees for the board, they were two consecutive terms?

18-00:41:46

Lin: Yes.

18-00:41:45

Li: So two years?

18-00:41:48

Lin: No, a term of three years, so two consecutive is six years.

18-00:41:53

Li: So if you have these different competing KMT factions, were there problems on the board?

18-00:41:58

Lin: Yes. Well, then it usually is not at the board level. Because the board members from the government are generally the ministers. The minister of economic affairs, the minister of scientific council, etc. Those are very high government level leaders. I don't have problems of competition with them. Competitions came more often from the industrial board members and the Legislative Yuan. Most problems were related to the annual ITRI budget, the appropriation of budgets. Different people exerted influence on the committee members in the Legislature which would determine the budget of several long-term research projects.

One day I was invited to a dinner, a very fancy dinner. The host was a senior member of the legislature and here was this young man who was dressed very well and spoke very well. The legislator says, "Otto, this is my friend, a good

friend. And actually, his family knows the other family and he's now coming from the United States. Now, in ITRI, you have this environmental project to the tune of several million dollars for the next year....”—

Begin Audiofile 19

19-00:00:00

Li: This is Robin Li and Emily Hamilton speaking with Otto Lin, November 12, 2008 in San Francisco, California, and this is tape number nineteen.

19-00:00:11

Lin: So we were talking about ITRI at the middle of 1980s, actually eighty-five, eighty-six, in this period. So the prime minister Sun and his successor, Mr. Kuo-hua Yu, have recognized that they need somebody who knows how to do industrial research to head this institute. It's not a job for the normal bureaucrats. It's not a job for university presidents. It's not a job for just a company president. The person should have the attributes from all these different sectors: academic research, industrial research, business contacts, and also knows the national vision, and has some contact in the government. At the time I was already vice-president in charge of the materials research lab two years earlier. They are looking for somebody to head ITRI and they have identified Morris Chang.

Morris had little roots in Taiwan. He grew up in China and then he to MIT, MIT or Harvard for college education and then, from either one of these universities, and got his PhD. And then he worked for Texas Instruments. At Texas Instruments, they also sent him to Stanford to do some management studies, I believed, MBA. I was told that he was the highest paid student of his class, receiving already the highest salary. This was in the late sixties, and from Texas Instrument. I understood that he was highly regarded by David Haggerty, who was Chairman of Texas Instruments. Haggerty soon promoted Morris to become vice-president of Texas Instruments, in charge of quality in the manufacturing area. So Morris spent most his early professional career with Texas Instruments. Then he left TI and become president of General Instruments, GI, and actually, moved then to New York. At this point in time, in 1986, I think Morris was president of GI, General Instrument. Of course, in that position he has opportunities of interaction with Taiwan, just like what I did while working in DuPont. Although I was many levels below the president, but I think I was able to participate in fairly important activities in Taiwan. Then, of course, I have the advantage of growing up in Taiwan.

Morris was considered a star performer of U. S. corporate executives with Chinese origin. Many people in Taiwan finally got to know him. One of the important person in this group was. Professor S. S. Shu, who was Chairman of ITRI. At the time, Mr. H. C. Fang, President ITRI, has made his retirement plan known. Noting that Fang's position of presidency will be soon open, Prof Shu contacted Morris to take the position of president.

Now, for Morris, it's a difficult decision because he has never really lived in Taiwan, although he knows these people through business contacts, I don't think he knew the local corporate culture. But he finally agreed to come. And of course, Shu went to visit him at his New York office several times. There were also many other contacts from Taiwan. So Morris finally decided to come to Taiwan and become president of ITRI.

Morris is a person of strong views, strong will, and is a tough manager. Obviously, Going from Texas Instrument to General Instrument and became the number one person in such a big corporation was a remarkable move. He's recognized for his accomplishment in the semiconductor field. His coming to work in Taiwan was a culture shock, for both Morris and for Taiwan. For example, in meetings, he usually raised good and candid questions and was getting impatient with elusive answers. He was seen throwing papers at people. He asked pointed questions at people, which at times was embarrassed and would not be able to finish. But I think those are quite normal in the United States; it happened in many companies. So these are more the style of an American business executive. Certainly he was very much used to that. And in China, at the time—I guess people would be more courteous and tolerant, and less abrupt and abusive. So Morris was a shock to the people in ITRI. And so, of course, with a lot of modern day management practice, Morris wanted to talk about motivation. I think he knew what he needs to do but was frustrated for unable to do it. He asked people to produce, but people did not come out the way he wanted. There's a big gap in the expectation.

One time I told Morris, I said, "Morris, suppose you are a great pianist and you try to play a piece from Mozart. You are so familiar with the piece and have played it many times before. But it just did not sound right." I said, "You probably should know that there may be a problem with the piano." So I said, "Perhaps you should look at the piano, open it up. I won't be surprised to find many strings are missing, or screws are loose. So how can you play a good piece with this piano?" Obviously, certainly, you will not be happy with the sound. So I said, "You should think about organizational improvement. And, suppose you are a conductor for this orchestra. And you find the pianist and the violinist and the drummer were out of step with each other. They never had that kind of experience. So you have to train them, for them to recognize the importance of that. You have to get the musicians right to have good music." I'm not saying that he did not recognize some of these, but I pointed out to him that this was really the problem. His understanding and his expectation in the real world in Taiwan are not in sync. Just wanting to have good music is not enough. You have to improve the people and to improve the organization.

19-00:09:08
Hamilton:

Did he ask for your help or did you just see this as an opportunity?

19-00:09:11

Lin: No, we talked. We discussed. There are not too many people that can discuss with him at that time. I would say all these years, Morris and I worked pretty well together. Again, speaking of respect, I respected him as a more senior and very accomplished executive. I'm a young turk, at the time to him. Well, actually, it's not that young. I think he probably is close to eighty at this point. He may be about seven or eight years ahead of me. But his white hair is commanding.

19-00:09:50

Hamilton: Big long beard.

19-00:09:54

Lin: [Cleanly shaved.] I think he took the job of president for no more than three years. He was restless with the job and people did not like him that well.

19-00:10:09

Hamilton: And this was in the mid-eighties? This was in the mid-eighties? Could you put a date on that, when he came?

19-00:10:15

Lin: No, I have to find a date. We can find the date. [Narrator's Note: 1985 to 1988] He was not happy with the performance of the organization and not happy with himself. And people around did not necessarily like him so much. Many good people are leaving ITRI. Not just scientists and engineers but some high level people. A number of them could not, while speaking with him and making formal presentations, take comments like "These numbers are worthless". People felt compelled to leave.

He did not speak Chinese, Mandarin, that well. Now he speaks very well, but at that time, he was just trying to get acquainted with it. Actually, he can write pretty well. He's a fairly good writer. A problem generally perceived was that he did not have the patience to listen to people. I think he is a good listener, but anxious for wanting to do more with his time.

19-00:11:20

Li: But where in China was he from? What part of China was he from?

19-00:11:24

Lin: I think it's Shanghai. Shanghai.

19-00:11:25

Li: Okay. And did it matter that he was Chinese? Was that a factor or—

19-00:11:29

Lin: No, at that period in Taiwan, Mainlander or Taiwanese, it's not a matter. This is an issue that was later played up by the DPP. I never cared with the birthplace of Ching-tai Shih, who was my executive vice-president. I did not ask him where were you born. Of course, I know that he was a much younger person and must be born in Taiwan, but I have never really taken that into

consideration. When I recruited, I have never asked [whether the candidate was born in the Mainland or Taiwan]. There's no need to. In the Legislative Yuan, he was having a lot of pressure. I am supposed to be a person of fairly good temper but I was getting impatient with some Legislators. And he was outrageous and people were outraged at him.

And then when one entered Taiwan, obviously, [when I went to Taiwan, I had my father there], one could usually associate with the family or some relations. This is not in his case. Reportedly his salary became a sore point in the inner circle. He might be the highest paid executive in Taiwan at that time. Certainly, compared to the ministers, his pay's was much higher. So that became a source of uneasiness with certain segments: the government sector, the legislative yuan, and some senior ITRI people, and perhaps some the industrial executives. He is IC specialist. Did not know much about chemistry or materials or energy. So he's kind of new and lonely in the business community. That's why I say he was lonely—many people left and the impression spread. A lot of people say he's like a type X leader, although actually I don't think he is. He also has very much concern about the individuals. But his image is more X than Y. You want to talk about X?

19-00:14:07

Li: Sure.

19-00:14:07

Lin: The X is—there are two types of management style. One is that people are bad, people are lazy, people are not motivated. You have to control your people through regulations, through force, sometimes with sticks, sometimes with carrots. The organization is only important if it can achieve company objectives. Without that, it cannot survive. The type Y management is that people are people—and people are basically good. People basically want to contribute. A good manager has to be able to build an environment so that people can contribute. This is X and Y.

19-00:15:09

Li: And how do you place yourself in that continuum? Where would you be?

19-00:15:13

Lin: Well, I'm Z type. Yes. There is Z the type. At least I try to be a Z type manager. I mean, you have to understand people on what they think.

19-00:15:30

Li: And what is a Z type? What does that—

19-00:15:32

Lin: A Z type manager is one who recognizes people as people. People are different. You have to treat people as a whole person. You cannot just say I want to talk about your strong point and forget about your weak point; they are all together in one person. And, people are not perfectible but improvable. You have to see people as always in the process of improvement. [Narrator's

Note: A manager's job is also to help his people improve to be a better performer and better person. This is my philosophy of management if there is one.]

At that time, [the big environment is changing rapidly] and IC technology in ITRI has been pretty well developed. We already have spun off a company called UMC. And ITRI has continued to improve IC and was able to work on larger wafer and final line. I explained this to you, right?

19-00:16:40

Li: About the—

19-00:16:42

Lin: Well, the thinner the line, the higher the technology is.

19-00:16:49

Hamilton: The more you can fit on a smaller wafer.

19-00:16:51

Lin: Well, our hair is about eighty microns. A micron is one millionth of a meter, okay. So your hair, you can split eighty times, then you can get a micron. At that time, the lines, the IC is about one micron, one-eightieth of your hair. And now it's about one-thousandth of a micron. So that's how technology changes, too. So that's the technology.

In 1972 when ITRI went to RCA and bought the technology, it was seven-micron technology. And when UMC was spun off from ITRI, they were working on three point five, the one-half, double the technology level. And at that point, we already able to work on one micron. So it's a fairly major improvement.

And the wafer is silicon wafer. It's like potato chips or a pancake, okay? The larger the wafer, you are able to get much more pieces of chips out of it, the chips are in the shape of a square. So a six-inch wafer, you can get four times the numbers of chips than in a three-inch wafer. Three to the square is nine. Six to the square is thirty-six. Thirty-six and nine is a ratio of four. In other words, if you were able to work a six-inch wafer, you will have four times as many in chips in the same process and your costs will be only twenty-five percent. So that certainly is an advantage. Thinner the line and larger wafer: these are the two key characteristics of IC technology.

So at that time, ITRI was able to work on higher technology compared to UMC and about ready to form a company TSMC, Taiwan Semiconductor Manufacturing Corporation, TSMC. And as in any major project, you need really a good champion. So I think the government felt that perhaps Morris is the best champion for that. Well, he's in the business world. He knows what the customers need and how to deal with them. The customer will be like Honeywell, IBM, Hewlett-Packard, etc., companies that use ICs. Previously,

the ICs are coming from companies like Texas Instrument. So Morris has an advantage in knowing the general customers. Morris knows how to run the business. He has done it before. So perhaps it will be good for him to take charge of the TSMC. They made him the chairman of TSMC and I become president of ITRI. [Narrator's Note: Prof S. S. Shu was chairman of ITRI. He recruited Morris to the presidency some two years ago and decided now to step down to leave the chairmanship vacant for Morris to keep his linkage with ITRI.]

19-00:20:23

Hamilton: Was TSMC the first spin-off company from ITRI?

19-00:20:27

Lin: No, no. The first company is UMC. United Micro—I'll show you. In one of these slides, it shows that.

19-00:20:38

Li: But is Taiwan Semiconductor the most famous?

19-00:20:40

Lin: Both are famous, but TSMC is bigger than UMC. And I think TSMC is bigger and doing much better because of Morris. I think Morris is a visionary in business strategy. He has a very successful business model in running TSMC. You see, IBM needs the chip to make its computer. Texas Instruments needs the chip to make its instruments. Boeing needs the chip to build the equipment to run the airplanes. These people have the end uses in mind. But they all need IC chips of certain characteristics, certain performance level.

Morris went to IBM, told the IBM like this "Well, at present, you make your own chips. Your IC manufacturing department provides chips to your business department. I can supply to you the chips of equal quality, as good as your own, and I'll beat their price to you. Make it cheaper for your computer." He went to Hewlett Packard, said the same thing. "That you don't have to worry about your own manufacturing. I'll supply that to you at the same quality level, if not better. Certainly at a lower cost." It's like music to the ears. "And further, I will not be in competition with you. I will not make any computers. I will not make any instrument to compete with you. My manufacturing facility will be dedicated to you."

19-00:22:42

Hamilton: Was there reluctance within ITRI to let these companies go?

19-00:22:48

Lin: No, no. You're talking about technology transfer from ITRI. Well, no, Morris's business model for TSMC is a unique. With very large capital investment, TSMC needs the volume to be successful and acts as an IC foundry.

At that time we have a lot of difficulties trying to sell the technology to the Taiwan industry. This is a technology the government has spent money to develop. We are bringing generations of improvement here. And to form a company to produce the various IC products, you're talking about hundreds of millions—I've forgotten the number. Again, you're talking about maybe a billion U.S. dollars, or half a billion but in that order. There's not too many people that can afford half a billion dollars at a time. So the Taiwan government says that, "Well, the government bank, the Bank of Communications, which is a bank to fund development backed by government, will put in twenty-five percent of the capital that you need." The rest was going to be raised from the private sector. Morris was able to talk to Phillips Electronics. Phillips for many years has set up operations in Taiwan. They're making TVs, making all kinds of electronic gadgets. Phillips knows Taiwan and was willing to invest in Taiwan. So Phillips has committed to contribute forty-nine percent of the capital. Now, so out of this 100%, you have forty-nine from Philips and twenty-five from Taiwan government. You only need about twenty-six percent of this half a billion dollars. At that time, nobody wanted to put in any money. We originally thought of finding just two investors, but no luck. Finally we tried to form consortium with smaller percentage to facilitate wider participation.

We talked to many people and said the government has been helping you for all these years. All we would hope now is that you would contribute and become a partner for this national project. The government's already willing to put twenty-five percent and Phillips is forty-nine percent. We only want you to contribute two point six percent. He finally organized ten investors, each contributed two point six percent. This made it twenty-six percent, with the government twenty-five, with Phillips forty-nine. He has built this company of TSMC.

It was not easy to persuade people to invest 2.6%. One of the investors is Y.C. Wang of Formosa Plastics, the leading chemicals manufacturers in Taiwan. Y.C. Wang just died two months ago at the age of 91. He was the number one chemical tycoon in Taiwan. He started as a small businessman. I don't think he went through high school but he was in the lumber business back in the 1940s. In the 1950s, the government went to Taiwan, built petroleum refineries and wanted to set up petrochemicals network. The economy game plan in Taiwan at that time focused on petroleum. Basically you buy crude oil from Saudi Arabia, or perform petro-cracking, from which you get gasoline, diesel fuel, jet fuel, and about ten percent of the crude will eventually become chemicals such as methane, ethane, ethanol, propane, butane, some xylene, some styrene, or a whole host of derivatives, including plastics and textiles. The government has to plan for the various end-use applications of this ten percent of crude, which is still a fairly large number. It required a great number of industrialists to participate and take over the different parts.

The government encouraged Y.C. Wang to set up a company that can process ethylene which leads to vinyl chloride, and polyvinyl chloride, the famous PVC. Wang at the time did not know anything about chemistry, let alone polymer. The government said to him, "Okay, you don't understand petrochemicals, we'll find experts to help you. You need some money, we will give you loans. You need some land, the government will give you land." That's how Y.C. Wang was starting his empire and getting his billions. At that point, 1986, Formosa Plastic has already become the number one private company, in Taiwan. So the government went to Wang "Would you be a leader and participate in this project so that we can—" and so on. Wang, a cautious man was skeptical of this thing called IC. But he felt kind of obligated to participate, with obvious reluctance. And then, likewise, there's some nine other investors joined in not entirely full heartedly. So putting together this investment was a very difficult job at the time, for Morris and the government.

And, of course, I supported Morris' strategy and business model. In the first two or three years it was losing money. Well, of course, the market took time to build up confidence in the product, and also the optimization of the fabrication processes was gradual. It could not generate profit the efficiency was maximized. Not until the middle nineties—four or five years later—that TSMC started to show profit and it was skyrocketing because of the economic boom. Wang was among the first investors to exit from TSMC. Once he sees that the opportunity to break even, he went out. At that time, TSMC has already become a publicly traded company, so they were able to exit gracefully.

Morris was chairman of TSMC and ran TSMC very well and through TSMC he made a big contribution to Taiwan. A lot of ITRI people was relieved that he left. I made analogy of Morris as a virtuous pianist, some people felt he's more like a bomber pilot. He dropped a lot of bombs and left. I am the person to succeed him to run ITRI. So this was the environmental background of ITRI that I found at the time.

19-00:31:02

Li: How much time did you have to prepare? When did they appoint you and how much time passed before you took over?

19-00:31:10

Lin: Well, it's maybe a week.

19-00:31:12

Li: Oh, really? Okay. So you didn't have six months to think about it?

19-00:31:15

Lin: No, no. Maybe a week. Of course, I think they felt I'm pretty ready.

19-00:31:21

Li: Right, because you were already in the materials lab.

19-00:31:22

Lin: Yes. I was already in the materials lab. I was dean of engineering of Tsinghua University one time. But there's a risk with everybody, right? I think Prime Minister K. H. Yu, and Minister Li-an Chen were comfortable with me. Professor Shu, who was chairman of ITRI, was very much my mentor. I guessed they tried to find the best, but failing that, settled with the second or third best to fill this position. Ready or not, I was the one to be chosen.

19-00:32:09

Hamilton: You clearly learned from some of the mistakes that Morris made in running ITRI. Did that affect your friendship with him when you—

19-00:32:18

Lin: With who?

19-00:32:22

Hamilton: With Morris Chen.

19-00:32:26

Lin: Well, Morris was a very successful chairman of TSMC, more so than he was a successful president of ITRI. Because I think the ITRI presidency was the early part of his career in Taiwan. He did not know the culture that well and did not adjust himself to the environment. And at that time, people certainly were skeptic to take a “foreigner” as leader. In the U.S., making direct criticism at a presentation is normal. Certainly you feel bad, but you soon forget about it. You don't take it personal. This is the kind of attitude that we usually do in the U.S. But people there in Taiwan could take it so well. I think it's not a fault of Morris, but a matter of mutual adjustment to each other. There's a cultural difference there. I think this is real.

I would say Morris is a man of integrity, a man of talent, and a man of vision. I think his business model is what made TSMC successful. This is the OEM model, right, that you do the production and let lots of people attach their brand labels. In a way, it's basically like that. But he is in technology OEM business. It's not OEM in men's or women's shirts, you make the shirts and your client can just put a label of those famous names to it. This OEM, is making IC. The company is making IC according to the client's specifications. Clearly it is not something that can be directly substituted.

19-00:34:25

Hamilton: I mean, was it difficult for him to see you become president? You fixed the piano, as you said.

19-00:34:34

Lin: I think the reason I did that is that I said, "Well, let's go to basics." So this is back to basics. Back to basics means several things. One is that you have to re-position ITRI. You cannot always talk about business. Yes, we want to promote business but we are not the one who runs the business. You have to respect the role the business world will play. And in Morris's case, I think

when he became chairman of TSMC, it's the right place for the right man because he is a company man and has the mentality for business. If the leader says go, it will go. You can talk about all different kinds of options until the leader makes a decision and you go. In the politics, in the government you cannot really do that. You have to do a lot of compromise. In a company, you don't have to do that. It's a different practice of governance. The reward system, the control mechanisms are all different. I think TSMC needs that kind of person. But ITRI is not. ITRI is not a government, it's not a company, it's not a university. So I said, "Well, we have to make clear what ITRI is." The positioning is important. It has to be clear to our own people; and also clear to the government, that it will not expect us to make and sell products. It has to be clear to the university that ITRI is not going to produce students and be your competition, to raid your faculty to the institute and be in the education business. ITRI is going to tell the business world that we can help you but we are not going to sell the products that you are selling. In fact, ITRI sets a standard of strategic withdrawal. I want to build trust, understanding and mutual respect among these players. This is positioning. I think this is something that is very important.

In my inauguration address—it's a two-page thing. [See Appendix 8] I'm going to translate this. I wrote this. After all this time I still felt that it was a very important piece of document. I think it is also about defining the role. I see the role is also different from the positioning. Positioning is pretty much defining the relationship, husband wife, parents and child, and so on. But the role can change. When your son was just born, he relying on you to feed him, to wash him, to clothe him, to hold him. As he grows older, you'll help him to tie his own shoes. You'll hold his hand cross the street. I have that kind of role with my son, too, right. But now when I cross the street, he holds my hand. I used to teach my son this and that. Now he taught me this and that. Software and Photoshop and that kind of thing, which I didn't know. While the relationship stays, the roles can change and vary.

And in ITRI's case, we are dealing with so many different industries: Machinery, IC, PC, materials, chemicals, and so on. Each industry is at a different stage of development. For the IC case, and PC case is easy because they're basically non-existent in the industry before ITRI, so we can do whatever we want to do. We are a leader. We are the first. For the other industries, we are not, so you have to adjust your role. And even for the IC—now that you ask a question. Today, TSMC has become so big. It's a world-class company. UMC is a world-class company. There is no technology in the IC field ITRI can do that TSMC or UMC cannot do.

One of the technology transfer principles is that once the technology leaves ITRI, it may form or become part of a company. This company will have no relationship with ITRI, except perhaps ITRI may hold some equity shares. Other than that, the administrations are different. They are two separate companies. There is some blood relationship, you might say. But the children

belong to different families from the parents. Different family. In ITRI's case, each family for the technology transfer belongs to a different generation. ITRI will not compete with them. ITRI will have to think about if I am going to continue to serve that business field, what can I bring to the table for the next year or the future? I have to think about different things; ITRI's role is different and I want each laboratory to think about that, to understand that. They really need to know.

I will now talk about some specific actions. In the beginning, when I was just taking over the president, Electronics Research Service Organization, ERSO, is the largest lab in ITRI. It's very important, works successfully in IC and has spin-off companies like UMC and TSMC. But it is getting large and complicated. Computer technology is part of ERSO. Communication technology is also part of ERSO. And these are quite different from IC. In the IC case, all you're interested in is how to make the line thinner and the wafer bigger. In computer technology, IC is taken for granted. But you are trying to put out good operation system, OS, and good application software, AS. Things like Windows, that's important. You are talking about different users needs. You're working with different groups of people. For the IC, I do not sell IC to you, to you, to individual consumers. I sell IC to the industry. But for the computers, they are selling it to the end users. That's another difference between IC and PC. There are also very much different elements in IC and Communication technology and business. In the eighties, there's a lot of big companies like Siemens, Alcatels and AT&T. These companies make big switching machines to manage different signals come into and out of a station. The station handles switching exchanges. This line call in and this other line call out. That kind of thing, right. Usually a typical scene would be hundreds of women workers with lines in hands and busily plug in and out, plug in and out. And now this was replaced by series of computers blinking on and off. Communication technology has very little to do with IC, per se. But in ITRI at that time, in Morris's time, all this were lumped together with complex working relationship.

The first observation I made was that perhaps they should be somehow separated. They should be separated, split so that each segment can address the needs of different industry. They would develop the specific technology, cultivate different talent and dedicated to serving different groups of people, different sectors of the industry. This is one of the major things that I did on consideration of the positioning and role of ITRI.

19-00:43:35
Hamilton:

What kinds of structural changes did you try to enact at ITRI that didn't work?

19-00:43:46
Lin:

Well, this worked very well. I did not enact too much on the structure. This was the obvious thing. And there are some combinations of things here. For example, the energy laboratory. Well, in ITRI, there was a mining and

minerals laboratory but Taiwan has very little minerals reserve. So after studies, I came to the conclusion that there's no reason to set up a mining laboratory as an independent unit. It should be merged with energy. So we established a basically new lab and called it Energy and Resources Laboratory, ERL, and that's the energy and resource, today.

Making structural changes in the organization is really not easy. When I split the ERSO, there's a lot of resistance, not only from the people itself, and from the government. People would say, "ERSO is very successful. Why do you want to spoil a successful organization?" Minister K.T. Li was very unhappy with this. I say, "Well, we need to be focusing on IT, but with the present structure we only talk about IC. So we will let the IC laboratory stay but I want to have an IT laboratory." He did not want me to use the name IT because there is a pet organization in Taiwan called III, Institute for Information Technology. Call it Triple I, I'm sorry. Institute for Information Industry Triple I is K.T.'s pet institute. He did not want me to use the name IT for the new lab. Eventually he agreed that we can split ERSO but used a name for the new lab, Computer and Communications Lab, in short, CCL.

19-00:46:17

Hamilton:

So he wasn't nervous about any sort of competition and research but was more nervous about competition in terms of name recognition?

19-00:46:26

Lin:

Yes, yes. Some of these issues come into play. These are political issues and if you have a very influential political leader that did not agree with you, you will run into troubles. [Narrator's Note: Minister K. T. Li was previously Minister of Finance and Minister of Economic Affairs. At this point he serves as Minister without Portfolio and is a sitting Director of the Board of ITRI].

These are the kinds of things that you would never expect to happen, but it happens. So I split ERSO to ERSO and CCL. So IC remains to be ERSO's responsibility. IC is the key element, or, the rice of the modern industry. CCL focus on major end products, computers and communications. It is like the different cuisines coming out of the rice, say, Shanghai and Cantonese cuisines. In comparison, they are like steel and automobiles.

19-00:47:26

Hamilton:

How political was this decision? It seems if you will split up a particular laboratory into two, then suddenly you have two separate groups that need two separate facilities. Was this part of the decision to do this?

19-00:47:43

Lin:

There is a question of who's moving to what? Usually it was one big family and now we want to split people. It's not an easy job. Then we went to get some advisors. It takes about half a year's time to accomplish. And I think our guiding focus was the industrial needs of the time. And some of them are very different, drastically different. For the computer group, we will be working

with Sun Micro-systems as a partner. They're working on different computer systems for different users in the future and that kind of thing, which the IC people will never really need to think about. We always think and talk about it from the industrial perspectives—that was a decision that I made and I think was very important.

And because of the CCL, we recruited Steve R. Y. Chang, then Research Manager of the Interconnection Systems at Bellcore, to take the position of the lab director, and he is the person who made the suggestion that we should work on Notebook PC. And you heard the detail of the story of notebook PC [in my seminar at Berkeley]. That's how I think major defining objectives arose. And I would support them with manpower, finance, commitment, and strategy of implementation. I would go to the government and say, "Well, you want ITRI to perform this kind of function, to help the industries, then you need to support that." And I think Steve was very good at that. He set up a number of major research objectives which became major ITRI's objectives and was able to identify government budget to fund those. So a lot of those budgets actually go through a vetting process. We have to submit proposals to do this and that and if the government committee felt it is OK then we get the money to run those projects.

19-00:49:53

Li: Would you be competing against university labs for the contract, the government contract for the research or—

19-00:49:59

Lin: Yes. At that time, usually there's no competition. I mean, to be fair. If you want to develop an IC technology, the universities don't have that kind of research strength. They don't have that kind of laboratory and the people to do that. ITRI is the technology leader, driver of technology. At that time that is possible to do. Now, I think this will change today. If there is a government project for electronics, most of the work was done in the industry, in the university, then in ITRI.

19-00:50:37

Hamilton: There were a lot of changes in ITRI in the late eighties. How many of those changes do you think can be attributed to the new leadership of ITRI and then to outside economic factors, political factors?

19-00:50:54

Lin: I would say, being a leader of ITRI, a leader, we expect him to understand manage the change. I am not an IC person. I am not a PC person. But I listen to people and I understand that while the economy changes, the industrial requirement changes such that to put these things together using old method does not make sense. So we need to do something new and innovative. So I think it's my job to do that, to learn from people, to talk to people, and then to make some decisions.

19-00:51:34
Hamilton:

So if someone else had made that same sort of forecast in 1982, you think it still would be successful?

19-00:51:44
Lin:

Yes, I think so. I think a person, whoever's in my position that can make that kind of decision would be successful. One of the smaller things I talk about is quality. Quality measurement. Quality assurance. I talked, again, to industrial people and so on. They were very much concerned with ISO, ISO 9000. This is a quality standard. ISO 9000 is for the entire organization—it may be a company that makes shoes or a company that makes ICs, no matter. But ISO 9000 is the international standard of operation that describes an organization effort to keep their quality. And it's not enough that you told me that you took quality very seriously. I want to know what did you do to maintain your quality? There are certain standards that you have to maintain, certain processes that you have to do. How do you design a product, what kind of processes in the manufacturing factory? What kind of control do you have? What kind of tests do you do? Your management system: how do you document, how do you review, how do you revise, how do you train people, that kind of thing. You have to show and prove your whole system to the field of experts so that you can get a quality certificate saying that you are an ISO 9000 organization.

I said in 1992, "Well, ITRI had to become an ISO- certified organization. Every branch of ITRI laboratory has to meet ISO 9000 requirement." A lot of people did not understand that. Why? We are a research laboratory. We are not a factory. I said, "In the future, your clients will all be ISO members. If you are not, you will not be able to communicate with them. It will be a license to play in any field of technology, a pre-requisite if they want to work with you. Otherwise, they don't know your culture." ISO is a culture, it's a quality culture. Today we are going to have all these trade dispute problems. I think some of this is basically because each organization has different standards and there's no uniform, enforceable standards. That's the problem. In Taiwan we put this concept in effect very early in the game. Then I say, "Well, you are a mature lab." It's very easy to convince the IC people and the computer people because most their clients are already in that area. So they know the importance of quality and ISO-9000. But it's difficult to convince the energy lab, the chemical lab, the materials lab or the other labs to adopt that. I say, "Well, ISO is not just a piece of certificate. It is a process of how you plan, how you execute, how you review." You have to go through that kind of discipline. I think now at ITRI, all the sections are ISO approved, including the corporate office, administration office.

19-00:55:36
Li:

So some of this, what you're talking about, seems sort of like a framework, a business framework that your American experiences were helpful in both understanding and explaining it to other people. Were there a lot of people in the labs who would have had American corporate experience or—

19-00:55:55

Lin: Yes. The higher-level people in ITRI, I would say, a good portion of them have worked in the United States.

19-00:56:12

Li: So they have some familiarity with some of the—

19-00:56:13

Lin: They have some familiarity, yes. Otherwise it would be very difficult to do. This is very important. The recruitment, the human resource management, is very important.

Yes. Okay, so I say back to basics. These are the re-positioning, defining objectives and financial commitment and long-term strategy. I have talked about the “one to one” principle of budgeting, right? I mean, this is a very small decision but has very major impact.

I told my colleague, he said, "If you live feeding other people's hand, you'll never be able to stand up." You have to be able to say to the government, "No, I don't want to do your project," and to refuse a project from one client because we have a better client to work with. When you have that capability to make that selection for yourself, then you are the master of your own destiny. Otherwise you'll be always subject to the government or to the industry. It's not only good for the sustainability, but it's also good for dignity.

19-00:57:41

Hamilton: I'm interested in your use of the phrase “back to basics,” mainly because in the United States in the eighties, there's kind of a move for a back to basics approach in math and science education. I'm wondering sort of how widespread this idea is. Were you seeing other research labs, other industries adopting a similar back to basics structure?

19-00:58:05

Lin: Well, I think in Taiwan it's a small place. ITRI is basically, I would say, unique and I think that's why ITRI was more successful over this period. But nowadays, it's more widespread, as you said. So there are a few other laboratories doing very well. I think the biotech area, the communication area, their area is doing quite well. Some of the concepts are very simple. Like earlier I talked about the health insurance concept. I mean, this is a very basic thing.

Begin Audiofile 20

20-00:00:00

Li: This is Robin Li and Emily Hamilton speaking with Otto Lin. It's November 12, 2008 in San Francisco. This is tape number twenty.

20-00:00:15

Lin:

How I described all this, it's not always coming from me. Because I have a piano that was losing and missing keys, [I learned from that]. I asked all the laboratory directors, deputy directors, and section heads and so on to get together in an off-site meeting. We formed Task Groups, forming a taskforce to look at different issues that are facing ITRI at the time—campus development,[plus human resources, financial planning, technology portfolio, technology diffusion, industrial relation, etc, 10 task groups in all]. We don't have enough lab space. We don't have office space. We don't have certain pilot facility and so on. Even if you [the industrial professionals] want to work with us at the time, there's no space to accommodate them. I think that that's important. And we don't have good dormitory or housing—these are the needs. I'm asking somebody to take charge of this group to see what can we do in developing a better campus.

20-00:01:26

Li:

You showed us an image of the building that you envisioned for ITRI, the design for the campus. Can you speak a little bit about the structure? What was the thinking behind having a circular building or having a campus structure in the way that you did?

20-00:01:42

Lin:

Well, of course, I see many American campuses. It's not just buildings. There are trees, greens, people, they can walk around, they can relax, rub shoulders, and interact. This is very much in the design. Before we build the building, I asked to Administrative Services to assign a certain space to nurse the trees. And then when the building is built, some trees can be planted and they can be moved around, to make the environment attractive.

20-00:02:29

Hamilton:

Did you bring in Canada geese, too?

20-00:02:34

Lin:

Yes. I think it's the environment that will attract people. I think one of the keys here is that people is the center figure—unlike in a traditional factory, you are depending on good machinery to produce productivity. In an institute, you're depending on people and their ability to innovate. As leader, you should give them some room so that they can contribute. You have to have an environment that is conducive to innovation. That's why I wanted to create this campus.

20-00:03:13

Hamilton:

Was the land around the existing campus open space? Was it available space?

20-00:03:19

Lin:

No, no. It's not open space. When we started, ITRI did not have any money really. And it would rely on the government to say, "Well, this spot we'll reserve for ITRI." Later on, we have to buy from the farmers any additional land we need to do anything. And this usually runs into a lot of political

problems. Because, again, you want to buy land from the farmer and this is within the general framework of the Science Park. And at that time, the Science Park—the first person who had the concept of Science Park is Professor Shu, S.S. Shu. He is a visionary. The same man talking first about electric vehicles, the same man talking about geothermal, the person also talking about Science Park. Li Choh-hsien, great uncle of Robin, later on became a director Science Park. And of very much concern is the price, the cost of land. At one time, I wanted to have a small piece of land for my campus. It was in a very awkward place because I have this part and then this part of activities all around it. But these farms sit in the middle. Knowing that I want to buy this little piece of land, they raised the price which I don't agree. And again, certain the higher levels of government, came advising, "Why don't you raise your budget? It's just a small piece of land, right?" Yes, I mean, even double it, we can afford it, that's no problem. But I say, "Well, if I double it, then I'll create problems for Dr. Li in Science Park because it will raise the standard, the floor price. Then he would be shocked to hear it the next time. He's always wanted to buy more land. Then look at the total government budget you will have to encounter. It's becoming impossible. There's more things like this in the environment. You always encounter interference like this. And you have to learn when to stand firm and when to compromise. This is the story of the campus development. The dormitory, I also set up dormitory, the standard dormitory. I say it has to be at least the standard of a three-star hotel so that our colleagues would feel comfortable to stay there.

20-00:06:20

Li:

Would you assign people? For the dormitory, would you have different types of scientists living in close proximity on purpose or would people just wherever they chose?

20-00:06:30

Lin:

The basic guideline is according to the need. Housing. I just speak about housing here because I think housing is what people always concerned with. But people with family have different needs. They are assisted to look at outside. And ITRI itself did not develop any housing for married people. It's difficult.

20-00:06:52

Li:

How close was it to a residential area? Was there a neighborhood or town?

20-00:07:00

Lin:

Yes, it's all residential area outside.

20-00:07:02

Li:

Okay. And relatively easy commute.

20-00:07:04

Lin:

Yes. That's right. It's here, too. In the past, when I pick an institution, organizations like ITRI, when a state company or a government office occupy a large area, they all wanted to run schools, run barbershop, several restaurants and all this workers would become employee for the organization. When I came to ITRI, I said, "No, we don't want to do this. This should belong to private sector to develop. It would be for the private people." ITRI actually grows double the size during my time but they are mostly all professional people. All have to do with the core business, technology and research. Through the non-core businesses we will be interacting with the society, the community. Let the community do those businesses. Through that, it will be a contribution made to build up the community.

20-00:08:15

Hamilton:

ITRI was involved, if I remember correctly, with some sort of school, though, wasn't it?

20-00:08:20

Lin:

No, ITRI did not involve with school. The Science Park—

20-00:08:26

Hamilton:

Oh, right, right.

20-00:08:27

Lin:

One thing that I told Professor Shu when he was planning the Science Park. I guess I told the story about how he took me to see Science Park before anything was built.

20-00:08:37

Li:

Right. There was just a field there.

20-00:08:38

Lin:

Yes. I told him that you need to build a bilingual school.

20-00:08:43

Hamilton:

That's right, that's right.

20-00:08:47

Lin:

And Professor Shu recognized this and he set up a bilingual school. But it was very difficult to run. It became a headache for him and to the Science park director because that's his core business. But I said you need to have the people to work in the same spot and the family to live in the same spot. So this is a necessary evil. For ITRI, luckily, we don't run into that kind of situation. This all these activities basically became socialized. You just depend on your local people to do it.

20-00:09:26

Li:

Right. It seems like this concept of balance was critical for ITRI, as well, for the employees there, that a balance of work and life were accommodated, but also in terms of the kind of projects ITRI was interested in.

20-00:09:37

Lin:

Yes. And also, ITRI is a more fixed organization like a research institute. At that time, there were really about 5,000 and I'd say 6,000 would be the most. But by that number, we cannot afford to have many of the services. It's different from Science Park. Science Park is the collection of companies. At all times and a lot of people coming in and out. So you have the scale of economies. It's different.

We have a committee to talk about how do we make technology development—have to maintain a portfolio of long-term, short-term, and middle-term. The idea is that, I hope that we have maybe three or four projects that can generate some results next year and two or three that can generate some good results in four or five years and one or two that might be able to get results in five to seven years. Then when you do this, then every year you have some concrete accomplishments coming out from that laboratory. You will feel good as a laboratory. The scientists feel good and the society feels good. You cannot afford to have all short-term projects. Neither, can you afford to be all long-term projects. You have to figure out a balanced portfolio. And again, this balance would be depending on the field, whether you are mechanical or chemical or electronics. And you have to be able to pick the projects.

So how do we strive for that balance? I would have a committee to define project selection. The general criteria being: specific niche advantage, economically feasible, and an industrial partner. Also have a partner that can contribute some funds. And also have a champion. Specific niche advantage, economically feasible, partnerships and then sponsorship and also champion.

20-00:12:10

Li:

Would the champion have to be an internal, like someone within ITRI who would sponsor the project?

20-00:12:14

Lin:

No, no. A champion could be somebody that specifically fit for the occasion, who has the knowledge and ability to pull things together. For any project, regardless of how good it is and how much funding you have, if you don't have a champion, it's not going to work. These are the five criteria, I told my laboratory directors. I said nothing about the nature of the technology or how sophisticated it is—so long as it has niche advantage, is economically feasible and all of that is a good project to have. ITRI is not dedicated to scientific excellence. Let me put it this way. I have to admit that. It's certainly not for scientific excellence. But it's an organization that develops technology that will be commercially successful for the industry.

For ITRI, we don't really have a problem of technology not being transferred. I had visited a lot of academies in the world, and universities. They always say that, "Well, we have this wonderful technology, and the report was well-written. And sometimes there may even be patents there but nobody wants to

use it. How come?” I say, “Well, you want to apply the technology to bring innovation, to bring economic value.” The concept of technology transfer is from the beginning of your project planning. It’s not afterwards. It’s. When you use the concept that we have just talked about—defining economic feasibility and defining industrial niches and partners, etc. When you have industrial partners overlooking, they cannot wait for your final result to come in. They were very anxious to implement it already. They don’t want to waste time. They want to be able to immediately make use of it.

20-00:14:29

Li: Do you think it would be a true statement to say that ITRI’s primary objective was the growth of the Taiwanese economy?

20-00:14:35

Lin: Absolutely. Yes, yes. These are important principles. I say we are definitely positioning ourselves in the Taiwan setting. I wrote a paper called *The Position of ITRI*. [See Appendix 9a] And it’s so important. I submit this to my board, to the board of directors for ITRI, for their discussion and approval. It became a document that all ITRI people should know and keep in heart. And we use the document to communicate with the university, with our partners. That’s very important, so it’s clear.

20-00:15:14

Li: That it’s not the university’s task, it’s not a corporation’s task.

20-00:15:17

Lin: I don’t think so. No, no, no. I don’t think so. It was approved by the Board meeting, 1989, April the 19th. It’s a very important piece of paper.

20-00:15:37

Li: And it’s simply titled *The Positioning of ITRI*?

20-00:15:39

Lin: *The Position of ITRI*. And there’s several chapters. One is the organizational mission, the mission of the organization. The second is the criteria for the benefits, criteria for measurable success. Third is the funding source. Number four, research objectives. Here we’re talking about long-term, short-term. What’s long-term, what’s the short-term? How do you define it? And how do you define the project portfolio, and the relationship with the government and with the industry. Number five is pilot production. It described the strategy and guidelines for doing pilot production. That you don’t do that all the times. And number six is technology transfer, technology diffusion. Industrial service is number seven. Number eight is on human training, human resource training. This is the major—

20-00:16:44

Li: So how did you phrase the mission statement for ITRI? Just the number one.

20-00:16:51

Lin: Well, the mission statement is from the legislature that we setup. It's one sentence. It's to accelerate the industrial technology level of Taiwan.

20-00:17:07

Li: So very simple phrase.

20-00:17:08

Lin: Yes, very simple. Very simple. It's just like a law. It's the law. And then we go from there. Let me tell you the organizational structure. ITRI is a private organization. It is established by the legislature. So ITRI is a national institute. It was dedicated to applied research. This is the positioning of ITRI. There was a paper and this is something that we give to people, when they want to know about ITRI, in bullet points.

20-00:18:08

Hamilton: In short...

20-00:18:08

Lin: Yes, yes. Right. Yes. Well, okay. I think there should be some English copies. I set up a taskforce to do the re-engineering of ITRI. And the taskforces are made up of all the higher-level managers of all the laboratories: campus development, technology development, technology selection criteria, diffusion, human resources management, how to bolster industrial relationships and how to promote government relationships. Actually, the government relationship is very good, but sometimes too good. We want to set up some firewall, basically. Out of this group, we need to establish a liaison with the legislative yuan and we also have to understand the different political parties, so some kind of liaison with the different political parties—which is maybe right or maybe wrong, we can talk about this later—bolstering teamwork. What measures can we take to bolster the teamwork in ITRI and do strategy planning. We needed a strategy planning process in ITRI, so these are the taskforces. There may be about nine or ten here.

20-00:19:39

Hamilton: You clearly had your own opinion about the direction that ITRI should go.

20-00:19:45

Lin: I have some, yes.

20-00:19:46

Hamilton: Did you advise the taskforce beforehand?

20-00:19:50

Lin: No, no, no.

20-00:19:51

Hamilton: Or just listened—

- 20-00:19:52
Lin: I just out point out that this is an important area. How we should do it will be depending on the discussion, because the idea has to be bought by people. This is the process. Actually, the strategic planning process is to strive for consensus and to bolster commitment.
- 20-00:20:13
Hamilton: Did the taskforce come back with anything that you expressed today?
- 20-00:20:16
Lin: Oh, yes. A lot of things are coming back from this taskforce.
- 20-00:20:19
Hamilton: Did they come back with anything you didn't agree with?
- 20-00:20:23
Lin: I forgot. But there are not on many major directions.
- 20-00:20:28
Hamilton: In the end there was consensus.
- 20-00:20:29
Lin: Yes, yes. And I think in the process of discussion, there would just become one. It's not any sharp differences of opinions or anything. Yes.
- 20-00:20:40
Li: I don't know if this is relevant here. But was the relationship between Taiwan and Mainland China and Taiwanese development and industrial production in Mainland China, was that an issue that ITRI thought about or considered?
- 20-00:20:54
Lin: At that time it's not. In the year 1986, eighty-seven when I became president, it was not.
- 20-00:21:00
Li: Not an issue. Maybe later on.
- 20-00:21:02
Lin: But later on. Yes, later on. I think ITRI—
- 20-00:21:04
Li: Maybe tomorrow.
- 20-00:21:05
Lin: Yes, maybe tomorrow. In section three I talk about globalization and the Mainland. That is very much a focus of that time period.
- 20-00:21:15
Li: OK. So at this point, with the taskforce, it wasn't a concern?

20-00:21:17

Lin: Yes. This taskforce was not concerned with that—it was too early. The human resource is a very important area. I talked about the organizational structure. There are the different laboratories, with different types of organizational structure; it does not make sense. You cannot communicate, you cannot transfer people, you cannot do team projects, you cannot generate synergy. We needed to reduce this to the same or similar platform. For example, lab level and salary management. How to manage salary? Salary review. Recruitment. We also talk about motivation factors. Yes, particularly for the higher-level people. I have a practice. Actually, in all the laboratory directors' level, I interview and I always try to find out why are they interested in coming to Taiwan. Did we talk about that?

20-00:22:24

Hamilton: Yes, you've talked a little bit about this.

20-00:22:25

Lin: Yes, yes, yes.

20-00:22:26

Hamilton: It's interesting.

20-00:22:30

Lin: Because it was very difficult for people to go back to Taiwan. A lot of people, they said, "Well, it's an easier life." It's perhaps a better return, better pay, easier work.

20-00:22:46

Hamilton: To stay in the U.S.?

20-00:22:45

Lin: Huh?

20-00:22:46

Hamilton: To stay in the U.S.?

20-00:22:48

Lin: Yes, compared to the U.S. I said, "No. If you want to have an easier life, better pay, better environment, you should not go back to Taiwan. This would be the wrong reason. If you want to have a better career, different career path, you want to have your children learn Chinese in a Chinese culture setting, yes, I mean, these are good reasons. You're tired of your career and you feel there are very limited opportunities here in the U.S., you want to find another opportunity." Yes, all that's good. Different levels. Different levels of motivations.

20-00:23:27

Hamilton: Do you feel like race played a factor in terms of what was limiting in the U.S. if people stayed in U.S. corporations?

20-00:23:34

Lin: Well, I think yes. You're talking about in the timeframe of the eighties.

20-00:23:39

Hamilton: Yes, in the eighties.

20-00:23:40

Lin: Seventies, eighties. Chinese scientists can be very good in their technical level. They can be promoted to the highest technical level you have in the organization but they probably stop there. You don't really see many Chinese in the higher managerial levels. I think for the IC and computer industries, it's different. This is a newer field. But you are going into automobiles. You see any Chinese people in the executive level? Later on I saw a couple, but very, very few. Out of ten thousands, maybe five or six. General Motors, DuPont, very few. Many kinds of company, there are very few. So Chinese are not recognized as good managers. Communication is one problem, and culture. There are always things. But there are a lot of people like myself—when I was in DuPont, I could see myself in the final position I would be in. I could see it. That's why I felt that while it's an opportunity that I can do something different, that I can be of help to Chinese people, I'm interested. The love of Chinese culture is very much a part of me. And China, for all these thousands of years, hundreds of years, always in war and everything. So I hope that we can build a society that can be like the United States. Yes.

20-00:25:31

Hamilton: So this—

20-00:25:31

Lin: This is my motivation.

20-00:25:32

Hamilton: And this was probably motivating to a lot of people. A lot of people in your similar position in the U.S. must have found these kinds of arguments motivating to come to Taiwan.

20-00:25:40

Lin: Yes, that's right, that's right. So they can accept the lower pay. They can accept the more difficult and tougher work schedule. They can do many different things because you know ahead of time that's what you would end up with. So they have staying power. Because if a man comes in and he spends two or three years, finds he has to leave unhappily, then I think it would be a waste of his time and a waste of my time. If we know ahead of time [what's to expect], it's much better this way. We put a lot of factors into recruitment and a lot of factors in the training. I told a guy, "When you come to work for ITRI, you are a technical person to start, but you may end up a business executive because we'll have the opportunity to learn and to practice,"—changing from technology to manufacturing to marketing to management and so on. In a few years, he would have a lot of exposure and experience and become very marketable. We also arrange training

opportunities in the university, in industry, and so on. Like Japan, it's very difficult to send people to Japan for training. Going to a Japanese university is okay, but if you want people to train in Hitachi or Fujitsu, it is very difficult—or in the national lab, it's very difficult. But we are quite successful in doing that. With the Japanese, you have to know the network.

20-00:27:28

Hamilton:

How would you forge those kinds of relationships? Would you hire people at ITRI who already had networks with Japan or would you send people to go—

20-00:27:37

Lin:

You establish your network. You might hire one or two who already have good network but networking is dynamic and can change. And the network depends on how you can also benefit the other people by working with you. You can get out some other benefit as well, organization-wise. It's kind of a synergistic relationship. You're always trying to find common grounds for organizations. For example, we send people to Hitachi. Then when he comes back, he learned Japanese and the company and the culture. Can he help or be helpful to Hitachi's business in Taiwan? He will be able to help communication with the industry and the society. We're considering these things. So the targeted company felt that ITRI could be a source of support for their business, that we'll be good for them.

20-00:28:39

Hamilton:

Were there any Japanese companies already established in Taiwan during this period?

20-00:28:44

Lin:

There's a lot of Japanese companies in Taiwan but not dedicated to technology development.

20-00:28:50

Hamilton:

Right. Just manufacturing.

20-00:28:52

Lin:

Manufacturing and maybe some sales support. Transferring internal, external, career development, [we have] talk about those. Is there any question here?

20-00:29:09

Hamilton:

Yes. Well, I was curious about the technology transfer between labs. Was that facilitated structurally? Would the heads of different labs spend social time together where they could talk about what they were doing or would the transfer happen more kind of like through seminars or—

20-00:29:32

Lin:

Well, all. Seminar is one thing to start. And I think what I am more interested in finding different talents needed to build a major project. For LED, LCD display, it's more chemists and material scientists for that kind of job. But then you have to know about PC and the activity behind this. We needed a group of people to work together. Just by the electronic engineering itself

could not do this job. It's an example that you need multidisciplinary talents to work together. A lot of the time, they can stay in their own laboratory and participate in this taskforce. But on the other hand, there are times when we feel it may be better that we transfer people. And this was not able to be done previously, like in the old days. It's difficult to transfer somebody from the department of commerce to EPA, for example, vice-versa. But I think in ITRI, gradually, this formed a culture.

We built corporate values, because we all recognize that innovation is important, teamwork is important, and respect the individuals. All these kinds of things are important and we have a consensus in that. Also, I wanted people to think these were not just empty words but they are a measure of how successful we are in the particular aspects. At least we can set some goals in trying to do that, and that way you really can practice your values. The appraisal form is an equalizer, really. When it's just a document, it may mean different things to different people. I'm sure it is. But [when we can put specifics down] when we talk about innovation, [we will understand] that's what we mean. When we talk about excellence, that's our standard. So gradually when you have that kind of value, people can transfer, people can go in and out. There should be no problem.

I think the focus on IPR is very important. I think I am privileged for the opportunity in showing that. At this time, during the eighty-six, and the nineties, I think probably a good portion of the U.S. patents by Taiwan organizations, companies or institutes, is basically from ITRI. Or at least ITRI certainly is a leader in that aspect.

20-00:32:43

Li: And IPR, Center for Intellectual Rights.

20-00:32:44

Lin: Right.

20-00:32:47

Li: Rights.

20-00:32:47

Lin: Intellectual property rights.

20-00:32:52

Li: So would you set goals, then, for each lab about how many patents they were supposed to try and get by a certain time?

20-00:32:58

Lin: Yes. Well, it's not just a number. We talked about this area a lot. What do we need to place ourselves in a good competitive position in that particular field? And we know there will be certain number of areas needed. And then we have to have people to work on these areas. And need to spend many years. My guess is that if you were spending a man-year or two man- years, then at least

you have some result, some intellectual property result will be coming out of that. Well, if you spend three months empty, that's fine. Six months, did you learn anything at all? But after six months' failure, I mean, you must be able to think about something differently. This is the kind of process that we want our technical people to think about. If you know what to look for, that it's easier to get there. When we put a number in there, it was with that consideration in mind. Then, of course, there's a lot of flexibility there. There are a lot of things that you cannot predict or forecast ahead of time.

20-00:34:35
Hamilton:

So people wouldn't be in fear of their job being tied to hitting a certain number of patents or a certain benchmark?

20-00:34:43
Lin:

Well, then you have to negotiate. It's a management by objective. You negotiate with your superior. Look, if you want me to do this, then what kind of resource do I have? I usually give an example that you want your son to be a violinist. You at least have to give him a violin, right. You cannot say, "Well, no, I cannot afford a violin, but go borrow your neighbor's violin and practice." It's tough. The objective has to be practical, has to be compatible with the resources, and also has to be challenging. Usually we talk about the example of people throwing horseshoes, right. Have you played the game? Yes. Then you say, "Well, okay, your objective is throwing horseshoes. The measurement is to see how many horseshoes that you can put into the pin, regardless of where you want to stand." You would think that this guy would take a hundred horseshoes and go next to the pin and then just drop all into the pin. No, it's not like that. People will usually step back to test their ability and start throwing. Most people are like that. He wanted to set a challenging goal for himself. If that is not challenging, there is no fun, no challenge whatsoever to somebody who has an education. This is a basic in motivation. He will set some goals that are compatible and also feels challenged.

20-00:36:40
Hamilton:

One of the things you mentioned as a corporate value was excellence. How would you define and evaluate that?

20-00:36:45
Lin:

Excellence?

20-00:36:46
Hamilton:

Yes.

20-00:36:48
Lin:

Well, excellence. In terms of product, it is the values added. People always talk about Taiwan for having has low value added products. Were you able to work on an existing product, increase its commercial value. That is a level of excellence. Or, if it's a new product, it would enable this company to expand into another field. For example, carbon fiber bicycle is an example of excellence. And I think a lot of things can and have happened for machine

parts. If you go to a hardware store, sometimes you pick up a valve. You can feel the difference of difference makes. Sometimes it is the feel of the maturity of durability of those things. Those are different values, from different design concepts or material concepts that come into it. I think excellence in the field is to be Number One in this field, or Number Two. It is kind of easy just saying it, but you want to define clearly how you can be in the position.

20-00:38:33

Hamilton: So it's always relational, then. Even if you're making pliers, you want to make the best set of pliers and design them with a—

20-00:38:43

Lin: Yes, that's right. That's right. That's right. You want to make the best pliers in that price level.

20-00:38:57

Hamilton: Right. So you weren't dedicated to making the best pliers ever made in the history of the world, but for the goal, for that level that you were—

20-00:39:41

Lin: That's right. Yes. That level. So in other words, we tried to put this value into practice in the work so that it's not just an empty slogan. I think the worst thing that happens is you become a slogan, then you forget about the meaning of that. Yes.

20-00:39:30

Li: Did you have any other question for today?

20-00:39:38

Hamilton: I don't think I have any for today. My other questions are all kind of thematic.

20-00:39:45

Lin: Well, I think we covered many topics, right.

20-00:39:47

Li: Yes, it was great. Thank you.

20-00:39:50

Lin: Good.

Interview 4 [continued]: November 13, 2008

Begin Audiofile 21

21-00:00:00

Li: This is Robin Li and Emily Hamilton speaking with Otto Lin. It is November 13, 2008. This is tape number twenty-one in San Francisco, California.

21-00:00:16

Lin: Well, in the later part of ITRI, there is a period of time where there's a large change of currency exchange rate. The Taiwan industry and economy has

suffered a hard time. In a way, it's just like what we have seen here today. I forget what period of time it is. But no, it's about in the early nineties.

Hamilton: Is this related to Japan's economic crash?

21-00:00:47

Lin: Japan. That's right, that's right. We came to the realization that most Taiwan products have their key components imported from Japan. The more product you sold, the more you have to import from Japan. And those key components ate up the margin of the profit. So the objective is to find whether we can do something to develop some key components in Taiwan. And IC is one of them. But other than IC, what can we do? Can we pick a field, other important components, and then try to design it using different materials or different process or different package? That is a major program that we undertake.

And at that time, the minister of economic affairs, where ITRI gets most of its money, is Vincent Siew. He's now the Vice-President of Taiwan at this point. He's helping Mao Ying-jeou in this last election. Vincent asked me whether we can do anything about that. And I think, well, certainly if anyone in Taiwan has to do it, it would probably be ITRI. So I organized a taskforce. The taskforce would consist of members from different laboratories, key senior persons, to focus on key components. And I ask Ching-Tay Shih, one of the EVPs, to chair this taskforce. The focus here is that you look at components and identify the key elements. This specific component can be used in a camera, but also may be used in some control instruments. A sensor, for example, and a sensor module. And some of this may be used by different industries, different end users. I think we need people to analyze what are the major components that come in from Japan and who are the users of these components, in what applications. And then we look at those applications and see can we bring anything new in here? New material, new design, or new modules and that kind of thing. That is the effort that we did. ITRI conducted a strategic planning. It included status analysis, analyzing, planning and also organizing. And actually, these are steps we do during manufacturing. We just suggest the government and then the industry to take on and manufacture those technology products. If it is a technology that we do not have, we try to find it for them. In other words, it was a research effort, or a technology effort, not because of a need in technology or a need in the industry, but it's a need from the government, because of the trade deficit situation. They want to minimize the deficit, to minimize the trade deficit between Taiwan and Japan. And with this policy objective, ITRI did the work. The outcome had pretty good results. But it's in the later part of the study and it's kind of scattered through many different industries. If I have the research dollars and research time, this would be a good subject to study, the impact of that.

The second major project is this SME. You say, well, there's a lot of SMEs, small, medium size industry and they really need to find a way to elevate their levels, their competitiveness in the world market. Of course, I have talked

about carbon-fiber bicycles. But this is just from one company. It has a very visionary owner [Mr. Liu Jin-biao] who was able to do that. But not every SME has that kind of manager or leaders, so can we do something in that area to accelerate the upgrading of the SMEs? I think this is the intent of the second major project. And if you look around, there's so many SMEs in so many different types of business. It's hard to do. I told my guy, "Analyze any basic product, regardless if it is communication or food or clothes. There are always four elements in it." One is materials, one is design, one is fabrication process and the fourth is quality. In men's or women's clothes, you will find the difference is in the materials, the fabric, and the cutting, the style, the craftsmanship to put them together, and the quality, whether the durability is good. By using this I can evaluate relevant technology, really. By looking from these four angles, I guess you can go anywhere and examine all industry, really. We formed advisory groups or teams for each industry to analyze the industrial problems. This might be the clothes industry, this might be the plastic industry, this might be the automobile parts industry. So we go in there to look at those things. And this effort, I asked Anthony Ku, the other EVP, to chair the taskforce. Again, the effort here is not because a specific client that asked it, or we want to push a special technology that's new. But it was a government effort. There's a policy objective and we're trying to respond to that. With the basic talent pool of ITRI, we were able to organize the resources to do different things at different times.

21-00:08:07

Li: I wanted to change topics a little bit. I wanted to make sure we talked a little bit about the National Assembly.

21-00:08:15

Lin: National Assembly. Yes, yes, okay.

21-00:08:17

Li: I know it's kind of a different—

21-00:08:18

Lin: Well, it has less to do with ITRI per se, but it's very important historically. It is in the 1992 period. Lee Teng-hui at that time is already president and he wanted to strengthen his control of the Taiwan politics. He wanted to push the old guards out, basically to exercise a new scheme of things. One of the things he wanted is to have a constitutional amendment, to make institute new amendments to the ROC Constitution. The Constitution, I guess I mentioned it one time, is the old constitution that, for one thing, focuses on education: that the central government should spend fifteen percent of the budget on education, science, and culture. At the provincial levels, twenty percent, on the local county level, will be twenty five percent. This is in the Constitution of the Republic of China, adopted in 1948 in Nanjing, and moved with Chiang Kai-shek to Taiwan. One of the basic cornerstones in this constitution also says how the president was elected through the due process.

The process of electing a president in Taiwan, in the Republic of China, as depicted in 1948 in Mainland, it's not by direct vote. For each county, people vote their electors. We call this the Representative of the National Assembly. When these national representatives get together, they called to hold the National Assembly and vote for the president. It is a different form of the electoral system here [U.S.A.]. We vote electors here and when the final electoral college meets, but it's a kind of formality. I heard that there are instances in the United States where the electors did not actually cast their ballot as they promised to and have some problems, but it's rare. But in the Republic of China, in the constitution, when you vote the representatives to the National Assembly, he or she is on his or her own. She can go to the National Assembly and vote whatever he or she wants to whoever candidates. So it's real power.

There are several functions of this National Assembly. One is to adopt the constitutions and also to make constitutional amendments. That's very important. Secondly is to vote for the president and vice-president. That's very important. Thirdly is that they can impeach a president or vice-president. There are only several major functions of this National Assembly.

By 1992, most of the original National Assemblymen are gone. Those are voted out from the Mainland China period. My father was one of those assemblymen. There are about 3,000 of them from China.

21-00:12:42

Li: KMT who left Mainland China and came to Taiwan?

21-00:12:45

Lin: Yes. Well, there are KMT. There are the other parties, as well. There are a number of smaller parties in the Republic of China. They are not very powerful but they are. My father was a KMT member who was also a member of the National Assembly.

21-00:13:07

Li: So there's 3,000—

21-00:13:07

Lin: Hmm?

21-00:13:08

Li: Three thousand representatives?

21-00:13:09

Lin: About three thousand representatives, yes.

21-00:13:11

Li: So were they voted in China and a majority came to Taiwan and maintained their position—

21-00:13:14

Lin: They came to Taiwan. That's right.

21-00:13:16

Li: —in Taiwan.

21-00:13:16

Lin: That's right, that's right. And because their constituents are in China, there's no longer elections there, so it's impossible to change these members.

21-00:13:30

Li: You can't have a new election because the voters are in Mainland China.

21-00:13:35

Lin: But the people in China cannot vote. The other day we touched upon the subject of prison. The prisoners cannot participate in the vote. So this becomes a dilemma for Taiwan. You see how difficult it is? And that's the legitimacy of the Chiang Kai-shek government. It's based on that. If you do not recognize the existence of this group of people, then you do not recognize the legitimacy of your own government.

21-00:14:09

Li: Right. Because the Republic of China depends upon it representing the people of China.

21-00:14:13

Lin: Yes, yes. But how do you solve this problem? Right? Chiang Kai-shek was looking for ideas. He has been electing more assemblymen from Taiwan. For those people [where free election is possible], new election is gradually restored, thus creating more assemblyman from Taiwan. More Representatives in the National Assembly and more members of the Legislative Yuan, in Taiwan. The Legislature was also elected the same way by the old constitutions. And now when you moved to Taiwan—originally Chiang Kai-shek was thinking in about five years maximum he will be returning to Mainland China. So now we have to lift the quota, go through an amendment process, and open up the quotas so that the great majority of representation is from the Taiwan proper. But this processing of reformation is long and not very efficient. Obviously as people die and this original group gets smaller, many remaining members become more powerful and become a headache to Lee Teng-hui. Lee wants to get rid of them, really. He wanted to retire all these people—just say, well, a blanket retirement and then he wanted to vote to find a group of people entirely based on the situation in Taiwan reality. There is a need there.

21-00:16:12

Li: When they'd had new representatives in Taiwan, would they represent counties in Mainland China?

21-00:16:20

Lin: No.

21-00:16:21

Li: Even though—

21-00:16:21

Lin: No. They would be just representing Taiwan. But then there will be a certain percentage representing the overseas Chinese, representing the Mainland China. A small number. I've forgotten the number, but it's like fifteen percent total. So eighty-five percent of them would still be from Taiwan. So the president, the government, and the constitution more fully represent Taiwan. This is the basic political incentive that Lee Teng-hui wanted to have. So he is pushing for a system. There are different parties, the KMTs, and the DPPs—at this time, there is already the DPP party in existence.

Before he died, Chiang Ching-kuo implemented a number of programs of major political consequence. One is to allow traveling between Taiwan and Mainland for a group of people, a special group indeed, retired veterans of the armed services. They are soldiers who came with Chiang Kai-shek to Taiwan. And at that time, already forty years has passed. These people, they really wanted to see their family, their parents, their wives, children, so there are some negotiations. Mainland China said, "Well, we will let them in if they can prove that they are born here and they have family here. We'll let them come and visit." But Chiang Kai-shek would not allow anybody to go to the other side, his arch-enemy. Chiang Ching-Kuo, his son, and President [of the ROC] then, recognized that thing like this was really needed and the consequence would be significant. So in the last year of his life, he did several things. One is that he let the martial law to be ended. So the wartime and the emergency control situation disappeared, and the nation return to its normalcy. In other words, when martial law was effective, if you have a group of so many people together, ten, maybe, then you have to apply for approval. Don't quote me on the number of ten, okay, but this relates to the freedom of meeting. People can indeed gather but they have to seek for approval. So that law is repealed. People can now gather freely. The second thing was he allowed the retired veterans to visit China.

21-00:19:29

Li: Now, this is 1992?

21-00:19:32

Lin: No, 1987. Chiang Ching-kuo died in 1988.

Actually, there are some complications between the two sides. When the veterans visited there, they may bring some gifts, money, technology and information over to the Mainland which aroused a good deal of curiosity. People there became curious about Taiwan and wanted to learn more. Even more people in the Mainland wanted to come out and some went to Hong Kong. There's a window opened there. When Lee Teng-hui came to power, he had set up a three-step process for unification with China. Although he's president, there's a lot of power group from the old guard. And these three

steps of national unification will enable a gradual easing of relationship between the two sides. The first of the three phases is to promote and encourage travel between the two sides. Travel, family visits, or business visits and that kind of thing.

21-00:21:05

Li: So this is when you first went to Mainland China?

21-00:21:07

Lin: That's when I went to Mainland China, yes.

21-00:21:09

Hamilton: And this isn't just finally travel is allowed, but encouraged?

21-00:21:14

Lin: Allowed and encouraged. Yes. Allowed and encouraged. And then the second phase will allow for collaborations and joint developments—joint development of science, technology, business development, or whatever. That would be allowed. And then the third phase would be the discussion of reunification. I mean, it's gradual and logical and there is no timeframe to place on the first one or two or three. It called for constant review by the two sides and, if they feel, now finished phase one, they can go into phase two and so on. That is basically the guideline for re-unification. Lee Teng-hui did not object to this. Lee Teng-hui's major objective is to change the Constitution, to totally change the way the President was elected because he wanted to be the first elected popularly president of Taiwan. Although he was elected by the National Assembly, that's how he came to power, being the protégée, the second man of Chiang Ching-Kuo, and therefore he inherited the machine, the KMT machine. But this was not enough; he loved to be elected by the people. So he needed to change the Constitution.

The assemblymen will be elected by different districts in different cities. Taipei, Taichung, Hsinchu, and so on—actually, about twenty districts along the Taiwan Island. These will account for about eighty percent of the members. And the other twenty percent will be nominated by the party, the political parties. They are representing the parties. They call these national tickets as oppose to the regional tickets from the cities and counties. The national tickets will be shared by the KMT and the DPP in a ratio proportional to the total votes the party gets in the regional ticket. Thus each political Party can propose a slat of people in the order of priority. They may propose a number of up to fifty persons. But how many will be picked will depend on the percentage of votes the Party gets in the regional tickets. If the regional ticket is eighty percent KMT, then KMT can bring eighty percent out of this group. This is the mechanism. So the national tickets are those people who supposedly can represent the view of the party in the national election. And Lee Teng-hui asked me to become a member of the KMT national ticket. In this slate are other people. One of them is Ma Ying-jeou. Actually I knew Ma Ying-jeou way before this on more casual occasions. Thus by accepting the

nomination of KMT to be a candidate of the national tickets, I became part of the political process. My picture and personal information was printed on every ticket. Lee wanted me to be on the ticket because he felt that he needs somebody from the science and technology field. The slate would have people from the law, which is obviously very important, and Ma Ying-jeou is from the law. And then people from the commerce, trade, industry, and people from different segments of the society. I was the only one from science and technology. He wanted me to represent it.

21-00:25:44

Li: What role did science and technology play in this vision of reunification? Was that an important component to—

21-00:25:51

Lin: Well, I think it is an important component. Science and technology is important for the economy. Science and technology is important for the environment. And I have talked about science and technology. There is no question that the society accepts it as an important area. And Lee Teng-hui felt so. He's basically using this national ticket, this slate of candidate to tell all the people that, "Well, if our party comes out, these people will be our standard bearers, they will represent the views of the party." It is kind of a showpiece. For a period of time I have to go often to local stations to help KMT candidates campaign—although I don't run on the regional ticket. I have visited many different areas on the Island Quemoy to talk to the public about visions and dreams of KMT. I spoke for the candidate but also the party. And finally, I was elected. I was at the front portion of the of the national ticket group, the safety group. Regardless how the party votes actually comes out, I'll be a member of that National Assembly for sure. I become a member because of my work at the ITRI. Lee Teng-hui felt that I can represent and can communicate with him. I accepted because there is a sense of mission, that I feel science and technology is important for the future of China, for the economy, quality of life and so on. I feel perhaps some of my ideas can be put into the Constitution.

21-00:28:01

Li: Did you feel as though that's also a responsibility given your father's service?

21-00:28:04

Lin: That's the second point, yes. My father was a regional candidate from my home county in Chaoyang. So he felt very happy for his son to be a member also. My father was still alive at that time.

21-00:28:19

Li: Was he happy that you—

21-00:28:21

Lin: Yes. I was happy to accept that, yes. He was very happy that I was invited. So I was accepted and serve for one term. I did not accept for the second term, because then, after I got elected to the National Assembly, I came to really

realize the motive of Lee Teng-hui. The fact that Lee is now a virtuoso politician is becoming clearer by the day. During this time, because of the guidelines for the unification of China, the three-step process of re-unification is becoming very clear: visit and exchanges, collaboration, and unification. I feel science and technology is my field. So I encourage my guys to go to China, visit China, to participate in international meetings that run in China, whether the subject is telecommunications, electronics, materials, chemicals, energies, does not matter. Most of my vice-presidents, laboratory directors have visited China all along.

21-00:29:45

Li: Was there apprehension about going to Mainland China?

21-00:29:47

Lin: No, no, no. Because ITRI was very much welcome there. ITRI persons from Taiwan are known to be experts, professional, and don't have political affiliations. From this point of view, we have no political power. So ITRI, as an institution, is one of the pioneers that explored the field of science, technology and business in China.

21-00:30:18

Li: Because you said prior to 1992, your position was sensitive in terms of your ability to travel to Mainland China. What would have happened to you, do you think, if you had traveled?

21-00:30:27

Lin: Well, actually, I have a message that Lee Teng-hui wanted me to go there.

21-00:30:30

Li: He did or he did not?

21-00:30:31

Lin: He did. The first APEC meeting. APEC, Asia Pacific Economic Conference meeting held its meeting in Beijing and Taiwan was invited to be an observer into the APEC.

21-00:30:51

Li: What year is this?

21-00:30:53

Lin: 1991, I think, in Beijing. Lee Teng-hui through his close friend [Dr. Liu Taiyin, an economist and President of the Taiwan Economic Research] wanted me to go there together with Liu and Dr. Samuel Hsieh, chairman of the Central Bank. Then, of course, I have to clear with the Minister of Economic Affairs and the Prime Minister. The Minister of economic affairs is Dr. Li-An Chen, and the Prime Minister was K. H. Yu. They both felt that I should not go. It's curious because they both favored strong ties with the Chinese Mainland. They felt that I was too sensitive to go there. It might create a worse problem.

21-00:32:31

Li: What kind problem would—

21-00:32:33

Lin: Well, perhaps they felt that if I go there, I would speed up this process, that may not be proper to some, who thinks the process should take its time to evolve. And if you just go too fast in it, it might create problems for the other. For example, it might encourage a lot of companies that want to move to Taiwan to Mainland, moving out of Taiwan. [Narrator's Note: It was still a puzzlement to me for Yu and Chen to express this view, might they not be someone else who thought that but did not want to say it to me directly.]

21-00:33:06

Li: So just even the symbolism of you going to Mainland China?

21-00:33:08

Lin: Yes, going to Mainland. Eventually there will be a lot of companies or businesses who will move to the Mainland.

21-00:33:14

Li: Right. Because your travel there would sort of sanction ties to Mainland China?

21-00:33:17

Lin: Yes. That was a kind of consideration. Liu said President Lee wanted me to go there. He wanted me to size up the Mainland Chinese, with regards to science and technology development. And I figured that, really, the time is very short. Just go in and go out for two days. Basically, there's no opportunity to do that. It's a very high profile meeting with lots of watchful eyes. I won't be able to see anybody. So I did not go. I did not go at that time but waited to find a different occasion.

And then that comes to 1993. I invited the president of Chinese Academy of Science, Dr. Zhou Guan-chao to visit Taiwan as guest of ITRI. He came in with twelve members of the Chinese Academy of Sciences [CAS]. Never before have one saw these people, in such level and in such size, to come to Taiwan. And I think I have some photographs of the occasion there. In the gathering, I have invited Former Premier Sun Yun-suan and the Chinese Academy of Science people, to be together. It was the first time. News media called it the icebreaking meeting in Taiwan. The level of people is quite unusual because they are leaders, top leaders in their fields. You can call it a big deal. After this meeting, communications in the science, technology and industry fields between Taiwan and China has really never had any problem because people pointed to this pacesetting event of Zhou Guan-chao visit to ITRI.

21-00:35:52

Li: And what year was that?

21-00:35:53

Lin: 1993. And after this visit, you start seeing a lot of Taiwan business moving to Mainland China.

21-00:36:11

Li: For cheap labor or for—

21-00:36:12

Lin: Which?

21-00:36:14

Li: For cheap labor? What was the motivation for leaving?

21-00:36:16

Lin: Well, many businesses moved to China because of the cheap labor costs. Yes. But I also told them that when you want to move over there, you need to think about new technology, otherwise you'll be moving again pretty soon. Some people didn't listen to this. But then gradually some high tech people are going there. At this time we are finishing working on the notebook PC. So suddenly a lot of people are interested in notebook PC, moving into making key components for notebook PC and having their manufacturing operations in the Mainland. In my last seminar, I have figures showing the number of companies, Taiwan companies that have the operational manufacturing base in China, this number increases after 1995. It's a tremendous increase.

I think these are all creating the environments and conditions, for increased exchanges. And today, the Mainland China has become the number one trade partner of Taiwan. In the old days, the fifties, sixties, it was Japan. Seventies, eighties, nineties, was the United States of America. And now it's Mainland China. These are all very important consequences. And because of the move of this technology business into China, China was able to establish close business contacts with the United States, with Europe, with the outside world. So that stimulates further manufacturing activities in China in the science and technology context. It's partly like a catalyst, speeding up the growth of technology industry in China. I cannot say what's the size of these factories. But they are manufacturers. Of course, governments of all levels in the Mainland have opened up allowing this to happen. They implemented very important policy measures. But I think the fact that Taiwan technology companies were able to set up operations in China and brought the management skills, world partners and business channels into China were catalysts. The Taiwan companies were playing a catalyst function in the opening up and modernization of China. I think it's an important factor, this is a subject that can be studied really.

I only have some superficial figures to indicate the importance but the details need be studied. But all these developments have led to what I call the "Global Chinese, Inc." business model. I guess I show you this chart concerning the source of the laptop pc by Thomas Friedman in his book, *The*

World is Flat. A lot of the notebook PC manufacturers are located in the Mainland China, but actually mainly are run by people in Taiwan. The R&D and the headquarters are in Taiwan. “Global Chinese, Inc.” is “design in Taiwan, manufacture in China, and market in the world.” This is basically a model that had been operating from 1995, up to this point, in these last fifteen years. I would say. It would still be operating this way. And I guess now China has recognized the drawback of this after they become a manufacturing base. China was not happy to become just a manufacturing base. They want to put their own creativity, innovations into the whole scheme of things. This new focus is producing, or inducing, or catalyzing another wave of movement for China to upgrade their economic structures. This work in Taiwan, in ITRI, has in many places been a catalyst for some of later developments in the Chinese Mainland. It’s not the only [catalyst]. It may not be the major catalyst in many cases, but I think it’s a significant one.

21-00:41:51

Li: So I think this seems like a good place to stop for our next session to come back and discuss more about Mainland China and Taiwan.

21-00:41:58

Lin: All right. Good, good.

21-00:42:01

Li: Thank you. Thank you.

Begin Audiofile 22

22-00:00:00

Li: This is Robin Li and Emily Hamilton speaking with Otto Lin, November 13, 2008, San Francisco, California. This is tape number twenty-two.

22-00:00:07

Lin: At the time Chiang Ching-Kuo died, Premier Sun Yun-suan was just recuperating from his stroke and has no real position in the government. He could not do anything except personal health rehabilitation. At that time, his physical activities were bound by the limits of the wheelchair. He was out of the government. In the meantime, Lee Teng-hui was vice-chairman of the KMT, and vice president of ROC and is a native Taiwanese. The power commanded by Chiang Ching-Kuo were split by several people. Chiang Ching-Kuo is a good organization man. He has a chief takes care of economies, another commands the military, someone takes care of the party affairs, someone takes care of foreign relations, someone else handles internal politics, that kind of thing. Mainly he has a good organization and every pieces of the government are in place. But no obvious leader was designated for the top position. Most insiders knew that the presidency was originally set for Y.S. Sun but Y.S. now was sick. So at the critical moment, the person close to it in the hierarchy is Lee Teng-hui. So Lee took the position, became president of the Republic of China in Taiwan, according to the Constitution

and later elected Chairman of the KMT. But the government was still under the control of all the power groups. Lee was a good poker player. He maneuvered for them to fight each other, so in a few years all the other peoples are displaced and substituted by by Lee's own pick.

22-00:02:14

Li: Was there a lot of support for Lee by the native Taiwanese? Do you think this—

22-00:02:19

Lin: At that time there's a lot of native Taiwanese that rise to power. I'm talking about the executive branch here, the ministries. But a lot of Taiwanese also came through the legislative branch. There are many younger generation Taiwanese in this executive branch, Lien Chan was one. I have to write some [Chinese] names there. They also rise to fairly high positions. Actually, there's no prejudice, at least in my mind, and those people that I have interacted, like K.T. Li, S.S. Shu, have never really discussed the state of your birth, that kind of thing. No, we did not talk about those things. To this day, I don't know what province you are really from. Whether you are Shanghainese or whatever. I don't really know. We never really pay attention to that. It was a very minor issue.

Inside the executive branch there are native Taiwanese that rise to the higher position and as Lee Teng-hui gradually put this position in place. It becomes an important factor of consideration whether you are a native Taiwanese or not.

22-00:03:58

Li: So it was important to other people, not to you. It wasn't important to you in particular, but it was important to a lot of people around you?

22-00:04:04

Lin: Yes, that's right. But the major force that comes into play is the legislative yuan. The legislature is important because those people are elected by local elections, every two years and different groups come into power. And they exercised the power in legislature through appropriation of the budget and enactment of laws. Lee Teng-hui used his group of people as his leverage to gain control over the executive branch. Used it as a wedge, he gradually displaced Chiang Ching-kuo's people, and replaced by the Taiwanese that he picked. There are very bright Taiwanese, obviously, but also some who are not up to that caliber yet; but were promoted to take high positions. That's why you look at the Taiwan economy. It goes up like this for decades until the late nineties, and then you just see it stays there for a little bit and then struggles to remain on the line. There was a period of times like this very clearly.

22-00:05:24

Li: How did this manifest itself in ITRI in terms of how the board was composed.

22-00:05:28

Lin:

Yes. ITRI was a very important organization for Lee Teng-hui. He recognized that. Lee Teng-hui was very well-read. His English is okay, but he was very proficient in Japanese. He listened to Japanese radio. He conversed like native Japanese. We knew that probably he went through Japanese education. Recently there were some speculation that he was born by a Taiwanese woman to a Japanese father, although there may be more rumor than truth.

22-00:06:09

Li:

So he was the generation of the Japanese occupation of Taiwan?

22-00:06:10

Lin:

Yes, that's right. Yes. So I should say theory was not proven. By official record, his father is a Taiwanese. Behind the story was that his blood father is a Japanese policeman and good friend to Lee's father. This was before the time of DNA identification anyway. Some people observed the physiques, the mentality, and the temperament, all very much different from his titular father.

Anyway, because of his understanding of Japan—a country very much in popularizing science and technology. And after the Second World War, Japanese are focused on production technology and electronics technology. Lee Teng-hui knew about that. He recognized that there is an ITRI in Taiwan that was doing what an institute should do. Further, I have many Japanese friends. When I first came to ITRI, I brought in to Taiwan also some Japanese scientists. I think this fact was not lost to Lee Teng-hui.

As vice-president, Lee Teng-hui become very close to ITRI/MRL. His office usually called from the phone saying that the VP Lee wished to see me. So I went to the presidential office to talk with him and, for a period of several years, we saw each other frequently, probably once every other month. And he came to ITRI Frequently. There are many pictures in the album. He officially visited ITRI labs as vice-president a number of times. Material science is very strong in Japan, especially engineering ceramics. He introduced me to some ceramics professors and companies in Japan. And when they come to Taiwan, I usually arranged for to give seminars and to talk to our scientists. We have a lot of exchanges this. We felt President Lee Teng-hui was close to me.

22-00:08:52

Hamilton:

It seems that there would necessarily be competition between Taiwan's economy and Japan's. Was this unique, that you were letting ITRI collaborate?

22-00:09:04

Lin:

Yes. Well, I think Japan would not consider Taiwan as competition in those days because they felt Taiwan is far behind.

22-00:09:13

Hamilton:

What did Taiwan think?

22-00:09:16

Lin:

Yes. Certainly lower in many levels than Japan. We often think that that today, yes, we are much lower than you, but tomorrow may not. And because of all this work in other related fields, we may gain some headway in certain niche area. Taiwan can make some contributions in some spots. And that is true.

22-00:09:50

Hamilton:

So do you think this almost one-sided competition helped accelerate Taiwan's progress? To have Japan as, in some sense, a model as the industrial leader at the time that you were hoping to tomorrow—

22-00:10:09

Lin:

My colleagues and I, we learn from the United States, learn from Japan and learn from Germany, etc. We are at that period of time. It's a new concept, taking new technology and trying it out in Taiwan. We learned IT and computer science technology from the United States. We learned material science and manufacturing technology from Japan. I would say we also learned a lot of the quality concept from Japan. In talking about the quality, right after the Second World War, the quality of Japanese products was little if not zero. When we talked about Japanese radio, for example, it's often had the connotation that it was a scrap. And, of course, in ten, twenty years time, Japan rise with their focus in equality and finally t defeated General Motors and Ford to take the lead in the automobile industry. That's all through their quality programs. And we also recognized this. Just like in the university, we try to learn from different professors. Japan is a professor. America is a professor. We've tried to learn from different peoples and tried to get something and make use of those teachings and learnings in Taiwan and tried to build Taiwan from all this knowledge.

22-00:11:59

Hamilton:

When you say that you learn from Japan and the United States and Germany, how was this knowledge transferred? Was it conferences, journals, travel?

22-00:12:09

Lin:

Conferences, journals, travels, all of this. And also by working together on some projects. For example, I worked with Holland, TNO, to learn their technology on testing bicycles. I had described the example of developing carbon fiber-epoxy bicycles, right? When we build the composite bicycle, and need to find out how durable it would be, because we do not have that kind of confidence. So we went to TNO and get their facilities to test our bicycles, form this knowledge we devised a program to perfect the manufacturing process of the composite bicycle. So this is a very important part of the program.

We worked the Fraunhofer Institute of Germany. Fraunhofer Institute has fifty some different laboratories under it. It's a big organization like ITRI. It's a bigger organization than ITRI. When we were working with Taiwan Power

[electric] Company, we are interested in the inspection of their boilers—huge boilers and generators. And the Germans had used acoustic emission techniques for this. They send a certain sound wave signal and study the reflection. You can detect defects in those tubes and so on. We worked with them to learn the technology and then use the technology in Taiwan. We worked with them through projects. We paid them. We went through formal setups. I send people to the Institute Fraunhofer under formal contract and after they return, they worked on this project with Tai Power Company with the help of the Fraunhofer Institute. This is all technology transfer. Everything's legal and everything is synergistic.

I am of the lucky few who can send technical people to Japan to go into industrial labs like Hitachi and Asahi, and to national labs in Japan as visiting scientists, or post-doc to work with them and to learn how they work on certain technology and so on.

22-00:14:54
Hamilton:

How challenging has it been to bridge language barriers, to send qualified people who can speak the same language?

22-00:15:02
Lin:

Well, I think language is a barrier, no doubt. But, of course, I did not myself go to Hitachi and study at Hitachi. If I am the person who is being sent to Hitachi, then the proficiency of Japanese is a must.

22-00:15:22
Hamilton:

So was that a major consideration in the hiring process?

22-00:15:25
Lin:

Yes, yes. It's a major consideration. Not in the hiring process, but in the process of assignment. When you want to assign somebody to do this, you have to recognize whether he or she has that ability or not. So ITRI is an organization that has that kind of flexibility to send people to many different places. If we were in the government, they would not be able to do it. Where you are talking about formal diplomatic relations, and politics come into play.

ITRI is a very important and very useful organization in the schemes of things for Lee Teng-hui. That's why we worked very close. I have known Lee Teng-hui as an economist. He was an economist, okay. And he usually talked with me about making use of computerization and technology for economic progress. I think he's made very good points. I've known Lee Teng-hui as a politician. Later on he became president and dedicated himself into the election process. He loves to talk to groups at mass meetings. He liked to go to the countryside and speak to a group of tens of thousands of people and preach his philosophy. He enjoys doing that. Electioneering. He enjoyed doing that. And because of that, he would talk to people, shake hands with people who are scholars, merchants, and criminals alike. Criminals, he would

do that, so long as he could get his votes. So Lee Teng-hui the economist and Lee Teng-hui the politician are totally different.

22-00:17:35

Hamilton:

I wanted to go back a bit and talk about some of the international collaborations that you've had. And you've already talked about Japan and the United States, Germany and Holland a bit. But just to sort of get this on record. You mentioned the United States was a leader for ITRI for things like IC and IT. Is that correct? Would you say that there were any other important aspects of that model for you?

22-00:18:10

Lin:

Well, I think the United States, in terms of technology, IC, IT and computer sciences are very important subjects. There are other important ones: space science, telecommunication, biotechnology, I think U.S. is very far ahead. So these are the areas that we have constant interest for Taiwan and we send people to universities, to companies as students or post-docs. In fact, already many Chinese people worked in companies like this. And one of the things that I had not talked about is that we formally set up many advisory committees: advisory committee in IC, advisory committee in chemical technology, advisory committee in material science technology, and I also invite many of those senior people to be advisors.

22-00:19:15

Hamilton:

Are these committees housed in the United States or in Taiwan?

22-00:19:18

Lin:

No, most of these advisors are in the United States. The members travel. We sought their advice but we never wanted them to talk about company proprietary information. This is something that we do not do. We talk about what's new, what's offered, what's in the news, say, in display technology, that they could use to complement our products. In the old days it was electronic tubes and then gradually it becomes flat panels and there are different types of flat panels. There are plasma, there are electronics, there are transistor, and there are different types of liquid crystals. We do not ask you about what your company does. But there are so many scientific meetings, sometimes just to digest what goes on at the scientific meetings, understanding what are the papers all about is a job. At the advisor's meeting, we ask questions like this. Because of that, we are able to learn quickly what are the newest developments. These are the kind of things we did. So ITRI is an organization that has a lot of ears and eyes. Yes.

22-00:20:41

Hamilton:

I understand that you were working with university professors and university labs in the United States. Bell Labs, DuPont, Texas Instruments. But did you have any other strong ties that you can think of right now as standing out?

22-00:20:56

Lin:

Well, we work very closely with MIT, UC Berkeley. Major universities. I know Berkeley, for example. I worked with the School of Chemistry, School of Engineering, material science, astrophysics, electronics. I know a lot of people in Berkeley. Most of them, they are retired now. I know Jud King, for example. MIT is the same. So is Stanford. We have ties with all the major universities by virtue of their faculty that went to Taiwan or we have friends that study here or I have colleagues that might be coming from here. There are many different levels of interactions.

22-00:21:49

Hamilton:

And what about the professional research labs, like the old Bell labs?

22-00:21:51

Lin:

Yes, yes. Bell Labs. In the computer communication laboratory that I set up, I have an advisory group on computers and communications and many IBM persons, Bell Labs, Bellcore scientists are members of this group. And when I tried to recruit somebody to head an important position, this is my search committee right here. The person who led the CCL, computer communication laboratory that I set up, and led the development of notebook PC is Steve Cheng. Stephen came to ITRI from Bellcore. Before working for Bellcore, he was in Bell Lab. And I did not know Steve myself personally. I knew him through our advisory committee. Our advisory committee meets and he was one of the persons that this group of advisors identified as a rising star. We invited him to give a seminar to this group and asked him what is the future of computers. I think people were impressed, so when we have a position open, he is obviously a prime candidate to this.

22-00:23:32

Hamilton:

How did your interactions with the United States change during the dot.com boom?

22-00:23:39

Lin:

During?

22-00:23:40

Hamilton:

During the dot.com boom. We're moving ahead a little bit chronologically. Because a lot of the work in Silicon Valley on the internet I'm sure that you were involved with. Did that change your professional interactions?

22-00:23:55

Lin:

Yes, it did. The internet certainly helps. I knew Silicon Valley quite well all from the sixties. You see? And you looked at Silicon Valley, every ten years, there is a change of different focus. In the fifties, it was weaponry and defense industry. In the sixties it was ICs; companies like Fairchild and National Semi-conductors. These are the leading companies in the sixties. In the seventies it was personal computers, PCs. Then you have started to see companies like Xerox. The Xerox PARC is a very important organization in computer science development. Although unfortunately Xerox itself did not

make use of the technology that it developed. We have talked about technology transfer and innovation. Within the company, it is a big problem. But in Silicon Valley, Xerox PARC and IBM and then, of course, Apple come into play, became big in this area. And then in the eighties you started to see the internet coming out. So every ten years or so, you can see Silicon Valley was undergoing gradual and major change. The leading industry is changing and become a technology leader.

And this is an inspiring model to me. That for any organization or institute or region, to be really innovative, it nurtures from a good combination of universities, institutes, business and government interactions, so that it can have a life of its own. It can manage the change of time. It can stay ahead in the change of time. So Silicon Valley is a good example of that.

22-00:26:13

Hamilton:

Interesting. So you'd say in some ways Taiwan's development is along the same model as Silicon Valley's development throughout the fifties, sixties, and seventies?

22-00:26:23

Lin:

Yes. We like to take Silicon Valley as a model. But, of course, you cannot duplicate Silicon Valley. And a lot of places in the world want to use Silicon Valley as a model, but you cannot duplicate it. And when you go look into a situation like the Boston area. The Route 128 is a very famous. Route 128 in Boston area. You have Harvard, MIT, Northeastern University, and so on, and have major laboratories, Lincoln National Laboratory, the Media Labs, the Whitehead Institute, and so on. And you have major companies like Raytheon and many others. But with the view of Silicon Valley as the model, Route 128 Boston model is quite different. As an intellectual question, we are very much interested in why are these areas different? In fact, I should have made an appointment to see Annalee Saxenian who is a scholar in Berkeley that did entrepreneurship studies in trying to study the regional difference. I would say that my years in ITRI were fairly successful—I can still say it's fairly successful today. This was not from me alone but by many comments that we have heard. One of the reasons [it is considered successful] is that we were an organization that is able to learn. We were able to become friends with many of these institutions in the world, be it in the United States, in Japan, in Germany and Holland. And we are always trying to be complimentary, to be synergistic with them.

22-00:28:56

Hamilton:

Not competing but working with. Yes.

22-00:28:58

Lin:

Yes. It's not really competition. It's competition in a way but it's also cooperation. In the traditional agricultural economy, it's a zero sum game. There was only so many land there. That you have to fight, you have to fight to get more land to farm. There are only so many people. If you don't have

enough labor, then you fight, wage a war with the other country to get more people. It's zero sum game. But I think we are moving into the knowledge-based economy, where the pie is expanding. Take the Internet, for example. Think about the size of the economy that was created by the internet. I would say maybe trillions of dollars. But fifteen years ago there was no internet. Actually, pre-1995, well, the science was there and the technology was there. But you need the business people to build it too—with Cisco working on the routers, Oracle on some of the software and Netscape on the browser, and so on. Is that it? Well, we had never heard of eBay, Amazon.com, Yahoo, not Google. All the internet world is a result of people working together. They compete with each other but they also work with each other. With Microsoft, with Intel, again with IBM, they all compete with each other, mind you. But together they build this new economy.

22-00:30:41

Li:

So that's interesting, because most people see globalization as an end result, but it sounds like, from ITRI's perspective, globalization was a strategy from the building, to have connections with international organizations.

22-00:30:52

Lin:

Yes. Globalization is my strategy of survival, because at the time when I came to ITRI, our university was weak. They are strong in that they can come out with good students, good quality students, but they are weak in technology development. So to build Taiwan, I have to go to American, to Germany, to Holland, to Japan to get help, to bring in the new technology to ITRI, and then we put them together, package it together, and to apply it to certain programs that we work on. I think that is how globalization helps ITRI, and ITRI uses the globalization as a means to help Taiwan.

22-00:31:44

Hamilton:

You've talked a lot in your various collaborations about having a symbiotic relationship. So what did Taiwan offer the United States?

22-00:31:54

Lin:

What did Taiwan offer the United States? I would say a lot. The economic development of Taiwan has offered people in the United States with better clothes, better things for living. Today I did not do any shopping in Hong Kong or Taiwan. I do most of my shopping in the United States when I came here, because Americans enjoying the fruits of development, or economic development of Taiwan or many other countries in the world. The best camera, best whatever, are all in the United States, and bringing good enjoyment into the United States. And also, now that it's not only the end product here, but I think in looking at today, I would say the economy was partially sustained by the reserve from Taiwan or from China in the U.S. Federal Reserve. You look at these Treasury bonds—the American government now is financed by the Japanese government, by Taiwan, by China. Today the interrelationship is very great. This is the situation now. America is strong and is dependent on its partners. [We are inter-dependent].

22-00:33:40

Hamilton:

What about in terms of science and technology development? So while Taiwanese industry learned from American industry and American science, there was certainly a symbiotic relationship there. What did the Taiwanese bring to the lab?

22-00:33:55

Lin:

I would say in terms of hard technology, communication or IC fabrication or things like that, I would say the Taiwan, mostly Taiwan are still behind the United States. In a very limited number of areas, like manufacturing of IC, I think Taiwan is ahead. The fact that I show you this data on the seminar the other day. In the foundry IC field, UMC and TSMC, basically, two companies have sixty percent of the world market share. It was because their products are much better than anyone else, that's why their products are used. And because of that, the American instruments, American machinery were able to make use of good, basic technology products from Taiwan, to put it into their final products. This is the kind of thing that the manufacturing technology in Taiwan was good in that particular area. While Taiwan is not strong in automobiles, so you certainly cannot say Taiwan is helping the United States in the automobile industry. But in certain areas, I just mentioned IC manufacturing, it's helping Taiwan to get ahead of the United States at this point. But I think the strength of the United States is more than just one technology or two. I think it is the freedom, the democracy, the way that people function. The respect of the individual right, the individual freedom and quality, I think this is what makes the United States strong. And I think when I was in ITRI, I tried to build that kind of culture into ITRI. I do not run ITRI like an army, you see. We talked about all these values there. In a way, I'm trying to bring the modern management concepts into ITRI. But there are also some Chinese philosophy that I was able to bring into ITRI.

22-00:36:29

Li:

What were some of those? Could you talk a little bit about that?

22-00:36:31

Lin:

Well, I think Chinese values such as the search for excellence. The quality concept, it's a Chinese concept. The Confucius says that one should aim at perfection [止於至善]. Perfection is the Chinese concept of quality. You should not be happy with just a minor mistake or minor defects. It's really in the Chinese teaching. Confucius teaching. It's hard to tell the story. But Liu Bei, of the Three Kingdom Era, said lying on his bed before death, however small, if it's good, should be implemented. However small, if it's evil, should not be tolerated.

22-00:37:57

Li:

What's the phrase in Chinese?

22-00:37:59

Lin: I write it down for you. [毋以善小而不為 毋以惡小而為之]. Well, language is very important. If I'm young again, I will learn French and German so that I can open up a portal into another world if I'm lucky.

22-00:38:30

Li: Is it difficult, do you think, to translate some of the Chinese philosophical principles to English?

22-00:38:35

Lin: Well, I think there might already be some translation. I don't know. But I did not know. These words are not from Confucius. It's from Liu Bei. Liu Bei is one of the kings in the three kingdoms period. And he tells his son as he is dying, a form of his final will: [Do] not [ignore it] because it is small. If it's good, you should use it to the fullest extent.

22-00:39:25

Li: Like Taiwan.

22-00:39:26

Lin: What?

22-00:39:26

Li: I said like Taiwan. It's small.

22-00:39:28

Lin: Taiwan, it's small. As an example, if you walk into the street and see there's a piece of paper on the street. If you see it, you should pick it up and put it into the trash can. You do not think that, "Well, it's just a small thing. Someone else will do it. I don't have to do it." It's a small thing to do, but it's good. But in his philosophy that we should go and do it, and pick it up and then put it in the trash bin. If it's something that's evil, you do not feel that it is small, and you can just tolerate it. Are you a smoker?

22-00:40:14

Hamilton: No.

22-00:40:15

Lin: No, okay. A lot of people feel that it's just smoking. There's absolutely nothing good coming [from] cigarette smoking, but it's fun. You just do it. In the Chinese mind, if something is bad, regardless of how small it is, you will not do it. This is the concept of perfection. And when I wrote about ITRI DE, excellence, I talked about this example.

22-00:40:53

Li: So it's not American excellence you're thinking of but this Chinese concept of excellence.

22-00:40:56

Lin: Yes, it is Chinese. It's very much Chinese. A lot of people felt that quality, maybe Japanese. Actually, Japanese had learned it from the American. You

heard about Edward Demming The Demming Award, quality awards and Crosby. Jack Crosby, okay. I was very fond of one of his examples. Crosby said that America talks about qualities and Japanese talks about qualities. He said an American quality it's like a football game. There is the coach and the quarterback, and they talk about strategy. But then every football game, everybody runs all over the field. There were some strategies and some tactics, but you really have no control of the game. The Japanese quality is like the ballet. They have detailed plan for very single act, at any single moment, any single position, for single person. When you say he's supposed to do this or that, at that moment, at that place, he will do this and that at that moment and that place. In the Japanese corporation, the quality is like the ballet. In the American corporation, the quality is like playing the football. In America we have the football star. Everybody loves the star—big shot and everything. And Japanese talk about teams. Well there are stars but in ballet, really, you have to depend on everybody, the team. And the person who illustrated this concept is an American. And he used that kind of concept to teach the Japanese that if you want to enforce it and make good quality, you have to do every step.

When you looked at the safety, traffic safety data, General Motors was very proud of saying, "Oh, our cars are ninety-nine percent safe." Out of a hundred cars, there is only one defect. And you think about only ninety-nine percent perfect. That's really darned good, right. Ninety-nine percent. What else can you do? But think about a million automobiles at that time. One percent would be how much? It would be ten thousand cars on the highway that have some defects. And at the peak, you have ten thousand cars a month having some kind of defects but you're still putting them out on the highway. The kind of accidents causing injuries and damage would come back to haunt you. The Japanese says no, they are not happy with one percent. They are talking about ninety-nine percent, 99.9% percent. One out of a thousand, so you're talking about part PPT, part per thousand. And then they have figured later on that no, it's no good. They have to talk about part per million, PPM concept, right. That's how Japanese beats the American in the automobile industry.

When I got my first job, I bought a Ford Futura. You have never heard of it. I loved to drive it, it was my first car. But it was very noisy, so I took it to my dealer. I said, "Oh, it's very noisy." "Oh, the cars are always like that."—but a new car! And finally I bought a General Motors car. It was much quieter. I can play music in it. I can hear classical music while driving! But the windows, the electric windows, sometimes they go up and just stuck there. When it comes down, it would get stuck there. I took it to my car dealer. He said, "Oh, it's always like that. Gee, you just kind of help it with your hand. Pull or push it a little bit and you just do it." So I was supposed to getting used to this. And one time I have a station wagon. You know how kids loved the station wagon. One day we were over the Delaware Memorial Bridge coming back from a party at midnight and suddenly I had to get off the road, the car just stopped on me. There's no transmission and I had to pull it to the side. It's

a new car. A new station wagon from Ford—the Torino. And finally these serviceman come. And I said, “I don’t understand. It started alright. But it would not go. There’s a loss of transmission. I don’t understand it.” He checked it out. He said, “Well, you want to know why? I’ll show you why.” He went to the car and then went to one of the wheels. He just pulled it. And the wheel just came off. At that time, there’s a famous axel bearing failure. There was no bearing on the car axel, so you can just pull it off the car. How can this happen? But Americans are supposed to tolerate that.

The big industry tolerates that. I have been opposed to Japanese goods and wanted to save the American automobile industry. [Because of lingering memories of the Japanese war] I am very much against that. But you cannot just give [the customer] the money to make up for the injury or damage. Then I think you are not helping the industry at all. You really have to use the money to change the way they think and the way they do things. I have used the Ford car, General Motor cars, Chrysler cars, and finally I bought a Honda. For two years, I never have to do anything with it. When the time comes that I need to go for an annual checkup with the car, I just go in there in the afternoon and bring the car. I do not recall having to do anything additional for my Honda Accord. So I bought one Honda, two Hondas, three Hondas and four Hondas over my lifetime.

Li: So if the U.S. form of excellence is football and the Japanese form of excellence is ballet, how would you describe Taiwanese excellence? What would be the metaphor?

22-00:48:08

Lin: Well, I think it would depend on the kind of situation. If you are making a professional product, you’d have to do it like a ballet. And I don’t know whether you remember, in one of my slides, I show you the IC manufacturing process. There are many steps and there are four major ones. The total yield is depending on $A \times B \times C \times D$. There are four major steps here. And each step, if you say you are ninety percent good, well, Nine times nine is eighty-one, right. Eighty-one times eighty-one is a bit over sixty-four. So each individual step, if you are able to do ninety percent perfect, then the entire process is only about sixty-some percent, right. In the IC fabrication, one time I counted about thirty-five processes there, major steps. Sometimes there can be forty different steps—at almost every step you have to get the 99.9, to be able to come up with ninety percent yield.

22-00:49:32

Hamilton: And each of those steps is usually a complex scientific process, which of course has its own standard error that you need to look into.

22-00:49:41

Lin: Yes, that’s right, that’s right.

22-00:49:44
Hamilton:

So it's more difficult than you're even making it seem to get it 99.99.

22-00:49:49
Lin:

Yes, that's right. But you know the wafer that we made, for computers and so on? It's made out of a silicon wafer, like in the Silicon Valley, a silicon wafer. All the materials have defects, but for IC wafers, we have to get perfectly defect-free materials and then we want to dope [it purposely for certain characteristics wanted]. Doping is a technical term. Doping. N dope or P dopes. In other words, it's pure silicon and then you purposely dope this with P or with N type of dopants. And you want to adjust the doping level to have the level of part per billion. In other words, for that kind of situation, you can tolerate a defects on a part per billion level. You know what PPT is? You know what PPM is. And PPB is part per billion. Part per billion meaning it's like the entire China, you can tolerate one bad guy out of its one billion people. One villain in a one billion population. That is perfectly impossible to do. Easily you can have hundreds of hundreds of thousands, right, but you need to reduce it so that you can tolerate only one villain in this land. It's impossible. But that's the level that was called for in the IC manufacturing. That goes to high quality products. I'm talking about this thirty-five percent step together. Each step has to be almost 99.9999999. So we're talking about well over ninety-nine percent. Ninety-nine point one, two, three, four, five, six, seven nines percent.

22-00:52:28
Hamilton:

So nine nines.

22-00:52:29
Lin:

Yes, nine nines, to make a commercially acceptable computer product. And TSMC and UMC were able to do this because they wiped out the other companies. Taiwan's technology was based on the a technology obsolete by RCA; that's where this all started. RCA was unable to run a good product with it. ITRI brought the process to Taiwan and used that as a base to improve upon over years and then was able to take control of the world from that on.

22-00:53:19
Hamilton:

Certainly innovation is important in that but how important would you say patience is?

22-00:53:24
Lin:

Patience. Invention is ninety-nine percent perspiration and one percent inspiration, right. That's our practice. Patience. Discipline.

22-00:53:41
Hamilton:

Would you say that patience is a way that you can characterize Taiwanese sciences different than other nations?

22-00:53:47
Lin:

I would say patience and discipline are what makes Taiwan so successful. Dedication, and the concept of excellence. This is what makes Taiwan's

scientists successful. When you're talking about that period of time, and what are the success factors, I would say this value has a lot to do with that.

22-00:54:12

Li: As you describe the U.S. relationship to China as examples of democracy and management styles and some conceptual and philosophical approaches that were important to Taiwan's development, would you say that Taiwan's relationship to Mainland China is similar in terms of setting an example, in terms of democracy and philosophical practices?

22-00:54:33

Li: Well, I think Taiwan, even today, I think is superior compared to China in several ways. One is this quality concept, out this teaching of excellence from Confucius. This situation would have never happened in Taiwan business alone. Because not only do people have to have the conscience, but also, the government has to exercise measures such as inspection and standards to promote quality. In China, it does not exist. So that's why you have this problem.

22-00:55:09

Li: It's interesting, though, because it's not a western concept that Taiwan's bringing to China, it's a Chinese concept that Taiwan is, in some ways, reminding China about, right, because you're saying this version of excellence is a traditional Chinese notion that is not being practiced right now in Mainland China in terms of production.

22-00:55:27

Li: That's right. But I think China is growing too fast. I think the problem in China in these last fifteen years is that it was growing in an uncontrolled fashion. I don't know whether you remember, but when you grow, during a certain period of time, you feel sore. Perhaps very painful. There are no real or big problems, but you're just very sore. It's just the growing pain. Because the skin is not growing at the rate of the bones. This is what happens to your child. A big baby. Sometimes you feel uncomfortable because your different parts grow at the rates that are out of balance. So we have the growing pains. And China is having growing pains and people did not recognize this. They have to have control—control is not a good word—but you have to keep balanced paces. You have to pace things properly so that this all can come together. You want to build high-rises. But if you don't have the sewage system, what happens? You need to build a sewage system before you can build high-rise buildings. If you go visit Italy, in the ancient city of Rome and every other major places, look at their sewage system. It's very beautiful. They never have a problem of major pollution or anything at that time because they have that concept [of balance and coordination]. And it takes time, many years to build Rome. I think the problem in China is that they are too fast and the government loses control. The government says, "Let people do it on their own." You cannot really let people do it on their own. You have to set up the rules, the law and the framework.

22-00:57:46

Li: The patience and discipline that you were talking about.

22-00:57:48

Lin: Yes, yes.

22-00:57:50

Hamilton: Which you would need to have a successful ballet, but a successful football game, it's rules and force.

22-00:57:57

Lin: Yes.

Begin Audiofile 23

23-00:00:00

Li: This is Robin Li and Emily Hamilton speaking with Otto Lin. It's November 13, 2008. We're in San Francisco, California. This is tape number twenty-three.

23-00:00:21

Lin: At this time the turnover rate is high because the business is good and there's a lot of market demand for our people. And the industry comes to grab the engineers, scientists from ITRI. The high turnover rate I mentioned in ERSO. One time it get as high as thirty, thirty-two percent. It's a very difficult position.

23-00:00:48

Hamilton: Were most industries in Taiwan experiencing the same problem?

23-00:00:50

Lin: I think most of the people would be around ten. I realized that when we talk about this problem, then the government usually says, "Oh, no problem. You just train more people and have the trained people for the industry. Then it's within Taiwan and there's no brain drain or anything." But it's difficult for the institute to do programs. And we realized that a lot of those people that are leaving the lab, ITRI, are the younger generations. They might be just coming to ITRI for a few years, two or three years, and then while they're still on the entrance level and it's easy for the industry to come in and give them a fifty percent raise. For younger people, a fifty percent raise is a big number. We tried to figure out how to keep talent like this. There are many things to do.

We talked about the hierarchy of needs yesterday. We tried to address their physiological needs, their salary, the job condition and so on. The security needs. Provide them with some medical insurance, future career prospects, and for retirement, that kind of thing. After the Task Force exercise that we went through, we looked at our retirement program. We found out that our retirement fund, our pension, our retirement savings pool is abundant because nobody ever stayed in ITRI so long to take out any pension money. So we felt

that we can figure out a device, a scheme, try to help people to stay, building on this financial strength.

One thing that I come up with, I call it XY65. As illustration, let's say we're trying to get the people graduating from a college. They come to the Institute after their military obligation, ROTC. They come to us, at say, twenty-five years of age. We would like them to stay maybe for twenty years, at least. Twenty-five plus twenty would be forty-five, right? If he comes here at twenty-five, and stay twenty years. When he leaves ITRI, at that point age 45, and with 20 years of service, this makes 65. My scheme, we called it XY65. Now, I tried to tell the guys that if you stay twenty years with ITRI, you will have experienced many major projects, three or four major projects. You'll be rising in your career from an engineer to a manager, most likely. You'll be trained not only in technology but also in marketing, business management, project management, that kind of thing, and you're still only forty-five years old. You are very versatile, full of energy and have a lot of experience behind you. With good track records you will have very good market potential. At that time, it will be a good time to consider a second career to leave the Institute while you have very good market potential. And we will give you full benefits of the retirement [with no reduction even before the formal retirement of 60 which few people at ITRI was really serious about].

23-00:05:13

Li: At forty-five?

23-00:05:14

Lin: At forty-five. Whatever you accumulated, and according to the law and everything that you are entitled to. There's no reduced retirement or anything. You can take it at forty-five. We called it XY65, right.

Now, another group of people I'm targeting are people who came to the States gotten their advanced degrees, and have work for a company or a university and return at forty-five, like myself, like some of my colleagues. We're targeting this guy to stay for ten years. He might be a Senior Researchers, Senior Scientists, Manager, etc, coming to ITRI. I think if he works for ten years, he will have made a lot of contributions to ITRI. Fifty-five plus ten would be sixty-five. So X plus Y sixty-five. This is my XY65 plan. Targeting for the group of people, to stay at ITRI. Don't just come and leave. Come and work and contribute, then leave.

23-00:06:29

Li: So you have young people and more mature people, but they're not the same people because they leave in the middle but new people come in.

23-00:06:35

Lin: Yes. I think if they just come for a few years and leave, they did not make too much contribution to ITRI and they did not do themselves too much good. So I told people that if you leave the organization just for the money's sake, most

likely you're going to leave pretty soon. I ask them not to jump jobs just because of a slight salary increase. That's not the reason to move.

And this was a first in Taiwan. No organization was doing that. I think right now in the United States, you think about some packages, some companies that try to encourage their employees to leave and give them a bonus package. This is the kind of thing that I think we're doing here right now. But in that time, I do this in ITRI. And this proposal has to go through the Board of Directors because this will involve with corporation resources. The Board asked, presumably you might be depleting our resource pension pool in no time. But I convinced the Board it wouldn't be the case. Actually, when I first proposed it, I was talking about XY60. The Board, mainly Morris Chang, came back and said, "Well, why don't we do it XY70?"

23-00:08:13

Hamilton:

Good bargainers.

23-00:08:14

Lin:

Yes. They're thinking financial consequences and the human resource management aspects too. Actually, the plan works in a gradation [better to show it in a chart]. You have to do this one, the service age, and then the service time, and then the age, and then you can see the certain plane would be like this. It's a XY65 plane.

I recently went back to ITRI, recently meaning about two years ago, and I the person who was working in the personnel office, "How does this program work?" And she told me that it worked pretty well. This way, there is not too much deadwood for the organization, and this helps. Still, for the very younger group, it is not very useful because they cannot see working for the institute even for twenty years in the rapidly changing economy like Taiwan. Imagine that you work for an institution for twenty years! It's difficult this way for the younger person. But for the middle level people, I think it makes some difference there. This is a way that we can keep some talent, management talent, within the institute. This is something that is fairly innovative at the time.

Secondly is that I explained about the benefit cycle of national R&D yesterday with this big cycle. This is nothing new here now. But the concept is very different from many similar institutes in China or in many other places. So it's a breakthrough concept for the institute not to do commercialization itself but to cultivate businesses and deploy this innovation system to its fullest potential. The players, the positioning, the division of responsibility, that kind of a concept—that is an important concept that we have come up and taken heart in its implementation.

Another point that I wanted to mention related to my wife. You asked at one point are there any woman working at ITRI? Actually, there are quite a few women scientists, engineers, and in the higher echelons, senior management and up, I would say if they count a hundred senior managers, there may be about twenty percent. Not too many, but twenty percent.

23-00:11:05

Li: Twenty percent women.

23-00:11:06

Lin: Yes, twenty percent. Yes. My wife is one of them. My wife Ada was a classmate in Taiwan and later we were at Columbia together. We got married in Columbia and then she was working in the pollution control and industrial safety and health areas. Pollution control, at that time, was a very forward-looking type of thing, and also industrial safety. And then when I returned to Taiwan in 1979, she works at the Academy Sinica doing some biochemical research. And when I came to ITRI, she first worked as a professor at Tsinghua in the neighborhood. And then, a few years later, Dr. H.C. Fang, the president, asked her to come to ITRI to set up an anti-pollution group. And then when Morris Chang came, she became director of the Center for Industrial Pollution.

23-00:12:38

Li: Was this a big concern in Taiwan at the time? Pollution?

23-00:12:42

Lin: We are very much concerned with that. Actually, we should have done much better, spent more resources in that area. I think this is one area of regret if I come back to think about those things, is that we did not do enough to look at the environmental problems and its impacts on the global scale.

23-00:13:06

Li: What could ITRI have done? Could it have encouraged the government to have more regulations?

23-00:13:11

Lin: Well, and also it can develop more technology. You need to tell the industry how to do it. Although we have already done that in a few areas. For example, the electroplating industry. Electroplating is very important. Many industrial products needs electroplating. My glasses, there is electroplating. Automobiles, lots of electroplating. And the plating solution usually is toxic. You can't just dump it into the waste water which goes to the river. But people usually do—there are food companies, paper companies, a lot of those companies that they just dump into the water, polluting the river. ITRI has worked a lot on those things. And Ada, her group did a lot pioneering in this area. And I think that program could have been expanded much larger. And she is also working in the area of trying to improve industrial safety. People working with their hands, there are a lot of cut fingers and injuries every year. Especially in woodwork, handicraft, machine tool areas, and so on. So you

teach people how to improve their process and use the right equipment. In the chemical plant, right protection gear, eye goggles, helmets, safety tools, that kind of thing. And you have to do a lot of technology, going from there. For example, trying to keep a reactor from explosion, what they call runaway reactions, and setting up standard operations procedures. Technology, training, equipment, many aspects with different industries; we could have done more in that area.

23-00:15:15

Hamilton:

Would you say that during the course of your career you saw improvements, though, even if it wasn't as good as it could have been?

23-00:15:23

Lin:

Yes, there's definitely improvement. At the time when we were in Taiwan, there's a lot of these SMEs with low technology level. Unfortunately a lot of them now move into China.

23-00:15:44

Li:

What's an SME?

23-00:15:56

Lin:

SMEs. Small medium enterprise. It's a common term. This is the second thing that I want to add. Finally, I want to talk about a few people that are very important to me. And I need to say just a few persons. One is Professor Shu. Professor Shu is the person who offered me, when I was in Tsinghua as dean of engineering before I came to ITRI, the position in Hsinchu Science Park. And I have told the story. He is truly a visionary. He had the science park's concept thirty years ago. Certainly it's not totally original with him, but I think he recognized there's a need to gather the people and the brains together. And then the government will take on this task with the Science Park. The key is that you want to provide the business and the industry with some special help. Special environment, some tax advantage. Obviously you cannot provide these helps to every corners in the country, then you let those people within this area. It's like a prototype. It's easier also for the government to exercise some coordination, and monitor. The key is to attract them with this type of policy instruments to nurture them. I think he's the first one who recognized this.

Well, in Taiwan I should say at that time already they call it export processing zone, EPZ, export processing zone. That is that in certain port areas, in Kaohsiung or in Keelung, the two ends of Taiwan island, with good shipping industry that supports international trades. In the area, the government may be built a thousand, two thousand acres area for companies to set up their operations there. Within this area, the raw materials comes in, processed, and then ship it out again. The goods would normally not come into inland Taiwan. But if they wanted to come to Taiwan, it would be as if there's an import item from, say, the United States. If they come in and then processed in that area and shipped out again, they would not pay any tax. This is called

export processing zone. This creates jobs. This attracts companies to come in. It's a very good practice for Taiwan. A lot of Japanese companies, American companies or European companies have been making use of this zone.

The Science Park concept is a bit similar to this. But it's not a processing zone for import and export. It's built inland for the purpose of developing technology. So it's a similar model but with different content. In the export processing zone all you need to provide is enough electricity, water, and labor. In the Science Park, you need that, but also you need a lot of technology, education, training, R&D. This is a much higher level than the EPZ. Professor Shu, S.S. Shu was able to crystallize this concept and convinced Chiang Ching-Kuo to do this, to set up in Hsinchu. This concept, when he would first talked about this, a lot of people in Taiwan opposed that. A lot of people meaning minister level, cabinet level people. Basically they asked Prof. Shu that you wanted the government to spend this money to get the land, to prepare the land, to make sure that there's enough utilities, and then you want people to come into this park. Give them tax free loans or provide fund with the VC funds and then you say, "Well, you can set up, do technology, and then when you have a product to come out, in the first number of years, the government will not assess tax from your product." How is the government ever to make money like that? How the government can take anything out of this?

23-00:21:33

Li: Right, right.

23-00:21:35

Lin: High-ranking officials questioned that kind of concept. But Chiang Ching-Kuo was strongly behind Prof Shu. When the Science Park was built, the grand opening, nobody, no minister level people come to celebrate, but Chiang Ching-Kuo came.

23-00:21:59

Li: What year was this?

23-00:22:01

Lin: At that ceremony, I was not there, but I knew this because I was participating in the planning.

23-00:22:06

Li: But what year did the Science Park open?

23-00:22:08

Lin: It opened in 1979. At that time, I just returned to DuPont at that time, so I was not in the ceremony. But Chiang Ching-Kuo came and then he rode an EV, electric vehicle, and toured the Science Park area. And Chiang Ching-Kuo made a very important speech at that occasion to say he felt that technology is the instrument for the Taiwan industry to 脱胎换骨, gain revival. It is to

completely come out of the embryo and gain the new skeleton. He wants to change the skeletons of the Taiwan industry through technology.

23-00:23:11

Li:

I wanted to ask you, because at this time during the U.S., the phrase “Made in Taiwan,” it was ubiquitous. Everything was made in Taiwan. But Taiwan wasn’t thought of as a place where things were invented. It was just where things were manufactured. Was there a consciousness that you felt where people wanted to become more creative, people who would invent things rather than simply produce in Taiwan?

23-00:23:34

Lin:

Yes. I think the process of invention often goes through imitation. I think usually it’s imitation, then you have invention and innovation come afterwards. In the first phase, usually, you just look at what the market, what the people want, and see whether you can do this on your own. Gradually as you get into this field, then you feel you have to bring the product with differentiation, some different features. People will recognize that this differentiation will come through some real creativity, that this might be a result of research, a result of development, a result of design. But also this is the R&D process.

Taiwan went through these steps. And China now recognized these things, too. So this is the pattern. That’s why the Taiwan model is being reproduced. Or if not necessarily reproduced, it has been learned, has been imitated or emulated in many places. So this is model people talk about here.

And I visited many science parks in China. The people usually tell me that they have this much land, and have water, electricity, communication facility, etc, and I always ask them, “What are the research activities or R&D activities there?” I say, “If there is no science and technology, you cannot call yourself a science park.” It’s an export processing zone, okay, but it’s not a science park. Export processing zone can be like this because foreign companies come in, what they like and focus is the cheap labor. But for science park, you’re trying to create something new, something different, so you need the creativity aspect of that.

Professor Shu is a visionary. He recognized the importance of geothermal energy. We talk about yesterday. Wind power we talked about yesterday. Electric vehicles. These are all thirty years ago. Science Park comes in. This is number one. And I think he’s a patriot. He grew up in the Mainland, and went to the States for graduate studies. He was a professor at Purdue and Chiang Ching-Kuo knew about this and invited him back to Taiwan to take over as president of Tsinghua University. At that time, the salary difference, it’s unbelievable. When I returned to Taiwan, I only got paid about thirty percent of what I got in DuPont. Professor Shu, again, also had a very difficult time.

And because he went back, he was able to attract a lot of people. Scientists come back to follow his footsteps. I am one of those people following him.

Irving Ho, who was the first director to Science Park. Irving is from Silicon Valley, went to Stanford, worked for IBM here, and then followed Professor Shu and become first director of Science Park.

And then Dr. Lee, Lee Dong-yang. Lee was at Fresno State University. His specialty is urban development, urban planning. So he went back to Taiwan, to help Science Park in urban planning during my time.

And, of course, later on Li Choh-hsien went back. He's a senior person. These are very senior scientists, professionals in the United States, and then returned and followed the footsteps.

Professor Shu is a tremendous person for Taiwan and is very passionate. He wanted me to return to Taiwan multiple times. He came visit me in Cherry Hill. Write to me and come visit and try to solve problems that I have with my family, in looking for jobs, and children and that kind of thing. Do all those things to make sure that we can get settled in Taiwan. He's very passionate so far as scholar goes. He never come back to these people whom he has helped and ask for personal favors, for any personal gain or to form a political group. In his position he could have done that, but there's nothing like this. He's a scholar. So it's a person that I remember all the time. I have several pictures here, photos here. He has two famous sons, David and Frank. Frank was a professor at Berkeley, astrophysics, and become a university professor in the UC system. And Frank went to Taiwan recently, about five, six years ago and was recruited to be president of Tsinghua University, a job that his father once held. He took it for one term and now he returned and lived in San Diego.

The second person is Kwok-Ting Li, It is a well-known name in Taiwan. Usually you heard and a lot of people called him K.T. and was regarded as godfather in science and technology. K.T. was a physicist and trained in Cambridge and returned to China during the wartime, the Second World War, and then moved to Taiwan. He is a very intelligent man. I don't know his IQ but I think he's up there in the top. He learns quick and is foresightful. People came to him and told him DNA and then he learned molecular biology. Told him computer and he recognized the importance of IT. Although he may not have any real understanding of it, but he recognized the impacts of the technology. I would say K.T. is more an outstanding manager than scholar. He is a politician and can get things done. He was the person who questioned Professor Shu that, Really, is Science Park a good idea?, He was the minister of finance and he recognized at that time that the Taiwan government did not have a lot of resources, so we have to use the resources very carefully.

[Narrator's Note: K.T. made important contributions to the Science Park later by coordinating diverse government support programs and the establishment of venture capital funds and tax incentives to technology investments.]

- 23-00:32:30
Li: Were both Li and Shu of the generation—did they go away to school before the war with Japan?
- 23-00:32:38
Lin: Yes.
- 23-00:32:37
Li: Like were they finishing before you?
- 23-00:32:39
Lin: Yes, yes. They're the generation before me.
- 23-00:32:41
Li: So do you think they came back with a real sense of building Taiwan?
- 23-00:32:44
Lin: Building China and building Taiwan.
- 23-00:32:46
Li: Building China and Taiwan.
- 23-00:32:47
Lin: Building China and building Taiwan. Yes.
- 23-00:32:47
Li: And that was part of what was sort of drawing them back?
- 23-00:32:50
Lin: Yes, yes. They're a generation ahead of me. Shu and Li both, they're dead now and I think they would have been around a hundred if they were living. So I guess one full generation ahead of me. But unfortunately K.T. and S.S. did not see things together. For example, K.T. questioned Shu's concept, the Science Park. I would credit S.S. Shu as the father of the Science Park because that's his idea, his baby, and he implemented this. He knew that this is not an EPZ because he is on the National Science Council. He was chairman and he wanted the National Science Council to run this. K.T. felt that this should not be with the National Science Council. It should come under the industrial bureau. The two had other arguments there. It becomes a known fact that the two do not see things together. [Narrator's Note: This led S.S. to resign the NSC post sometime later.]
- 23-00:34:04
Hamilton: What types of advice did you solicit from both of them, since clearly if they didn't see eye to eye, but they were both your mentors, you probably went to them with different questions.
- 23-00:34:14
Lin: Yes, yes. You have to understand why they are against each other. Not because of the personal side but because of their views on a particular subject, what should be done, how should it be handled, etc. I think people like me

usually get caught in between. It is good for S.S. to set up Science Park. It was instrumental. If it weren't for Science Park, I guess Taiwan would be long gone today.

23-00:34:56

Li: Really?

23-00:34:56

Lin: Yes. Because of Science Park, we're able to have the UMC, the TSMC, and the new technology companies. These are the companies that have fueled the survive Taiwan today.

23-00:35:11

Li: Would you consider this like an exercise of soft power, then?

23-00:35:14

Lin: Well, it's a soft power. Soft and hard power both. It's both. Certainly that the leadership provided is soft power.

23-00:35:18

Li: Both. But that made Taiwan something that could stay strong?

23-00:35:22

Lin: Yes, yes. Taiwan is a technology economy. The ability of Taiwan to pick up and use technology, to change the structure of the industry and its economy is the central element. Therefore it's now able to survive.

23-00:35:40

Li: So what would Taiwan be like without those things?

23-00:35:43

Lin: Taiwan be like without them? I think probably it might be simpler for the world because now Taiwan will naturally become part of China. China easily would come in and overcome Taiwan, and there would be no crisis that we heard about between the two sides of the Straits. Maybe. But I would still argue for Taiwan's existence because of the technology that brings the wealth, that change the economy and brings the democracy. Chiang Ching-Kuo was able to promote social and political changes, and therefore promote democracy in Taiwan because of the economic strength. And the democracy has impacts spreading over to China. That is the real significance, historical, in here.

23-00:36:38

Li: So would you say he created an alternative trajectory for China? You gave an example of a different way of going than the way Mainland China had gone or was going. Instead of just manufacturing, that you could develop this technology.

23-00:36:53

Lin: And innovations.

23-00:36:54

Li: And innovations of this. Yes.

23-00:36:56

Lin: Yes. Yes.

23-00:36:57

Li: So it's sort of a parallel development to Mainland China that—

23-00:37:00

Lin: Taiwan is about fifteen years ahead of China in pursuing the roles of creativity, innovation, people, technology, management, and democracy. It's about fifteen years ahead. And China was kind of falling through, unfortunately, due to Mao Zedong. Mao is bad news. But fortunately, here came Deng Xiaoping. After Mao, Deng was able to gain control of the country, y full control in the 1980s, about the time that I returned to Taiwan. Deng Xiaoping was able to implement many reform programs in China. And I think one example he took very consciously, I think, is to recognize Taiwan's development model.

23-00:38:10

Li: So do you think Taiwan pushed China to follow a similar path?

23-00:38:14

Lin: Taiwan forces China to think about what kind of road that they need to go through.

23-00:38:23

Li: Did Nixon visiting Mainland China affect Taiwan at all?

23-00:38:27

Lin: Very much. Very much so. Republicans were always considered friends for KMT. Hence, Nixon was considered a turncoat and Kissinger an accomplice of Nixon in betraying his friend, the ROC. Chinese always take friendship very closely, close to their heart. A friend is a friend. But, of course, from Nixon and Kissinger's view, you cannot just close your eyes with this big country there. I think history would say that Nixon and Kissinger did the right thing to help open up China. So China has the opportunity to think about whether it is going to pursue the market economy concept or just follow through the traditional Communistic doctrine, Marxism-Leninism and so on? I think Deng Xiaoping realized that traditional Maoism is a dead end. You cannot go down that road. So it's more you have to go through what road Taiwan has gone through. But, of course, Deng Xiaoping will not call this the Taiwan model. So he used pursued his own model of "socialism with Chinese characteristics"—basically respecting private ownership, giving incentives to people for making use of people's talents, technology, innovation. This is good. And I think he wanted gradually to open up to democracy, too, but he wanted economy to go first.

23-00:40:08

Li: So did you feel like he encouraged the return of overseas Chinese in the same way that Taiwan encouraged you to come back?

23-00:40:14

Lin: Yes, yes.

23-00:40:15

Li: That was a strategy that—

23-00:40:17

Lin: Yes, that's a strategy. Because of Professor Shu, he has set up his model there and he's been coming back to me many times. And, of course, not only him. I wanted to also mention Minister Y.S. Sun. At his urging, I was really moved. I gave up my job in DuPont to return to Taiwan, to do all those thing in MRL and then ITRI. That's an opportunity for me. And at that time I was considered crazy. My friends at DuPont said that you have a good job, you have a salary, guaranteed security, nice career, everything. Why would you want to go back to Taiwan? It's always talking about war with the Mainland. And it's a third world country at the time. Uncertain future. Very little pay. I think it's crazy. Everything against the normal way of thinking. But my motivation is to help China and the millions of poor people devastated by war and poverty.

23-00:41:30

Li: Do you think then that Mainland China opening up, Nixon visiting, did it spur Taiwan on to move faster or to—

23-00:41:38

Lin: Yes, in a way. In a way, certainly as China was opening up, the existence of Taiwan, the way it is, and the existence in Hong Kong, are big promoter and became big help to China. Otherwise China will be like Russia. It will be like another North Korea. But because of Taiwan, because of Hong Kong, and overseas Chinese scholars, China was able to interact with all the places in the world. So I think this gives impetus to the people in the Mainland, that they need to do something different, to look at the models and to review their own behavior.

I was very friendly welcomed in the last fifteen years. I was invited to give talks in many places, organizations, and universities in China about what we have talked about here. And now, today, we're almost like the world is flat. These are very clear examples. We have shown how to build the university, business, government, institute to work together—a new national innovation system. Each player has its special place in the national innovation system with different roles and responsibilities, and you need to create those environmental factors for them to grow together. They should not be overlapping to become one. They should not be separating to four different entities. I mean, it is very simple to take either route, right. But I think this concept here that we show is that, to be effective as was working in Taiwan, is

a dynamic interacting one. And I think that is how people are interested in this model.

And what we're talking about here is that the effort that we have to make to keep this model, to make this model functioning. ITRI can easily disintegrate if people run out to the industry. But ITRI was not marginalized. When ITRI was able to help the industry, at the same time it still maintained the vitality today. So that is this the beauty of the model. There's something to it.

23-00:44:17

Li: Was there a lot of competition with Mainland China to recruit scholars, recruit scientists?

23-00:44:24

Lin: Yes. But there's no comparison. People will go to Taiwan. Because once you see the political system there, I think people will go to Taiwan. Except for those people who really have very strong family ties and still a lot of family members in the Mainland. Then, of course, it will be different. And I say there's a change of the Chinese ex-pat at this point. Is that in the sixties, seventies and eighties, a lot of students from Taiwan study in the United States. And as the economy changed, society become more affluent, there are more opportunities back in Taiwan and the university is getting better. Fewer students want to come out to the States now. But look at China. Most Chinese students in Berkeley, MIT, Michigan, I would say are now from the Mainland China. I think it's repeating something that happened fifteen, twenty years ago, for the Chinese. So it's a change there. And I expect those students from Mainland China, many of them will stay in the United States. But as the situation changes, economy getting better, quality of life much better, so many students will also return to the Mainland.

23-00:46:14

Li: When did you first go to Mainland China?

23-00:46:16

Lin: I first went in 1993.

23-00:46:21

Li: And why hadn't you been before that?

23-00:46:24

Lin: Well, at that time it's very difficult to travel to Mainland. And because of my position, it's more sensitive. Well, actually, talk about one thing here. So here I just talk about Shu and K.T. and tried to compare these two persons. One is a visionary. I would say K.T. is more foresightful. So there are different levels here. In terms of vision, I think S.S. is one level ahead. This is the first time I say this to you. In Taiwan it would be very sensitive to say that. S.S. is a loner, more a loner. He's a scholar and patriot. He did not have an organization. K.T. is an organization man. He never worked outside of Taiwan or China. And he was minister of finance, minister of economic

affairs. So he built his organization, he built his followers in there. K.T. is more efficient. He gets things done and S.S. is more difficult. This is a comparison of these two giants, you might say. People call K.T. the godfather of science and technology. I think he certainly was a valuable contributor, but not deserving all that. Both make contributions to Taiwan in their own way. And I think K.T.'s contribution to Science Park also come at the later part. Once the Science Park is set up, the company is set up, the company needs to—

23-00:48:17

Li: Mmhmm.

23-00:48:19

Lin: But K.T. is an organization man, so he gets things done.

And now we should talk about Y.S. Sun. Y.S. Sun, compared to these two gentleman, he's a younger person. Maybe five years younger. He's an engineer. He's an electrical engineer and he worked for the electrical company. He was chief engineer and he was sent by the government in Taiwan to Nigeria to help build the power plants there. And he returned to Taiwan and he's become minister of communication and minister of economic affairs, and that's the time that I get to know him. And after I know him, about two years later he become prime minister. So he was also very helpful to my career at the time. So he's also a person who wanted me to leave the U.S. to come to Taiwan and to work for the government, to work at ITRI. So basically I think they have crafted out this position of the materials research lab director for me. I think they felt that I am the most qualified person for the job—. I have worked for DuPont, polymer scientist, chemical engineer knows the industry, knows technology, and have contacts with the universities, so I'm the right person. Both YS and S.S. knew me and we worked together very well.

S.S. Shu. When I worked in Tsinghua, although I did not know S.S. at the time, but he observed that I am a person that can do something for the country. And YS also had observations on that. I know YS because when he was a minister of economic affairs, there's some family contact relations. He is a friend of my father-in-law. My father-in-law, at the time, was a professor of economics in Canada. I went to see him so he get to know me. I think it's just kind of the first contact and then later on we become, through this work in the nation building conference that I have some photographs, getting to know each other better.

S.S. was not only president of Tsinghua one time, chairman of the National Science Council, Chiang Ching-Kuo wanted him to be chairman of ITRI. So S.S. was a "Chiang Ching-Kuo person", with direct relationship. Y.S. Sun was the minister of economic affairs and prime minister. Certainly he has to respect S.S. for what he was and accomplished. And so when S.S. talked to

him about Otto Lin as a candidate for material research lab, I think he supported it wholeheartedly. That's why it's very easy for me, kind of natural for me to take this job. When I become the material science laboratory director, I did something that they felt was quite different. I was able to pull different branches of material science together, which we have talked about the last time, one of the last sessions. Bring the companies together with the researcher and the institute. The development of Carbon fiber bicycle was taken to show my management ability. So when the problem to replace Morris Chang and looked among the laboratory directors, I became the prime candidate and was picked to take over the presidency. So it was kind of natural when you review what has happened. YS is not a visionary man as Shu, but he's certainly also an outstanding manager. He is a patriot and a passionate person. We become good friends in the later part, although he is much ahead of me. Position wise and age, he's much my senior, but I think we have talked a lot. And in his final years when he had the stroke and forced to retire. YS always considered ITRI as his number five children. No, number six children. He has four children. So Number Five is the Tai- Power which he worked for many years before getting on government services. Number six is ITRI because he set up ITRI when he was minister of economic affairs. That's 1973. And I'm the person basically that can really implement his idea about ITRI. We are very close together.

The last person I want to mention is Lee Teng-hui. You heard about the name, right?

23-00:54:46

Li:

I haven't, no.

23-00:54:46

Lin:

You don't? Come on! Lee was a Taiwanese and Chiang Ching-Kuo, on getting older, has wanted to cultivate new generations of leaders. With the work in the economy to help, Y.S. Sun and S.S. Shu become a member in the group of leadership,. So Taiwan's economy become much stronger. Chiang Ching-Kuo was then able to implement the process of democracy. With many local elections, getting the new people to come to the government, Lee Teng-hui is one of them. Among this new breed of native Taiwan people, Lee is stands out and is ahead. But at the final years of Chiang Ching-Kuo, he wanted to have Y.S. Sun as his successors. So he appointed him as the prime minister and Lee, as vice-president. In the normal sequence of events, Y.S. Sun will be vice-president. But Chiang Ching-Kuo felt that YS is so instrumental in pushing all those policies. It's not only economic policy, but social policies and so on. Being an engineer, he traveled a lot. He knew has the global view which is important input for Chiang Ching-Kuo. So he want YS to continue to be prime minister for a few more years. He felt the vice-presidency is a lesser position, though higher in the hierarchy, but less important. Most vice-presidents become unknown, right. But he felt that he needed to cultivate the next generation of native Taiwanese, so he picked Lee

Teng-hui to be his vice-president and wanted to keep an eye on him while Y.S. Sun runs the government. Lee's pick was a surprise to everybody. Unfortunately, Chiang Ching-Kuo's health deteriorated very rapidly; he suffered diabetics, and he died within a few years. Against all expectations, Chiang's surprised pick of Lee might have created some pressure, some strain, disappointment in Y.S. Sun's mind. YS had a serious stroke in 1986 or 87, we'll have to find the date. Overnight he became incapacitated. He was laying on the floor and then he was wheeled into the hospital and surgery followed. Then Y.S. Sun was removed from any government role. He could not do anything. It would take about two years for rehabilitation to a more meaningful life style.

[End of Interview]

Interview 5: March 26, 2009
Begin Audiofile 24

24-00:00:29

Li: All right, it's Robin Li and Emily Hamilton speaking with Otto Lin. It's March 26, 2009 on UC Berkeley's campus. This is tape number twenty-four.

24-00:00:37

Hamilton: So today we're going to be talking a little bit about ROC politics, ice breaking with the PRC, your departure from ITRI, basically covering the years 1993 to 1997. So we talked a little bit about Lee Teng-hui last time and the National Assembly. I wanted to start actually just with a question about the decision in Taiwan to have this democratic election. What do you think the inspiration for that was and did it relate at all to the desire to be a more advanced technological, industrial country? Was that related at all to the decision to have these nationwide elections in Taiwan?

24-00:01:27

Lin: When Chiang Kai-shek went to Taiwan, he very much wanted to build a strong country. He wanted to implement Sun Yat-sen's Principles of the Three People which he never got a chance to do in China. He now retreated to a small island, a more secure place, and he felt he had that kind of opportunity. After the fifties, sixties, from agricultural reform, land reform, then he went into industrial development – light industry and then gradually moved into heavy industry, and then the technology industry, and so on.

By the time Chiang Ching-kuo took over, Taiwan already has a fairly sound economic foundation, so he ventured into the technology area through ITRI, with the Science Park, and then further moved up along the ladder in terms of economic powers and so on. But Chiang Ching-kuo felt very much that for Taiwan to sustain that kind of economic development model, you needed also to open up the government, to promote democracy. He was really a man of vision and he foresaw this very clearly. He wanted to open up the process of governance so that the local people can participate. It took a little bit of time

because in the fifties, the country was in a very chaotic situation. They were not able to do it. But now with all this building up and setting the stage for political reform, one of the things he did was to open up the local elections, for the city councils, the parliament, and for the city or county government, and then gradually opened up the high levels of the central government. This is his mechanism for democracy in Taiwan.

Now, in the Republic of China political system, you have the Executive Yuan, which is basically the Prime Minister's office, with the many ministries and so on. And then you have a Legislative Yuan, which is like the congress. And then the third part is the Judicial Yuan. "Yuan" means "Branch." The Judicial Yuan was consisted all the different levels of the court system.

And then under Sat Yat-sen's idea, there are two more branches of the government. One is called the Examination Yuan, and this is very much a part of Chinese history designed for normal people, the farmers or people on the lower echelons of society, who are not born to be officials. This gives them an opportunity to move up the social ladder. The governments, through Han Dynasty and so on, held annual examinations. Everybody can come, sieved through different sections of the different provinces and so on, and then finally can come to the capital and have a grand examination. In all the examinations, you may start with several thousand [people] altogether. And the numbers vary from time to time. Finally there maybe a hundred or so selected to the Central College of Scholars [翰林院]. These lucky people will learn the running of the government. And from this group, comes the elites who will be the future ministers and prime ministers and so on. This is the historical background for the Examination Yuan. It's one way to nurture, to cultivate officials for the country. And the second purpose is to open up the government, to promote equality, to make an avenue for the lower class farmers, so people have a chance to rise through the organization. This is very important in the Chinese history all through the thousands of years, it takes various forms.

Sun Yat-sen wanted to keep that. In Sun Yat-sen's idea this is called Examination Yuan, so it becomes the fourth branch of the government. And then this yuan, in addition to selecting officials, also run very special examinations for professional people for the various branches. People who wants to go to the foreign service, people who wants to go into—as time changes, management specialties in pollution, for example, or industrial safety or occupational safety, that kind of thing. There are certain guidelines for the government to set up exams. Normally, the government will ask a panel of experts to run those specialty exams. Thus the technocrats will basically be certified for a specific kind of public jobs.

24-00:07:15

Li:

It sounds like a democratic process in the sense that anybody could study and aspire to take these exams and pass them and become an official.

24-00:07:24

Lin:

That's right, that's right. This is a part of the democratization process. And another part—the fifth branch is called the Control Yuan, control meaning the auditing and reviewing. Like the GAO in the United States. They exercise as an independent power. These are the five branches.

Now, I seem to be digressing, but actually, the Legislative Yuan, the Control Yuan, these are very important branches of the government. And, at that time, the members including the key leading members, were all elected [when the ROC government was] in Mainland China. After they moved to Taiwan, the members aged and the system became hard to sustain. There was a need for the parliament to reform by retiring the older generation and getting a new generation to come in, but through what mechanism? Because the old generation, the original Legislative Yuan, for example, were people elected by the entire [country of] China, not only the people in Taiwan, but the people in Guangdong Province, in Shanghai, Hubei, in Shensi, and so on and so forth. But now the government has moved to Taiwan. So the reality is that you cannot hold free elections in Shensi and then send [them to Taiwan]—so it's impossible. This caused Chiang Ching-kuo and his government a very difficult time [figuring out] how to get this process to work. He needed to not only build up the experience of democracy through the local level government, but also he had to work on the very top level of the government. This is all part of the democratization process.

Chiang Ching-kuo started the process, as I said, first, through formal elections, then through the retirement of the old members, and then certainly also through recruitment of local people in Taiwan to put them into various levels of the government. People whom you have heard of today, like Lien Chan [連戰], Lee Teng-hui [李登輝], Lin Yan- Gang [林洋港], and many others, are part of the efforts of Chiang Ching-kuo to increase democracy in the government.

In answer to your question—this is indeed a very well thought out process. When Lee Teng-hui came in—Lee Teng-hui was born in Taiwan during the time of the Japanese occupation. He went through a colonial education and then spent several years in Japan, attending school as part of his training process. After the Second World War, Taiwan was returned to Chinese sovereignty. Lee Teng-hui at that time was a middle level official in the agricultural segment. He worked as an agriculture economist for the Agricultural Reform Commission. He started as a middle level person. And then Chiang Ching-kuo noticed him and sent him out to Cornell. He got a PhD from Cornell University in agricultural economy. Then he returned. I think Lee Teng-hui is just one example. There are several others, a good number of people like this whom Chiang Ching-kuo took pain to nurture.

Chiang Ching-kuo, in the year 1983-84, felt that one of these days he would be gone. He had to prepare for a new generation of government. All the

indications we have now is that he had planned for Sun Yuan-suan to take the helm. Sun was Minister of Economic Affairs and quickly became prime minister. Chiang wanted Sun to be his vice-president, and then take over the government after him. Sun is a technocrat, well-liked, a man of integrity, a man of foresight. I can use those adjectives on him [and would not be exaggerating]. Sun was an engineer and he was born in Shandong. It is in the Mainland. And Chiang Ching-kuo felt that, in the future, you needed to have more local Taiwanese to come to the government. So he actually had two major candidates that could take over the highest slot down the line. One was Lee Teng-hui, one was Lin Yang-kang. Lin Yang-kang at the time was the Governor of Taiwan. Lee Teng-hui at the time was mayor of Taipei and then moved to the Executive Yuan and become a “Minister without portfolio”. Basically, he was just on special assignment to take over different projects. I think when Chiang Ching-kuo instituted this, he felt that his health was still good. Although he’s about seventy at the time, he was in good health and was still on top of things. Since there are many national projects yet to be carried out. He wanted Sun Yun-suan to still take the position of prime minister; so he named Lee Teng-hui vice-president. His thinking was that vice-president, after all, is not a position of power, really. It’s just kind of keeping Lee under the wing and let him learn about the governing process and kind of nurturing him to the top position one day. But he still have very little real full powers or control. So Chiang asked Sun Yun-suan to remain as prime minister or the head of the executive yuan, and then use Lee Teng-hui as vice-president of the country. In terms of hierarchy, the VP of the country is at a level above the prime minister, just next to the president, right.

Unfortunately, at this time, Sun Yun-suan has suffered suddenly a stroke and was basically out of the picture overnight. At that time, I had already arrived in Taiwan. I was director of the Materials Research Lab. And Sun Yun-suan, you might recall, asked me to work out a national project on material science and technology development for Taiwan. While Sun Yun-suan was out of the political arena, Lee Teng-hui automatically—as the vice-president, succeeded Chiang Ching-kuo as president and also took over the KMT party. There was a good deal of details we can talk about, but I don’t think we have time to get through the politics.

24-00:15:06
Hamilton:

So he was sort of the sole power person. Since Sun Yun-suan was out and then when Chiang was gone. Lee Teng-hui was sort of by himself.

24-00:15:16
Lin:

Yes, yes. Lee Teng-hui was in the right position at the right time. He was vice-president and by the Constitution, he was the second man in charge. So he became president.

24-00:15:23
Hamilton:

Right. And there’s no third man now?

24-00:16:25

Lin:

Well, I think there are still many persons. There are several circles of people on the level below Lee Teng-hui. These are very strong, powerful persons whom have been nurtured, grown by Chiang Ching-kuo when he was alive. Chiang Ching-kuo was a very good manager and he grew leaders, you might say, in every field. In the field of education, economics, finance, foreign affairs, military, the political parties, security, and the like, he had put somebody in charge. He had nurtured a group of leaders, and at all these fields, in the power position for many years. This group of people did not pay much attention to Lee Teng-hui. Lee was only mayor of Taipei, and a minister without portfolio. People have noted that Chiang Ching-kuo wanted to groom Lee, but really did not pay much attention to him to see him as a threat. But then suddenly Lee became the leader.

Lee Teng-hui was a very shrewd politician and he was able to manipulate through the power structure. There were about three most important rivals and he made them fight each other in their positions while he was sitting at a high level. He watched them fighting one another and gradually built up his own power base. Basically he took over the party, the KMT Party—which is the base of the power structure. Then the executive yuan, then the military. These are the three major groups. So when Lee Teng-hui became vice president, the executive yuan was under Sun Yun-suan. After Sun Yun-suan had the stroke, Yu Guo-hwa [俞國華] was put in top position—Yu was an economist,—at the executive yuan. And that was the time when the Science Park was built and everything. Very important. And at that time the KMT party was run by a Mr. Lee, another Lee, Lee Huan [李煥]. Lee Huan, was a very close confidante of Chiang Ching-kuo. The military was run by a person called Hao Po-chun [郝柏村]. So I think these are the three major power groups.

And then Lee Teng-hui found a way to maneuver around these three power groups which easily counteracted each other trying to gain more influence with Lee Teng-hui. So Lee Teng-hui just let them do the things and fight each other out. Pretty soon, within about a year or so, Yu submitted his resignation. So he [Lee Teng-hui] nominated Lee [Huan], the party person, as prime minister and immediately put James Soong [宋楚瑜] to take over the KMT machinery. James Soong was an alumni of UC Berkeley, and figured very importantly in these last several years—. James Soong had helped Lee Teng-hui in the critical hours in the rise of Lee to the throne of KMT and had since become the right hand person of Lee. In a few years, Lee [Huan], as prime minister, became disfavored, so Lee Teng-hui put Hao, the military person, to take over the executive yuan. In doing this, Lee Teng-hui put his own person in charge of the military. It just came about like this. In a few years, Hao became disfavored, and Lee Teng-hui used the DPP, to pressure Hao to step down. This was how the DPP was purposely nurtured by Lee Teng-hui as an instrument of power. These several persons I talk about are all from Mainland, the Mainland groups. So he wanted to use the DPP, who's represents the local

Taiwanese power, as an instrument to capture all the power from the Mainlanders.

24-00:20:13

Li: So between this old guard KMT and the Taiwanese nationalists, how did you situate yourself?

24-00:20:19

Lin: I was in a very difficult situation. I was born in Mainland China. So in that sense, I was in this other camp. But actually, when I was the president of ITRI, it was an organization for which I would recruit people to important positions. This “birthplace” thing was the last thing on my mind, whether the candidate was from the Mainland, or his family relationship or something. I didn’t even bother to request information of birthplace. Basically it’s professional. It was the talent and the people best suited for the job. That’s how we did it. But in that position, I have come to know many people. Hao, Lee and Soong all have maintained good relationship with me. I have no problem dealing with people.

24-00:21:22

Li: So your family’s position didn’t affect you?

24-00:21:24

Lin: My family’s not a factor at all. And these people have always been supportive of ITRI because they recognized the importance of ITRI in nurturing high tech which was what behind the economic power for Taiwan. They all respected me and respected ITRI. I was very fortunate to be in that position. However, I have to deal with the Legislative Yuan, which is now mostly controlled by local Taiwanese constituting most of the new legislative members that came in. They replaced the old members, the original members that were elected from the Mainland China. There’s a generation divide. A lot of those old Legislators from Mainland China are friendly to me, very friendly. But unfortunately, we have to see them go, and replaced under the process. They have to be replaced. My father was a member of the National Assembly in the Mainland. He was elected by his constituency in the Mainland. But he had to retire. Unknowing to either of us, I was to be elected to the National Assembly just a few years later.

So for my position, politically, I have no problem with the prime ministers, with the KMT, with Lee Teng-hui himself. Actually, Lee Teng-hui and I were very close. When I was director of the Materials Research Lab, he visited the laboratories often and I went to see him often as the VP of the country at the time. I found him a person eager to learn what’s new in the United States, what’s new in Japan, what’s new in science and technology and industry. And I have a lot of friends, visitors, professionals whom I can introduce him to. He loved to get in touch with these people. So perhaps he felt he also grew on his job through this ITRI channel. So we worked very well together. And later in 1988, I was made president of ITRI. I think probably Lee Teng-hui might

have something to say on this. This position, by charter, is appointed by the prime minister. And because of the significance, the ITRI position might be a subject of discussion between the prime minister and the president. I'm sure if Lee Teng-hui saw my name, he would support it. And somehow I have the impression that he has expressed his support. After I was president of ITRI, we worked even more closely together.

So my problem is not with Lee Teng-hui, but with the Legislative Yuan. Because now the local people became the power brokers. And it was the first time many of them got their chance to look at the national budget—okay, so they want a piece of the action, right. And at this point, Lee Teng-hui tried to gain the support of this group of people for his political agenda. So he let them, if only tacitly. He let them do the work which turned out to be divisive. He tends to see these things with one eye, or, opens one eye and closes the other.

24-00:24:59

Li:

So do you think there was a lot of corruption that was going on?

24-00:25:01

Lin:

There's some corruption that was being nurtured at this point and hence came what people referred to as the Black Gold phenomenon. The Gold meaning that wealthy people were welcome to positions of political influence. Thus people with really good economic positions wanted and gotten even more. The Black meaning that those in the underground society were now pampered and valued. When you're talking about in the city or in the countryside, the rule of law is not uniformly and justly practiced. There are local triads, local people who come up to the sphere of influence through coercive and unlawful undertakings. These people are important to Lee Teng-hui's game plan because of the power and influence they have wielded in the bottom tiers of the social fabric. He knew what was coming to the future politics are elections. You are to elect local officials, local parliaments, members of the Legislative Yuan, members of the Control Yuan, and, he wanted to have favorable influence on those people. So Lee's changing behavior was an eye opener to many observers. There are many subtle changes of the values of the political scene.

In the old days, Chiang Ching-kuo would never socialize with the business people. If a business problem arises, he will direct the problems to the official having the responsibility. He worked through the ministry. And, since there are many national conferences or consultation meetings, people can choose those public avenues to voice their opinions. He never played golf with business executives. He only socialized with his father's comrades of the revolution and war times. But Lee Teng-hui, he wants to be a commoner's president; he rubs and hugs with people of all shades including the Black and the Gold.

24-00:26:50

Li: What do you think that was his motivation?

24-00:26:52

Lin: Lee Teng-hui?

24-00:26:52

Li: Yes.

24-00:26:54

Lin: Well, he wanted to build up his own power base, because the power he held then was given by Chiang Ching-kuo.

24-00:27:01

Li: So he wanted to assert himself?

24-00:27:02

Lin: Yes, he wanted to assert himself, that he wanted to have his power base, all his own. And his power base is from the people, from the local people. He encouraged all local people to participate in elections. So purposely—he wanted to grow the DDP party as a leverage. Of course, he wanted to grow the new KMT party, and wanted new members to rise through this type of elections. Now, you have to understand that in Chiang Ching-kuo mind, he also wanted to open up the KMT party. He wanted to hold local elections. He also wanted to give amnesty for the DDP. This was very much in Chiang Ching-kuo mind. While he was in control, Chiang worked hard to grow the people of the middle income level of the society to become the major stabilization force. He would open up the government this way gradually and orderly. But when Lee Teng-hui comes in, he just speed up this process.

24-00:28:03

Li: Is this a good time? Because I wanted to ask you about Lee Teng-hui, his guidelines for national unification and what you thought of that.

24-00:28:11

Lin: While Lee Teng-hui wanted to be very friendly with the local legislators, many members of the Legislative Yuan—came to showing off their inner connection and influence. They wanted favors, okay, from time to time. I guess I talked about a number of instances last time with certain ITRI R&D projects, or industrial services and technology transfers, those type of things became easy targets. So I felt that it would become more difficult to sustain ITRI's position as time goes by. Thus, I have to talk about values and be assertive with ITRI's mission and roles. So this got me into some trouble with the Legislative Yuan. And at the end, when things come to Lee Teng-hui, he did not really show his personal support because, after all, this is only economy. And technology is only parts in the scheme of things. He has a much bigger agenda. He wants to make himself elected by the people, through direct election, and thus will not take any action to endanger his hold on the power base. And that's why I started seeing a changing Lee Teng-hui. There

are three faces of Lee Teng-hui: Lee as a scholar, Lee as an economist, Lee as a politician. They are very different.

If times allow in the next few years, I will be writing more details about my interactions with Lee Teng-hui. There's a lot to write on this from my position and observations. So the difficulty I have is in the Legislative Yuan. I have to make reports there on what we did, because more than one half of ITRI's budget is from the government, so we need to answer to them of what we have accomplished and to make budget proposals for the next year. So the legislators have caught me at several points of the budgeting process. So I have to deal with these people here. You want to talk about the assembly? National Assembly?

24-00:30:24

Li:

Yes.

24-00:30:32

Lin:

Every year it's a battle in the Legislative Yuan. Every year we have to work with these people and I became quite involved in this. Instead of trying to work on the inside of ITRI, I have to work more outside of ITRI for support and set the stage for all those projects. And at this point in 1991-92, the National Assembly, it is to come up for reelection because the old representatives from Mainland China, elected from Mainland China, gradually becomes fewer and fewer, to the point you cannot run an effective Assembly anymore. So Lee Teng-hui—maneuvered for a blanket retirement for them, and undertook to elect a new slate of members to the National Assembly.

In Sun Yat-sen's concept of the Constitution, the National Assembly is the highest level of the Parliament because it is charged with the duty to elect the president and vice president, and, impeach them as warranted. Understanding that the calls of duty are limited, it is also charged to make important Constitutional Amendments as the case arises. Therefore being a Representative is not a full-time job. They only meet once a year or when there's a need. Unlike the Legislative Yuan, members have a full-time job; likewise, members of the Control Yuan is a full-time job. Therefore, traditionally many ministers and vice ministers and high ranking officials in the government, also hold a National Assembly seat in the old days. So with the reign of Lee Teng-hui, he wanted to make many changes including the composition of the Representatives. He wanted the highest level of the Parliament be composed according to the party line. About eighty percent of them are to be elected from the local and twenty percent of them are to be divided by the political parties, representing the party platform. Basically, the KMT party will say, "Well, these are our representatives," and together with the local elected KMT representatives, they will form the KMT's part in the National Assembly. The same is for the DDP and so on.

Lee Teng-hui and KMT Party General Secretary James Soong nominated me to be in the KMT national slate. Lee Teng-hui did not have to go to the countryside or the street to campaign for me, or this group. But I actually did go to the countryside and the street, campaigned for my colleagues who are the local candidates. My position was kind of assured. Because this percentage was determined by the percentage of the vote that KMT will receive as a total. So for those people who are nominated, say, among the top quartile, they are sure to be elected. People nominated in the bottom quartile would not be so sure. It becomes a very complicated thing, but there will sure be somebody on this party slate who sits in the lower half and will not be elected.

24-00:33:53

Li: Why did they want you? Lee Teng-hui and Soong? Was it because of your technology experience or because of your network of—?

24-00:33:59

Lin: Yes. Basically, he wanted me to represent the technology sectors and because of my network.

24-00:34:09

Li: Because of your network, okay.

24-00:34:10

Lin: Yes, and because of my—

24-00:34:10

Li: So that was what made you kind of unique?

24-00:34:11

Lin: Because of my own standing in Taiwan. So they pulled out these names as candidates. They felt that the general public would recognize that these are representatives of the KMT, thus adding creditability to KMT as a party. Among this group of this national candidate was Ma Ying-jeou. Ma Ying-jeou and myself are among the first group of people nominated by the KMT.

24-00:34:35

Li: Is that the first time you worked with him or the first—?

24-00:34:37

Lin: Yes. Actually, this was the first time that I worked with Ma Ying-jeou. And Ma Ying-jeou is a younger person. I think he is about 12 or 15 years younger. I believe he was also born the year of the tiger. I might be wrong, but I think he's a tiger.

24-00:35:04

Lin: That's how I get to know Ma Ying-jeou and a number of other people now very well known [in both KMT and DPP]. I was kind of fairly well known. My name appeared in the news a lot of times, newspaper and the TVs. And once you are in that, you also become controversial, also become a target of

attacks. This is the flip side of things. And also, at that time, I was selected to the members of the Royal Swedish Academy of Science. I only know probably one or two people in China, in Taiwan, who was elected to same position. I was given the Industrial Leadership Award by Drexel University. I think you know Drexel University, yes. I was also given the Technology award by the Third World Academy of Science. People felt that I was fairly prominent in the area and believed that I was a candidate for minister's positions a few times, but ITRI is where I wanted to be. So that's my National Assembly position.

Then I participated in the Constitutional Amendment effort. I have tried to put in the new Constitution an article that the country, Republic of China, should develop science and technology as an avenue to promote the economy and improve the quality of life. I said in that clause that, while promoting economy, economic growth, the country also has to be keeping equilibrium with the environment and the nature. So this is something that I put in for the constitutional amendment. [Narrator's Note: Appendix 23 is a reference to the TWAS Award on Technology. Appendices 24 and 25 were copies of my publication on national development of science, technology and industry. Appendix 26 is a copy of letter to Ma Yin-jeou who serve as vice chair of the sub-committee on constitutional amendments of KMT.]

24-00:37:17

Li: Was this conceived as something for Taiwan or more internationally?

24-00:37:20

Lin: For Taiwan. For Taiwan. The constitution basically is for Taiwan.

24-00:37:23

Li: Right.

24-00:37:25

Lin: For the Republic of China.

24-00:37:25

Li: Right. But the idea of bolstering the economy through science and technology, was that really, I guess, a capitalistic type of idea or was it an international competition type of idea?

24-00:37:39

Lin: Well, I feel it's more of a pragmatic thing because Taiwan has very little national resources. And also from what I understand of the international scene, abundant national resources can become a disadvantage, ironically. If you look at Saudi Arabia, Kuwait, countries like this with rich natural resources. Then look at countries like Holland, Japan. Those are in very cold climate, very small land, and very little natural resources. But they had developed to become economic powers, through science and technology. United States was different. It's a big country, a lot of natural resources and

also with good science and technology. So that's why America was a superpower because it was able to make use of both these factors.

24-00:38:40

Li: At this time you're in the National Assembly, but you still have to go to the Legislative Yuan with the budget from ITRI at the same time?

24-00:38:47

Lin: Yes, yes. The National Assembly is just for matters related to the Constitution. But my basic job was with ITRI, and ITRI's budget has to go to the Legislative Yuan and I had to work with the Legislators.

24-00:39:00

Li: But does the National Assembly position help you negotiate better with the—

24-00:39:06

Lin: Well, it helps me to have a better network. I'm better known. That helps a bit. During that time, in the 1993 period, I also supported an ITRI colleague, Reynold Liu, who is a vice-president in charge of administrative services, to run for Legislative Yuan from Hsinchu. Because I felt that we have to spend so much time in the Legislative Yuan partly because the legislators did not understand science and technology and its importance. So if we have somebody who understands science and technology as a Legislator, that would be very helpful for the cause.

But in the end, Reynold lost by a small margin, unfortunately, because of an internal struggle of KMT factions. That was a hurt to both Reynold and me. It hurts me further because I was perceived as losing political neutrality and had positioned myself too much in politics. I think in hindsight, being a member of the National Assembly is probably okay. But getting too much involvement with the local election was not. Actually I supported Reynold for the good of ITRI and for support to national science and technology development. Therefore I felt my intention was publically minded and justified. One of the vice-directors of UCL/ ITRI, S. N. Tong, ran earlier as mayor of Hsinchu and was elected. He has done a lot to modernizing Hsinchu to support the development of science and technology of the city. It helped to make Hsinchu a leading city in Taiwan. So it's very difficult to analyze politics. Life is never simple.

24-00:41:02

Li: So when you talk about needing to set the stage for ITRI projects to get support, that kind of advocacy wasn't so much political as it was for educational?

24-00:41:15

Lin: Yes, it's not political. Basically people will listen to what we say. But they might be thinking about having a chunk of the actions in there. Overall, I guess ITRI can get our projects through in the end, just that we might be talking about eighty million instead of a hundred or something as we

originally proposed. They all want to swing their swords to cut and to pick and choose. In this process, people want to exert influences on ITRI. This is the kind of thing that I have encountered. I have never really worried about the budget for ITRI. And I think last time I talk about the “one to one” ratio. I told my laboratory directors that we don’t want to get too much money from the government in any case. It’s better to maintain fifty-fifty. Fifty percent from the government for mid-term and long-term projects, fifty percent from the industry for mid-term and service projects. I said to them when we are in a position to say no to the government, then we have gained dignity and their respect. That’s basically what’s behind this, is that—

24-00:42:40

Li: Did you ever have to say no or did you choose to say no?

24-00:42:42

Lin: Yes. We have the opportunity to say no, that we cannot work on this project. Yes.

24-00:42:50

Hamilton: What’s the pan blue, pan green?

24-00:42:53

Lin: I’m sorry?

24-00:42:53

Hamilton: Pan blue, pan green?

24-00:42:56

Lin: Oh, okay. That’s talking politics. Well, pan blue is, at this time, referring to the KMT and its supporters. The KMT originated from Mainland China. Sun Yat-sen, Chiang Kai-shek and Chiang Ching-kuo, all stand for one China. To them, there’s only one China, even to the point of 1976-78, and the China is the Republic of China. It is a founding member of the United Nations, you remember, in San Francisco. But after losing out on the Mainland, Chang Kai-shek went to Taiwan and at that time, United States tried very hard to keep the Republic of China in the United Nations. And, of course, the PRC, People’s Republic, led by Mao Zedong, was already getting more and more supports among the member countries. So there was always a fight in the United Nations as to who should represent China. So I think Presidents Harry Truman and Dwight Eisenhower always tried to talk to Chang Kai-shek, “You can keep your seat in the UN but accept also PRC.” And Chang Kai-shek’s policy is an affirmative and definitive “No.” To him, there is only one China, meaning the Republic of China [ROC]. There’s one China. Taiwan is part of China. China and Taiwan are one. Remember, this is what Chang Kai-shek has said. But see how time changes. Chiang was always hoping to return to China, although that hope was gradually fading. So this group of local people have established DPP and gradually came to the limelight. They certainly look at China all the time and consider this prospect for the future. And, perhaps

someone like Lee Teng-hui will ask, purposefully—well, if China and Taiwan merge to one, who's going to be president of this new China?

24-00:45:11

Li: Not Lee Teng-hui.

24-00:25:12

Lin: Not Lee Teng-hui. Right. As a politician, would you support an idea which ends up getting yourself out the power? So naturally he wanted to make this process slower. Not to move so much so fast. So inside KMT, this one China issue is becoming diffused and confused. Originally, maybe eighty percent of the people are for one China, and gradually more people will say, "Well, perhaps we should find a way to recognize China and recognize Taiwan and to assure that both are equal."

The green, the DPP party, who is from basically the local Taiwanese, they say, "Well, we're just Taiwanese. These people from Mainland are outsiders. Why should we want the outsiders to be taking the major positions in the government? And why do we want to be influenced by China?" So they're taking a very strong position, to the point that they want to be a separate Taiwan, national Taiwan.

24-00:46:30

Li: And those are the greens?

24-00:46:30

Lin: This was the side of the green, the very green. Now, where does Lee Teng-hui sit? Lee Teng-hui was originally here. It was a one China.

24-00:46:46

Li: And that's blue?

24-00:46:48

Lin: Blue, very blue. KMT is blue. DPP is green. Gradually, the blue becomes several shades of blue. This is the pale blue, the green become different shades of green. There is blue-green. That's what I meant by diffused and confused. Originally, Chiang Ching-kuo was president, and then in 1992—actually, after the constitutional amendment, there is a direct election. Ninety-four. 1992. Or, ninety-two. 1990—I have to figure out the dates.

24-00:47:37

Li: 1991 was the official transfer.

24-00:47:39

Lin: Yes. No, 1994 is the first time he was—

24-00:47:42

Li: Lee Teng-hui was elected by—

24-00:47:43

Lin: Lee Teng-hui was elected, yes. He was elected for the first time by universal suffrage in Taiwan. But up to this point—I think that was also a transition for Lee Teng-hui. He felt that he want to have a two party system. As the president of the Republic of China, and also the president of KMT—he has also managed to support the DPP! There were also allegations that that he channeled money to DPP.

24-00:48:26

Li: Lee Teng-hui?

24-00:48:28

Lin: Lee Teng-hui. Probably or through other ways. And purposely to grow the DPP party.

24-00:48:39

Li: To make it full strength with the KMT?

24-00:48:42

Lin: Yes, yes. Eventually Lee Teng-hui was expelled from the KMT. He resigned from the KMT in the year 2000 when Chen Shui-bian, DPP candidate, become president. And why was Chen Shui-bian elected? People felt that Lee Teng-hui was behind the scenes. At that point, he was still president of KMT and KMT run the candidate of Lien Chan against Chen Shui-bian. But KMT was defeated. Because while KMT supported the candidacy of Lien Chan, Lee Teng-hui was openly supporting Chen Shui-bian. The KMT people become outraged. Some had staged demonstrations, quite violently, and wanted to surround the public square and wanted Lee Teng-hui to be held responsible. After about a year or so, Lee Teng-hui resigned from the KMT and then formed another party outside of KMT and DDP, the Taiwan United Party. Which is the greenest green, on the other end of the spectrum.

24-00:50:16

Li: It's funny, because it seems like for the generation above you, your father's generation, this issue of unification, or "Taiwan is China, China is Taiwan," is a deeply emotional issue. For your generation, is it still as emotional an issue?

24-00:50:34

Lin: Well, it's still an emotional issue for me. I grew up in China. It's actually not so much I grew up in China, but the history is. Chinese culture is very much in my mind. Let say, for example, Taiwan to China is like Florida to the U.S. Although different states have different problems, you would not consider Floridians not Americans. But if the Florida people, they say, "Well, we are Floridians. We want to be a separate country." I think we will all feel very unreasonable. It's illogical, it would not work. I have often talked about Singapore as an example. Actually, when I was in this period of becoming a National Assemblyman, I make public speeches. I say, "Well, look at the United States as an example. Louisiana or Alabama or Mississippi never wanted to secede from the United States for their local issues." And look at

Singapore, which is a much smaller country. There are even a lot of racial differences inside. But they never want to set up two or three Singapore's. So why would you want to argue a case in Taiwan? To me, one country, one China, and China and Taiwan will be one. This is my position. [Appendix 22]

24-00:52:05

Li: Is it both emotional, then, and also pragmatic?

24-00:52:08

Lin: Well, it's emotional, it's culture, and also, I think it's pragmatic. But now, Beijing was talking about one China. At that point, Chiang Ching-kuo talked a lot about one China. Now it's Beijing's turn to talk one China. And the green people, they're not talking about one China. They want Taiwan and China, to be two countries. They say, "Well, what China has helped us in the last fifty years? We have our own passports, our own money, currency, our own industry, own everything. Why should we listen to China?" Well, it's true. And Lee Teng-hui and these people—some people even said Lee Teng-hui might be a Japanese, not a Taiwanese. There were stories that he was born during that time. There are thoughts that his father was a Japanese policeman. He was born out of wedlock with a Taiwanese woman or something.

24-00:53:17

Li: Do you think this story gained popularity because of his perceived corruption and his—

24-00:53:20

Lin: Yes, yes. And because of his stand of nurturing DPP, aligning with Japan, and advocating for a separate Taiwan with China. Who argued the one China policy? It was the Chiang's in the first place, and now it is Beijing. Life is complicated and full of paradox.

24-00:53:48

Li: How did this relationship between Beijing and people in Taiwan who are pro-unification or pro I guess one China? How did the greens then affect this relationship between Mainland China and Taiwan?

24-00:54:03

Lin: This becomes difficult for people like myself. I was very lucky that I went out of Taiwan during 1995 to 2005, otherwise, I would probably be very miserable. I guess—you know, you see Chen Shui-bian. Right now, every time, all this corruption that you heard about in the newspaper: bribery, embezzlement, money laundering, etc. broke open, he always talked about as the prosecution of Mainlanders against him as a Taiwanese. He said, "Well, I hide this money because I want to build a separated Taiwan, independent Taiwan." He was the president. He was elected and sworn in as the President of Republic of China. He had his hands to all the resources of ROC. To me, it is clear-cut, and downright criminal. But it still is an emotional issue because people can't settle with such a person who appears to have no shame whatsoever. But he still has some followers. It is unbelievable.

24-00:55:02

Li:

It's interesting. What you're describing is Taiwan and Mainland China going from enemies to being cooperators, both sharing the same agenda for one China. How did this happen in the context of globalization and the other things happening nationally? Do you think that Taiwan and Mainland China wanted to have one China for global reasons?

24-00:55:26

Lin:

Although we have not talked about it in this context, in the last ten years, Taiwan and China are actually cooperating to grow what I had called the "Chinese Global, Inc." business model. The technology, the design, R&D is mostly done in Taiwan—the manufacturing mostly done in China because of the labor cost. We're able to design new products, good product, to sell to markets all over the world. I suppose China and Taiwan benefited mutually because of that kind of relationship. Now, that kind of relationship will not last forever, because obviously, internally China did not want to be a manufacturing site forever. They wanted to be in technology, design, higher ends of the value chain, etc. The inter-relationship will have to change. They will have to adjust. And, of course, you have to talk about this in the bigger context of the global situation. But I think the upshot is that both sides were benefited because of this collaboration. Political rhetorics aside, I think this is the real thing that has been moving Taiwan and China in the last decade. China was able to hold on to an over \$700 billion of U.S. Treasury reserve in the U.S. at this point. China was a poor country—a poor third world country not too long ago—but is able to become a force of stabilization for the American economy. It is weird, you might say.

24-00:57:23

Hamilton:

So do you think that globalization, then, helped bring the PRC and ROC together?

24-00:57:27

Lin:

Together. Yes, yes, because they can grow together. They do not need to fight with each other for small things. They can build a larger pie together. I think building this pie is good for everybody.

From a technology standpoint, fifteen or twenty years ago, before the internet was invented but computers was already gaining popularity—there's a new driving force emerging in this world, although we did not think this way so clearly. But all this wealth was created mainly after the invention and popular adoption of the internet. Of course, other technologies: wireless communication, multimedia, semiconductor science and technology, which Berkeley, MIT, Stanford being major players, all helped and many organizations in the world have helped. It's not just because of the United States. People in France also contributed a lot to the internet. These are the kind of things that the wisdom of many people at different places put together and make this a better world.

Begin Audiofile 25

25-00:00:06

Li: This is Robin Li and Emily Hamilton speaking with Otto Lin, March 26, 2009, Berkeley campus. This is tape number twenty-five.

25-00:00:16

Hamilton: You had mentioned that you didn't think the cooperative relationship between Taiwan and China could exist. Do you think that that's true even under a one China model, where Taiwan would still offer research and development and Mainland China would still be in the manufacturing role? But under the one China model, technically everything would be happening in China. Do you think that relationship could last then?

25-00:00:43

Lin: It's interesting to think about this way. If you are saying it's one China, then everything is just one China regardless of where you do R&D or where you do manufacturing, right?

25-00:00:58

Hamilton: Technically, maybe not emotionally.

25-00:01:00

Lin: Technically, yes. Well, I think, actually, in the future, I think actually you cannot talk about manufacturing and R&D being separated like this, because you have to look at the entire value chain.

25-00:01:21

Hamilton: And that's, in some sense, some of ITRI's philosophy.

25-00:01:24

Lin: Yes, yes. And some of the manufacturing can be in the United States, for example, automobiles.

25-00:01:31

Li: In Alabama.

25-00:01:33

Lin: Yes. And actually, producing automobiles can be profitable and useful in the United States. Like some of the Toyota and Honda factories, they are still profitable operating in the U.S. Most of the R&D probably will not be done just here but there's still some new technology in the future, many new technologies will be from the United States. In the future, we should think about the entire value chain, where the market is, and to make best of the resources everywhere globally.

25-00:02:14

Hamilton: So increasing globalization almost makes it a useless question to ask.

25-00:02:21

Lin: Yes. It's immaterial. It seems to me that the increasing globalization will be helpful to everybody.

25-00:02:30

Li: To sum up the experience with the National Assembly, it sounds like in terms of this goal of expanding the pie, growing the pie, that your position at ITRI was more useful or more powerful in that sense than the political position at the National Assembly. Would you say that's true?

25-00:02:49

Lin: Well, Yes. I think it's true because ITRI made real national contributions from the technology side. And regardless of DPP or KMT, you've got to grow the economy, if you are really interested in growing economic power for Taiwan. They have to view ITRI this way. After I left ITRI, in this last ten years, ITRI is still doing very well with the DPP coming in power. There was a lot of changes in ITRI, but by and large, ITRI still grows. It's one of the very fortunate and weird things in the last ten years in Taiwan. But ITRI's role will also change with changing times. I think it's more because of the relationship of ITRI with university and with technology source and with the development of the industry.

As we have talked about IC before, when ITRI worked on IC, at that time, there's no IC industry in Taiwan. ITRI was basically a provider in every aspect. And now, when the industry comes up faster and bigger, and they understand the markets better, then ITRI's position would have to change. Working in the same area would not be so valuable anymore in that particular field. ITRI has to identify a new area to work now. The relationship of ITRI and industry in the economy will change with time. There will not just be one model unchanged.

25-00:04:51

Li: You've talked about the benefits of globalization and you have a book coming out about the benefits of globalization. What are the problems with globalization?

25-00:05:00

Lin: Yes. Well, I think the problem, as we can see very clearly is that you have to build up local strength—I always talked about globalization based on localization. You have to recognize your local strengths and not let yourself be pulled away by whatever other people do. You can't just follow suit. You have to have some independent, creative, innovative thinking about how your position fits into this scheme. For those places, if you are doing the same, like sub prime or selling the same kind of financial products that people were doing here in the United States, obviously you'll run into trouble. Like the HSBC. It was a very successful banking, but they're doing the same kind of business as many other banks in the United States, so they have big problems. They're running into a big problem. Globalization does have its faults, and it's

just like a plaque or disease or AIDS—once a place has it, you are likely also to be infected. You have to set up some measures in your location that is specific to your situation, so that you have a special competitive position and with that you can exercise better controls in things.

25-00:06:49

Li:

There are clearly some economic disadvantages. But what about cultural? I mean, local and cultural tradition is very important to you, and do you see globalization as challenging some of these social aspects?

25-00:07:06

Lin:

Well, I think so far I have not seen that globalization has an adverse effect on local culture. Of course, it's depending on the people in the locality, how they are to view their own history. If they have respect of their own culture and history, I think globalization is a time when they can preserve their kind of history and culture. They have more resources to do it. I'll give an example. Technology, I always think of technology. With digitalization. One project we do in Taiwan is to take the paintings, Han Dynasty, Han Dynasty paintings and digitalize it so that image can be taken out for education purposes and also to let more people outside of Taiwan get a chance to see it. Previously, people had to travel to the National Palace Museum to be able to see that or they have to buy very expensive reprints to see it. But with that, now they get a better appreciation of the culture and arts and music and likewise, and also help bring creativity into new areas. I think globalization like this is okay.

Of course, with globalization, we get to learn more about America. I don't know whether you have seen this movie, the *Slumdog Millionaire*.

25-00:09:00

Hamilton:

Slumdog Millionaire.

25-00:09:01

Lin:

I think it tells you about a process of change in India, in the process of globalization and one can learn. It can change, I am sure. I don't think it will happen, that globalization will destroy local cultures and things. In fact, I think with the new technology and resources, it can help preserve that much better.

25-00:09:39

Li:

Interesting.

25-00:09:42

Lin:

I'm just saying that there's no a priori assumption or thesis that we can say that globalization will be bad to localization.

25-00:09:52

Hamilton:

I was interested in this because there's often a sense brought up in the United States that perhaps the westernization of the world is a bad thing. You were talking about Coca-Cola and McDonalds during the break, and examples like

that are used in America, saying that maybe it isn't right that we're putting McDonalds out in the world or putting Coca-Cola out in the world. But you don't see that as fundamentally bad?

25-00:10:18

Lin:

I don't see that. I don't see that at all. Like I think McDonalds has a very positive contribution to China. I think it teaches people other aspects of the eating culture. The fast food is not necessarily bad. You can have more time, get more balanced meal. It's a new industry. It can help people, promote employment and so on. There's a lot of Chinese fast food. You go to some shopping malls and so on. You can see more and more of them. No, I think that's not bad. They're also a way of introducing Chinese food, getting more popular to many people.

25-00:11:08

Li:

Right. Because of indigenous Chinese fast food businesses that are modeled after McDonalds or modeled after Kentucky Fried Chicken that are Chinese owned, Chinese operated and serve Chinese food.

25-00:11:17

Lin:

Yes, yes, yes. The way I see McDonalds is not a culture of beef, eating beef, but it's a culture of doing business. Did I tell you in the past interviews a story about my interview with McDonalds?

25-00:11:40

Hamilton:

No.

25-00:11:40

Li:

No.

25-00:11:41

Lin:

Okay. Maybe a few minutes?

25-00:11:41

Li:

Yes. Yes, yes, yes.

25-00:11:44

Lin:

I was teaching in a class at HKUST on innovations and entrepreneurship. I was curious about McDonalds in Hong Kong. Cantonese like myself are very picky about eating and Cantonese are very good at roast pork, roast duck, and steamed fish, those kinds of things. They're delicious. So why would one ever want to sell McDonalds hamburger in Hong Kong? I was curious, and I went to talk to the founding chairman of McDonalds of Hong Kong, Dr. Daniel Ng. He has retired. He's my age, but now he's retired. He now flies helicopters on the Silk Road region doing studies of the local music and so on. I asked Daniel, through e-mail, "Can you come to give a talk to the students on establishing McDonald in Hong Kong some twenty five years ago?"—I don't know him before. He said he would be happy to come but we need to meet first to get a feel of my expectation of the class and the students' interests. [I think this was a very reasonable and thoughtful thing to do.]

So we made an appointment to meet on this particular Wednesday at nine o'clock in my office. That Tuesday night, there was a number eight signal typhoon coming through Hong Kong and all the schools and public offices will be closed the next day. At about 8:00 am in the morning, I was waken up by a phone call. It was Daniel Ng. He said, "Oh, Professor Lin. I'm sorry, there's a typhoon." I said, "Yes, of course, Daniel, no problem. We just have to find another time to meet." He said, "No, no. I'm already on the campus." I said, "Oh, goodness, how come?" Well, he said, with number eight signal typhoon, there's no cars on the highway and roads are almost empty. I just drove myself from my home—it took me no time at all to come to campus. What a beautiful day for me."

I said, "Okay. You just go to the first floor coffee shop at the university lobby. Get yourself a cup of coffee while I will be rushing over to see you." I got up quickly and in about ten minutes, I arrived at hall and saw this man wandering around. I said, "Daniel?" He said, "Otto?" I said, "Well, why didn't you sit in the coffee shop?" He said, "Well, the coffee shop is closed. There's no coffee." "Okay," I said, "in that case, I will take you to my office and I will make coffee for you today. We need to talk because he wanted to make sure that his lecture will be acceptable and interesting to the class, so he wanted to have a discussion with me.

And then I say, "On second thought," as we are moving up to the elevator, I say, "We have recently opened a McDonalds restaurant on the campus. I don't know whether it is open." He said, "Well, if there's a McDonalds, it has got to be open today."

25-00:15:18

Li:

He would know.

25-00:15:19

Lin:

I said, "Why?" he said, "Well, I have set the rule. In a day like this, there will be more reason for some people to need drinks and foods." So I said, "Okay, let's try it then." We go down to the McDonalds. It sure was open. The light is bright and there are already some people sitting and eating. The store manager was shocked seeing Daniel Ng walk in, he rushed out and shook his hand. He asked, "Mr. Ng, what brought you here?" He thought the Chairman was making an un-announced inspection or something. I was joking to Daniel. I said, "Well, Daniel, it was a positive identification for me, because this is the first time we met." He said, "Well, when Typhoon number 8 visited, the branch manager has to make sure that his employees will get to work. He should drive, hire taxis or do whatever he needs for the fellow workers. Because it was time like this that hungry people who are really looking for food or drink. This is occasion to provide a valuable service to customers."

I told my students this story as an introduction what a true entrepreneur looks like. And then I asked him, "How can you get the Cantonese in Hong Kong to

eat beef?” He said, “Really, I did not sell beef. I did not sell hamburger.” He said, “I’m selling cleanliness, quality, service and values. This is what would attract people to McDonalds. They like the place which is clean. They like that things with consistent quality. They like the value and get friendly service. Under this context I can sell hamburgers or chicken or fish or salads, coffee, tea, and whatever.” That’s the story of McDonalds. I think that kind of culture, actually, is now learned by Chinese fast food stores.

25-00:17:27

Li: Yes. I went to a place in Beijing that looked like Kentucky Fried Chicken. It had a logo that looked like “the Colonel,” an old man with white hair.

25-00:17:31

Lin: KFC.

25-00:17:32

Li: Yes. It looked a little like Sun Yat-sen, actually, but it’s a fast food place, Yonghe Da Wang. You can get fast food Chinese.

25-00:17:38

Lin: Right, right.

25-00:17:39

Li: Yes, that’s insane.

25-00:17:41

Lin: A funny thing there also. In Beijing, they are also a number of shops selling California Beef Noodle.

25-00:17:47

Li: Yes. Right. Chinese food from California brought back to China. Did you want to talk about some of the icebreaking with the PRC?

25-00:18:00

Hamilton: Yes. I think that’s a good time to—

25-00:18:01

Li: Is it okay if we switch Tapes?

25-00:18:03

Lin: Yes, fine.

25-00:18:05

Hamilton: I wanted to start first talking about the open lab program at ITRI. We haven’t talked much about that. So could you tell us a little bit more about what this program is about?

25-00:18:14

Lin: Open lab. Yes. Well, I ask President Lee Teng-hui for support enabling ITRI to build labs. The old labs in the old campus mostly are small, old and rundown. ITRI needs expansion. Lee Teng-hui agreed that this is similar to

building infrastructure for education. The total budget was about 2.2 billion Taiwan dollars at the time, which, divided by thirty, would be U.S. dollars. It's not a small sum. I told Lee that we hope the government would provide this money, although ITRI is not in anyone of the national projects. I invited the President to examine the model and visit the site and argued that the future impact of this investment will be equal to a national project. There, I was speaking like a politician. And he agreed with me. He would find way to help to get the fund needed by working with the prime minister, who was Mr. Lee Huan, at the time. Knowing the president's support certainly made the job of the prime minister easier. We sent the proposal through the Ministry of Economic Affairs to the Legislative Yuan for the money to build the new ITRI central campus, now called Innovation Plaza.

And for the building. I showed you the picture, right? Part of this is for it to serve as a center for the various Labs in one location. I felt one of the problems with ITRI is that different branches have occupied different territories. I want communication, coordination, and people talk to each other. I want a place where all the different branches of ITRI technology experts can meet and rub shoulders. You have IC person talking to the computer experts, material scientists, chemical engineers, energy specialists, and so on, and then there will sure to see new stimulations. I also wanted to have a place that ITRI can talk to the industry, this is the open lab concept. At that point, people wondered about this. Why do you want to have industry people to come and work in ITRI? I say, "Well, not only industry people come to ITRI, but there are some projects from ITRI that are likely to be readily commercialized. They need a staging area." But at that point, they can still make use of ITRI's help, assistance. This is to actively incubate a new venture. At that time, this name incubator was not yet popular. I called it open lab. It's a lab where the technical people can also interact with commercial people right at the start. They can work with marketing, with manufacturing, with clients, and everything here. This is the open lab concept. We set out an area to house some twenty or thirty such projects in the open lab. People were curious about that. But I think now, as it turns out, it was developed to become technology business incubator—you understand the name incubator? Yes. It has become a very successful branch of the ITRI organization. This pattern was modeled by many others in universities, and in science parks. Certainly in Taiwan, but also some other places.

25-00:22:09

Hamilton:

And how many companies were involved in this? Industry.

25-00:22:13

Lin:

Well, I proposed this building, this complex, but I have not taken any office in it myself. I left ITRI in 1994 while the construction work is still in progress. But I think in the beginning, we have allowed for twenty to thirty laboratories and maybe twenty or thirty companies. And now, I think, finally that area expanded and it has roughly about a hundred companies at one time. And as

they grew up, they are allowed to stay there only for a few years, and then they have to move out to make the space available for new comers.

25-00:22:59

Hamilton: You said that other similar collaborative projects occurred in Taiwan. Did those become competitors for ITRI?

25-00:23:08

Lin: They are not competitors for ITRI. They may be overlaps in a particular area for a short period, but ITRI's philosophy is that if the technology is from ITRI, and if this technology is being implemented by the industry, then ITRI will strategically withdraw from that area in favor of the company. So we will not be competitors. But they're competitors in the sense that they will be in the same technology field, although with different focus. ITRI will not have a commanding position in that field because of these other players emerging. If you come back to thinking about ITRI's role, this is totally in agreement with ITRI's mission. ITRI is not intended to become a company, to be an industry by itself. The job of ITRI is to grow the technology so that the industry can take on with it and grow. I think in that sense, it is and it's not.

25-00:24:26

Hamilton: And you mentioned that the scientists were almost forced out after a few years. Where would they go?

25-00:24:38

Lin: You mean the company? Are you talking about the companies?

25-00:24:42

Hamilton: The scientists involved in the labs. And you had mentioned in a lot of different areas for ITRI that turnover was important to try and get new ideas into the company. And when you had this turnover, where did the scientists go after they left the open lab collaboration?

25-00:24:57

Lin: Mostly, they joined the company.

25-00:25:01

Hamilton: Oh, okay.

25-00:25:02

Lin: They join the company and become vice-president of the company or president of the company.

25-00:25:06

Hamilton: So the company that they were working with.

25-00:25:08

Lin: Yes, yes, that's right. That's right.

25-00:25:09

Hamilton: Interesting. Okay.

25-00:25:10

Lin: There's a lot of people movement. They join a company to help the company set up. But, in a few years they may grow and merge and be acquired and they become other companies, so there's a lot of movement there.

25-00:25:24

Hamilton: And would you say that most of the patents came through the open lab program at ITRI?

25-00:25:29

Lin: The patents? Well, patent issue is very complicated, but in general the philosophy is that—and we have to fight for that. Is that if there's a technology that developed by government funds and transferred to the industry, the patent is owned by ITRI and ITRI licenses that technology to the company. The company has to pay ITRI certain royalties or fees or something.

25-00:26:07

Hamilton: I see. Okay.

25-00:26:09

Lin: [They have to] choose some kind of financial arrangements. And this can be negotiated and it can vary from time to time and project to project, and field to field, product to product, and also vary according to the extent ITRI can support the projects. You see, one can take a recipe to bake a cake. Teaspoon of milk and teaspoon of sugar and so on. I'm sure if three people bake a cake on the same recipe, it would not come out the same, right. The process of doing it is important. I can transfer this recipe to you and to him, and so on, but that does not mean that you can necessarily make the best product. The extent that ITRI can continue working with you to make sure that the process is efficiently run and the product is tuned for quality, is a factor of success for the company. That's why we feel that people are important. Although we transfer the technology, we still encourage the company to hire our people to work on that project, and we advised the investor or the owner of the company, that you should treat the technical people well so that their future can be aligned with the company. And that's how we help people to move out of ITRI. I think this is a very productive and good way of people movement. Once these people move out from ITRI, then I have space for newer people to come in and I may be able to move into a new field. But the movement of people is voluntary.

25-00:28:04

Hamilton: Would ITRI be involved at all in helping these companies acquire funding, early stage funding for these new technologies? Or where would the money come from to fund these companies?

25-00:28:13

Lin: Well, most of these companies, have their own funding. One external source can be the government. The government usually does not provide funds directly. It funds new technology ventures through the bank. There's a

Taiwanese bank called Bank of Communication [later changed name to Jiao Tong Bank, then Mega Bank], which is basically a development bank. This bank managed the government funds for industrial development. It's to support industry, like commercial banks support commerce and trades. This Bank of Communication is to develop industry. Companies can get loans, can apply for equity participation with this bank.

25-00:29:02
Hamilton:

And so ITRI would not be involved in any of that?

25-00:29:05
Lin:

ITRI would not be directly involve in that. Government will not be really involved with that, either. This bank will manage the assets and so on, it's the bank's function. Again, this is a very important feature of the Taiwan technology development. If we're looking at the Hsinchu Science Park or there's some other park right now, government ownership is small. It's, I would say, maybe three or five percent as opposed to say China. You go to Beijing or Shanghai, I would say government ownership probably would be over fifty percent. That's why the Taiwan technology industry is more private sector controlled. I think the vitality's different. You don't want the government to run business. That's our basic philosophy. [Narrator's Note: I was appointed a director of the Bank of Communication, and later, an executive director. In this function, I provide policy and assessment of technology ventures to the Bank. My successor, C. T. Shih was also appointed a director upon my retirement at ITRI. Therefore ITRI's input to government funding is quite definite.]

25-00:30:03
Hamilton:

We've spent a lot of time talking about your involvement with ITRI, of course, and what I'd like to talk about is how that involvement brought you notoriety, and not for political purposes, but in your field. So I wanted to talk a little bit more about other positions you've held in Taiwan and China. So I understand that you were involved and were president with SAE Global. Can you tell me a little bit more about that? It dealt with circuit board manufacture and distribution.

25-00:30:35
Lin:

Actually, my involvement with ITRI is full-time. I have never taken any other job with executive responsibility while I was president of ITRI. I sat on the board for many other organizations or companies on behalf of ITRI or sometimes on behalf of myself. Just as a director of the board. For example, I sat on the board of the Bank of Communication because the bank, with the role of giving money to support the industrial development of Taiwan, the technology industries, they have to make some judgments as to whether this is the field or the time that they should be in. My directorship is only part-time. I sit on the board of directors of a specialty steel company, whose major funder is the Evergreen Group. They want to branch out into this area. Again, I sit in there because of my understanding of technology. They felt they need a

technology person. I sat on many of these, but that was never my job. After I left ITRI, I wanted to go back to Tsinghua University. [Narrator's Note: I served many times as Executive Director of the Chinese Institute of Engineers, President of Chinese Society of Materials Science, and, President of the SAE-China, and many others. All are honorary professional activities in my own capacity.]

I think there's an issue we did not talk about and if you want to talk about, I can. But this is an issue that is very sensitive. It has to do with my wife, and I think it's better to mention this today than tomorrow.

25-00:32:33

Hamilton:

Okay. When she's not nearby.

25-00:32:37

Lin:

I should like to say as reference of time, my second term as Board Director and President will come to end in mid-1994 when I shall have served ITRI for nearly twelve years. At this point, Ada was an ITRI Fellow and also served as Director of the Center of Industrial Safety and Occupational Health.

Ada is a classmate of mine in National Taiwan and then later on she went to Columbia and was trained as a biochemist and had her own professional career. She did research in many subjects, liver cirrhosis, enzymes and enzymology, and so on. Later on, she worked for the U.S. Naval Hospital in Philadelphia on liver related diseases and gradually getting into the field of industrial hygiene and occupational health. Quite naturally, sailors have an occupational health issue. They drink too much, right. And I think this actually brought her into fields of liver cirrhosis. When I went to Taiwan, she came with me and worked at the Academia Sinica, and later taught at Tsinghua University in pollution control and occupational health. When Morris Chang was president of ITRI, he asked Ada to come to set up a special program on industrial safety and occupational health. When I was made president, we became colleagues though not in a direct reporting relationship. Of course, everybody knows we were husband wife and we socialized together with many people.

I have two Executive Vice Presidents [EVP], right. One is Ching-tai Shih, who later become president of ITRI succeeding me. The other is Anthony Ku, who later become president of Kaohsiung First University of Science and Technology. I have recruited both to the positions. Between the two of them, CT takes charge of the IT related part: IC, computers, electronics, materials, optical electronics, and related areas. Anthony takes charge of machinery, automation, chemicals, chemical engineering, energy and resources environment, and safety. Ada was appointed Center of Industrial Safety and Occupational Health reporting to Anthony. She was very successful as a scientist and leader of the group. She was very well respected in the

professional fields. She was known as a person who speaks her mind. She was recognized as a pioneer for pollution control and industrial safety in Taiwan.

And then come 1993, there was an instance that happened in her Center. It has to do with staffs making errors in keeping records of the Center's contracts with the government and the industry.

As I explained previously, ITRI received funds for research from the government, and funds for research and service from the industries. And, sometimes for research-oriented projects, technical people can be assigned full-time to work on it and the record is relatively simple. But on service-oriented projects, most ITRI people are with mixed assignments, because every project need different kind of technical talents but only in parts. A technology specialist would be like a lawyer, working twenty percent of his time for client A, ten percent for client B, fifty percent for client C, and so on. So at the end of the day you have to tally how many percent of time you work for each project. This is the use of the time sheet. For ITRI, each organization is like that, each lab/center is like that.

In the Center of ISOH, there were clerks whose responsibility was to collect data from the professionals who at times, could be busy, grudging or tardy. The clerks were to do this every week and every month and tabulated the data and reported it to different clients and to the ITRI headquarters. The data would be used as a reference for time charges and also for management analysis. In this incidence, the head clerk has apparently altered some records or reported some un-authenticated data, not to enrich herself or anybody, but so that in the paperwork, she would appear to have good controls of the projects, as forecasted. This case was found through internal audit and was reported. Ada was director of the Center and should take responsibility. But she was not the person who worked on those projects nor was the person who supervised the clerks. But this incidence happened, so there's publicity. And it was sensitive because it involved my wife.

So what I did was ask Anthony Ku to set up a special panel to look into the facts and make recommendation on disciplinary measures. I thought this is the right way to do compatible with ITRI's management principle. We also have to give the individual and the professional involved "the respect" by first finding the facts before taking action. But Morris Chang thought differently. As chairman, Morris felt I should not take this route of action and should ask Ada to resign immediately, to limit any further publicity or damage. And I protested, "What grounds do you have to ask her to resign?" I mean, right at that point, the real cause was not clear. If you ask her to resign, then you're implying that there might be some wrongdoing on her part. That would not be fair or right. But the pressure was such that Ada finally resigned on her own initiative.

25-00:40:36

Li: Without having a panel review it?

25-00:40:40

Lin: The panel had confirmed that the discrepancy between what reported by the scientists and the engineers and part of the data did come out from the head clerk. But the head clerk *alleged* that she has carried out the work according to direction implying that the director knew what was going on. Obviously the negligence is to be shared by the levels of management involved. Some managers in the chain of command including the director of the center will have its share of responsibility. The Panel has recommended dismissal of the head clerk and various degrees of reprimand to the management including the Director of the Center. It's not an action that calls for resignation. Morris was not happy with this recommendation. And Ada was very unhappy and felt that she was wrongfully accused by a subordinate who wanted to cover her own faults, and, unfairly treated by the top management in the interest of expediency. I argued with Morris and wanted to pursue a proper course reflecting due process. He thought that I might be more sympathetic with my wife and risked possible adverse publicity to ITRI.

It was a very difficult position. That's why I think a lesson to be learned from this is to avoid a situation of having husband wife in the same organization and in close ranks. This is a matter, can be handled properly and swiftly otherwise under normal circumstance. But at that time, the political situation is complex in the Legislative Yuan—I was talking about the tension with the legislature—and I know some people would be trying to blow up this incidence. And I think perhaps that's what Morris Chang, to be fair, was thinking about.

Ada resigned. And shortly afterward, my second term as Board Director and President came up. The bylaw of ITRI says that a Board Director shall serve for no more than two terms. I have pondered seriously whether I should continue at ITRI in some capacity. Although I felt during my tenure of ITRI presidency, I have served the Institute well. Under my years of leadership, ITRI has advanced to a different level of accomplishment and gained worldwide recognition for its contribution. But every show has an end and this was probably the best time for me to take the bow. So I decide to retire and leave ITRI altogether. I decide to explore going back to Tsinghua after ITRI. At that time, the minister of economic affairs was Chiang Pin-Kuan [江丙坤], who has gained wide recognition in the later [recent] years for leading the cross-straits association in negotiation with Beijing, made inquiry if I would mind to work for an ITRI spin off company or a state owned company [presumably to be its chairman or CEO]. I said, "No, thanks. I wanted to go back to the academia." So I re-applied with Tsinghua and through the due process of evaluation in the University, I was offered as Professor of Industrial Engineering and Engineering Management.

And during this year of academic life, Ada could not come over from the unhappy incidence and the overall political situation in Taiwan was getting murkier by the day. There was daily confrontation of the Pan Blue and Pan Green. Worse still, I had sensed major political in-fights within the KMT factions. I thought the best thing to do is for me to leave Taiwan for a while. And then an opportunity comes up in Houston, the Westlake group of companies. They are looking for a senior vice president and chief technology officer. So I took the offer and move to Houston. It might be a detour of my professional life but was the best available at the time. The priority for me is to take Ada out of Taiwan in a more neutral and perhaps cheerful vein. That's why I left.

25-00:44:57

Li: Was your wife working for Tsinghua University while you were there?

25-00:45:03

Lin: At different times. She works for the Academy of Sinica one time and she works for Tsinghua, because we lived in Hsinchu. Later, she actually quit Tsinghua's job and went to ITRI, taking a full-time job at ITRI. When I was president at ITRI, I also taking some positions, concurrent with ITRI at the wishes of the government. It was helpful to be a platform to promote collaboration. Just like the Lawrence Berkeley National Lab here. Certain faculty members of U C Berkeley also hold concurrent appointment at LBNL. So these are the kinds of similar situations.

25-00:46:05

Li: So should we talk a little bit more, then, about your leaving of ITRI today and then we'll go back? So we can get that done today and then go back? Because I know that Emily has more questions about some of your time at ITRI. But should we just conclude now talking a little bit more about the—?

25-00:46:19

Lin: No, up to you. Do you want—?

25-00:46:21

Li: Well, maybe if you don't want to discuss this tomorrow. Would you feel more comfortable—?

25-00:46:26

Lin: No, no. I think if you want to ask questions about Ada, it's better that we talk about it today.

25-00:46:32

Li: Yes, yes.

25-00:46:33

Lin: Because she's still very unhappy. She felt that I did not support her adequately at the time. And I probably did not support as rigorous as I could, because of pressures from Morris Chang and K.T. Lee.

- 25-00:46:51
Hamilton: Did you feel like your work was done at ITRI? When you left, did you feel that the work you had wanted to do there was complete or was there a lot of motivation based on a personal need or desire to leave ITRI?
- 25-00:47:04
Lin: I think it's a job where you do well and you always have a question whether I should continue doing it.
- 25-00:47:17
Hamilton: But when is a good time to leave.
- 25-00:47:18
Lin: But the charter says that the director should serve no more than two terms. So I had served two terms.
- 25-00:47:30
Hamilton: So your time was done there.
- 25-00:47:31
Lin: Yes, I'm done with that. So I think I might as well. But my age was not retirement age, you see. At that time, 1994, I was fifty-eight or fifty-six. I forgot. I could have stayed a few more years as a researcher, as whatever, but I don't want to stay. I think it's not right. It does not feel good for me to stay there because of this instance. Otherwise I could have stayed, even though I may not be president.
- 25-00:48:05
Li: And did Ada want to return to the U.S., in particular?
- 25-00:48:10
Lin: At that time, she was depressed. She did not want to take any job in Taiwan. And I felt that the only thing I can do is to take her out of the environment altogether. That's why we come back to the U.S.
- 25-00:48:27
Li: And your children were in the U.S. already?
- 25-00:48:29
Lin: My children were in the U.S., all of them. Ann is already in Michigan.
- 25-00:48:35
Li: Already a PhD, already a Professor.
- 25-00:48:36
Lin: Yes, yes. And Gene already is in MIT, I think, or just finished Berkeley. And Dean, I've forgotten to mention. Dean lived with Ann to finish his high school at the time. So it's kind of natural for us to come to the United States. Yes. And this opportunity. The Westlake is a family company. It's in the petrochemical business which I was quite familiar with, fairly big, so I just took the offer.

25-00:49:12
Hamilton:

And you were only there for one year, is that correct?

25-00:49:15
Lin:

Only one year, yes.

25-00:49:16
Hamilton:

And did you know that going in?

25-00:46:18
Lin:

No, I did not know going in for one year. If I knew it was for one year, I probably would not take this job. I think you are very smart. Yes.

25-00:49:30
Hamilton:

It's a big move for one year.

25-00:49:31
Lin:

It's a big move, it's a big move. The reason I wanted to move—many people felt I should not move, and I should stay. In politics, one has to be used to ups and downs. But politics is not my priority.

25-00:49:46
Li:

Because you had built a reputation in Taiwan.

25-00:49:48
Lin:

I had built a reputation, I was good at Tsinghua, ITRI and everything. I think there's a lot of opportunities for me. But I feel that if I stay there, my wife's not happy. What am I going to do? I think I should get her out of that environment, in a nicer way. Professor S.S. Shu was very concerned about me.

25-00:50:21
Li:

Yes, before you left for Texas.

25-00:50:23
Lin:

He asked me whether I would think about positions in Taiwan and so on. But then that takes time to work out and then this offer come in, so I just took it. It was a family company. The father, Mr. T. C. Chao, a famous industrialist and two sons, James and Albert. They are working in polymers. Polyethylene, polypropylenes, vinyl chloride, PVC. They are very big in PVC pipings and PVC sheets and polyethylene films. Typical, just like Y. C. Wang who runs the Taiwan Formosa Group. Mr. Chao thought that I could help him in growing his business. I said, "Well, what can I help you with your business?" He said he was interesting in diversification. Then I said, "Well, if you want to diversify into different technology, then perhaps I can help you." So I was chief CTO and senior vice president. I went to the headquarters in Houston and pretty soon I found that our ideas of diversification were quite different, really. Mr. Chao was himself experienced in the petrochemical business and has the right mind-set of working in bulk chemicals. He was very good at process efficiency and the economies of scale. Your see, for Polyethylene, one

batch is like, say, a million pounds, and of course, if you can make one more cent out of a pound of PE film, that amounts to a ten thousand dollars more profit per batch. I was more in tune with the business of innovative IT technologies and added values. More importantly, what I talked about all would require making major investments with unknown risks.

[Narrator's Note: Actually I have known Mr. Chao since 1979. I had invited him to be a member of my NSC Task Force on the development of polymer science and technology in Taiwan. However, our paths did not cross on the ensuing years because he has moved his business to the U.S.A. from Taiwan. We have many common friends especially I was a director of the CTCI Foundation which served as a common forum for people in the petrochemical businesses.]

In Houston, 1995, that was the year Netscape became public. I wanted to get into the Internet area, that kind of thing. But the company wanted me to go into its two or three plants in the mid-Western States making PVCs and two in Lake Charles, Louisiana in making polyethylene, all for process improvements, and the like. I can do it okay, but there are many others who can do better. And actually, I'm bit weary of the politics in the business world, family business included, and was thus more interested in going back to the academia. In a discussion with James Chao, we agreed that we should part then with mutual respect and understanding.

Almost at the same time, I had gotten a letter from an old friend, Prof C. C. Hang, who was vice-president of the National University of Singapore, inquiring if I would be interested in going to NUS I said, "Well, doing what?" He said, "Doing whatever you want to do. You just have your office here and give us a few lectures and give us advice as needed." Well, over the years at ITRI, I have come to know the new leadership of Singapore including BG Lee Hsien-Long, his wife Ho Ching and EDB Chairman Philip Yeo and SISIR CEO Liew Mun-Leung and others. Singaporean friends have visited Taiwan quite frequently and were interested in the ITRI operations. Therefore I understand their constant interest in establishing a national innovation system to boost its economy. On the personal side, one of my uncles, mother side, had migrated to Singapore years ago, married and has a large family. Therefore I have a very good feeling with Singapore.

Li: So you had colleagues in Singapore that you knew?

25-00:54:22

Lin: Yes. So that's why I went to Singapore. After a year in Houston, then Singapore.

25-00:54:29

Hamilton: To be clear for the tape, NUS is the National University of Singapore.

25-00:54:33

Lin: Yes, National University of Singapore, yes. It was a joint appointment between the Faculty of Engineering and the Faculty of Business Administration. I was reporting basically to the vice-president of research, CC Hang. I was really associated with the newly established research center, the Center of Management and Technology. It fits very well for me.

25-00:55:03

Li: And was Ada happy to go to Singapore? Was she—?

25-00:55:06

Lin: Ada also went to Singapore. Ada took up a position in the School of Community Medicine, because of her qualification in occupational health. Community Medicine is also big there. So Ada was also taking a full time job.

25-00:55:26

Li: And did she know people in Singapore, as well? Like was she happy to go to Singapore?

25-00:55:30

Lin: Well, she was not certain as to what will happen in Singapore, but she felt that perhaps there's an opportunity for her to return to professional work.

25-00:55:41

Hamilton: Was she working in Houston?

25-00:55:41

Lin: Hmm?

25-00:55:42

Hamilton: Was she working in Houston?

25-00:55:43

Lin: No, she was not working in Houston. No. Well, we were just moved in. We bought a new house and then this opportunity come to me relatively rapidly. Although we could have stayed in Houston for other things, but I thought that it's better for me to move.

25-00:56:08

Hamilton: If we could move back just for a second. I'm interested in whether or not you were actively looking for a job when you got the offer from Westlake or if this opportunity just came at a time—

25-00:56:19

Lin: I was not actively looking for any job when I left ITRI, because there is only one place that I wanted to go which is Tsinghua University. It was not automatic that I can return to Tsinghua for full-time engagement. Like I heard about Henry Kissinger, going back to Harvard after all those years in Washington DC was not really a given. But I explored with the president of Tsinghua, C. S. Shen, who was Dean of Science while I was Dean of Engineering, and we became good friends. CS explained to me the long

process of academic appointment, as if I don't understand. I said, "Well, you take no position for my case now. I'll make application with the Department and the School. If the application gets through the stops and come to your office, you just make decision on the recommendation of the dean." I went through the entire process and was appointed as full Professor at the School of Engineering. I wanted to make sure the process, which the former dean has helped established actually worked. And then I went back to Tsinghua. I did not apply for any other position. My association with Tai-power and the Chinese Petroleum went back a long time and my joining the management of either would be quite natural, if I would. But I wanted a change of career, and farther away from the current politics the better.

[Narrator's Note: I was director of the Board of Tai power company when I was ITRI president and was an advisor to the Chinese petroleum company on many occasions. I was familiar with the business and the personality. But these are basically state-owned companies and their budgets have to go through the Legislative Yuan with the same group of people. I want to have a change. So I did not actively seek other job opportunities right then.]

The Westlake opportunity came as a surprise. Although I have known the senior Mr. Chao since the late 1970s, but we had little contacts save mutual friends. I was an executive Director of the China Technical Consultants Foundation where good friends K. C. Wang and Sam S. F. Tung have kept me posted with T. C Chao. Undoubtedly, TC would also know the latest development of ITRI through them. It was Paul C. W. Chu at the University of Houston who conveyed Mr. Chao's interest in discussing with me about the Westlake Group.

Begin Audiofile 26

26-00:00:04

Li: This is Robin Li and Emily Hamilton speaking with Otto Lin at UC Berkeley. It's March 26, 2009. This is tape number twenty-six. So Emily, did you want to return to some of your questions about the time of ITRI?

26-00:00:21

Hamilton: Yes. That's probably a good—

26-00:00:23

Li: And then we'll come back to NUS later on.

26-00:00:25

Hamilton: I understand that you were involved with the Chinese Society for Material Science?

26-00:00:28

Lin: Yes, yes.

26-00:00:31

Hamilton:

And could you tell me a little bit about how you got involved with that to start.

26-00:00:35

Lin:

Oh, that was kind of natural. Being the director of the Material Research Lab, the newly founded national lab in Taiwan, I was very active in promoting material science. So the material science community, academia and industry, welcomed me heartily. I interacted with local material scientists on a daily basis with regards to the national project and MRL itself. I also knew a lot of material scientists from the United States and elsewhere. I have arranged for my people to go to UC Berkeley, MIT, Hitachi, and many European Institutions for research and training. So I was very well known in the materials community in Taiwan. There is a material science society in Taiwan, which is an established professional society, and I was elected president, so that's how I'm involved. I should add that my time at MRL was the best, most fulfilling, period of my career. Being the materials lab director allows me to keep abreast with science and to work with scientists a lot. I would say at that time, probably my time is 50/50, fifty percent on science, and fifty percent on administration and policy matters. I learned stainless steel technology, which is very important now. I learned advanced materials. I made new friends with James Li, Paul Chu, Morris Cohen, Mert Fleming, Garreth Thomas, and the like. As my work in MRL starts, I also get to know many Japanese scientists, especially Hiroshiki Suzuki of Tokyo Institute of Technology. And because of this international network—Lee Teng-hui was very impressed with me. Lee read Japanese and spoke Japanese and a lot of times I would bring new Japanese scientists to Taiwan. Japanese are very good in applying materials technology, so Lee Teng-hui would have added opportunities to learn about the newest development in Japan. So I think this all helped to build my reputation in Taiwan. So I was elected the president of material science, the Chinese Society of Material Science.

26-00:03:17

Hamilton:

And was this an academic organization, or was it involved in production at all?

26-00:03:24

Lin:

No, the Society was a professional society. It was a place where scientists from academia, industry, research and government meet and discuss. It's like American Chemical Society, American Physical Society, basically like this.

26-00:03:46

Hamilton:

Where was the place?

26-00:03:48

Lin:

It does not own a building to itself. It is a more virtual but with good organization. Actually, in the past, the Chinese Society of Material Science

has traditionally been run by—in the first period, the National Taiwan University and later The Chung Shan Institute of Scientific Research, which is a national defense institute, perhaps like the Sandia, or Los Alamos National Labs. And after I become the director of the MRL, we took over the organizational matters. The community likes to move the CSMS headquarters at ITRI instead of the defense institute. I spent quite a portion of my time on CSMS. We published a good quality scientific journal and held annual meetings. In the first annual meeting that I attended, you might have presentations of twenty papers, I guess. Now any meeting will have several hundred good quality papers. We also published a journal called Material Chemistry and Physics, which is now circulated worldwide, and is also fairly popular. As CSMS goes, this is a high quality engagement. And one aspect of this is that it brought me to interaction with the material scientists in the Chinese Mainland.

At that time, there is a society in the U.S.A. called Materials Research Society, or MRS, for short. MRS is an organization based on academia people in the United States. The president was Professor Philip Chang of the Northwestern University. Philip was previously with Bell Lab before he moved to Northwestern, which has a very good material science department. I was interested in forging a platform worldwide for material scientists in Taiwan. As you know, material science was very advanced in Japan, in the United States, in Europe, and after many years, it was felt appropriate for MRS to globalize. Philip came to me and said, “now that you are president of CSMS, why don’t you join MRS as a chapter, and call it MRS-C.” I certainly welcomed that. But at that time, China also has a large group of material scientists, metallurgists especially. And the largest scientific organization is the CAS, Chinese Academy of Science, which runs many material science laboratories. There is a society in Beijing pretty much like CSMS in Taiwan. The materials science society in China was then chaired by a Professor Lee Heng-de. Again another Lee, of the Tsinghua University. And the Chinese society also wanted very much to become a chapter of MRS. So it is a matter of how to get the two sides to settle on the issues of joining MRS on equal terms.

26-00:08:04
Hamilton:

What was the opposition to that?

26-00:08:06
Lin:

They don’t want us to join under the name China. They felt the Chinese group has a legitimate claim to the name China. So after two or three years of behind the scenes discussions and negotiations, we finally settled on a formula which is forming a subsidiary under CSMS to join the MRS. This CSMS subsidiary will be called MRS-T. Thus MRS becomes globalized by setting up chapters worldwide: MRS-J [Japan], MRS-C [China], MRS-T [Taiwan], etc. These chapters are formed not by country, just by major locations of scientific

activities. In Germany, I think there would be two or three MRS, but I forget their names.

26-00:08:58

Hamilton: Just to be clear, it's the inverse relationship. Instead of having the Chinese society be a chapter of MRS, now MRS is setting up chapters elsewhere?

26-00:09:07

Lin: Yes. So have chapters in China and chapters in Taiwan. So we'll call it MRS T and MRS C.

26-00:09:16

Li: That's interesting, too, since they're regional designations and not necessarily recognizing Taiwan as a country.

26-00:09:22

Lin: Yes, well—

26-00:09:22

Li: Where by saying MRS Taiwan, it's not—

26-00:09:25

Lin: Well, you see, I told him that we are talking about this scientific society and professional society formed for the public good. We are not interested in politics. So the solution is not ideal, but acceptable under the circumstance. The political path is to set up international union closely related to the United Nations, and then you have national membership. But then it might not be scientific or professional any more. Our societies are non-governmental. I think this how it was settled finally. MRS forming chapters in China, call it MRS C and forming a chapter in Taiwan, call it MRS T. So CSMS is not a member of MRS and the Mainland r society is not a member of the MRS either. This was an example of how simple scientific activity matters can get complicated in the international politics. My role was really complicated. On the surface, you have this man, Otto Lin, speaking for one China, but then in an other place, he will be speaking for two but equal entities. Life is full of irony.

26-00:10:27

Li: Right. We should have two.

26-00:10:30

Lin: Okay. May I speak about a similar one?

26-00:10:33

Hamilton: Certainly.

26-00:10:34

Lin: It's the Asia Pacific Confederation of Chemical Engineering. I was president of APCChE and it took about fifteen years of work, for now, for APCChE to have both China and Taiwan as member societies. I have long file on that.

26-00:11:01

Li: Do you have some questions about that?

26-00:11:02

Hamilton: I do.

26-00:11:03

Lin: Oh, okay.

26-00:11:06

Hamilton: You'll need, of course, to tell me a lot about this. But before the Confederation, the global chemical engineering community wasn't unified. So was this a founding mission of the Confederation, to create a space, whether it's virtual or not, but to create a space, to have a community?

26-00:11:29

Lin: For the APCCChE? Well, again, APCCChE is a professional organization. It was established to promote chemical engineering, to improve chemical engineering for the benefit of the people, recognizing that there are pollutions, hazards, and other un-intentional effects coming out from the chemical industry too. There is a need to promote the advancement of the science and the industry and so on. It is natural, I think, that an organization wants to become global or at least become regional. Did I answer your question here?

26-00:12:06

Hamilton: Yes, I think so. And you actually brought up one of my other questions. The Confederation is aimed at promoting human welfare through science.

26-00:12:18

Lin: Yes.

26-00:12:19

Hamilton: And I'm interested in your comments on that, because that's central to your own values, to ITRI's values. How do you think that this contributed to the work of the Confederation?

26-00:12:33

Lin: Well, I think these are complementary. My work in ITRI is basically to promote the economy of Taiwan. It tried to improve the industrial technology level, to make it more efficient and effective use of the resources and making Taiwan a better environment. That's my mission of ITRI in Taiwan. When I participated in APCCChE, you look at this now, chemical engineering in America is, in a way, not a growing industry, because of people's perception about its effects on the environment and so on. In Europe, chemical engineering is looked at similarly. But it is very much a growing sector in Asia Pacific. Chemical engineering is the source of clothes, foods, shelters, transportations, everything. You cannot live without chemical engineering. So I think it is a natural tendency that we wanted the environment to be improved, or not to have detrimental effects to the environment in the Asia Pacific. Secondly, we want to be able to compete for the industry in that area

with the advanced countries: the United States, Europe, Germany, UK, and so on. I think it is a mission or vision for the regional chemical engineering society, wanted to group and to discuss and to talk about issues of common interest to that region.

26-00:14:22

Hamilton:

So you would say that the mission for promoting human welfare through science and technology is secondary, that that comes after an economic development?

26-00:14:34

Lin:

I would say yes. I would say most of this society, this professional society, wants to promote their trade, promote their science. And to do that, you have to think about what can you help the society? What good can you do to society? The society is a platform. You do things to help the development of society.

26-00:15:05

Hamilton:

And you were president of this organization. When did that begin?

26-00:15:10

Lin:

I was president of that organization because I was involved in the Chinese Institute of Chemical Engineering [CICChE] in Taiwan. The China Technical Consultant Foundation that I talked about earlier has been a major supporter of the CICChE. And the Confederation takes turns—every two years—to hold its conference in the Asia Pacific region. Actually, that one's every three years, at that period, running a regional conference in each of these places. And it is to be managed, organized by the members of the Confederation. And one of the conferences was to run in Taiwan and—

26-00:15:46

Hamilton:

Was that in 1996?

26-00:15:47

Lin:

1996, yes. 1996. Yes. It's very interesting, because I actually left Taiwan at the time I was president. I have started preparation for the meeting. So that's why I was president of the Confederation. Now, I have worked about fifteen years for APCCChE to accept both the Chinese Institute of Chemical Engineers, CICChE. The counterpart in America is AICE. American Institute of Chemical Engineers. Or the German or the Japanese or the Philippines. They're called IChE and then with the country's names. It was denoting China or whatever. So CICChE, at that time it was about a fifty year old organization in China and then moved to Taiwan in the late 1940's. In China, Mainland Chinese, their organization do not call CICChE, they're called CIESC. Chemical Industry and Engineering Society of China. CIESC. Before I was president, we always talked about how to get—CIESC to join APCCChE. But take note now CICChE is a founding member of APPCE. The members of the society, the Japanese, the Korean, the Singaporean, Australian, always have an interest to bring China into this, [since it is] a major economic power. Chemical engineers,

there's a lot of chemical engineers working in the Mainland China. How can you [be called] Asia Pacific, APCChE, without the membership of China, Mainland China? I also recognized that. I said, "Well, okay, let's bring the CIESC in." But the condition of CIESC to come in is that the Chinese Society, CICH in Taiwan has to be out or to change name.

26-00:18:17

Li: Because they can't be China?

26-00:18:18

Lin: Unless you change names, they don't want to come in. So this job—

26-00:18:27

Li: This is a recurring problem, huh?

26-00:18:28

Lin: It was a problem. It was starting from the APCChE conference in Melbourne. Well, I could leave this for you, if you want to read it. But I think this, again, is another aspect of my professional reputation in the region. Is that I finally have to help change the charter of APCChE. Okay, it starts from the 1990s. On the fifth conference of APCChE congress, the China—can we bring China in? was formally on the agenda. And finally, a success. It was successful, but not until 2003.

26-00:19:34

Li: So it took thirteen years?

26-00:19:35

Lin: Thirteen years. And then China, 2008, this year in October, the organization, APCChE held its conference in China, in Dalian, it's 2008. Now it's become a full-fledged member. Like all the other members, they are doing the application, the responsibility of holding a conference for all the member societies and so on. It starts from 1990 and a key point is 2003 and then 2008. About eighteen years work. Basically, the Singaporean, the Australian, Korean, Japanese chemical engineers did not understand the complex nature of bringing Taiwan and China together. Basically CIESC said the society from Taiwan has to take the word "Chinese" out of their formal name. But Taiwan say, "Well, why do we have to change our name,—we are a Founding Member." It was deadlock. In 1993, I was president of APCChE and everybody in the Council said, "Otto, the only person most likely to get this settled is you," so I was taking it upon myself to work on this issue for APCChE.

One time I went to Beijing, I met with the minister of the chemical industry. The basic situation is that all the other member societies of APCChE are professional, non-government organizations. But CIESC in China is a government organization. They are supported, they are run, they are staffed by government. They listen to the government for what they do, so they cannot make decisions on their own. One time I was taking an opportunity in

Washington. I made an appointment to meet Mr. Pan Lian-sen [潘連生], president of CIESC who was also in Washington, DC. I asked him to a private lunch meeting. I explained to him the nature of CICHÉ, the Chinese Institute of Chemical Engineers and how it was run. And the name Chinese—I said, “Well, Chinese does not mean Republic of China. It means Chinese, meaning that the members are mostly Chinese. The language basically is Chinese. The culture is Chinese.” Mr. Pan was vice-minister in charge. I said, “Today we have lunch in this Chinese restaurant. It’s not a ROC restaurant or a PRC restaurant.” I said, “We receive no money from the government.” Actually, everything is by donation or through membership. And, of course, we have institutional membership, like ITRI, like the university, Taiwan University, Tsinghua University pays a membership fee, but these are all membership fees, and companies pay membership fees. This is how CICHÉ was sustained. We do not represent the government. We have no government position to make. He said he now understood and would present the case when he returned to Beijing. This was really the early 1990s, 1992-3. I pleaded with him to explain the fact that CICHÉ is not government, just professionals.” He understood. He went back to talk to the Beijing government. He said, “Now, we have to find a way to do this.” Because they cannot make a decision on their own. They have to listen to the Ministry of Foreign Affairs and the State Council which makes decisions on all these matters.

I came back to APCChE to say, “Well, okay. Perhaps we should define and clarify the membership of the APCChE. It’s not based on nations, but based on professional society in the region. And the full members of the society of the APCChE are member societies in the region. These are full members. And any country can have more than one full member. And, of course, if any country have ten societies all want to have full membership, the APCChE membership committee will look at the applications to see if they are operating professionally as defined. Whether they have membership, whether they are promoting the science, promoting the technology, all that kind of things that we expected member should do. So the membership committee will study and select. But overall, the membership is society based, not country based. The member does not represent countries. Also, one country can have many societies representing. I also talked to the Taiwan—the CICHÉ. I was no longer president at the time. “Well, can we make some compromise here?” They finally said, “Okay. We will still like to be called CICHÉ but the entity to join APCChE can be called Chinese Taipei Institute of Chemical Engineering.” Ironically, this name to me reads awkwardly but the present Council of CICHÉ felt Okay.

I wanted to read this to you, because the Chemical Industries and Engineers Society of China, CIESC, has accepted the invitation to become a member of APCChE. Upon its full admission, CICHÉ, a founding member, has agreed to change its name registering in APCChE as the Institute of Chemical Engineers- Chinese Taipei. It’s a concession there. And by acclimation, the action was approved. I at that time was no longer president of APCChE. But I

was a honorary member of APCChE and put efforts on both sides. In reality, The CICH in Taiwan also wanted the Chinese to come in because that way they can get access to the Mainland Chinese colleagues there in scientific discussions, in promotion of the science and technology, and also working with the industry. It's mutually beneficial. They are looking at it pragmatically. As they say, the Olympic model, right. Olympic games. Chinese Taipei, so they accept and everybody is happy.

Dr. Cheng at that time was the president of CICH. He made the following statement on behalf of CICH. One, CICH welcomes CIESC to join APCChE. In order to express its good will and sincerity, CICH, through the approval of its board of directors, agrees to change its registration name in APCChE to Institute of Chemical Engineers Chinese Taipei. I think CICH in this case, is like many industrial private organizations that change their names from time to time, Exxon Mobil, Morgan Chase, etc,. You can trace back to their names, they all make changes.

26-00:27:51

Hamilton: And what's the document that you're reading from? What is that?

26-00:27:53

Lin: I'm reading from the minutes of the meeting of the council of the Asian Pacific Confederation of Chemical Engineering.

26-00:28:00

Hamilton: And what's the date?

26-00:28:02

Lin: 2003.

26-00:28:03

Li: 2003.

26-00:28:07

Lin: And also, number two, the statement from Taiwan is APCChE is an international professional organization for the benefit of chemical engineering education and professional development. It should not be involving any political issues. Number three—

26-00:28:22

Hamilton: That statement was made right after the first one? Where they talked about changing their name?

26-00:28:27

Lin: Yes. Also I have to save face, right.

26-00:28:32

Hamilton: It seems like a lot of your career at this stage is this very delicate balancing act of trying to promote science and technology through sort of this minefield of politics between the PRC and ROC.

26-00:28:47

Lin: Yes. I tried to ease out the political issue, to bring both sides together. Similar to the MRS effort, for example, this is a major example, because it takes many years to accomplish. And finally, there's a paragraph here. The president stated that many had played a role in bringing CIESC into APCChE and expressed formal appreciation of the efforts from Australia, and in particular the efforts of Professor Otto Lin.

26-00:29:16

Li: This was a major career accomplishment.

26-00:29:20

Lin: I get no pay or anything from that. Did not even get a medal.

26-00:29:25

Li: But you get a mention in the minutes.

26-00:29:30

Lin: Yes. But at that time, I was an honorary member of the APCChE, so it was my job to help the organization. And in this Dalian meeting of October, 2008, I was invited to give a speech and so on, and people recognized—the chairman said, “Well, Professor Lin is one who contributed a lot for us to be a member.”

26-00:29:56

Hamilton: But still no medal.

26-00:29:57

Lin: Huh?

26-00:29:58

Hamilton: Still no medal, though.

26-00:30:00

Lin: Yes. No medal!

[Narrator's Note: Around the 2004-06 time frame, the CICH in Taipei has formally changed its name to Taiwan Institute of Chemical Engineers. I was in Hong Kong and did not know about it, otherwise I would have lodged a strong personal protest to it. This happened in the height of the DPP rule in Taiwan. Chen Shui-bien was busily engaging in promoting for Taiwan's separation from China. In changing the name “China” to “Taiwan” would make good politics with the DPP! If CICH were to give up its name 15 years ago, then all the hassle with regards to APCChE would not have happened? On the other hand, is this really what CIESC, or China, would like to see happen? Who is the culprit of “one China, one Taiwan”? Such is the tragedy of time and the irony of life.]

- 26-00:30:02
Li: This story is similar in some ways to the Chinese Academy of Sciences, in terms of the bridge building that you—?
- 26-00:30:07
Lin: Yes, I'm building bridges. I am building bridges for the two sides. And that's what I did. And I think we did not talk about the major subject of bringing the Chinese Academy of Science president Zhou Guan-Chao to come to visit Taiwan.
- 26-00:30:24
Li: Right, yes.
- 26-00:30:26
Lin: Did we talk about this?
- 26-00:30:26
Li: No, we haven't. Not yet. Yes, let's take some—
- 26-00:30:28
Lin: I think that is something that we should talk about.
- 26-00:30:31
Hamilton: Before we move there, I'm interested in what the APCChE, how they were involved with promoting education and whether this was one of the missions from the very beginning or if it was after the Mainland China involvement.
- 26-00:30:46
Lin: No, no, it has been that way all the time. It has been that way. I must say, it was a good society. The Australian has done a wonderful job promoting APCChE. The headquarters of APCChE is in Australia.
- 26-00:30:59
Hamilton: Yes, I saw that.
- 26-00:31:00
Lin: Yes. And I should mention and recognize the effort of a key person, Professor Rolf Prince of Sydney University. He's a member of the Royal Society, MRS England, and is a statesman in chemical engineering. And he was my predecessor and he said, "Otto, if anybody can bring the Chinese in and the Taiwan group in, you are the person to do it." So I felt I have no excuse. That's why I mention Australia, because APCChE have its headquarters in Australia.
- 26-00:31:44
Hamilton: What types of practical things were done to improve education?
- 26-00:31:46
Lin: Well, many things. Like any society, it was to run meetings, publish journals. In this case, APCChE did not publish a journal, but by holding biannual meetings—every two years. Bi-annually, right.

26-00:32:09
Hamilton:

By education, do they mean education of professionals in the field?

26-00:32:14
Lin:

Professionals in the field, chemical engineers in the field. Like, for example, we talk about curriculums. Whether chemical engineering department should be run like this. UC Berkeley has chemistry and chemical engineering together. You call it a college, with chemical engineering. In many other places, chemical engineering is combined with others, like with material science department. Northwestern, for example. Minnesota, for example. And I think in my university, at HKUST, chemical engineering now, the department of chemical engineering is called the department of chemical and bio-molecular engineering. CBME. We talked about curriculum issues, we also talked about technology issues for the industry. How to control water pollution, industrial waste, air, carbon dioxides. How to achieve carbon economy, that kind of thing. These subjects we talked about. And also, there's a world chemical engineering congress that runs every four years. They change from one continent to another in the cycle—from Europe, managed by the EU Chemical Engineering Society and to America, by AIChE, and then to Asia, by APCChE. They take turns. These are the three organizations worldwide for that, so they are promoting education, promoting education, promoting the science.

26-00:34:09
Hamilton:

Would you be able to compare both the organization and your involvement in the organization? Make a comparison between the CAS, the Chinese Academy of Sciences, and the APCChE?

26-00:34:26
Lin:

CAS and—?

26-00:34:28
Hamilton:

And the Asia Pacific.

26-00:34:30
Lin:

In ITRI?

26-00:34:30
Hamilton:

Yes.

26-00:34:31
Lin:

Oh, okay.

26-00:34:31
Hamilton:

No, the Asia Pacific Confederation.

26-00:34:34
Lin:

Oh, okay. I think it's different. The APCChE is limited to chemical engineering. Just chemical engineering. It takes membership from different countries, member societies in different countries. The CAS—a better

comparison is CAS with ITRI. CAS's name is Chinese Academy of Sciences. There are many organizations called Academy of Science. The National Academy of Science in America, NAS. There are many members in Berkeley, faculty are members. NAS and NAE, National Academy of Engineering in the United States, these are honorary organizations. They do not have an entity that runs laboratories and so on. But CAS, it's a national Chinese Academy of Science. It's an honorary society, but also a real entity. Because under CAS, there are about forty some institutes. Institute of Chemistry, Pure Chemistry, Applied Chemistry, Institute of Physics, Applied Physics, Semiconductors, Anthropology, Biochemistry, and many others, like modern history.

26-00:36:11

Li: So it's not just science?

26-00:36:13

Lin: Well, I think not history by itself, but I think it's like a science history or something. And the Institute for Anthropology, which is very important in China, history of geological survey, geology, geochemistry. There are about forty institutes like this all over China.

26-00:36:38

Li: How old is the organization?

26-00:36:40

Lin: The organization was established in the 1920s.

26-00:36:47

Li: Oh, so pre-civil war.

26-00:36:49

Lin: Yes, before the war, or before the Chinese and Japanese war.

26-00:36:54

Li: So before the PRC or the ROC?

26-00:36:57

Lin: Oh, it was run by ROC. It was in the ROC time. The original name is Academia Sinica in Chang Kai-shek's time. It existed. And then in 1949, Chang Kai-shek moved to Taiwan. Once they are in Taiwan, he set up Academia Sinica in Taipei. In the meantime, some members remained in the Mainland. Mao Zedong preserved the organization and actually kind of expanding it to become CAS. Of course, CAS, which is the original name in Chinese, and the name Academia Sinica has its origin in Latin, sounds weird to many. But they kind of having a real entity, a physical body of research in Taiwan. So there is Academia Sinica and CAS, one in Taiwan and one in China. But these two organizations are not compatible, really. Academia Sinica also has institutes, was a real academia. It has academia of history and language and so on. And it has researchers and so on. But basically it is dedicated to doing research, supposedly basic research. The CAS in China was big. Ten thousand people, probably. More than ten thousand people, it is

more like 100,000 people counting the staff and researchers, together, 100,000 people. Twenty percent of them do basic research. I would say sixty percent of them do industrial research and twenty percent are industry related. This is the CAS in China. In ITRI, very little basic research. Basically, it's a small organization in comparison to CAS. But ITRI focused on applied technology research. ITRI does not own companies but does have close collaboration with the industry. So that would be about twenty percent of our work. These two organizations lay side-by-side, are more compatible.

After 1989, when Chiang Ching-kuo, before he died—no, I'm sorry, 1988, before he died, Chiang Ching-kuo made several major policies. One is to allow the veterans to return to China, to visit China. That's very important, so that there's some channel of direct communications, at least for certain group of people. And also certain companies are allowed to invest in China. Because Taiwan is very small, with very little resources and the market is small. They have to get access to cheap labor. Previously people in Taiwan moved to Vietnam, to Philippines, to Costa Rica, to South Africa, and then the people say, "Well, why not China, Mainland China?" So Chiang Ching-kuo allows certain low-tech industry to go to China. That's very important. As soon as this became publically recognized, I encouraged my senior people to visit China. This applied to all the branches in ITRI: chemistry, IC, computers, machineries, materials, safety, pollution, etc. Quickly, they all have identified their counterparts in China to work with. At this time, Lee Teng-hui has become President of ROC.

For some reason, I was given an award by the Third World Academy of Science: Award in Technology. [Narrator's Note: The citation credited my work in developing composite materials technology and in leading technology transfer to benefit the society. See Appendix 23.]

I went to Trieste, Italy in the autumn of 1992 to receive this award and met with President Zhou Guan-Chao of the CAS. We took advantage of the occasions and compared notes in developing technologies. And I invited him to visit ITRI. I said, "Our people have visited your people and laboratories. I have not been to China, but my colleagues have been visiting and found much interests in yours." He said, "Okay, I would like to come." Afterwards arrangements were busily carried out for his visit. Finally they came in March of 1993.

Now, at that time, preparation for this visit was very complicated and sensitive. Professor Zhou was the top leader of PRC in science and technology. He was also holding a very high position in the Chinese Communist Party. And when he came, he brought—brought twelve members of CAS/CAE with him.

The logistics of the trip was rather formidable. At that time, there's no direct communication, supposedly. As expected, they need a permit to enter Taiwan.

I have to take personal charge to make visa application for them with the Mainland Affairs Commission in Taipei. At that time, the Chairman is Mr. Huang Kun-hui [黃崑輝] who is a confidant of President Lee Teng-hui. And he said, “Dr. Lin, how can I allow these people to come in? They all are scientists holding leadership position. And besides, Professor Zhou is a member of the National People’s Congress. What can I say on what ground I can let him in?”

Luckily, right around this time, Lee Teng-hui has pushed through the “Guidelines for Unification of the Nation” and has publically expressed a willingness to follow the Guideline in promoting mutual understanding with the Mainland.

26-00:43:52

Li: Lee Teng-hui is 1991?

26-00:43:53

Lin: Lee Teng-hui, yes. And there are three steps or three phases. Phase one is to promote visits and communication between the two sides. Phase two is find ways to collaborate on actual programs. Phase three then is to enter into discussions on reunification. I said, “Well, we just made public proclamation of this guideline. How can you not do anything to support it. You’re supposed to lead the efforts. I was simply helping you to do something MAC wanted to do anyway.”

26-00:44:20

Li: This is phase one? Would this be—?

26-00:44:21

Lin: That’s phase one, was only the phase one. And he is coming as a scientist. He’s not coming in the capacity of the People’s Congress. And so, of course, Huang sought the approval of Lee Teng-hui. In hindsight, I should have talked to Lee Teng-hui myself. But Huang’s relation with Lee was very intimate, much closer than Lee and I. It was quite well know that Huang was considered an alter ego of Lee. A few years later, when Lee was expelled from KMT, Huang set up a third party, called Taiwan United Party and had invited Lee to be its only Honorary Chairman.

26-00:45:15

Li: Right. Very close.

26-00:45:17

Lin: They are very close. I should have talked to Lee Teng-hui myself. But Huang had apparently reported the visits of Zhou and the group to Lee. And around that time, my relationship with Lee Teng-hui was very good. I spoke up for Lee in the National Assembly and promoted the Constitutional Amendment which I also advocated for Lee. I wanted people to support Lee, vote for him, that kind of things. I told Huang that I trust President Lee would support this visit and he should find a way to do it. So Huang came back to me and said,

“Well, we have to find a way to do it[meaning, some justification to fill the blank in the application approval form.]” I said, “Well, first of all, CAS is a honorary professional society. They are all scientists. And when they come, they would be talking about science, not politics. Neither will we. There will no signing of agreements or contracts or MOUs. And as to his membership with the People’s Congress, it is a fact. Yes, but that Congress is a part of the Chinese Communist Party.” I said, “Just like the DDP which is a political party, the CCP is a political party.” Several years ago the DPP was considered a rebellious group in Taiwan. After this democratization process started in Taiwan, DPP was recognized as a social, non-government organization. In a way, I said, the CCP can perhaps be treated as an organization of the society, just like DPP.”

26-00:47:04

Li: It’s just a very brazen argument to make. The Communist party, they’re not political, they’re just a social organization. Did he believe it?

26-00:47:14

Lin: Well, he finally issued the permit.

26-00:47:20

Li: That’s great.

26-00:47:21

Lin: The permit came through from MAC. I never told people about how this was negotiated, this is my first time here.

26-00:47:26

Li: It’s so funny. Yes.

26-00:47:27

Lin: No, I think the story can be told. I don’t mind telling it now. But I promised him that I would not publicize how the process was done at the time.

26-00:47:38

Li: So this was 1991?

26-00:47:39

Lin: The end of 1992 and 1993.

26-00:47:49

Li: So almost twenty years ago.

26-00:47:54

Lin: Almost twenty years. Actually I think what he had to say was that the applicants are scientists and would be in Taiwan strictly for scientific conferences—and, as guests of ITRI and Otto Lin, its president who will take personal responsibility of the visits. I say to Huang, “They are not just visiting me for pleasure. They are here to attend a scientific conference and make presentations in the symposia of materials science and technology, so that our

people can learn more about what China was doing in those areas of material technology.

I should also mention that there are three sponsoring organizations for the conference: ITRI, China Steel Corporation and the China Times.

Li: The newspaper?

26-00:48:34

Lin: Yes, The newspaper. And I was very grateful to Alice Yu who at the time was the publisher of the Commerce Times, a member of the China Times family. Actually Alice, who has been a close friend and supporter of ITRI over the years, and I had discussed many scenarios and felt that this combination of sponsorship will cover a wide spectrum of possibilities and assure its successful completion. I was also thankful to the colleagues of the organizational committees; they came from the three institutions with high dedications.

I need to describe the nitty-gritty of things to appreciate the detailed logistics. I sent my colleagues in ITRI, Jason Hsu and Reynold Liu, to Beijing to work with CAS preparing for questions from the State Council. The travelers also have to apply with the State Council for an exit permit to leave China. The State Council would not give exit permits unless the MAC [Taiwan] had first approved their entrance visa to Taiwan. You see, if the visitors were to be denied entrance to Taiwan at the airport gate, this would amount to “lost face” with grave consequences. So the State Council must have assurance of their admittance before they would allow their exits. They would not want to have somebody break the news that a group of high-ranking scientists from the Mainland intended to visit Taiwan and Taiwan government would say, “No way, we will not let you in.” Right?.

26-00:49:22

Hamilton: Well, at this time period, would Mainland China have been worried that the scientists would not come back?

26-00:49:28

Lin: No, this was not a concern because they are very high ranking and they come as a group. They don't worry about defection or anything.

26-00:49:36

Li: So they're not worried about anyone. Defection.

26-00:49:39

Lin: No, no, no. I don't worry about that either, because those people who come, they are very dedicated or “diehard” communists, really.

26-00:49:45

Li: Right, right. And they live pretty well in China. They have a good life.

26-00:49:47

Lin: They are the fortunate groups, yes. They are members of the CCP, they are academicians. Some are head persons of institutes or laboratories.

26-00:49:59

Li: They had no reason to leave.

26-00:49:59

Lin: They had no reason to leave and they are very hardcore Communists. That's why they wanted to learn something about Taiwan. I said, "Okay, you come and see, and we will be all open to you." That's the basic concept for the visit. I have to send my people to Beijing to work with CAS about how the paperwork should be issued. And basically, they travelled to Taiwan via Hong Kong, they would stay in Hong Kong for one day to actually get their entrance papers. Nobody will know that these group of scientists have come to Hong Kong. We give them the paper which we have applied for them with MAC. Then the paper was shown to the representative of the State Council of Beijing, so they are guaranteed that they will be welcome. And I said, "I am going to the airport to welcome and escort them to the city." Actually, the visa was given by the China Travel Agency, representing Taiwan in Hong Kong. So that the group do not have to appear personally in the China Travel Agency Hong Kong office, my colleagues took their passports, like travel agents, and would do the walking for them. And then my colleagues accompanied them to Taiwan. So we are all meet at the VIP room at the CKS Airport. What a feat it was. I was forever grateful to the two colleagues who shuttled between Taipei, Hong Kong and Beijing for this, Reynold Liu and Jason Hsu of ITRI. You have to take note that this was 1993, well before any formal communications between the two sides.

When they arrived at the CKS Airport, the news was headline of many newspapers and continued to play out in the newspaper everywhere. But I said again and again that they are not making any formal visits to any government agency. They are coming to this the Conference and to ITRI. Understandably, they may have some friends, personal and business friends. They may visit some university. That's to be expected. And I planned for them to tour the Sun Moon Lake which is a landmark scenic attraction of Taiwan. They all enjoyed it.

On the day the conference opened, I was making the opening address. On the podiums as honor guests, besides Professor Zhou Guan-chao, was Sun Yuen-shuan, former premier and served as honorary chairman of the Conference, Professor Ta-you Wu, President of the Academia Sinica, and Hsia Han-Min, chairman of the National Science Council, Morris Chang, and Yen-Tze Lee, Nobel Laureate and the President –designate of the Academia Sinica, and K. T. Lee. And Professor Zhou made a keynote presentation reporting the mission and the research projects of CAS. The scientific work were all targeted to help accomplish national objectives such as food supply, water resources, disease control, space exploration, earth-quake prediction,

industrial upgrades, etc. The speech was very well regarded. There are news reporting and all called it an ice-breaking visit for science and technology between the two sides. They stayed one week in Taiwan.

26-00:53:18

Li: Was this big news in Taiwan? Was it in the newspapers that these scientists were coming to visit? Was it—?

26-00:53:25

Lin: Yes. You can't keep out Taiwan news reporters. They're everywhere, you see, and particularly it was co-sponsored by China Times, so we cannot keep this news under cover. But we mentioned that this is not a political meeting. They do not engage in anything near politics.

26-00:53:46

Li: But was your average Taiwanese very interested in this event happening?

26-00:53:51

Lin: Yes, they recognized that this is a scientific meeting and there is a group from the Mainland led by the president of Chinese Academy of Science.

26-00:53:59

Li: But would your average Taiwanese person have been interested in this news? Was it a big deal?

26-00:54:06

Lin: Well, I would say the average Taiwanese—

26-00:54:11

Li: Did they pay—?

26-00:54:13

Lin: People in the farmland, in the countryside, probably not. But people in Taipei, in Kaohsiung, in the cities, university people, industrial people, they would be interested. They know about it.

26-00:54:21

Li: Yes. Because they're thinking now maybe there is going to be more connections.

26-00:54:25

Lin: Yes, that's right. And the even more important thing is the implication—now that President Zhou and this group of academicians have visited Taiwan, it eased the way for Chinese scientists to come to Taiwan and to be admitted to Taiwan, and also make it easy for Taiwan's scientists and industrialists and people, scientists, to visit the Mainland. I think for communications, scientific exchange, and technology business cooperation really, this was the icebreaking visit. The event was done openly. It was open and their status was published in the newspaper everywhere, including the Mainland.

26-00:55:18

Li: It's interesting, because we've talked a lot about how important science was to the vision of Taiwan's future or the vision of China's future. And it's interesting, because now it seems like science was a critical component in the political peacemaking between China and Taiwan.

26-00:55:32

Lin: Yes, yes, yes. I don't know whether in my talk, one time before here, I showed the trade between Taiwan and China. It has a substantial increase after the mid nineties, that is, after this visit.

26-00:55:53

Li: Right. You said China was Taiwan's number one trading partner. Is that right?

26-00:55:56

Lin: Certainly now China is Taiwan's number one trading partner. About thirty percent of the GDP is trading with China. Right.

26-00:56:09

Li: Right. And so prior to this event?

26-00:56:10

Lin: Well, in the fifties and sixties, it's Japan. And then in the seventies, eighties, it's America. Now it is China.

26-00:56:25

Li: Do you think this was a watershed moment where this visit of these twelve scientists to Taiwan, really after that, things really began to expand?

26-00:56:33

Lin: Yes, yes. It began to expand.

26-00:56:37

Hamilton: By making it clear that this meeting was purely scientific and not political, that's a political statement in itself?

26-00:56:43

Lin: That is a political statement. Yes, that's right, that's right.

26-00:56:47

Hamilton: So although the meeting could be considered as simply scientific to allow it to happen, it really had huge political ramifications.

26-00:56:55

Lin: That's right, that's right. I think it was good for ITRI, at for the right time and the right place to do this. I think it's a contribution. But now, with the all the travels and trades and tours, people felt it's normal. But I think at that time, it took that great effort, determination, and preparation to accomplish this.

Interview 5 [continued]: March 27, 2009
Begin Audiofile 27

27-00:00:14

Li: This is Robin Li and Emily Hamilton speaking with Otto Lin on March 27, 2009 in San Francisco. This is interview five, tape number twenty-seven. And Emily, do you want to—?

27-00:00:30

Hamilton: Yesterday we finished the interview talking about the Chinese Academy of Sciences, but I still had a few more questions. You had said earlier that as director of the material science lab, your responsibilities were 50/50 administrative and scientific work. Could you talk about the proportion of your political and scientific work with the CAS?

27-00:00:55

Lin: The interaction with CAS, I think, basically, I would say is ninety percent political. And the scientific aspect, myself as a material scientist or chemical engineer, it's just a door opener and provide a common language to start. So we talk about some of these new advancements in science, in materials, in chemistry, physics, that kind of thing. Just kind of like a common language. But actually, my job was to set up the platform so that we can communicate and, more importantly, for scientists and engineers to work together. It's more of a management responsibility, a political job, you might say. It's more than just chemical. So for this assignment, this work, it's more a management function, more political than technical.

27-00:02:12

Hamilton: How large was the organization when you were involved?

27-00:02:16

Lin: You talking about CAS or what?

27-00:02:17

Hamilton: Yes.

27-00:02:19

Lin: CAS has—I don't—I can find the figures. But it's much larger than ITRI. CAS, the Chinese Academy of Science, they're scattered all over China, and I would say they have about—think about it. They probably have about 120 institutes and laboratories all over China, and they have branch headquarters offices in Shanghai, in Xian, and elsewhere. It's a very large organization and it covers many different fields. Not only physics and chemistry. Particle physics, applied mass, geology, astronomy, agriculture. Many, many subjects. And over the years, they have made very important contributions to China, such as on rice production which is the major food of Chinese. I think this is a very important piece of work. The botanists, agriculture chemists, they tried to culture new grains of rice. Previously, most of the fields can only have one harvest a year. With some invention, scientific discovery, they have developed

a new grain with proper way of irrigation and care, most Chinese rice fields now can have two harvests a year. Further, each harvest has a much higher productivity, probably four or five times more productivity than the past. Together, you might have ten times of production of rice in a matter of decades.

27-00:04:29

Hamilton:

Do you remember when this innovation was made?

27-00:04:31

Lin:

Well, I cannot tell more about this invention right now. This is something that we can find out. Offhand, I don't have the actual figures and don't want to be misleading. I was just trying to say that CAS is a very large organization and work on basic scientific research. But most of the work, I would say seventy percent of their focus, is apply oriented. Before I visited CAS, I was always thinking that perhaps the organization to interact with CAS is the Academia Sinica. As it turns out, they do not think so. They felt that ITRI is the right counterpart [對口單位], the more proper organization to interact with CAS.

27-00:05:35

Hamilton:

You said that there were many different disciplines that were involved with CAS. Were there individual conferences for physics and chemistry and material science?

27-00:05:44

Lin:

There are many conferences. On the ITRI senior level, science and engineering, have attended many conferences in China. My wife, Ada Lin, for example, attended one of the meetings in industrial safety, prior to my meeting with CAS, President Zhou. But also, over the years they have also attended conferences outside of China such as in the United States, in Europe and so on. So there are some natural contacts already between ITRI and CAS people. So we both have some common understanding already.

27-00:06:37

Hamilton:

And this is through applied efforts, not through purely scientific? I don't like to use that term, but—.

27-00:06:47

Lin:

No, the contact is natural because people went to the same conferences. In IEEE, for example, electrical engineering and electronics, that is a very large organization. They held many, many types of meetings in the U.S., Japan, and Europe. Naturally, that's a place that people meet. Our scientists meet with their scientists at materials conferences, so they talk about things, so they understand that there is an ITRI in Taiwan. I think they have already heard of ITRI. We also already heard of CAS. But previously, I would say again, that our understanding of CAS is partial. We understand that they just might be doing some basic research. But actually, as time goes on, we realize that they are doing more applied research than basic research. Yes.

27-00:07:53

Hamilton: And was CAS involved in infrastructure building in China for science and technology?

27-00:07:59

Lin: Well, they are. For example, their geo-engineering group is helping to build the dams, the Yangtze River dams, for example. They do a lot of surveys. They do a lot of design to provide technical support for the different ministries. So in that sense, they are also very much applied oriented and help building the infrastructures for the country.

27-00:08:32

Hamilton: What role did the Chinese government play in helping the CAS develop this infrastructure?

27-00:08:37

Lin: The Chinese CAS is a government organization. So everything in China, at that time, at that period of time, is supported by the government. It is funded by the government. When I first met with Professor Zhou he knew about our efforts in making technology transfer and tried to spin off companies. He said, "Well, they also are doing technology transfer." But at that time, most of the industry are controlled by the government, so they also have a lot of spin off companies. Actually, in a sense, the term spin off may refer to different contents. The companies still belong to CAS as of that time. Around 1992-93, that period, it has about 450 companies. I told President Zhou that he had a much tougher job than I because ITRI does not run any companies. All those companies that were spinned off become companies of their own, being their own legal entities. They do not have any formal financial relationship with ITRI, except for maybe technology transfers, paying some royalties, that kind of thing. But ITRI did not participate in the management of the company. But most of these 450 companies of CAS belong to CAS and CAS has overall financial responsibility over those companies and that's why I say his job is much more difficult.

CAS also runs universities. Under CAS, there's a very famous university called University of Science and Technology- China, USTC, which is located in the city of Hefei in An- Hui Province. Hefei's the city, Anhui's the province. It belongs to the CAS. So within one CAS organization, it's part research, basic research, part applied research, part commercial entity, and also part university.

It is a very complex system of innovation in CAS. And I might say that this is a system that I do not advocate. I always like to propose a simpler model where the universities, the institutes, the business and the government, being the four elements of a national innovation system, being separated entities. They should not be lumped all in one. They should be separated but with some degrees of interaction. They should understand each other, they should be linking to each other, but t should not be one organization.

27-00:11:54
Hamilton:

Could you be more specific about where the conflict of interest arises?

27-00:12:00
Lin:

Well, okay. Let's focus on university. You have the faculty who has ideas, makes invention or discovery of certain things, and he wants to capture the result and to make products. This is a very long process. The best inventions or discoveries in the world cannot necessarily make the best product in the market that the customers want to pay for it. Because whether a product is successful or not depends on whether it fits the need of the customer or the market at the time. Right? So you need a lot of different kinds of talents to make a commercial success out of any scientific discoveries. So it's a long process. Most of the faculty, professors in a university, end up bankrupt because of this. I always talk about an innovation system where you have these four elements, while the elements are working together, they do not belong to the same organization.

Like ITRI, you see. We talk about all those technologies that we have just developed. But after they developed, they've always been transferred into the industry, who will take those technology and make products out of it and sell the products to make money, at a profit. That's their job. You cannot have one organization do everything. If you were trying to do this, [then you're] back to the planned economy time, like the Russian system. So the Russians can perhaps make the best airplanes or missiles or everything, but they do not come out with good commercial products.

27-00:14:04
Hamilton:

So do you think the laws against private ownership were a hurdle for Mainland China?

27-00:14:08
Lin:

Yes, there is that, too, because everything has to be owned by the state. They do not consider private ownership is important. But private ownership is very important. When you have a company, and have the scientist from the university or this organization to run the company, if he loses money, well, his job is still secure because he still gets paid from his functions as a Professor, as a researcher. What kind entrepreneur is that? If he was successful in making lots of money, the money goes to the state. He's still only getting a basic salary. So what kind of motivation is that? You see, this is the key thing. That's why I say the nature of the jobs of the different players of the innovation system are different and the criteria of success is different. In the university, the criteria of success is you come up with good students, you publish good scientific papers. In the commercial organizations, papers, students, does not mean anything. You want to come out with the best product, to have a large market share that has a large profit margin and that can sustain, that can beat your competitors. That's what it is. The criteria of success are different. The talents are different. There are more differences than similarities here. That's the kind of national innovation system that I

have advocated. Granted, it was all these four elements, but these four elements should not belong to one entity. There should be four different clear entities each with defined responsibilities and goals.

Actually, this school of thought, my thinking, has been accepted by CAS, by Tsinghua University in Beijing, and by many other places. That's why in the last ten years, I went to many places to talk about this national innovation system and people felt there are points for their own review.

27-00:16:34
Hamilton:

Certainly that wasn't an immediate process of change. What were some of the early arguments against your national innovation system?

27-00:16:44
Lin:

I'm sorry. Say it again, yes?

27-00:16:46
Hamilton:

What were some of the arguments against your model of a national innovation system?

27-00:16:50
Lin:

Well, I think a workable system has to be easy to implement. It's natural. The government has the money, and give the money to the source of technology, which is a university. A university has the people, so they run through this. It's kind of natural, it's easy to do. The government has very good control. The system that I have advocated, that's basically on this interaction model, is you have to have good university, you have to have some good institute, you have to have some pretty sound market economy concepts and entrepreneurs. So it is more difficult. They're more difficult to come by. They're more difficult to control, meaning that if the governments sees a big product that it wants to control, then it's very difficult. So the first system is easy. I think in my talk to Berkeley, I drew four circles. You see, these four circles should not be totally independent of each other, but should not all overlap to one. They should overlap just to a certain extent, have interaction to a certain extent, but they should not be collapsed into one. I can say that most countries, most people, most scholars, have accepted this idea. And I think that's how ITRI was successful. ITRI did not run [businesses], did not give degrees. We are not competing with the Tsinghua's or Jiao Tong, or Taiwan University. We do not compete with them. We are not running any companies, so we are not competing with our clients. We just try to make this transfer from the scientific concept to become a technology which is commercializable and let other people do it.

27-00:19:15
Hamilton:

Was there pressure to expand? Because once ITRI had a name, I imagine people want to benefit from the name. So they might say, "Oh, let's have my company be within ITRI?" or, "Will you come sponsor an academic program at [inaudible]?"

27-00:19:29

Lin:

Yes. There are some companies, the technology from ITRI, and a lot of times they want ITRI's name in it. Under the ITRI organization, we have an investment arm, which is very small, mind you. We call it the Industrial Technology Investment Company. And actually, I was one time chairman of the company, and we have a very small fund in that. Sometimes we do invest a little bit and own maybe five, three percent of equities in this new venture. The business investor, they're not really looking for our money, but by showing we want to participate, meaning we want to take risks with our money, so it makes it easier for them to ask other investors to come in. So that happens. That happens. But again, in that final invested company, it's a fairly independent entity. With profit and loss, they're on their own. But we do have agents to do that kind of thing.

27-00:20:51

Hamilton:

It's been important for ITRI's development to be both publicly and privately funded, and this is a crucial part for your nation innovation model—

27-00:21:01

Lin:

That's right. Yes. Sure.

27-00:21:01

Hamilton:

—that the CAS eventually adopted. But how difficult was it? I mean, private industry under the original CAS model didn't exist, so how was that switch—

27-00:21:15

Lin:

Well, I think it's very difficult. So, right now, they are still linked to the university and still has some companies. I ask Professor Zhou at the time we met, I asked him, "Of these 450 companies, how many are profitable?" And he said, "At most, it's one-third. At least one-third is total failure and the other may be just struggling." But I doubted this one-third was successful, because we have not heard of too many successful ventures. Nowadays, we can see, after all these years. The personal computer company has been very good [Narrator's Note: The Legend, now Lenovo]. But other than that, there are not much major commercial success that people talked about. I should not say that. There are some successes, but the total percentage of successful business is not very high.

27-00:22:23

Hamilton:

Why do you think that is?

27-00:22:25

Lin:

Why is that? Because the scientists, they are not entrepreneurs, they are not businessmen. Basically, they run the business as if they are running their experiment in the lab.

27-00:22:37

Hamilton:

Do you think that that mindset will change as generations continue?

27-00:22:40

Lin:

That mindset has changed. So I think there is now more of the entrepreneurial spirit in China. It's much better now. And there are people willing to take risks and cut off the umbilical cord with the mother, with the institute, with the CAS, and become entrepreneurs and businessmen themselves. That has been changing.

27-00:23:13

Hamilton:

Do you think that these changes can be seen in the education of scientists and engineers?

27-00:23:18

Lin:

It has changed in China today. We're talking about a difference of fifteen years now. Later on, I can talk about my visit in Tsinghua. Tsinghua was a university, but Tsinghua have some people running development technology, and Tsinghua also has companies. Again, this same CAS model, this CAS innovation system model, and they're running with problems. So again, these companies become a drain on the resources of the university. University Professors are judged by their publications, by the students, but company executives are judged not by publication, not by their students, but by whether you can make profits. These are two types of mentalities. Well, it is very seldom that you find the same people have both mentalities. Those are very seldom. Even in the United States, I think there are not too many of those.

So I talked to Tsinghua University. I gave them the lecture of my national innovation system concept, and I advised them to gradually withdraw from their involvement with the commercial activities. And mostly, now, they have formed new companies. The university will give the company, which belongs to the university, the patents and the technologies and let the companies interact with the private people and do their commercial operation and so on. And then these companies are responsible to the university. So it's a one step interface to insulate the university from the commercial success or failure. If the company said, "Well, this is a failure," and the university will have to plug the whole of bankruptcy, what kind of a university will it be? So it cannot stand on that model. So you have to have many firewalls and this firewall is a different identity for the different organizations.

27-00:25:53

Hamilton:

While we're talking about change over time, could you talk a little bit more about the changes in Tsinghua University from when you were there earlier and then when you came back in ninety-six, ninety-seven?

27-00:26:07

Lin:

You're talking about the Tsinghua in Beijing? I think I should talk about Tsinghua in Beijing. In 1993-5, period, the university has an office, particularly in the technology development division of the University administration. It was usually in charge by high level people, or officers in the university, and he would be the general manager or be the chairman of all the

companies. And then this person and his office, are all university employees getting their pays from the university. The compensation is just like the university professor. And they run those companies. But they do not necessary know the market. They only know technology, how good the technology is, and what wonders the technology can do. They don't necessarily know that whether this technology is what the market will need.

For example, if I have a technology enable me to cook a hundred pounds of beef or pork, deep frozen, and done in two minutes—I can invent a microwave oven like this, right, and I charge for this microwave oven for \$10,000. Would you buy it? As a housewife, would you buy it? Nobody would buy it, because although the technology is good, it's sophisticated, but it did not cater to the needs of the customer. For a successful company with the same technology, sometimes you have to think about how can I fulfill a need. Is there a need for the society and how do I fulfill that need? So these are commercial people. These are marketing people.

In the university, when a chemist runs an experiment, he may do it ten times, and he fails until the last time. In another word, not until the tenth time, it was all failure. Then he would be so happy. He could publish paper with that and go to ACS or whatever society and make himself a big name. But if a company, a cable company, that suffers nine failures and only at the tenth time he come up with good commercial product, this company will be bankrupted several times over. You see? So that's the difference. Because the scale, the time, and the space are different. So that's why I always said a good scientist may not necessarily be a good manager, business manager.

So people do not understand that. Most people felt that if he's a good scientist, that he has wisdom enough to make a discovery, he has wisdom enough to run a company. Thomas Edison was not a good business executive.

27-00:29:39

Li:

It seems almost a traditional Chinese way of thinking. For example, people studying Confucius classics in order to get a job as a manager, as a government official. So they would be very brilliant when it comes to Confucian texts, but then when they're actually put in a position of being a government official, they're not necessarily good at being an official—

27-00:29:57

Lin:

That's right, that's right.

27-00:29:58

Li:

—because it's not the same skills.

27-00:29:58

Lin:

Yes, that's not the same skills. Yes, yes. Confucius admitted that. He said, "If you want to learn farming, you don't come to me. You go to ask a farmer. You want to grow flowers, you go to ask a gardener. You don't come to me."

He was basically saying that my knowledge is much more important than the farming and the gardening, but also, as he respects professionalism, he's not good at farming or gardening himself.

27-00:30:31

Hamilton:

What kind of training was there for marketing for business in highly technical fields? Was there training?

27-00:30:41

Lin:

Well, I think this is a question that universities like Berkeley and Stanford and MIT tried to find out. It is a question that has no ready answer, not even today. If today in the United States, if the university take charge to commercialize those technology, the discoveries that originated from the university, then certainly the company will be much better off, much farther ahead. But it's impossible because the university does not have the people to do that. That's one thing. And secondly, even with the people, we may not have the time, the right time that can do that. [After- all, the mission of the university is uppermost, in education, not commercialization.] Look at the field of biotechnology. We have the best biotech, chemists, bio-physicists in the university. Look at the company Genentech or other similar companies in the field. They take many years to become profitable. It's not only that the process is difficult, but to come up with something that the market can accept, [and selling it], there are so many other factors in play there. So it's different.

27-00:32:02

Li:

Do you think that that is ideally met with large-scale collaboration? That it's not necessarily one person who's been trained in marketing technical products, but a collaboration of many people involved?

27-00:32:15

Lin:

Yes. Well, if you have a collaboration with many talents, it can structure properly, then certainly this can make this effort bear fruit much easier. And in ITRI, we have a success in the IC business, in the notebook PC area, in a number of areas, like the bicycles for example. I talk to you about the composite bicycle. Now, even with carbon fiber composite bicycle, ITRI did not make any bicycle ourselves. It was given to this company called Giant [捷安特]. They are already in the bicycle business. They know how to sell bicycles. They know what kind of customer can pay a little premium price to get this composite bicycle and they tailor it to their needs. I was totally surprised, in the late 1980s, when the CEO of the Company told me the price tag. I was totally surprised. Why would I spend \$2,000 U.S. for just a bicycle. He said, "Because Professor Lin, I'm not selling my bicycle to you. You are not my customer." You see?

Actually, last week, there was a bicycle fair in Taipei, and there are some bicycles now selling for \$500,000 TWD. Now, divide that by thirty. That is like \$15,000 U.S. dollars. It's like an automobile. Can you believe that? So there are certain segments of people who like that kind of bicycle. It was up to

the manufacturer, up to the marketer to understand the customers and the market. They come up with different products for different segments of the market. It's not the scientist's job. Scientist will interest in composite mechanics or composite materials.

[Narrator's Note: Please see Appendix 27 for the seminar presentation at UC Berkeley on the subject of "Transformation of Taiwan to a Technology Based Economy during 1975-2000: The Role of ITRI." The function of the national innovation of Taiwan, the operation of ITRI and its technology transfer are illustrated.]

27-00:34:15

Hamilton:

As director of ITRI, how did you—I'm trying to think of how to ask this question. How did you try to direct scientist's work? For instance, you're talking about not recognizing what the market necessarily is. Yet, there's a strong association between industry and the scientists at ITRI.

27-00:34:40

Lin:

Right, right, right. This is a very important point and I think I probably have not talked about this. It just came to my mind as I think about this. For each laboratory, each division of ITRI, the electronics, the computers, materials, the chemistry, each laboratory, we have strong interactions with the academia and the industry. One of these channels is the advisory committees. Two types of advisory committees existed. One is on technology, one is on industry. Industrial advisory committee, the committee was chaired, and the members of the committee are mostly industrial people who understand the needs of the industry, and what does it take to make products successful in the market. And then they come into the laboratory and we will talk to them of our plans, the technology we are working on, and why we are working on those things. They'll come in. They'll say, "No, it doesn't look like something that—it would take years for the company to accept your technology" Or, they will tell us that, "Well, it's good, but actually has been well implemented before, but you just don't know." I think they sharpen our focus. The industrial advisory committees are very important elements of ITRI's laboratory.

On the other part is what we call TAC, technology advisory committee. Mostly from the science and technology point of view and it would consist of a lot of foreign experts. Experts meaning specialists that are located in the United States, or Europe, and they are willing to provide assistance to ITRI. They would tell us what's new in nanotechnology, what's new in VLSI, what's new in the wireless technology and that kind of thing. So this will provide input to the ITRI technologists, the scientists. So each major division of ITRI has that kind of committee. So it provides support to us.

And when we have a formula, a program, usually we invite the industry to come and sit down and say, "Well, we are now trying to do this." We talk with them and let them think about this and let them criticize, and we also ask

them, “Would you like to participate? If you’d like to participate, would you put in some money. If you put in some money, then you have first rights of refusal when this is done.” That is the process of project formation. That’s how ITRI’s projects are established. And after the project is done, there will be people waiting to transfer this technology.

27-00:38:04

Hamilton: How often on average would a particular laboratory bring in technical advisors?

27-00:38:10

Lin: How often? Formally, the TAC meets with the foreign advisors once a year. And with the industrial advisors group, several times a year. Maybe quarterly or something. There are formal meetings and there are informal contacts. After a formal meeting, then there are informal sessions with the individuals, with the individual scientists and so on. So there’s a lot of those. So the interaction of ITRI’s scientists, engineers, and directors with the market, with the industry, is a very important part of our functions.

27-00:38:56

Hamilton: Were the technology advisors, were they handpicked for a particular project or did they remain stable for a period of time?

27-00:39:06

Lin: Well, they are basically more general, in the general area. This is a very sensitive issue because we have many advisors that come in from IBM and Honeywell and companies like this. Our philosophy and basic ground rule is that we do not want proprietary information. If something that is proprietary in IBM, I don’t want to hear about it. You only tell us those information that you have presented in the IEEE or somewhere you have made presentations. Because we don’t want to be in a position to get our friend and his company uncomfortable. Even people from the university, say, Berkeley, we don’t want your Professors to tell us the classified work that you do. We don’t want to do that. So this is the basic respect [an ITRI value] that we do with our advisors. So that’s why they are comfortable in coming to us.

27-00:40:11

Hamilton: Was this a paid position, to be on the—?

27-00:40:13

Lin: Most of these things are unpaid, are pro bono work. We do pay the expenses, the travel expenses for them to come in, for them to stay, for them to talk about this. But they’re pro bono.

27-00:40:27

Hamilton: And how long would they stay?

27-00:40:29

Lin: They usually stay maybe a few days, maybe a week. For example, I’ll give an example that I had one time. When I was the director of the materials lab, we

wanted to work with corrosions. We have a project on corrosion studies and we wanted to look at—Taiwan is an island, but there are offshore islands—the Penghu Islands. And they are several small islands in that group and linked by bridges. And these bridges have a tendency to fall down, because of corrosions. It becomes a safety problem, and becomes an economic problem and so on. Our client is the Taiwan Provincial Government. At their request, we have conducted a study. I have this group of corrosion scientists, experts from the United States, including Professors from MIT, Berkeley, Illinois, Ohio, and also from the NRC, National Research Council. They are happy to come to it because they can also have a first-hand understanding of how the situation of the corrosion there, and the experience there will help them to work on the United States problem. Every year, there will be some falling bridges like this. So the visit and the discussion stimulated their thought of how to do better corrosion protection. One thing they found out in this bridge—actually, the construction was everything by the book. But then the corrosion failure rate is much faster. That is, failures come much shorter in between. They expected the bridge to be able to last for maybe fifteen years, but then in five years, there are some areas already showing corrosion, bowing out. We have to look into the detail of how this bridge was designed, built and so on. It turns out it's on how they made the cement. Because this is an offshore island all the water has to be transported from Taiwan to make the cement. And there's a period of time there was a shortage of water, so they just added some seawater to make up. And of course in the seawater, there are different ions and different salinity. The ions became the agent of corrosion. Situations like this were found and the scientists were able to suggest methods of control, whether we can arrest the corrosion and so on. It would provide some grounds for them to do experiments, as well. This was a science and technology collaboration that is beneficial to everybody. We did not pay anyone anything, except for the travel.

27-00:43:59

Hamilton:

How often were scientists of ITRI asked to do similar things? To serve on panels for other organizations?

27-00:44:07

Lin:

Other countries very few, but industrial problems in Taiwan, very often. Yes, yes.

27-00:44:13

Hamilton:

Okay. So scientists at ITRI were not often brought into other laboratories?

27-00:44:20

Lin:

No, was not often brought into laboratories in other countries, I might say. But our scientists are often brought into companies in Taiwan to provide assistance, to provide consultation to their problems. And sometimes when our scientists went there, we pay the expenses. They are not supposed to be getting any other pay from the company. And it's part of our service. It's part of our marketing. And they find out that, well, perhaps ITRI has the resource

in doing that, so they'll come back to ITRI and contract our service. This is part of that.

27-00:45:06

Hamilton: Do you think that that will change? That more scientists will be brought into similar laboratories as globalization increases?

27-00:45:13

Lin: Probably. Yes, yes, yes.

27-00:45:15

Hamilton: Do you think that it's changed in a noticeable way?

27-00:45:17

Lin: I think it's changed. I don't know the details at this point, but I anticipate this to happen, because we did bring in people from IBM, Bell Labs, NRC, different laboratories to come to ours. When our scientists develop a name for themselves, then they will be in demand. Their services will be in demand. So in my mind, that's also helping to promote a scientist professionally. We wanted to make them known.

27-00:45:52

Hamilton: Practically, were these meetings conducted in English?

27-00:45:55

Lin: Yes. Mostly done in English, yes. I would say all of them. If we have some people from Japan—working with the Japanese is a pain sometimes because during that time—right now, the overall English proficiency of Japanese scientists I think has been improved. I don't know whether you've found this. But in the nineties, a lot of times they need translations and it takes double the amount of time at meetings.

27-00:46:26

Hamilton: Right. At least.

27-00:46:30

Li: I had a question with the Chinese Academy of Sciences. It seems like most of the people at ITRI had western educations. They went to universities in the U.S., maybe had corporate experience in U.S. labs. But then the scientists from CAS obviously didn't have that.

27-00:46:47

Lin: I think there are probably very, very few. That would be exceptional.

27-00:46:53

Li: So would they have been educated in China, maybe Russia?

27-00:46:56

Lin: In China, Russia, that's right. That's right.

27-00:46:58

Li: Was the science different?

27-00:47:01

Lin: Well, the science is not so much different, but the mentality is different. ITRI scientists very much think about this problem, how to apply the technology or to solve this problem, were able to make use of other resources or making their resources available to other people. I think the scientists in China usually will—if they have any ideas, they will have to talk to the superiors or check with the government first.

27-00:47:35

Li: And were they current with the latest research as much as scientists in ITRI? Were the scientists in China able to keep up with—?

27-00:47:45

Lin: Well, I think they work very hard. They work very hard. But language is a problem. Language is a problem.

27-00:47:51

Li: Reading documents in German or in English. Yes.

27-00:47:53

Lin: They have to be able to read, able to understand. But that's much improved right now in these last several years. In the past, they had interacted a lot with Russians. I'll give you an example, again, in aircraft. During one of those meetings, meetings that I have when I went to China when I was in ITRI, one of the objectives that I have is to see whether we can build up an aircraft company to make small aircrafts. Obviously we cannot make big aircrafts like the Boeing 747s, or the Airbus 300, that kind of thing. These are the specialty of companies like Boeing. But I was thinking about small aircraft that seats maybe a hundred people that can do the local and regional air travels. You see, the jumbo aircrafts come to some big cities, or a regional center. It's the hub concept. In our case, in New Jersey, it would be like when you come to Newark, and there change for local airplanes to go to Princeton or Cherry Hills or Lancaster—

27-00:49:13

Li: A commuter.

27-00:49:14

Lin: —or someplace like this, instead of driving. We're thinking like this because of the size of China, it would make sense. I went to visit China: Xian and Shanghai and Beijing, to talk with the local aircraft companies. There are a lot of aircraft companies in China, even at that time. Aircraft manufacturing! But when I went to the company I came up with something very interesting. They have all the parts. In other words, they have all the pieces of the Jigsaw puzzle, or they have solution to it. They have people working on design, engine, metal panels, communication systems, and they have people working on the rivets. In an aircraft, there are many tens of thousands of rivets. Later,

they will put all the pieces together, right. Everything. The word in Chinese is *xiao er quan*, [小而全] small but complete. It's a small company but have complete technology. But, I asked them, "How many whole aircrafts have you manufactured?" Basically very, very few. "How many aircraft have been flying commercially?" Again, it's very, very few. And even if a few companies have this aircraft, they might be useful only for military purposes. Then you come to the realization that there is a big difference in commercial aircrafts and military aircrafts.

In the commercial aircraft, we are anxious on the safety, the comfort, the durability. Safety is obvious- the liability of the company is at stake. Comfort is kind of obvious. You want to provide a comfortable journey, right. And the durability, if an aircraft can run for twenty years, stretch it to twenty-five years, then the interest rate, the depreciation, this will be a tremendous profit factor for a company running it. But for a military aircraft, these are not important. They're going to be shot down anyway. They do not need to carry a lot of people or make them comfortable. They're interested in how fast, how quickly you can respond. They're not interested in the comfort, because the pilots, those are military service. You're very cramped in space and very few passengers are there. The design concept is totally different.

And in the Chinese situation, that concept's still there. They don't know how to talk about commercial aircraft, even though for a hundred-person jet, they have never had that experience. They might not know the criteria of designing it. And further, they don't know the modern manufacturing processes and the tools. They wanted to show the visiting dignitaries that they have everything because the overall priority of China at that time is independence. The country then was so much dependent on Russian and there is a time the Russians and China friendship deteriorated. They quarreled, so the Russians stopped sending their technology. Then China were in a limbo. Furthermore, China's so big, at each location, they have to have a full set of technology available, therefore they have never got into the economy of scale. For aircraft, at least you have to make maybe 500 to break even. There's a minimum number of the engines you have to make to break even. Boeing would not make engines. It's General Electric or Rolls Royce who makes the engines. They do not know how to outsource, to find a specialty [company] to make it. That's why every company has their own engine, their own rivets, their own panel, their own everything. It's an impossible job trying to work with the existing Chinese aircraft company to build a company. And they don't have any safety records. When an accident takes place, it's a national secret. You do not want to get that information out. So they don't have any record that you can depend on for future improvement.

But now things have changed. Things have changed. And now it is a commercial aircraft, Chinese wanted to make, and was able to. I think there is one already rolled out. They will be commercialized in a year or two. It's a change of ten years, fifteen years.

27-00:54:40

Li: Do you mind if we switch now? Talk a little bit about the politics of some of this. I'm interested about the politics, of the interactions with the PRC in these early years.

27-00:54:50

Lin: Okay.

Begin Audiofile 28

28-00:00:00

Li: This is Robin Li and Emily Hamilton speaking with Otto Lin on March 27, 2009 in San Francisco, California. This is tape twenty-eight. So we were talking a little bit about your work with the Chinese Academy of Sciences and the bridge building between scientific communities, and I was curious to talk with you about the role politics played in some of that bridge building. And I know that you met with Jiang Zemin fairly early in this process. Could you talk a little bit about that?

28-00:00:31

Lin: Yes. I met with Jiang Zemin in 1993, in March 1993. To bring back a little bit of timing framework, this is the time of the eighth plenary session of the Chinese Communist Party. In that particular meeting, Jiang was elected President of China. He was already general secretary of the Chinese Communist Party, but during that session, he was elected president of China. As president, and also elected chairman of the central military committee, he actually has the three major, most important titles together. The general secretary of the party, national president, and the chairman of the central military committee. So I think I would say that it was the peak of Jiang Zemin's career. His status in history is sure but would be judged by what he would actually do at this extraordinary level.

And every year, the Chinese government holds the conventional National People's Congress meeting. Also, at around that same time period, the CPPCC, which is the Chinese—in my notes, this was misspelled there, it's CPPCC, the Chinese People's Political Consultation Conference, hold its annual session. These are the two major meetings every year. And at that time, in 1993, it was the eighth session. But I went to China not knowing how busy political leaders can be during the month of March.

Actually, it was also my first visit to China. My visit was arranged by Professor Lee, T.D. Lee, the first Nobel Laureate in physic at Columbia. And he arranged for this. I told him my interest in visiting China, so he makes the arrangement for me to go.

28-00:02:57

Li: And this is maybe one year after the CAS comes to Taiwan, right?

28-00:03:00

Lin: No, no, no. Actually, this was before.

28-00:03:05

Li: Before, okay.

28-00:03:06

Lin: This is before. This is before. Yes. When I talk to you during this interview, sometimes my dates are mixed up—I would have to re-check the exact dates.

28-00:03:17

Li: We can fix those later. Yes.

28-00:03:18

Lin: But the CAS visit was one year after this. This was 1993. And also, at that time, Lee Teng-hui has already become president and has also consolidated all of his power in Taiwan. He was planning to send his special emissary, C.F. Ku [辜振甫], to meet with D. H. Wang [汪道涵], counterpart from the Mainland. The first meeting was to take place in Singapore in April. My visit to Jiang Zemin coincided with these two particular time frames: One, he has consolidated all the three power positions in China; Two, he is about to have direct contacts with the Taiwan government. And I guess both Jiang and Lee were not sure of each other's position.

My time of visiting Jiang Zemin, was just kind of coincident. If I had known about the importance of these two national meetings, I probably would have picked another time. But as it turned out, he knew about my visit and he made an effort to see me. So the date, March 24th, 1993, is important that way. And I saw him at his office in Zhong Nan Hai [中南海], in translation, the central and south sea, which is the central compound inside the national palace. It is where the top leaders live. It's a residential and office compound. Mao Zedong, Deng Xiaoping, had once lived there. They never had to travel too far to go to work. And, it's a garden, also a lake. [Narrator's Note: So this is why it's called *hai*.] And this where Kissinger and Nixon met with Mao Zedong, I believed.

So Jiang Zemin, I met him at his office Zhong Nan Hai. I went there with the President of CAS, Professor Zhou Guan-chao. A few other high-ranking officials had accompanied me. One of them is the vice-president of CAS, Professor Wong Fu-song. Professor Wong is a chemist by training. Actually, I knew Professor Wong in some other meetings prior to that. Also accompanying me in the meeting is Wang Zhaoguo, who is the director of the Taiwan Affairs for the State Council. Also present is another manager of the Taiwan Affairs Bureau, the State Council, Mr. Liu Jen-Tao. These are the key decision makers in China at the time. So five people one side and I on the other. It's five to one.

28-00:07:10

Hamilton:

Have you met with these other five? Obviously not Jiang Zemin, but did you meet with these other people separately ever?

28-00:07:15

Lin:

All together. No, no. Except for Professor Wong whom I met elsewhere—I forgot where—but most other people, this is the first time. I guessed either Professor T.D. Lee or Wong Fu-song had brief Jiang Zemin of all my background. So in the meeting, he was very courteous and I thank him for meeting with me, because it was a very busy time for him. And he said, “Well, we know you have done good work for Taiwan and we’re very much interested in the work that you are doing, so I look forward to see you.” And knowing that it was the first time in forty years that I have visited China, he talked a lot of pleasantries and so on. And he show off his knowledge of the Chinese culture. He talked about Confucius and Juan-tse [莊子], who are very famous scholars in the Chinese history. He said, “Well, you have a stick of wood and you take half of it every day, and this wood will last for hundreds of generations. Basically, isn’t this the base of theory of infinity in calculus?”

28-00:08:51

Li:

It’s funny. When I was reading the transcript, I thought, “Am I not understanding something, or do these just seem very kind of random insertions into the conversation.”

28-00:08:59

Lin:

That’s right. This is the very beginning of the first part. It’s just kind of breaking the ice. Just try to small talk and reach each other.

28-00:09:07

Li:

So he’s situating himself for you. All that you know is his—yes.

28-00:09:08

Lin:

Yes, that’s right, that’s right. But he has impressed me with his understanding of Confucius, speaking very important quotations of Confucius. That with friends coming afar is one of the most happy things in life, and that kind of thing. Now, actually, I’ve forgotten to bring in there. In there, he asked me a question. He asked me about one of his old friends who work for ITRI, a classmate of his in Jiao Tong University. And I confirm that, “Yes, Mr. Wen Din-hsun [溫鼎勳] has worked for ITRI, and reporting to me as Vice President of Administrative Services.” Regretfully, he had just passed away shortly before. So it had just kind of breaking the ice, so the first time we met, we can relax a little. This is the first part of the conversation.

And then he wanted to ask my view of the world and the position of China in it. I talked about globalization with him. I said, “This is the era of globalization and therefore we need to look at it to see how can take advantage of it.” And I said, “Well, the way I see it, globalization is consisted of three parts. One is democracy, second, is technology, and third, internalization. These are the three major elements of globalization, the three

major streams. Each stream has generated some whirlpool or branch out to small streams. And sometimes it looks very complicated.

For democratization, the offshoot is diversification. So you see, the society is so diverse, people of different ethnicity, age, religions, professions, they all want the government to do certain things for them.

28-00:11:26

Li: But the second stream was innovation?

28-00:11:32

Lin: Technology.

28-00:11:32

Li: Yes, technology and innovation.

28-00:11:33

Lin: Yes, I think technology certainly is very important. Technology is the vehicle for countries with limited resources to rise to economic power. But because of exploiting technology, it also creates some problems for the society: pollution, erosion, that kind of thing. So we need to take both into consideration.

28-00:12:00

Li: Right. Take into account both and the balance of the two.

28-00:12:04

Lin: Yes, the balance. Yes. So this is the second main stream.

28-00:12:07

Li: And the third was internationalization?

28-00:12:10

Lin: The third mainstream is internalization. And while we recognize the importance of working with other foreigners, national partners, the internalization also creates an awareness that you need to protect the regional interest. So sometimes it looks like a word with different dynamics looking for balance, but these are facts of life.

28-00:12:37

Li: But how is it about the globalization? Because the first and the third seem very contrary with PRC policy. Democracy and internationalization.

28-00:12:47

Lin: Yes. I said, "Well, everybody is looking to democratization as a goal in life." He said, "Well, it seems to me that democratization is all relative." And then he followed, "Well, I am borrowing the term relative from Einstein's theory of relativity, his $E=MC^2$ equation. He said, " In China today, we are very democratic. People have enjoyed a lot of freedoms. People can complain in the street, complain about the government, and we'll let them."

28-00:13:20

Li: Was that true?

28-00:13:23

Lin: This is after Tiananmen Square. And I think probably it is true. Yes, probably it's true to a certain extent. And I think it's truer by the day. "So long as people do not advocate to overthrow the government by force, we'll let them speak." He said, "That is democratization." He said, "Well, democracy is relative because different countries have different needs." He said, "In Taiwan, you talk about democratization, but I see in your Legislative Yuan, through the TV screen, with people fighting. The legislators were fist-fighting each other, and I saw young legislators slapped the face of the old legislators. You think this is good? Is this democratization? How good is democracy there?" So he said, "Everything's relative." So every country attains different levels of democratization. I told him that, "Well, what's important here is that democracy should be accompanied by the rule of law. Democracy does not mean that everybody can do whatever they want. Everybody can do whatever they want under the law." And I say, "While I feel democracy is very important for China, I also feel that China should take this opportunity to institute the rule of law."

28-00:15:03

Li: And it seems that when you were talking about rule of law, you were speaking specifically about ideas of intellectual property and that kind of legal protections for innovation versus militaristic rule of law.

28-00:15:14

Lin: I was thinking in more general terms, not just IP. I told myself not to talk about the vice of communism. But I feel that if you respect the human rights, you will respect the rights of the business, the rights of different groups of people, then you are working toward democracy and the rule of law.

28-00:15:42

Li: I thought it was interesting, too, because in the text Jiang mentions the colonial government of Hong Kong.

28-00:15:48

Lin: Yes. And he said, "Well, ever since Hong Kong fell into British rule, the governor of the colonial government of Hong Kong was appointed by the king and queen of England, and then he decided who would be legislators, He appointed the judges. So he has executive power, judicial power, legislative power all in one. I have not heard anybody complaining about this. And all of a sudden, Cha Liang-Rong [查良鏞], the famous writer-editor was advocating democracy. Cha is a famous writer of kung-fu heroes.

28-00:16:31

Li: I don't read Chinese.

28-00:16:33

Lin: Yes. Very, very famous writer. I would say most people in my generation read his novels. Jiang said, "Why did he wait until now complaining that Hong Kong needs to have democracy, why didn't he complain about the British government. I have not heard him say anything about the British government being undemocratic before. All because of 1997 is approaching, so they all want to talk about democracy."

I think Jiang Zemin did not buy my argument of democracy. He's very strong in his view of how he wanted to pursue this path of democratization for China.

28-00:17:20

Li: But it seems interesting, too, because it seems in terms of internationalization and globalization, that for him, the memory of colonial problems and international powers invading and occupying China is still very present, that it's still a concern that China needs to maintain some independence and not necessarily let Western forces, either countries like England or philosophies like democracy compromise those.

28-00:17:50

Lin: Well, I think China is very much concerned about foreign countries wanting to impose their view, their value in China.

28-00:17:56

Li: Like the concessions we talked about last time. Yes.

28-00:17:59

Lin: Yes. Tibet. Dalai Lama. He debated to Jimmy Carter a few days ago, while Carter sitting on the same chair. He said, "Well, Carter was complaining about Chinese murdering the Tibetan people and would not let the Tibetans worship the Buddha and so on." He said, "Well, Tibet was part of China. Tibet has been in China for hundreds of years." Several years ago I went to visit Tibet, and was shown a piece of document how Dalai came to authority. It was in Chang Kai-shek's time. Chang Kai-shek, when the Dalai Lama was sworn in, has given him the authorization of ruling Tibet. The Chinese government has authorized him to rule that part of Tibet. So he derived his legitimacy from the Chinese government. I'm telling Mr. Carter that these are facts that you should not overlook. "Tibet has been part of China. It's not just from now. It's back many, hundreds of years ago. So why do you complain about Tibet about how will we treat the Tibetans? You should not interfere with our internal affairs." That's what he said. And Carter made some major errors in quoting numbers saying that there are two million Tibetans and three million Han Chinese. It's all wrong. In Tibet, there are 2.1 million Tibetans and 300,000 Han. The Han immigrant is about fifteen percent. And actually, these people are traders, merchants, engineers, professionals. They're helping to build Tibet. "So, Mr. Carter, you are wrong." So I think the central theme of Jiang Zemin was that he has a very strong view of what kind of democracy China wants to pursue. He has his own agenda in terms of democracy.

28-00:20:07

Li: And these are issues that Taiwan never had to think about or deal with, right? Because of Taiwan's place in the world, it was never a subject of criticism or potential occupation in the same way?

28-00:20:19

Lin: He did not talk about that specifically. But I think he expressed what's important in the future relation between the two sides. I wanted to say here is that he expressed his willingness to talk to Taiwan, willingness to discuss with Taiwan. Even the most sensitive issues of the name of the country, the national flag and national anthem. I think probably—

28-00:20:45

Li: How did you bring that up? How did you talk to him about that?

28-00:20:47

Lin: I talk to him. I said, "Internalization. What I see as a special important issue for China is to handle properly the Taiwan situation." And in the opening remark, he said, "Well, we are both of the same race, same culture. If Taiwan and China can work together, how nice would it be." I say, "Well, it is the most important issue for me from the stand point of Chinese. If China wants to pursue a meaningful role in internationalization, I think China should find peaceful solutions to resolve the problems between the Mainland Taiwan first." And I said, "It's very much in the Chinese culture that the big shall serve the small. The strong shall help the weak." I mean, this is Christianity, in a way. But in China, this is very much the value dating back to the Chou's dynasty. Before Qing dynasty. That's how we look at the history. I'm describing one of the founding ancestors of the Chou Dynasty, Tai-po [周太伯]. He was a powerful king, but he treated people very nicely, and regarded himself as servant to the neighbors, which are the smaller countries. So people around him placed trust in him and the reign of Zhou grew even stronger and eventually took over Shan's [商]reign.

I said, "China is huge. Taiwan is tiny. China is about fifty times larger than Taiwan in population, land, and much more in natural resources. Taiwan is just trying to fight for its own survival. Why threaten its security? I said, "Why don't China open up to embrace Taiwan? The threats made to Taiwan was very frequently repeated: if you don't listen to us, we are going to beat you up by force." I said, "This stance is not conducive to mutual understanding and respect." I mentioned further, "Yes, you're talking about one China, but the fact is that one China in Taiwan's view is the Republic of China. It's not the People's Republic of China." I was very blunt in putting all this on the table. I don't think anybody would dare to say it to him like this. I said, "The China that I talked about is the Republic of China and the China you talked about is the People's Republic of China. But this is result of the history. There is nothing we can do to turn back the clock or close our eyes to it. Our generations have been through that. If you want people in Taiwan to accept People's Republic of China's China at this point, you obviously will

have some difficulty. ” And the national flag. The Chinese national flag is the red, white and blue. Have you seen it ?

28-00:23:44

Li: Yes. With the blue—

28-00:23:46

Lin: Yes. With the white sun in the left hand corner with the blue sky and then the red earth. So that’s the flag. And the national anthem. And Jiang Zemin, he say, “Well, the name is not an issue. We can discuss that. So far we have not touched such issues. But we can discuss so long as both sides recognize that there is only one China and that China is inseparable. For the names, perhaps we can just call it China. Certainly, we can discuss this.”

28-00:24:10

Li: That’s amazing.

28-00:24:11

Lin: He felt that the People’s Republic, these are all adjectives, these are not necessary.

28-00:24:16

Li: Just call it China.

28-00:24:17

Lin: Why won’t you call it China? I don’t know whether I mentioned this or not.

28-00:24:20

Li: No.

28-00:24:22

Lin: Then they have to look at it in the translation. But we just call it China. He said, “The flag that you talk about, I’m familiar with it when I was in school. Every day there’s a flag hoisting ceremony and we have to salute to the flag.” He said. Sun Yat-sen, all the people have respected Sun Yat-sen. In the old days and in Republic of China, in the opening of every major official meetings, the chairman should always recite “The Last Will of the Father of the Nation, Sun Yat-sen.”. That was practiced until about fifty years ago. He said, “I can recite Sun Yat-sen’s will,” he was expressing a friendliness, a common background with me.

28-00:25:19

Li: Isn’t there a picture of Sun Yat-sen now in Tiananmen Square along with Mao?

28-00:25:23

Lin: Yes. It was not every day, but that picture of Sun Yat-sen was displayed on certain national holidays.

28-00:25:33

Li: And that was under Jiang?

28-00:25:33

Lin: No, it was facing Mao Zedong.

28-00:25:36

Li: Right. But that was while Jiang was president, right, that that—?

28-00:25:39

Lin: No, that was back when Mao was president. So Mao respected Sun. 28-00:25:45

Li:

Sun Yat-sen.

28-00:25:45

Lin: Yes, Mao paid respect to Sun Yat-sen. Jiang Zemin said they recognized Sun Yat-sen as a national hero, for he had led the revolution to overthrow the monarchy, the Qing Dynasty and set up a republic. But they will not accept the title of the Republic of China. Yesterday, I talk about my dealings with the CSMS, with the APCCHE. It all followed this line of thought. They are afraid to accept the fact that there was a Republic of China. I said, “This is a fact. It still exists. You don’t like it, but this is a fact.” Yesterday, I said when Zhou Enlai and Deng Xiaoping went to Europe to study, what passport did they carry? I say, “They must be carrying the Republic of China passport. So how can you deny that there is a Republic of China? You have to accept it. You don’t like it? That’s fine, but it’s a reality.

28-00:26:56

Li: So there seems to be these problems of naming that are not substantive problems. But do you think there was a sense of shared values? Chinese values?

28-00:27:07

Lin: Well, I think that’s important and emotional. Jiang Zemin reiterated that there’s only one China. You should not talk about separation of Taiwan from China. Just one China. And as long as you accept this premise, meaning people in Taiwan accept this premise, then we can talk any issues, even the national flag, national name or national anthem. We can talk about all this. And these are the most sensitive issues.

I brought out these unpleasant issues in 1993 on the table for the leader of China to see. I think, in a way, this is a contribution that I can make in the future relationship between Taiwan and China. I told him that these are the crux of the issues.

When one talks about whether there should be a direct flight or a direct mail, those are technically subjects. Those can be tackled, can be dealt with. The trade, the custom to do this and that, I think those can be resolved. That’s easy. But when you come to the issues, the name, the flags, the national anthem, I think these are political and deep-rooted emotional. And Jiang Zemin recognized this ; he also showed his personal view, that these would

not be issues unsolvable so long as you recognize one indivisible China. Then we, both sides of the Taiwan Strait, can discuss. That's what he said. And he further quoted Mao's poetry. I have to check the detailed wording and if there is a translation of Mao Zedong's poetry. Again, Jiang Zemin recited Mao Zedong's poetry *xin yun chun* [沁園春] for me, in a nearly musical tune. And in that section of the poem, Mao recounted several famous and powerful rulers of the dynasties in history. He said, "Well, those people, the emperors of Han, Tang, Sung, Ming, and Genghis Khan only knows about riding horses and swinging swords, they did not show much wisdom and grace." Mao was implying that these famous kings or emperors don't seem to have too much to brag about in their heart and brain.

This poetry was well known for showing off Mao's self-image: ambitious, confident, and arrogant. He's saying that these historical heroes are no better or stronger or smarter than he. Mao concluded, for the best of elites, come to see what we got today [數風流人物 還看今朝].

Interpreting the poetry, Jiang stated that we should not take the burden of history blindly and placed on our own shoulders. We should look to the future and think outside of the box.

28-00:30:09

Li:

Well, I was thinking, because you have talked a couple of times about this idea of usefulness as a Chinese value. What is the use of it? What can you do with it? And it seems that this meeting ground of applied science, between the PRC and the ROC, is this traditional value of Chinese usefulness. Like fixing the problem with the rice. How can you increase the yield of rice and feed a country this large? Is this a key value do you think in—?

28-00:30:40

Lin:

Well, I think that this is to make sure, to answer, to address the needs of the people. They have a basic need to solve: poverty. Once you can go over this problem, you can go to other milestones.

You go to Mencius [孟子] again say that these are the issues you still need to address. If people have an empty stomach, it's not very easy to ask them to observe the rule of the law. Mencius also says that.

I think our effort in trying to build up the agriculture, build up the industry, in a way, is to build enough conditions for people to survive, and to lift China out of poverty. Once this is accomplished or while we're doing this, we also should think about what kind of country China should be.

28-00:31:44

Li:

Because when you were talking to [Don?], Jiang, you mentioned that things will be too late in another ten years that this is depressing.

28-00:31:49

Lin: Yes, yes.

28-00:31:51

Li: Why did you say that?

28-00:31:52

Lin: Well, corruption. I'm concerned with corruption in a developing country. That's one. The destruction of the environment is another. Then it will be too late. The cost will be too much, too high for the reparation of that. That's what I say. Actually, I don't want to contest Mao Zedong and Jiang Zemin on the virtue, or the lack of, communism. I am not in the position, nor have the preparation to debate communism and its suitability for China. I simply don't have the preparation to argue. But I was thinking that if you respect your people's rights and their diversified needs, and take the time to implement the rule of law. I think in so doing, democracy will result as a natural course of events. I'm taking that approach.

But I want to hit him with the fundamental issues of national anthem, national names, national flag, and the need to recognize the different vision and wishes of the people of the Republic of China. It is a matter of reality. I want to hit him with that. I think he has responded to my challenge. He said, "Well, these are issues that you are concerned with and I understand. And these issues can be discussed. We are willing to discuss and find consensus under one condition; that there is one China and that there shall not be separation of China and Taiwan.

28-00:33:32

Li: Do you know if any discussions ever took place, any further discussions of the name of China?

28-00:33:37

Lin: So far, never. I am the only person I know of, who did. For many reasons, until these last two years when Ma Ying-jeou become president, there's not a lot of movement along this front. Actually, both sides have been patient and tolerant. It was recognized that a better condition to discuss serious issues should first be nurtured, on both sides. But they were not talking about how to name and sing it. It may take another five years for those issues to be dealt with, I think.

28-00:34:07

Li: This is related. It's a different time period. But did the Tiananmen Square incident effect relationships between Taiwan and Mainland China?

28-00:34:18

Lin: Well, I think not that much, because the Nationalist party in Taiwan, the KMT, understands the priority of the CCP under Deng. They will do anything to quash resistance and took control of the situation. It's kind of natural. We were not surprised that they did do that.

28-00:34:46

Li: So it was not a setback at all?

28-00:34:47

Lin: It is for democracy in China but not for the China-Taiwan relation. No, no. But I think it is people outside of China that was appalled by this action. In Taiwan, this is something to be expected out of the CCP Leadership. I think what is important here—he told me that Mr. Ku and Mr. Wang soon are going to meet. You know at approaching the end of the meeting, the information came in that a Mr. Hsu is coming to Beijing? Well, Mr. Hsu is H. Y. Hsu [許惠佑], who at this time is a middle level official in charge of Mainland affairs but who in later years is to become secretary general of the Strait Exchange Foundation. And this conference actually takes place one month later in Singapore. So he wanted to assure me that Mr. Ku can talk with Mr. Wang on any issues. But Mr. Ku did not raise the issues because it is too early. And why did I treat this conference as confidential? Because in China—Jiang Zemin is relatively a forward-looking person despite many criticisms about his other demeanors. He's forward looking. And I think he has also encountered resistance from his own party about recognizing the Republic of China, recognizing the national flag and the national name. These are emotional issues. He felt that it is too early to discuss these issues at that time. I felt that, too. So in Taiwan, I don't think it's time to discuss those yet. The Chinese culture is that if you talk about the most difficult issues, then you cannot accomplish anything. It's better to deal with easier issues, and to establish some experience in working together. Then you finally tackle the major issue, by then you have created an environment such that the conditions will be conducive to resolve those issues. I think the name, the anthem and the flag will come later. It should not be discussed right now.

That's why I keep this piece of paper confidential. If I published this years ago, I think I can probably make a name for myself, but I think it would not help the cause. I did tell Lee Teng-hui about this. I sent Lee Teng-hui a copy of my summary. But Lee Teng-hui was not very happy with that.

28-00:37:48

Li: For the reasons we talked about yesterday?

28-00:37:50

Lin: Yes.

28-00:37:51

Li: Yes.

28-00:37:50

Lin: Lee Teng-hui because he was pursuing an independence approach. He did not want me to galvanize this relationship, to foster this relationship, out of his own control. In a way, that's one reason that has made me disfavored with Lee Teng-hui. I could become a threat to his own plan. I would become interested in a real attempt of reunification of Taiwan and China, which he may not.

28-00:38:20

Li: What was Jiang's take on the plan for reunification? For Lee Teng-hui's plan for reunifying?

28-00:38:25

Lin: Well, Lee Teng-hui, as was publically stated, there will be a three-step concept. The first step is to conduct exchanges and visits, to get acquainted. The second step is to work on certain projects, to establish some working relationship. And then the third step is to discuss unification. These are three steps, very logical, right? But the key element was missing there, perhaps intentionally. There is no mention of any timing. There is no time constraints, no time limits. It has never mentioned a time frame. One year, two years, three years or over a century? So in a way, Lee can go along with it. But Lee did not invent the concept. That was not designed by Lee. That was designed back by Chiang Ching-kuo. And I sent my meeting summary [with Jiang Zeming] to Lee Teng-hui. Lee asked the general secretary of the National Science Council, General S. L. Sung [宋心瀾], to see me. General Sung met with me and he said, "President Lee read your report and he wanted me to see you to explain our strategy." And he said, "We are pursuing through this three step concept and I think all efforts should be coordinated."

28-00:39:57

Li: And did you meet with Zhu Rongji the same trip to China?

28-00:40:04

Lin: Zhu Rongji? Yes, in the same trip I met with Zhu Rongji. Actually, the next day I met with Zhu Rongji and he shook my hands dearly. He quickly asked, "Should we establish an ITRI in the Mainland?" It's a very technical question and direct. Again, as I have pointed out here, the time was 1993 in March. It was before the Wang- Ku Meeting, or the Singapore conference. Once again, the timing is important. The second point is that this may be one of the key issues that can link both sides to work congenially. So I want to leave the issue for now, because I was not representing Lee Teng-hui or the government. I did not get Lee Teng-hui's specific approval to make any commitment to do anything.

28-00:40:55

Li: It was an unofficial visit? It was an unofficial visit, then?

28-00:40:57

Lin: It was an unofficial visit. Unofficial, but I get to see Jiang Zemin. Yes. I did not tell Lee Teng-hui ahead of time that I may be seeing Jiang Zemin.

28-00:41:11

Li: So was the visit with Zhou the official visit? Your visit with Zhou, was that the official visit to go see him?

28-00:41:17

Lin: No, it's not official. It's the same as an unofficial visit with Jiang Zemin. This way we do not have to stumble over any bodies in the foreign services. For

them, it's just a call from somebody to Zhu Rongji that said, "Well, Otto Lin of ITRI is in town. Would you like to see him?" That's it.

28-00:41:43

Li: Did you discuss with him any of the things that you brought up with Jiang in terms of the—?

28-00:41:46

Lin: No. I did not write a report regarding my visit with Zhu Rongji either. [I thought I promised Jiang that I would keep it in confidence.] But Zhu Rongji—he is an economist. He is also a prime minister. And he said, "Should we set up an ITRI in China like the ITRI in Taiwan?" And, of course, I had not thought of that question specifically before. But I have some reactions, more conceptual at best, to him. I said, "What is hi-tech?" I asked him. Well, I don't know of any definition of hi-tech. But one of its basic characteristics is multidisciplinary. A hi-tech product is usually consisted of many different disciplines of technology in it. So if you want to pursue hi-tech product or business, it's important to have these technologies together. That's how ITRI is able to do. ITRI's successful project was made possible because of different technologies can be blended together under the same management, under the same mindset and project control.

And in China, CAS have over 120 research institutes of applied science, pure and applied physics, mathematics, astronomy, materials and the like. And each is big organization by its own right. It's difficult to have two big organizations work with each other. Who's listening to whom? I suspected that this kind of mindset has made it difficult for major industrial project to be run in China. That's how ITRI was successful, but others may be difficult. In principle, you should have a mechanism of bringing these different disciplines together. That's what I'm saying. This is the key.

Whether you should have an ITRI, is secondary, I think. ITRI was formed under many constraints and boundary conditions. Furthermore, Taiwan is a small place. Taiwan is small and is like a province, so it's able to do with one ITRI. I don't want to create an ITRI like the CAS. For that size, it is easily turning into a government- controlled organization that would not be good in managing industrial technology projects. Whether China should have ITRI is a question that I have not thought about fully in my mind. But I think you should learn the basics regarding the national innovation system. I would say there are two key related elements. You want to learn how ITRI operated to accomplish its mission. Not necessarily how it was formed, but it's how it operated. Thus, the two elements are the missions and the values of the organization, and, the operation policy and practice to achieve that. This would include how do we select or form projects, how we do technology transfer, how we do spin-off. These are things that are important in ITRI. That's basically what I have tried to tell Zhu Rongji.

28-00:45:19

Li: Did you want to talk a little bit about Tsinghua, the National Tsinghua University in Taiwan and your involvement with that institution?

28-00:45:26

Lin: Any questions?

28-00:45:27

Hamilton: I do. We've talked a little bit about this move, but for the tape, could you tell us what your official title was after ITRI when you went back to the National Tsinghua.

28-00:45:41

Lin: My official title was Professor of industrial engineering and engineering management, IEEM. I held many titles over the years in Tsinghua. The first I held was Professor of polymer science. And it's has a dual title. Another is visiting science fellow of the National Science Council. That's an organization that give me money to work in Tsinghua as a Professor of polymer science. But immediately I was made dean of engineering, dean of college of engineering. I think I talked about this with details in one of the interview sessions. To the academic community, I was known more as dean of engineering and as Professor of polymer science. And then I returned to the U.S. and then come back to Taiwan in 1983, I was director of material research lab in ITRI. At that time, I was appointed formerly as the director of the Materials Science Center in Tsinghua and Professor of polymer science. It was a concurrent position with ITRI—the government allowed me to hold this titles. My interest, again, is to bring these subjects together, chemical engineering, polymer and material science. The classical material science, even in the United States, are metallurgy. People working on metals or steels, that kind of thing. And they consider polymer chemistry, inorganics, not in the same envelop of material science. When I was in Taiwan, I tried to tell the material science department that in addition to metallurgy, there are polymers, electronics, and all these others. So I taught a course in polymer science to the material science department. And I taught a course of electronic packaging in the chemical engineering department. Polymers are just one component of any finished electronic product. Basically that's what I have done. And I taught the first course of electronic packaging in Tsinghua back then. I have many titles with the University.

Although I hold those titles, it wasn't a full-time job, so I applied to Tsinghua for a full-time academic position as a Professor in the IEEM department after I left ITRI in 1994. I felt that my research was not at the cutting edge of polymer science, nor at the cutting edge of metallurgy. But I am better qualified in the management of technology and innovations. Therefore I felt better for me to be in the IEEM department. And they agreed.

28-00:49:04

Hamilton: What courses did you teach?

- 28-00:49:06
Lin: Management of technology. Yes. I taught two courses in management of technology.
- 28-00:49:14
Hamilton: And was this your major duty while you were there, is teaching these two courses or were you involved in other aspects of the department?
- 28-00:49:20
Lin: Yes. I taught courses and also supervised graduate students.
- 28-00:49:27
Hamilton: How many graduate students did you have?
- 28-00:49:29
Lin: Two at that time. I just started at that time.
- 28-00:49:32
Hamilton: And do you know where they ended up going?
- 28-00:49:33
Lin: Well, that transition is only one year. Then I went to Houston, so these students end up with other Professors. Yes.
- 28-00:49:48
Hamilton: You mentioned that this was a major break from your work at ITRI. Was there any relation to the work that you did in ITRI, or was this purely moving away from an administrative position to an academic and there weren't many ties?
- 28-00:50:06
Lin: In ITRI? Well, it's kind of natural, because when you become president of an organization, you do not have the time or the energy to actually do scientific research or other technical work. Just like the university. I think the dean level is the demarcation. If you become a vice-president, then the time that you have to teach courses or do research is very minimal. So I think a person should make up his mind. I advised my colleagues in the university that after the dean position, you really have to make up your mind whether you want to go administrative or you want to stay as an academic.
- 28-00:50:46
Hamilton: When you went back to the university, did you have access to a laboratory?
- 28-00:50:52
Lin: In Tsinghua? Yes, yes.
- 28-00:50:54
Hamilton: And did you do laboratory work?

28-00:50:54

Lin: No, I did not do much laboratory work, but I would if I stayed. Remember now, I go back to Tsinghua in 1994-95. It's just a year. And then I left. I moved to Houston. So there's a lot happening in that year's time.

28-00:51:15

Hamilton: And from what field did your students generally come from? You taught a management class. Were your students in chemical engineering?

28-00:51:22

Lin: No, I teach some courses in chemical engineering, but I do not do research in chemical engineering any more.

28-00:51:30

Hamilton: Okay. And the students in your course were generally from engineering?

28-00:51:32

Lin: Mostly were students from IEEM, students from any engineering department, the school of engineering.

28-00:51:38

Hamilton: Okay. Do you remember about how many students you had?

28-00:51:42

Lin: In Tsinghua? I guess I had about thirty some students.

28-00:51:50

Hamilton: I know you didn't spend much time on the laboratory on this trip, but could you compare the materials research center to ITRI's materials research lab in terms of the facilities? What were the comparisons and differences?

28-00:52:06

Lin: Well, the materials science center [MSC] in Tsinghua is fairly independent from the university. It was basically a nationally funded research lab and centered on surface sciences. It has research projects studying surface morphology, molecular interactions at the interface, adhesion, that kind of thing. The purpose of establishing the MSC is for it to provide support to applied technology in materials such as MRL/ITRI is working. MRL has in its name "research" but it's more development oriented. Thus it is focused on industrial technology. But as a nation, we have to do some basic research. As basic research is generally done in the universities, In fact, it's done by many different universities in Taiwan. But the university also has the job of teaching. So the government wanted to set up a center whose job is basically to research in basic materials science. They don't have any teaching obligations per se. Their people can hold joint positions with the university but the funding will be just for research. I was the first director of that materials science center of the National Tsinghua University.

28-00:53:32
Hamilton:

Would you say that for conducting pure scientific research, the facilities and the equipment at Tsinghua were better than at ITRI?

28-00:53:44
Lin:

Yes, yes. There are some big science items, big ticket items. You heard about the words big science and small science? Big science refers to projects of major scale which may involve instrument and equipment like the synchrotron radiation, the super colliders, or TEM/SEM combined with Fourier GC/MS and that kind of thing. Many equipment usually costs tens of millions of dollars. This is Big Science. And they use that as a vehicle to study basic structures or materials in the atomic and molecular levels, semiconductor physics or molecular biology. The industrial laboratory usually does not need that kind of equipment in the factory. Some factory may need kettles or reactors and that kind of thing, but not necessarily those very sophisticated analytical instrumentations. So these are different. Although today, there may be overlaps in this area. There are also people using, for example, MOCVD or MBE, molecular beam epitaxy in ITRI and in the industrial labs. These are big items. Millions of dollars of equipment. We have been gradually asking a production facility to prepare samples at the molecular size. In nanotechnology, for example, a lot of times people are using equipment like MOCVD/MBE. So gradually there's are movements of the boundaries, etc. So this reflects the change of time.

28-00:55:45
Li:

I wanted to ask about ITRI's twentieth anniversary symposium. What year was that and can you tell us a little bit about it?

28-00:55:56
Lin:

It was 1993. It was held in July. Since I have a lot of contacts with institutes world-wide, I felt that there's a group of institutions that are very similar to what ITRI is doing and these are in different countries. In the United States, for example, Argonne National Lab, which is associated with University of Chicago, but it is a laboratory, very applied oriented. AT&T Bell Lab also is associated with companies, but again it's in this group. So in Germany, the Fraunhofer Institute and in Netherlands, the TNO. In South Africa, CSIRO. In Singapore, in Korea, in Japan, there are institutes like this. And these organizations are all facing similar problems, different from universities and different from the businesses. I thought it would be good for this group of people to talk about their common problems and their approaches for dealing with those problems. So I have organized with ten leaders from different countries, from Europe, from America, and Asia to celebrate the twentieth anniversary of ITRI. And I can provide a list in my supplement to you. [A list of the invited guests are shown in Appendix 25]. And actually, we have published a book after this Symposium. The book was published by the Elsevier publisher [Appendix 26]. One observation was that I thought I would complain and get some sympathy about our lack of budget and the difficulty of government control, difficulty of interactions with the government and the

business, and so on. It turns out they have no sympathy in me because everybody's in the same boat. But certainly people dealt with these problems differently. So it did not solve any scientific problem or announce any technology breakthrough. No, but it was an occasion among these different institutions on different continents to talk about their common problems. And I guess it's a way to establish the name of ITRI for the twentieth anniversary.

And also, at this time, the ITRI twentieth anniversary, Brooklyn Polytech, which is called Polytechnical University now, decided to confer an honorary doctoral degree to Sun Yun-shuan, the former premier. They wanted to make the conferrment taking the opportunity of ITRI's anniversary, because Sun was the founding minister for ITRI. So also held a ceremony in Taipei. Usually to receive honorary doctoral degree, you need to go to the university, right? But because of Sun's health condition, the president of Polytechnic University, Professor George Bugliarro came to Taipei and to officiate the ceremony. It was a real happy and emotional occasion. [Photographs are shown in Appendix 1].

28-00:59:45

Li: All right. So should we conclude there? Is that a good place for today?

28-00:59:51

Lin: Good. I wanted you to understand the importance of my meeting with Jiang Zemin. I think he saw me not because of me personally, but because of my work with ITRI, and as president of ITRI, I wanted to take advantage of the opportunity to raise some important issues. Perhaps, consciously and unconsciously, I think it has made some difference in the later discussions in the issue of the Taiwan Straits.

28-00:60:27

Li: All right, thank you very much.

28-00:60:28

Hamilton: Thank you.

Begin Audiofile 29

29-00:00:00

Li: This is Robin Li and Emily Hamilton speaking with Otto Lin March 27, 2009. This is tape twenty-nine, interview five. So I wanted to ask you a little bit, just to wrap up ITRI, about your departure from ITRI and tying up loose ends, the succession—

29-00:00:23

Lin: Yes. The reason I leave ITRI is that basically my job as president is for two terms, a term of three years each. I stay at ITRI for nearly twelve years, half the time as the general director of the materials research lab, and half as the President. By the spring of 1994, my second term's is coming to an end. So I decided not to stay in ITRI. I would retire but still stay in ITRI doing some

technical work that I was interested in doing. But I decided to leave. I have talked about the circumstantial factors yesterday.

Now, to the question of succession. I had thought about succession much earlier than that, knowing that under normal circumstance, a President will serve for two terms but important work of the organization need to be continued. Thus stability and continuity are important for the organization. So I have organized ITRI's technology work into two groups led by two Executive Vice-Presidents. Well, all our top-level laboratory directors are called vice-presidents, but above them are the EVPs. In other words, I organize ITRI under two EVPs, these together the President and a few Staff VPs, constituted a very close management committee. One EVP takes charge of ITRI's work on IT related fields: electronics, computers, optoelectronics, materials, etc. The other takes charge of work in chemistry, mechanical engineering, the energy and resources, environment, etc. The EVP can stand in as President at any time.

One of the EVPs is Ching-Tay Shih. CT has his PhD from Princeton and an MBA from Stanford. He was one of the originals of ERSO engineers who worked on the semiconductor process. He is a very personable, knowledgeable, and well liked. At the time when I become president, he was the director of ERSO and I nominated him to be EVP. So under him is ERSO, CCL, computer communication, applied electronics, materials, industrial standards and a few others.

And I put the chemical laboratory, mechanical engineering, energy laboratory, environmental research laboratories and safety and so on under another EVP, Anthony Ku. Anthony has a PhD from Notre Dame and has an outstanding academic career. I think the three of us have a good combination in covering all the technology aspects. And of course, these two persons, Anthony Ku Ching Tai will be the obvious candidates for the president.

And during this time when I was president, Anthony had an opportunity to become president of a university in Taiwan. So I thought it was an good opportunity for him, so we took another VP, Bob Young, who was in the energy and resources field, and appointed him to take the EVP position.

By the time I left, I nominated Ching-tai Shih to succeed me and was approved. This was basically how the succession was done. In the later years, EVPs were not all from inside. But actually, most laboratory directors are from outside and mostly have some major academic or corporate research experience from the United States or elsewhere. So I think they are all experienced scientists or engineers or business executives.

And during this time, in my years, there's two major projects coming in, both at the request of the Ministry of Economic Affairs. One is to build up the capability in Taiwan to manufacture major key components, electronic

components. Because the more Taiwan products sells globally, the more Taiwan have to buy from Japan for the key components. So a task force again was formed which cut across many laboratory lines. I have Ching-tai as EVP also to take over the task force. Another project is to help elevate the competitiveness of the traditional industry. There's a lot of small SMEs and traditional type business in Taiwan. We need to upgrade their technology levels. So we have another task force to coordinate these efforts and Anthony Ku was the leader of the task force. Both of them have made important contributions to ITRI. And because of these task forces, they also interacted very strongly with the business. This has added to their support and understanding from the industrial sectors in Taiwan. I think that's how we train people, from the basic strengths of technology and give them a lot of experience with the industry. And, of course, they have to deal with people in the government relationships. And so they will also establish sufficient international connections on the job.

29-00:07:33

Li: How has it been reflecting since you've left on what ITRI has done?

29-00:07:44

Lin: Well, I think ITRI has done well. In looking at the technology transfer, I think it has played a role as intended for Taiwan. The performance pattern spreads over all the laboratories and I think ITRI has become a very important organization in Taiwan. So I was very happy about that.

Actually, I went back to ITRI in 2008, last December with Ada and all my children, Ann, Dean and Gene and the grandchildren. They came to see me, visit us at Christmastime. So I brought them back to Hsinchu and we have met with Ching-tai and the current president Johnsee Lee. Johnsee was a chemist, and I recruited him to UCL as deputy director around 1990. Later he was made VP in charge of UCL and subsequently ITRI president. And he has been president for four years now and ITRI is doing very well. We met Johnsee and Ching-tai and a lot of old friends in ITRI. It was a very emotional reunion. And actually, they made a DVD for me just kind of recounting a number of things that I have done in ITRI. So ITRI was doing well and was very happy for the organization that I left. It was doing much better when I was there.

29-00:09:28

Li: And do you imagine having any future involvement with ITRI?

29-00:09:30

Lin: Probably not. I'm retiring right now. I would continue to be a friend and concerned with its growth and I still maintained contacts with a lot of ITRI colleagues. So in that sense, yes, but I think any official capacity, probably not.

29-00:09:58

Li: All right. Well, I think that closes the chapter on ITRI.

29-00:10:00

Lin: Good. Yes, that's good. Yes, good.

[End of Interview]

Interview 6: June 25, 2009

Begin Audiofile 30

30-00:00:00

Li: This is June 25, 2009, Robin Li and Emily Hamilton speaking with Dr. Otto Lin in Berkeley, California in the Bancroft Library. This is interview session six, tape thirty. Dr. Lin, we had talked at the end of our last interview about the 20th anniversary symposium.

30-00:00:26

Lin: Yes.

30-00:00:28

Li: Could you talk about why having the symposium was important for ITRI?

30-00:00:32

Lin: Well, at that time, there are many institutes in the world that are supposedly doing technology development to help economic progress. And we thought that it is a time to compare notes, to see how these institutes were able to do just that in their respective country. We want to learn something from this group. Because in the past, people always talk about university. The role of the institute is not really that clearly defined. I talk about a national innovation system, which consists of four partners: the university, the institute, business, and the government. I think the role of the institute was not very clear in this arrangement and we wanted to see, to further explore that. I think this is one of the reasons—scientific, you might say. The second reason is to see how each country, how different countries play out with this type of system. We have different countries, representing all the way from Sweden, which is very advanced, then Germany, Holland, the North America, Japan, Korea, and then to Taiwan, Singapore, and South Africa and Australia. So this is a whole range of countries: different sizes, different economic makeup, and different stages of development. I think it's quite interesting to see that. That's number two. Number three is that I think it is a time also to let ITRI's name be better known around this world so they will help the globalization of future ITRI's or Taiwan's efforts, you might say. I think really these are the three objectives that I had in mind in running this Conference.

And then we have ten different institutes. From Sweden we had the Royal Academy of Engineering Science; Holland, TNO [I think it's the Netherlands Organization for Applied Scientific Research Germany, the Fraunhofer Institution. Then two organizations from the United States. One is Bell Labs and then the other is Argonne National Lab. All the CEOs or the top person of each organization participates in this Conference. So from Bell Lab, John Mayo came and Alan Schrieshiem from Argonne National Lab. From Japan is

Kubota Izuka, formal Director General, AIST MITI Institute. Then we have South Africa, J. B. Clark, CEO of CSIR. Again, Australia [John Stocker, CEO/CSIRO and Singapore, Khoo Lee Meng of SISIR. We have ten heads or presidents of institutes in Taiwan.

[Narrator's Note: A list of the participants is shown in the Appendix]

30-00:04:24

Li: How did you decide on these ten?

30-00:04:27

Lin: How did I decide?

30-00:04:28

Li: How did you pick these ten to be invited?

30-00:04:30

Lin: Well, over the years when I was at ITRI, we have established already some contacts with all these institutions. Globalization is very much a part of ITRI. Because very early in the game we felt that by work inside ITRI alone, it might not be adequate to help Taiwan, so we need to get all the help we can from outside. We worked with Bell Lab a lot. A lot of people coming from Bell Labs, then also, Argonne National Labs. All these 10 are organizations that we have worked in the past. I think there are still some others, but I cannot invite all of them. There are institutes in France obviously was missing. And there are a few others.

30-00:05:30

Li: So did you not invite them because you didn't already have relationships with those institutes?

30-00:05:35

Lin: Yes.

30-00:05:36

Li: Is that why they were not on the list?

30-00:05:36

Lin: Right. Like the Fraunhofer Institute, ITRI and Fraunhofer had signed an agreement to become alliance.

30-00:05:46

Li: Oh. At the symposium or before?

30-00:05:48

Lin: No, it was before the 20th anniversary. I visited Fraunhofer's headquarters in Munich a year or so ago and we have exchanged a memorandum, MOUs. We have also the signed similar MOU's with South Africa. You might say, "Why South Africa?" During that time, South Africa was a very isolated country; it was before Nelson Mandela took control. They're isolated, same as in Taiwan.

Because of that, there's a fair amount of communication between the two in technology and the commerce areas. So that's why we have invited CSIRO. [Narrator's Note: South Africa was one of the few countries that still maintained full diplomatic relationship with ROC at the time. My high school friend Stephen Wang was ambassador of ROC to SA when I made an official visit to CSIRO just a few years ago.]

30-00:06:44

Li:

Were there other symposiums that you were modeling this event after? Had you been to other sort of events that you thought, "That's sort of what we want to have at ITRI?"

30-00:06:55

Lin:

Well, we found that all these countries, they are quite different. Each institute has a special place for their country, and they operate quite differently. Among all, I found that ITRI is most similar to Fraunhofer Institution in Germany. At the time—in Germany, you have the Max Planck Institute which is basically dedicated to pure science and carries out research in basic science. And then you have a whole host of industries and many, many universities. The Fraunhofer Institution was charged to help the small and medium sized companies, basically, SMEs, yes. And at the time, the Berlin Wall has fallen and East and West Germany has just begun to reunite. The Fraunhofer Institution has a mission to help East Germany, as well. The Institute at that time has about fifty laboratories in the West and now is gaining more laboratories, and cover more territories as they are moving much farther east.

And they were working on materials, electronics, communications, sensors, chemicals, very much the scope that ITRI has. And when I was the director of the materials lab, I went to visit Fraunhofer and established a collaboration in acoustic emission. Acoustic emission is a nondestructive testing method especially suited for assessment of the reliability of big equipments, such as transformers in the power generation plant, heat exchangers, that kind of thing. When you use power to generate steams and steam to generate electricity, there's a lot of heat exchanges. Inside heat exchangers, typically there are hundreds of thousands of meters of little tubes and we are relying on the integrity of the tubes to transfer the heat. If you have cracks or holes in the tubes, they cause problems. One of the questions that I have at that time is how do you evaluate the integrity of those tubes. We're using acoustic emissions as a non-destructive testing method. That's why I actually went to Fraunhofer to visit this institute and get their people to Taiwan to work with our people for our clients, which is the Taiwan Power Corporation.

30-00:10:16

Li:

So was this research being done at the Fraunhofer, as well, or did you just bring faculty, bring employees, bring scientists from Germany to Taiwan?

30-00:10:25

Lin: We bring the scientists from Germany to Taiwan to help establish a similar method in our power plant.

30-00:10:31

Li: Okay. And did you pick the Fraunhofer Institute because they already had the right facilities?

30-00:10:38

Lin: That's right. They have facilities and they have experience and they have records; their people are doing that routinely. And they are interested in doing this in Taiwan because this means some contracts for them. All this method has been developed over the years and from scientists to engineers' point of view, they like the method to be implemented. I think that it is good for them. This is beneficial to all of the parties involved. For me, if we have to develop this method ourselves, it would take many more years to do it.

30-00:11:19

Li: Do you think Germany being a divided country made it sort of more similar to Taiwan and the Mainland in terms of development?

30-00:11:29

Lin: Well, at that time, not in the sense that they are interested in Taiwan. And West Germany and East Germany, they're reunited. West German people have to have an obligation or job to help rebuild East Germany. Later on, actually, I introduced the Fraunhofer people to China because of their experience in working with East Germany. And, of course, there are different laboratories and the different kind of social system, economic system. It's different. I remember I talk about national innovation system. I say that one model is for all the four parties to be separated completely. They don't care about each other. Talk about laissez faire, academic independence, one model. And another model is for all these organizations to be one. That is generally practiced in the communist world: government gives money to run the university, the university runs the laboratory and the institute, and then they also open up companies. This is another model. In East Germany, you can see it was basically the second model, that all the parties merged in one. In West Germany, all these four are all separated. In Taiwan's situation, we are working on the system differently. We try to have some overlap between these four parties. They do not duplicate, but they have some overlaps. They have some areas to promote common ground for communication so that that they can work together. I think our system, in a way, is good for Taiwan and it's very much like Fraunhofer in West Germany. They are helping the university, helping the small business, under some grants with the state government and they also have to earn some money themselves from the industry. In fact, they are trying these one to one ratios. At that time they had not accomplished that. So we are under a pretty similar situation.

And we are very different from Bell Lab. We are very different from Argonne National Lab. Argonne is mostly funded by the U.S. government, although by that time in 1993, they are also trying to expand contracts with the private sectors. I think we are ahead in a way for that kind of effort. In working on this type of model, we are ahead of Argonne at the time. Bell Lab is completely different. Bell Lab belongs to a profit-making corporation but is an institution by itself. It has produced Nobel quality research. We do kind of compare, knowing that different models work properly for each country at different times.

And there are some common similarities: all the organizations are under the pressure of funding. And you have to interact with many different clients. Some are governments, some are industrial people. And when we talk about the difficulties that I run into in Taiwan in trying to interact with all these people, I have nobody, basically, expressing any sympathy because we are all in similar predicaments. Actually, after this forum, we published a book with the papers.

30-00:15:18

Li: Have these forums for these kinds of institutes happened again since this time or were they happening before this?

30-00:15:27

Lin: I don't think so. Not on this scale, perhaps.

30-00:15:35

Li: Because it seems like a lot of similar people but from really diverse contacts were all together in one room talking.

30-00:15:41

Lin: Yes, yes.

30-00:15:42

Li: Have you done this again since the symposium?

30-00:15:46

Lin: I had run many forums, in Hong Kong. In Hong Kong particularly where we talk about innovation. I run an international forum basically on the kind of model. But I think ITRI's 20th anniversary forum is unique because that was the first time it was done in Taiwan with this scale and with this wide variety of people from different places. But we are very focused. We are focused on the subject. We talk about the innovation system, national innovation system, the role of the institute. I think it's very focused. And I must say, we get very good feedback from all these participants because they felt they had never had that kind of opportunity to talk about that.

Actually, I think our model is quite unique. The ITRI model is quite unique. In later times, in the United States, National Research Council in the United States, which is also part of NAS, NAE, was also running some forums on

entrepreneurship, to study how to promote entrepreneurs, that kind of thing. The ITRI accomplishment in technology transfer is basically recognized. Develop technology and transfer technology, and not only transfer technology to companies, to establish companies, but also to help some entrepreneurs to start small companies. This model of entrepreneurship is—at that time, the word entrepreneur is not very familiar with. Most national innovation system did not cover that. In a way we are starting very early. Later on, I participated in the Six Countries Programs, related to national innovations. Again, the six-country program is basically developed in Europe: Germany, France, Netherlands, Sweden, and so on. And it soon had become twelve countries to include U.S.A., Canada, Japan and other I guess many more countries have participated in it now. I went to this program several times to talk about national innovation system. They are all interested in trying to nurture entrepreneurship and then to transfer technology—the technology transfer from institutes and the university to industry. Later on, I went to the Salzburg seminar twice as chairman of the Global Innovation Forum in 2007 and 2008, again based on the continuous demand to discuss this subject. In the 2007 Innovation Forum in Salzburg, I have invited people from UK, from Singapore [Professor Su Guan-nin, President- Nanyang Technical University], and from many countries again. I talked about the roles of different players: university, institutes, business and government. We also talked about some environmental factors, such as IPs, protection of IP rights, technology transfer mechanisms and so on. At that meeting, we have Professor Jud King who talked about Berkeley and the Lawrence Berkeley Laboratory. I think that it is proper for him to do this since had participated in starting many programs here at Berkeley. We have also invited speakers from Stanford University, a university known very much for nurturing entrepreneurs. Stanford University indeed. I'm sure you've heard of Stanford. Although a lot of Berkeley people claimed have not heard of Stanford.

30-00:20:18

Li: A small school on the peninsula, yes.

30-00:20:19

Lin: A small school in the west. Yes. So again, I think this worked. What I have done continued to attract interest. Now, the thing about our 20th anniversary, ITRI's symposium—it was conducted on a more global scale than I have first expected.

30-00:20:40

Li: So do you feel that the symposium was successful? It accomplished what you had hoped it would accomplish?

30-00:20:47

Lin: Yes. This 20th anniversary symposium was very good.

- 30-00:20:53
Li: And do you feel like it tightened the relationships between these other institutes worldwide?
- 30-00:20:57
Lin: Yes, yes, yes. And I think also it helps the situation in Taiwan, helps the position of Taiwan. Scientists in Taiwan would be known to these different countries. And also, we would send people to TNO, for example. For learning, exchanges or just visit.
- 30-00:21:20
Li: What's TNO?
- 30-00:21:21
Lin: With TNO.
- 30-00:21:22
Li: What is TNO?
- 30-00:21:24
Lin: TNO in Netherlands, in Holland. Yes. TNO. The Netherlands Organization for Applied Scientific Research.
- 30-00:21:35
Li: All these acronyms of science organizations.
- 30-00:21:38
Lin: Yes, yes, that's right. You have to learn all of the acronyms.
- 30-00:21:45
Li: And just a detail—all of the symposium was conducted in English, then?
- 30-00:21:48
Lin: Yes, all English. All English.
- 30-00:21:50
Li: And all the scientists spoke English? You didn't need to use translators?
- 30-00:21:53
Lin: Yes. We would like them to speak Putonghua but nobody can.
- 30-00:22:01
Li: And how long was it?
- 30-00:22:03
Lin: It was about a week's time, about a week's time. Yes. It was the first symposium of this scale in Taiwan and, for me, it also started a series of my own professional activities in the entrepreneurship area, innovation area, national innovation system sort of thing. It has to this day.

30-00:22:33

Li:

I was going to maybe shift now to talk about ITRI and your last days at ITRI. We talked a bit last time about your wife's work at ITRI and sort of the context of her leaving and your decision to leave. Could you talk about that last year a little bit?

30-00:22:54

Lin:

Yes. I think my wife's situation, I guess I partly told you about the incident with the timecard. I talked about this, so there's no need to go in to it. It's a small thing but then because of her position as a subordinate and my position as the head person in the organization, it becomes awkward and touchy. I wanted to handle it professionally because I respect any and all of my colleagues. If anything like this happens in any unit or Laboratory. I would normally organize a special investigation committee to look into it, determine the fact and then the responsibility. So I did just that in this case. But in this case the head [of the unit] is a close relative, some people might think that I may try to stall the investigation through the due process, and that kind of thing. There was such a pressure that I should just fire her, to show that I am taking swift action. This is in people's mind. even though I think I have been conducting myself fairly. And it has creates problems for me in the family because she felt that if she were anyone else, normally I would defend this person vigorously. But in this case, she felt I did not defend her enough. So you see, it's a touchy situation. And I might say that to this day, Ada has not recovered from the incidence completely. She was a person of high respect for herself, with high ideals and everything. But she felt that I did not defend her enough. And between Morris Chang and I, we have not had any major disagreements on things. But on this, he felt that I should not have let this happen in the first place. I should just immediately fire Ada especially she's not under any financial pressure or anything. These are the difficulties of the situations. Although I have respected Morris a lot, I think he made a hasty decision and forced my hand.

Unexpectedly, K.T. Li might have come into the play. K.T. Li was a member of the Board of the Directors. I had information that K.T. was using the situation to speak against me. This can actually lead into another subject here. But first, let me just finish. My lesson here is that I felt that it's not advisable for a husband wife to be in the same organization in a very close working relationship. It would make both [situations] difficult.

30-00:26:20

Li:

Was there an incentive for Morris Chan to force your hand, do you think?

30-00:26:26

Lin:

I have never thought of other possible incentives. He expressed unhappiness because this came out in the newspaper and people talked about it. So he felt that it's better for it to disappear from the news media the sooner the better.

30-00:26:39

Li: So he's really protective of ITRI from scandal or anything?

30-00:26:42

Lin: He's protective of ITRI. I think he, of course, is thinking about that. Actually, I think it's rather un-fortunate, in hindsight, for Ada to be in ITRI in that position. Because as the director of a center, she also participates in the headquarters staff meetings. The meeting of the president, the two executive vice presidents, and all the VPs of the Laboratories and Directors of the Centers. Twenty-some people. This is the top-level and most important meeting of the leadership. And she, as a scientist, and as a leader of a unit, spoke very freely and candidly. That's the way we wanted it. And sometimes, more often than not, there would be different opinions and different views about the business. Occasionally, Ada and I would take an opposite position on issues. It's all for business, of course. By this, Ada has left the impression that she is very strong willed professional who acts with total independence. As chair presiding, I usually would consider all the views and try to find a middle road, or strike a compromise, to the extent possible. And then there are people who might make different assessments of the debates and personalities, even though everyone was just talking business. So I would think that this is a situation that I would advise people to consider and to avoid that kind of situation to happen. That's basically it. It's kind of unfortunate to me at the time.

30-00:28:38

Li: And you said there were some other sort of players factoring in, some politics?

30-00:28:43

Lin: Okay. I think this is back to the bigger picture. During the eighties, 1970s and eighties, there are two very important persons in the Taiwan science and technology landscape. One is K.T. Li. K.T. was an individual of very intellectual capability. He studied physics at the Cavendish Lab at Cambridge. Did not have a PhD but graduated with a master degree and returned to China during the wartime, the Second World War and began his long career with the government.

30-00:29:27

Li: And he's your father's generation, isn't he?

30-00:29:29

Lin: It's my father's generation, yes. K.T. is very shrewd, very intelligent. He knows the language and the culture well. And then he started from a technical position, gradually moving to become minister. He was minister of economic affairs at one time, and then minister of finance. Both are very important positions. He was also a general secretary of the U.S. Aid Commission, managing the U.S. funds for Taiwan during the early sixties, I think K.T. was part of the command. Because of this, K.T. established for himself a

reputation in technology as well as in finance and economy. He considered himself the top person in that area.

30-00:30:36

Li: Did he work in the U.S.?

30-00:30:38

Lin: He never worked in the U.S. He worked in Taiwan. Now, another person is Professor S.S. Shu [Shian-Shieu Shu]. S.S. was a graduate of Tsinghua University [in early 1930's in Beijing] and then got his PhD at Brown University, applied mathematics. He was a professor at Purdue. Chiang Ching-kuo knew him, held him in high regards and invited him to come to Taiwan. By this time, S.S. has worked in the U.S. universities for maybe over twenty years. He taught in Brown and then in Purdue. S.S. has a broad understanding of the role in science and technology in the developing countries. The position of presidency of Tsinghua [the Hsinchu campus] came natural to him. At that time, all these top academic positions are appointed. So he was appointed to be the president of Tsinghua in Hsinchu. With a broad knowledge of the global scene, he became interested in many areas. Energy, for example. He knew that Taiwan has some geo-thermal energy. It's very small. And then he wanted to explore for sure and set up a geothermal energy experimental station. And in Tsinghua University, he promoted electric vehicles back in 1978, some thirty years ago! He felt that Taiwan has no oil, no petroleum, 95% of all energy was imported. And just to convert the very precious petroleum to gasoline and burned them up for transportation, would be very wasteful and also polluting. It does not make sense. Electric energy can be generated through hydropower, nuclear, wind and geothermal and much cleaner to use. So he felt that we should develop electric vehicles as a mean of transportation in Taiwan.

I guess I have talked about my story in Tsinghua while becoming the head of the EV project, more than thirty years ago. That's how I get to know S.S. Shu.

30-00:33:02

Li: When did you first meet S.S. Shu?

30-00:33:05

Lin: I first met S.S. when I become dean of engineering in Tsinghua. And I took over the EV project.

30-00:33:15

Li: So in the late 1970s?

30-00:33:17

Lin: 1979.

30-00:33:18

Li: 1979.

30-00:33:19

Lin: When I was on leave from DuPont. And that's the first time I met S.S. I didn't know him personally before. As chairman of the National Science Council, S.S. was a very important advisor to Chiang Ching-kuo. With his worldwide contacts, he became the head person in the science and technology area. After all, he was the chairman of science council. Naturally this becomes a rivalry situation with K.T. Li.

30-00:33:51

Li: And would you describe Shu as having more international connections because of his work in the U.S. compared to K.T. Li?

30-00:34:00

Lin: Yes, I think so. t. That's right. And Li, although he also has maintained a very wide spectrum of contacts, Li was really grown out from the bureaucracy. I did not mean it in a derogatory sense, but just to say that he knows much better the government system, and how to make things work under it.

30-00:34:18

Li: Because he went to school in Cambridge, but then came back—

30-00:34:20

Lin: Well, he went to school in China, but he spent two or three years in Cambridge.

30-00:34:25

Li: But then came back and has worked—

30-00:34:26

Lin: And then came back to China and worked in the government. So he rose through the government, through the ranks.

30-00:34:36

Li: The ROC government?

30-00:34:37

Lin: ROC government. Yes. Okay.

30-00:34:41

Li: And when did you first meet K.T. Li?

30-00:34:43

Lin: I met K.T. Li again, 1978, seventy-nine, when I was—

30-00:34:45

Li: Same time?

30-00:34:46

Lin: Yes, at the same time. But without knowing that these two are competing for the ears of Chiang Ching-kuo. So there is kind of a rivalry in the air. And I was recruited to Taiwan by the Tsinghua leadership: my good friend Dean K.

W. Mao and President M. C. Chang, both had briefed S.S. on my coming to Tsinghua, and then later on to ITRI which S.S. has direct participation. So K.T. considered that Otto Lin was an S.S. Shu man, putting me in this camp. So in a number of occasions, he was taking a not so friendly position with me. I could tell it; these are very funny things.

30-00:35:39

Li: Well, because they're the same generation, right? Shu and Li?

30-00:35:42

Lin: Shu and Li are the same generations. I am a younger generation. I came to Taiwan because I first knew S.S. Shu. Actually, I don't know S.S. Shu. I came to Taiwan and then knew S.S.

30-00:35:54

Li: But you left DuPont because of—

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Lin: I left DuPont because of Tsinghua [before any personal contacts with S.S.]. However, Li thought that I am a protégée of S.S for getting the Tsinghua job. However, he could not find much fault in this because I did fairly well in the job and everything, so become somebody who was pretty well known in Taiwan. But he always saw me with that frame in mind. This impression could be en-enforced by the fact that, whenever I talked about the science and technology development of Taiwan, I almost definitively mention the Science Park and S.S. Shu. After all, S.S. was the first person who told Chiang Ching-kuo that you should set up a science park and nurture science business, technology business here. But K.T., for the time, has served at two ministers post, and so has involved with many important policy matters related to science and technology, might have felt a bit side-lined.

I guess I had mentioned the story that when S.S. in the cabinet meeting talked about wanting to set up the Science Park, he met with a lot of challenges. They said, "Well, now you want the government to buy this piece of land from the farmers and to develop this land, build up modern infrastructure, make sure there is water, power, gas, communication network and good accessibility, and build the buildings and then rent it to the companies, to technology companies at very nominal rent. And when this company starting their business and making some money, you want the government to give them tax holidays, at least for some period of time. How do you balance your books? The person who asked that question was K.T. Li.

So when S.S. set up the Science Park, he was under tremendous pressure when I came to Taiwan. He was busy with the starting of the Science Park. I know these stories quite well. Not alluding to any disagreements among the leadership, I always gave credit to the person who is really the mover, the initiator, the creator of Science Park, S.S. Shu. Obviously, K.T. did not like that. Especially when the park becomes more successful and everybody likes

to claim some credit to it. As the saying goes, “Success has many parents, failure is an orphan”. You’ve heard of that, right? And here I am, always highlighting S.S. Shu. Although, to be fair, all the time I did mention K.T. Li’s supports was instrumental in bringing to life some of the policies for venture capitals, for loans available to the small start-ups, and budget to the government agencies for support to educations, etc. Those are important policy measures. And the Science Park actually benefited because of these policy instruments. But if you’re talking about Science Park itself, to me it’s very clear where to place the credits.

In reality, the contributions of these two persons in this Taiwan technology development and economic growth are very clear to me. S.S. Shu is the person who started the Science Park, and helped built the ITRI and served as its Chairman of the Board. K.T. Li is the person who facilitated various government supports and pushed forward many policies and laws to help the implementation of the Park and stimulated innovations and entrepreneurship.

30-00:40:14

Li: And Shu was a trained scientist, right? He’s a chemist? No, a physicist? Physicist?

30-00:40:18

Lin: No, he’s a mathematician, yes.

30-00:40:20

Li: Mathematician. But K.T. Li was—

30-00:40:24

Lin: Is a physicist, yes.

30-00:40:24

Li: Didn’t he say economist?

30-00:40:26

Lin: No, he has no formal background in economics. They both have very little background as economists. They were practical economists like I am.

30-00:40:36

Li: Was Shu more of a practicing scientist than K.T. Li?

30-00:40:39

Lin: Shu never practiced science as far as I can see. He is also a great teacher. He’s a top mathematics. At Purdue University, he was a well-respected mathematics professor. I met people who sat in his class and took his course.

30-00:40:58

Li: And K.T., did he ever teach?

30-00:41:00

Lin: No, never taught formally, as far as I know.

30-00:41:02

Li: He was always in government?

30-00:41:02

Lin: He was in the government, yes. But K.T. is very powerful because he went through these two very important ministries. And just think about the people whose careers that he has helped. So he has a big group of followers. So when K.T. Li speaks, people listens.

30-00:41:26

Li: Was there someone like you under K.T. Li?

30-00:41:28

Lin: There was someone like me under K.T. Li, yes.

30-00:41:31

Li: Was that someone that you competed with in anything at all?

30-00:41:34

Lin: No, I don't usually compete with anybody. Basically, my attitude is more like S.S. We're doers. We are given a job, we just try to do it well. All this politics, there's something to it. But it's just kind of incidental and a necessary evil and we just have to deal with it and move forward. And I have never given S.S. any personal favors. Never gave him a bottle of wine or something, at the time. And we think the same. We treated people the same and with equal respect, be it important leaders like K.T. or a new comers. Now that I come to think of it, perhaps I probably should have treated K.T. with more deference because in the government system, they have different types of ways of—

30-00:42:33

Li: So just to make life easier, maybe you should have?

30-00:42:34

Lin: Yes, yes, yes. I did not praise him loud enough and with enough credits, I think. So K.T. was not very happy with me. So now this thing with Ada happened. He was not going to be very understanding for me. So that's K.T. Li.

Now, at this connection, I still cannot say anything less about S.S. Always admiration because he even gave up his position in favor of Morris Chang. In 1988, somebody in the government leadership was not pleased with Morris and wanted to remove him as president of ITRI. Unable to reverse the decision, S.S. felt that to save face and to keep Morris' service in Taiwan, it's better to make him chairman of ITRI. Being the incumbent chairman, S.S. told Chiang Ching-kuo that its time for him to step down. Chiang Ching-kuo reluctantly agreed. You might recalled that S.S. was forced to resign as chairman of the National Science Council only a few years ago out of certain political pressure, some alleged that it might have something to do with K.T.

30-00:43:58

Li: How did he do that?

30-00:43:59

Lin: How did he do that? Yes. I have mentioned three persons, very important persons in the development of technology and industry of Taiwan. Another one is Sun Yun-suan, Premiere Sun. Premiere Sun was made premiere in around 1978-79. Previously, he was minister of economic affairs. You want me to write the name down on the board?

30-00:44:24

Li: No, I have the names here. Yes. I've got a list of names.

30-00:44:25

Lin: Okay. Oh, okay. All right. And he led a group of people, of top cabinet members to visit Saudi Arabia. [And, of course, I was not there, okay.] But the story was that when they got into Saudi Arabia and resting at the airport waiting for visa processing. They of course were sitting in the VIP room while their passports were being processed for them.

And S.S. produced his U.S. passport. Now, years ago when S.S. was asked by Chiang Ching-kuo to go to Taiwan, he already working in the United States for over twenty years. [I don't know how many. We can find out.] He has the American citizenship. And at that time, Chiang Ching-kuo assured him that he did not have to give up the U.S. citizenship." So he retained his U.S. passport. I understood that when they returned to Taiwan from Arabia trip, news and innuendos were made by someone regarding S.S.'s citizenship. So it had precipitated S.S.'s resignation from the National Science Council position.

30-00:46:22

Li: Because he had retained his American citizenship?

30-00:46:23

Lin: Yes, because of U.S. citizenship. Okay. And this was a kind of dirty, low blow, because he has cleared this with Chiang Ching-kuo, that he was an American citizen. Chiang Ching-kuo said that's no problem.

30-00:46:43

Li: So this was sort of the scandal linked to—

30-00:46:44

Lin: That can be said as a scandal, or one of the many.

30-00:46:46

Li: Because it was in the newspapers, they wanted him to resign?

30-00:46:49

Lin: Yes. S.S. felt that it's better that he not be the Science Council chairman. And when S.S.—I mentioned earlier making proposals to establish the Science Park, K.T. was the person who held different views on his project. When the

Science Park held its opening celebration, the basic infrastructure was built and then there's a grand opening, no minister come to the ceremony except Chiang Ching-kuo himself. Chiang came to the ceremony and ride on an vehicle that the Tsinghua team has built. The EV was part of S.S.'s vision which has been implemented in Tsinghua. From this one could see what kind of visionary person S.S. was. This was in 1979, all these concepts was originated back at that time. Chiang Ching-kuo has recognized Shu's effort.

30-00:48:00

Li: So when Shu resigned from the National Science Council, was he allowed to name his successor?

30-00:48:06

Lin: No. [Narrator's Note: The vice chairman, Professor M. C. Chang who was also a former president of Tsinghua succeeded him.] While he resigned from the National Science Council, Chiang Ching-kuo would not let him resign from the ITRI chairman post. ITRI is a nonprofit organization and, unlike government agency, has that flexibility. I guess I have told you that last time. It's a dual relationship. It was like a national lab but also a nonprofit organization. So he said for ITRI, there's no need for national citizenship. So S.S. was still chairman of ITRI.

And in 1986-7, when Morris Chang was ITRI president, he has encountered many problems with ITRI. I guess I have talked about how I was nominated to succeed him, right. At that time, political environment was such that there's a lot of questions about the position, the mission, and how ITRI was run, all that kind of thing. When Morris went back to Taiwan and became president of ITRI, his salary has attracted attention in some circles. I do not know for sure what the pay was, but come to think of it, I would support it in any case, because, after all, Morris was President of GI, General Instruments at the time, so he must be very well paid. And why should he go to Taiwan? He has no roots in Taiwan. So certainly personal compensation has to be a part of the equation. It's different from people like myself, who have roots in Taiwan. We can talk about ideals, trying to help Taiwan and everything. But there's no need for Morris. He certainly should negotiate for a package that he felt reasonable and comfortable with. In any case, because of his compensation being high, he becomes a target of interest for some people, not the least among some members of the Legislative Yuan. The worst thing was the unnecessary speculations behind the scene.

[Narrator's Note: Later, as President of ITRI, I answered squarely an inquiry from certain members of the Legislative Yuan and defended Morris's taking the Chairmanship of TSMC, which is a spin-off company of ITRI supported by government research funds. During the early days, while the effort of ITRI was not yet fully recognized, compensation package to returned experts and expats was constantly in the Legislator's mind.].

30-00:50:26

Lin: Now, was he born in the U.S.?

30-00:50:28

Li: He was born in China.

30-00:50:29

Lin: He was born in Mainland China.

30-00:50:31

Li: In China, Mainland China. But immigrated to the U.S. as a young man?

30-00:50:34

Lin: Immigrate to the U.S. as a young man. Went to Harvard and MIT.

30-00:50:40

Li: And didn't speak very good Chinese? Is that right? You said his Chinese was not very good when he first came?

30-00:50:45

Lin: His Chinese actually now is much better. At that time, it was not very good.

30-00:50:49

Li: Not very good.

30-00:50:50

Lin: Yes. At that time, it's not very good.

30-00:50:51

Li: So he seemed a little bit like a foreigner, maybe?

30-00:50:53

Lin: And he behaves like an executive in a typical U.S. company. When I was in DuPont, I was a middle-ranking manager and have observations on how executives behave. But, here in Taiwan, running things as if it was an American company would create a lot of tension. People used to say he was like a bomber pilot, Dropped the bombs and left. I think some of his actions could be intentional to rock the organization. He wanted to change the organization norm. I also talked about an example. He was quite frustrated with the organization and how it did not perform the way he had wanted. I gave him the analogy of the un-tuned piano. I think I had probably talked about that.

So when Morris went to ITRI, the first couple of years were frustrating time for Morris and also for ITRI people. So he was not very happy about it. Morris was a good businessman and is a man of strategic mind. I think he has made many contributions, definite contributions to Taiwan, but the first two years were very frustrating years. So the government did not want him to be president of ITRI, but have to give him a proper position. So S.S. said Morris can be the chairman. Thus, S.S. resigned and give the position to Morris. And I was made president of ITRI to succeed Morris.

Before Morris accepted the ITRI offer and came to Taiwan, S.S. as Chairman of ITRI, went to New York several times to work with Morris for him to take the presidency. However, K.T. always thought that he was the one who offered the ITRI position to Morris. Again, success has many parents. So I think the two of them, S.S. and K.T., have maintained the tension even afterward. In talking about K.T. and S.S. Shu, I realized that it was an impossible situation. K.T. is an organizational man and commands organizational support in Taiwan. S.S. was a scholar and a loner, pretty much like me. He was really the person who has promoted my career. So it is natural for K.T. to be quite apprehensive about me. So in some way, I have offended K.T. Li through S.S.'s relation and have offended Lee Teng-hui through my work with Zhou Guan-chao and China. By 1994, the circumstance has suddenly turned ominous to me.

I don't know how much I have talked about this. During Chiang Ching-kuo's last years, from all the indication we know, he was to pick Sun Yun-suan as his successor. But Sun was a very capable, talented technocrat and exemplary civil servant and, as such, hard to be replaced. Chiang felt now that Sun Yun-suan is in the middle of many important projects, Sun should continue to do that while his own health is still good. And the job of the vice-president is really not as demanding, right?. They're just like a spare and in-waiting. So he gave the job to Lee Teng-hui, not knowing that himself, his diabetes become worsen suddenly and died shortly afterward. So Lee Teng-hui was in the right position and become President of the ROC.

And during that time, from 1984 to the nineties, I was very close with Lee Teng-hui. Lee was very interested in science and technology and wanted to use that as a vehicle to build the economy. So we saw each other very often. But now he becomes president, which is both good news and bad. When he was vice-president, he indeed has not much to do and can spend a lot of time studying economic problems and technology solutions. He can go into things more deeply. Now that he was suddenly president, he has to be involved with power struggles to solidify his base. And at that time, in the KMT, to the high-ranking KMT leadership, Lee Teng-hui was a newcomer. So he has to maneuver himself out of these groups of rivalries to solidify his control.

I think it would be something in my book but I should not spend too much time here. We don't have much time to talk about how Lee Teng-hui maneuvered himself to solidify his power. But he did. And one of the major instruments is that he said, "Well, I want to reunite with China. I want Taiwan to be reunited with China." And this is Chiang Ching-kuo's vision and last will. So he will be the person to finish Chiang Ching-kuo's objective to reunite with China.

So in 1990, 1991, through KMT and the ROC governments, he has promulgated guidelines for the reunification of China. And in these guidelines for reunification of China, he talked about three phases. Phase one is to

increase contacts and exchanges for people on both sides to know each other. Previously there's no formal contact. You can meet people here, in the United States, in Europe, everywhere, in business but not as formal contacts. And the first phase would be formal contact between the two sides. The second phase, phase two, would be to set up joint collaboration programs. Setting up joint ventures or something is phase two. And phase three would be the discussion of reunifications for the two sides. And there is no time limits for these three phases. The process is very logical. Just for the two people to get to know each other, and then going steady, and finally strike a marriage, right?

30-00:59:11

Li: Is this Chiang Ching-kuo's vision?

30-00:59:12

Lin: That's Chiang Ching-kuo's vision. And Lee makes this vision as his guideline for the reunification of China. I was one of the persons who believed in that. So under this kind of guideline, I set up contact with PRC. I asked my laboratory directors, vice-presidents to come to China, to know about their counterparts in China. I guess I talked about how I invited Zhou Guangzhao to Taiwan. And that was part of that. Again, it was in 1993. Zhou Guangzhao, the President of the Chinese Academy of Science, led a group of twelve members of the Academy to visit Taiwan as my guests. This is unprecedented. At that time, the two sides had a lot of political problems and intricate struggles. I, as president of ITRI, was able to invite Zhou Guangzhao as president of CAS to visit Taiwan.

Begin Audiofile 31

31-00:00:00

Li: Robin Li and Emily Hamilton speaking with Otto Lin in the Bancroft Library at UC Berkeley. This is tape thirty-one. When we stopped the last tape, you were just beginning to tell the story of inviting Zhou Guangzhao from Mainland China as part of phase one of—

31-00:00:17

Lin: Phase one under the national unification process or guidelines. We thought this guideline very logical because it tells about how to progress from one [stage] to the other. But there's no set time limit. It was just to let things develop. From the science and technology point of view, I started doing things. I asked all my laboratory directors, VPs, to contact their counterparts and to know about China. And I myself worked with Zhou Guangzhao. I guess I talked about this in the last time. I was given an award by the Third World Academy of Sciences, a technology award for 1992. And Zhou Guangzhao was in that meeting, as well. I talked and invited him to come to Taiwan and he accepted. But then we have to work out some detailed logistics, which is very complicated at that time. I was basically moving in that area real fast. I think faster than Lee Teng-hui liked. He did not appreciate the work that I did in promoting collaboration between Taiwan and China. In

a way, I am getting further apart from Lee Teng-hui. That's the second leader that I was having trouble with.

Now, when I invited Zhou Guangzhao to Taiwan, I guess there's a lot of news and my name was in the newspaper all the time. Very high profile. About that time, I was also elected to the Academy of Engineering Science in Sweden. Again, this is very much in the newspaper. So in Taiwan at that time, I think K.T, for one, was not very comfortable with that.

31-00:02:40

Li: Because of your rising prominence?

31-00:02:42

Lin: Yes, it appears that I was rising in prominence. And at that time, there's something also happens in Taiwan, is the Academia Sinica, the National Academy of Science. Professor Ta-You Wu, very distinguished physicist, was retiring from his post as President of the Academia Sinica. And, Professor Y.T. Lee from Berkeley, was to become President of Academia Sinica succeeding Professor Wu. Lee is an outstanding chemist, obviously, the only native Taiwanese to be awarded Nobel Prize in chemistry. He was a person of my generation. He, I think, is two or three years my senior and very much a Taiwan separationist.

31-00:03:54

Li: Y.T. Lee?

31-00:03:55

Lin: Y.T. Lee. Lee Yuan-Tseh.

31-00:03:57

Li: Y.T.

31-00:03:58

Lin: And actually, because of that, he was rapidly taken into close comradeship of Lee Teng-hui. They both shared that kind of inner motive.

31-00:04:16

Li: Y.T. Lee, is he Taiwanese?

31-00:04:17

Lin: Yes, he was born in Taiwan.

31-00:04:19

Li: Born in Taiwan.

31-00:04:21

Lin: Yes. Lee Teng-hui was also born in Taiwan. They are native Taiwanese.

31-00:04:27

Li: Right. Y.T. Lee, he would have spent most of his career in the U.S.?

31-00:04:30

Lin: In the U.S., yes.

31-00:04:31

Li: He won the Nobel Prize.

31-00:04:33

Lin: Yes, he was a graduate student of National Taiwan and got a master degree from Tsinghua University. And then he went to University of Chicago, I think. Yes. And through his research in chemical physics and shared a Nobel with his professor. And he was a rising star obviously. All this work that I have done in promoting relationships with the CAS, I think, basically he thought should be his job.

Actually, around 1995 after I left ITRI, I went to Purdue University to visit Professor S.S. Shu. We have chatted what have happened during these several years past. Professor Henry Yang was in the dinner with us. I guess you probably know Professor Yang, he is now president of U C-Santa Barbara. Henry said, "Otto, while you are doing this, you were thinking that you are helping Taiwan. Do you know you have offended somebody?" I said, "No. Whom?" I thought I was doing the right thing at the right time, supposedly. He said, "Yes, you are doing all the right things supposedly, but it should have been done by someone else. It should have been done by the president of the CAS, not by president of ITRI." So unknowingly I have offended Y.T. Lee. Okay.

At this time, 1993, I was nominated to be a member of Academia Sinica. My nomination was confirmed by an overwhelming majority in the first process. This is the qualification review process. I guess after that, there is a high probability that it will be approved by the general assembly of the Academy. Many people would consider it is a fairly certain outcome. Newspapers talk about it. Somehow this should be confidential but leaks out and my name was in the paper. But then in the final vote, my nomination did not get through. I was told that it was Y.T. Lee, as the new incoming president of the Academy of Sinica, stood up and said things against me to the astonishment of many members. I was told that he made many remarks on me personally It has nothing to do with my accomplishments. So I was not elected to be a member of the Academia Sinica.

31-00:08:01

Li: Was that a surprise then?

31-00:08:02

Lin: It was a surprise to me. It was a surprise to me, okay. About two months afterwards, Y.T. invited me to lunch at the Taipei World Trade Center and he apologized to me. He said indeed he said things against me in that meeting before the election, because K.T. Li told him that I was not suited for the Academia Sinica. And he said, well, he [Y.T.] himself was new in the Taiwan

landscape and K.T. Li was a very prominent member of the government, a very senior member. And if K.T. spoke against me, he [Y.T.] felt that there must be a reason for that, so he just said that accordingly. And I said, “Well, why do you tell me about this?” Because he [Y.T. Lee] has talked to Frank Shu, son of S.S. Frank Shu was a professor at Berkeley, also a member of the Academia Sinica. And Frank told him that, “You should not say this things against Otto Lin, because what K.T. would say against Otto Lin could basically be targeted against my father.” And Y.T. Lee told me that he did not know that K.T. has a grudge against me until Frank Shu has told him about it.

31-00:09:57

Li: After the vote?

31-00:09:58

Lin: Afterward. And he basically said that he wanted to apology to me. and I just said thank you for telling me all this.

31-00:10:06

Li: Did you want to be a member of the Academia Sinica?

31-00:10:10

Lin: Well, I want to be a member.

31-00:10:11

Li: It’s an honor.

31-00:10:12

Lin: It’s an honor. But I did not think that Y.T. Lee’s apology to me was genuine, was sincere.

31-00:10:24

Li: You did not?

31-00:10:25

Lin: I did not. He just did not want me to be a member. In any case, he just seized that opportunity of K.T. making some comment against me, so he made it public. He just did not want me to be in the Academia Sinica.

31-00:10:45

Li: But then he moves the responsibility to K.T. Li so you don’t have a grudge against him.

31-00:10:50

Lin: Yes, that’s right. Okay. So this is my direct encounter with Y.T. Lee. Now, there’s another thing in which Y.T. Lee might be against me but he did not say so.

This is something having to do with my relation with Professor T.D. Lee of Columbia University. Professor Lee received his Nobel prize in physics in 1957 at the age of thirty-seven or thirty-eight.

31-00:11:23

Li: Yes. The second youngest ever to get the Nobel Prize.

31-00:11:26

Lin: Yes, that's right. He is an absolutely outstanding scientist with thorough accomplishment in the Chinese culture. And in my last years as president of ITRI, there was a movement in the United States regarding the establishment of the superconducting super collider, S.S.C.

31-00:11:51

Li: Can you talk about that a little bit?

31-00:11:54

Lin: Yes. Physicists in this country is working with the European scientists, trying to build an S.S.C in the United States [Narrator's Note: In Dallas, Texas]. Superconductor collider. S.S.C. Let me find out. Again, it's one of those—

31-00:12:18

Li: Acronyms.

31-00:12:19

Lin: And this is basically to study the fundamental physics of dark matter and dark energy. It certainly is in the arena of "Big Science." It would be more like the Synchrotron radiation facility, or the SLAC in Stanford. Actually, it would be bigger than that. Many physicists supported it, because once it is built, we'll be able to unravel the interactions of fundamental particles, including the dark matter and the dark energy and shed light on the "Big Bang", and the mystery of the universe. But that was a difficult time in the United States. 1993, it was Reagan's time. The economy is not very good. The government's under budget problem. This would be a nearly 10 billion dollars project. Obviously, when this is built, there will be a lot of squeezing effects for all the other science projects counting on federal funding. So there are also many scientists against it, and Y. T. Lee was one. People who are against it talked about the unknown and the uncertainties and whether understanding of the Big Bang or the secrets of the universe deserve this fund. Nothing can be sure, obviously. There's a big discussion of how to get this money to build this S.S.C.

I think the United States at that time was working on a concept of international collaboration, trying to get some other countries to chip in. Japan, France, the EU countries had made some pledges. So Professor T.D. Lee comes to Taiwan to see in what way Taiwan can participate in this project meaningfully. He felt in principle it is an opportunity for Taiwan to be in the forefront of world-class scientific research and the opportunity to train scientists and engineers. And in one of the projects under S.S.C, The GEM detector, which needs high-class microelectronics control and is at the heart of the S.S.C, appears to be a good cut-in for Taiwan. Professor Lee felt that ITRI can do this job.

The overall program is to build the collider, to physically build the collider. There are many major components of the S.S.C which required technical and managerial expertise to build: magnetic, optics, high vacuum, etc. These subsystems need to be done and there are a lot of control systems. And at that time, Taiwan, has been good in control technology because of the accomplishments in IC, and PC work. Certainly all this had originated from ITRI. He felt that Taiwan, with ITRI as lead, may be able to assemble a team of people to participate in this project. by taking charge of building the GEM detector. And in doing this, the Taiwan scientists will be working with the first class scientists in the world. Taiwan needs to invest some fund to the S.S.C but it would be to build the GEM under Taiwan's management and control.

Back then, it would be close to around 50 million NT dollars. It's a small part of the big project and is something that Taiwan can afford. My last years at ITRI, our budget is like \$500 million. This 50 or 100 million dollars can not come from ITRI itself and the ROC government has to allocate this money for it.

Professor Wu, known as a mentor of Professor T.D. Lee, and himself an outstanding physicist, saw the benefits of the S.S.C opportunity for Taiwan and supported it. And T.D. came to Taiwan and talked to me. My position was positive and clear. Well, this must be supported by new money from the government. With that, what the project need from ITRI is our people, our scientists. I will organize a group of scientists, maybe ten or twenty top scientists to support this project and to dedicate probably two years time. I knew that through this participation, ITRI will be able to work with top university people and in the world. It will be a tremendous opportunity for the people that work on that. And ITRI, by working through this, also gets a lot of prominence in this project. I see the benefits from this thing, so I supported this project. I said, "Well, if the government has the money, then I will be able to put this group of people together rapidly."

But there's one scientist who did not want this done this way. It's Y.T. Lee. He felt that with this money being used to do this, then there will be less money for other Academia Sinica projects. And again, this project should be something to place the Academia Sinica in the center stage, not ITRI. I think perhaps organizational jealousy has come to play here. I was very appreciative of Professor T.D. Lee's enthusiasm and foresight. I sent a group of ITRI scientists to the United States to visit Brookhaven and other related laboratories, to see whether, indeed, we can make any contribution to S.S.C. Obviously if it's too much, too far above our head, then I think that there's not much we can contribute. But when they come back to me, they reported that this will be the kind of work that ITRI can do best, although many challenges remained. But it's a challenge that we can accept, so I told the government that if there's money to do it, and if we can also involve some experts from the Academia Sinica, then ITRI would be pleased to participate in this.

Professor Wu, in a memo to the government without my prior knowledge, suggested that this project should be under the leadership of the president of ITRI.

31-00:19:16

Li: Why do you think Lee approached ITRI and not the Academia Sinica?

31-00:19:21

Lin: T.D.?

31-00:19:22

Li: Yes, because he came to ITRI.

31-00:19:23

Lin: T.D., he came to ITRI because ITRI's has the reputation of accomplishment.

31-00:19:27

Li: So he didn't go to Academia Sinica?

31-00:19:29

Lin: Huh?

31-00:19:29

Li: So he didn't go to Academia Sinica because—

31-00:19:30

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Well, in the Academia Sinica, there are many good physicists. But for the part of designing the device and putting this system together, only ITRI can do it. Only ITRI has the ability and has the record of doing it. So he felt ITRI can do it.

31-00:19:50

Li: And it's because the science was more applied? ITRI's science is more applied?

31-00:19:54

Lin: Yes, the job in question is more applied. And ITRI has on hand experience in smaller scale projects. Actually T.D.'s assessment of ITRI was not just by himself. He asked a group of scientists from Brookhaven and Columbia to visit ITRI and examined our laboratories at ERSO, CCL and MRL. The panel of experts made the recommendation. And I also sent a group of people over here to see whether we can do it. My position is that with guidance from the physicists in the U.S.A. and in Europe, then our scientists will be able to contribute to the project.

31-00:20:39

Li: This is just a side question. But do you think that ITRI was more networked internationally than Academia Sinica?

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Lin: I think so.

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Li: It had closer ties to international scientists?

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Lin: Well, closer ties. Well, ITRI is already a very globalized organization.

31-00:20:55

Li: And Academia Sinica is more local.

31-00:20:58

Lin: In the fields of interest, IC and electronic controls, it looks that way. yes. But regretfully in the end this project did not get done. This proposal finally was not passed by the Congress here in the United States, because of the money that's involved in the United States. So my position is that, first of all, this is a big project that has to be approved by the U.S. Congress. And if this is approved, a certain part of that will be my job. The Taiwan government has to support that. My part is really to organize a group of people and to make sure that these people can execute this project. I think I am a small part of this program. And certainly it's a good opportunity for Taiwan and for ITRI. And I think it also contributes to this big science. For me, I think my decision is clear. For Y.T.'s situation, he felt that it should be the Academia Sinica who did this project. Perhaps he was happy that this project was killed by the U.S. Congress after all.

All these factors were contributing and when Ada's situation happens, I felt that—and I had just come to the end of my terms. Another consideration is that the president of ITRI [actually the director] serves for two terms. I'm already in the end of my second term, so I think I should just take my bow and leave ITRI. It's the right time for me to leave and that's why I decided to leave. I could have stayed in ITRI as a scientist, as an advisor or something. But I did not choose to because of Ada's situation. I think it's better for me to leave cleanly so that the next president has a free hand without any interference.

31-00:23:10

Li: Were there any ongoing projects that were hard to leave?

31-00:23:14

Lin: My projects?

31-00:23:15

Li: Yes.

31-00:23:16

Lin: No, I don't have any personal projects. All my projects are all through the different laboratories. Computer, communications, IC, materials, chemicals. I do not have any personal projects.

31-00:23:31

Li: So when you left ITRI, it wasn't hard? There was no work that you felt like you were in the middle of?

31-00:23:35

Lin: No, no. I don't have any work that I need to follow up. At that time, the minister of economic affairs, Mr. Chiang, approached me and expressed the willingness to arrange for me to become a chairman of a company, an ITRI spin off or a state owned company. I said, "No, I am not interested in that. I want to go back to the university. I want to pursue my career in the academia." I made applications with Tsinghua University, where I was dean before. But I had already left my former position in Tsinghua. Then I told the president of Tsinghua that I'm going to apply, re-apply for a faculty position. I went through the department and also the school and then the university. I will become a professor of industrial engineering and engineering management. And because of my specialty that I have gained through the study of national innovation systems, entrepreneurship, technology transfer, I think there are some way that I can be useful to the next generation of students. I was formally appointed, through the process, as full professor of Tsinghua. So that's the end of my ITRI time.

31-00:25:13

Li: Just in retrospect, how would you characterize your legacy at ITRI? What do you think you personally contributed to ITRI?

31-00:25:20

Lin: Well, I think there are a number of things. One is that the delineation of the positioning of ITRI: the role of ITRI and the mission of ITRI in the national innovation system of Taiwan. I think I defined that position. I outlined the objective for ITRI, and stated the mission as fit for the time. I think that is the first thing that I have done. Of course, I did not do this by myself. I did this with discussion with Premiere Sun and many colleagues. I also recognized the importance of globalization for Taiwan's need and growth. I defined the position, role and objectives for ITRI with this in mind. I think that's my contribution.

Secondly, I think I have motivated the scientists in ITRI to accomplish the objective. Previously, with the first ten years, ITRI remains to be a small organization with shaky statue at the time Morris arrived at the scene. Being a good strategist and good corporate executive in the U.S., Morris was unexpectedly caught in the situation at this point and people were demoralized. I think I spent a lot of effort of stabilizing the organization, I give them colleagues a clear purpose and make ITRI like a modern enterprise. I have placed emphasis on motivation. I don't know whether I talked about this. My basic theory is go back to the needs and motivations, Abraham Maslow's theory. I tried to build an organization that will satisfy colleagues with varying levels of needs. I think ITRI colleagues responded favorably.

During my tenure, ITRI was recognized an organization that could develop and transfer technology for the benefit of Taiwan.

31-00:27:37

Li: Right. When you were designing ITRI, you talked about addressing the needs of the scientists.

31-00:27:40

Lin: Yes, needs of the scientists. I wanted scientists to feel that they are very much part of the organization and that their career can be compatible with the organization. We modified the salary system, the personnel management system to accommodate this. We provide them with good opportunities to learn, to train, to expose, to contribute and to grow professionally. I think I kind of tuned that grand piano. Yes. I think that's the second thing that I have done for ITRI.

And number three is starting the globalization work for ITRI. I make ITRI a globalized name in this field, in the field of technology. And number four, which I think is also significant, is started to work with China. We helped Taiwan industrialists and business people to set up in China because they need technical and marketing information. That's why I send my directors, VPs to China, to help really work through our clients to understand the counterparts. Then we brought Professor Zhou Guan-zhao and the academicians to come to Taiwan. This has galvanized the bridge of exchange. ITRI helped set up this bridge for communication between the two sides. Today, the technology relationship in the business is in full action. I think a definitive role is played by ITRI.

31-00:29:45

Li: When you left Taiwan to go to college in the U.S., you left to go study science so you could make Taiwan and China stronger. That was why you wanted to go study. So at this sort of end of this period of your time in Taiwan, did your vision for what would make a strong China, had it changed at all or was it—?

31-00:30:11

Lin: No, I think I helped make a stronger Taiwan. And a stronger Taiwan is very important for a stronger China. To this day, although I have a very good feeling about China, but I think China still has a lot to learn from Taiwan. You see what we've done in Taiwan is we did not help grow the big government, or the big state owned industry. Basically we helped the middleman, the middle class, the entrepreneurs and provide them the opportunity to grow and prosper. This has become the mainstay of the Taiwan economy—also the mainstay of Taiwan democracy. I In terms of democracy, Taiwan is much farther on the road than China. So I think by the examples in Taiwan, rightly or wrongly, will serve as lessons for China. The shameful corruptions around Chen Shui-bien was demonstrations on the negative side of national development. I think it is the unfortunate example. But the Chen scandal has also shown the powerful role of the law. It's now undergoing the judicial

process. I think this is the proof that that process works. The success story in Taiwan is a motivation for China and that will make China better and stronger. I think, in a way, my dream of help building a modern and prosperous China is coming to reality, piece by piece.

31-00:31:50

Li:

And did you feel like you still had more to do? Can you remember how you felt when you left ITRI? Did it still feel like there was going to be another chapter in your work to make China stronger?

31-00:32:01

Lin:

I think if I were to stay at ITRI after my twelve years—actually, I stayed at ITRI twelve years, six as president. Then I think there's a number of changes I would want to make. One of the changes, of course, is to try to work with China in a better position in that you cannot just unload obsolete or inefficient technologies into China. You have to also try to make use of the conditions or environment of China to be mutually beneficial on sustainable terms. China, right now, has become the largest manufacturing base in the world. China was not happy with that. China wanted to become the strongest manufacturing base, not necessarily the largest. You see? "Strong" would mean that it's efficient: energy efficient and material efficient, and, environmentally sustainable. I think if I were in Taiwan, in ITRI again, then we will have to work on more sustainable technologies. That I think is something that I want to do. But those things do not necessarily need to be done by me. I have no regrets in terms of technology or programs that needs to do because those are being carried out.

And actually, when I left ITRI, the next ten years, all the principles that I set up was basically continued to be enforced.—I said, I have fine-tuned or re-engineered the ITRI organization. One of them is to make ITRI financially viable: meaning the budget, one to one or fifty/fifty, right. One dollar from government, one dollar from the industry. This is the one to one rule. ITRI has accomplished that. A lot of the guidelines that I set out, objectives I set out for ITRI have been carried out in these last ten years. I think ITRI is 's starting now moving into a larger, different position. For example, today at ITRI, you see more biotech projects. At my time, there's very little biotech. Although in 1985, I did start the first symposium on biomechanics and biomaterials in Taiwan when I was director of the MRL. And there's a book published out of that. But I think ITRI is now more bio-related. That is something that I did not earnestly do. I don't know if your question is whether I have any regrets or any problems or anything that I have done differently or anything?

31-00:35:34

Li:

Well, no. I guess I was wondering, too, if you felt like there was more to do in terms of professionally, maybe outside of ITRI, but visions you had for things that you wanted to contribute to the strengthening of Taiwan or the strengthening of China.

31-00:35:51

Lin:

Actually, I am very happy when I left Taiwan because if I was still in ITRI, then because of my personality and friendship with the leadership circles, in the next ten years, I would be involved more in the politics, and miserably so. I would not have time to go to work on the projects that I have in Hong Kong and China. I think not too many people had the opportunity that I had to work in Taiwan, and Hong Kong, and also in China. I think I was very fortunate in that, as it turns out.

31-00:36:42

Li:

And I had a couple of questions just about Taiwan. Because in the twelve years that you were in Taiwan, so much changed in that country in terms of its politics. Could you talk a little bit about those changes and about what they meant for the relationship between Mainland China and Taiwan with Lee Teng-hui taking power and, just sort of in broad terms, if you felt that those twelve years were good for relationships between China and Taiwan or created more challenges.

31-00:37:18

Lin:

Well, I would say the first ten years, there's relatively little exchanges in the interaction with Taiwan and China. Taiwan was busy building itself through education, technology, international business, that kind of thing. That is the building stage. And if you're looking to see the GDP in Taiwan in those years, that is the point where you see the economy takes off. I think it's not until the last part, the middle of 1990s, when Lee Teng-hui becomes president, solidifies his position as president, Taiwan became more politically minded. And thus the economic growth slowed down. He could have stopped that, too. You look at the chart. It's going like this. But actually, the economics, it kind of stalled, hitting the plateau because so much effort and energy was consumed by internal political struggles. The talk of or separation of Taiwan from China and the struggle between KMT and DPP have contributed to this. In those twelve years that I was actually involved, I think the first ten years was the best part of my life. The last two years is very important in my life, but in terms of enjoyment, it's not as much. But I think on the other hand, the impact of the last two years is very important.

31-00:39:10

Li:

What does it mean in terms of globalization and the rest of the world for China and Taiwan to have a cooperative relationship? To be working more closely together like through the—?

31-00:39:25

Lin:

Well, I think it would be good for the world. Taiwan, although went through this political chaos with Lee Teng-hui and then the DPP, separation movement and so on, but the general public has become accustomed to democracy, rule of law and innovation. I think it has made progress in economies, in social structures, and in democracy, regardless. There are very few places in the world that you can see simultaneous progress at many fronts and at the same

time. And I think that experience is very important. Now, in China, in the last ten years, and twenty years, the improvement was tremendous. Now, compared to 1980s, China's progress was astounding. But China today is still, more or less, a dictatorial country. It's ruled by one party. And the party has absolute power and power corrupts. Today unchecked abuse of the law and corruptions took place in many levels of the government and overflow to other sectors of the society. By having a strong Taiwan, the experience of Taiwan will be learned and examined by more people in the two sides. Traveling and business cooperation helped mutual understanding. China will also change for the better. It's just a matter of time. They cannot stay like this.

31-00:41:08

Li: It seems like—is this true—that there's less political infighting in Taiwan now than there was when you left ITRI?

31-00:41:16

Lin: It's, more or less?

31-00:41:17

Li: Less now. Like do you think Taiwan's more stable internally?

31-00:41:20

Lin: Well, I think it's more stable after this year's presidential election. In the last several years, we have seen a lot of political infighting. But Ma Ying-jeou the KMT retook the government. I think now it has become more stable.

31-00:41:39

Li: Because it seems like it must make it difficult to do science, to have Taiwan be respected as a science powerhouse, with a lot of political instability.

31-00:41:47

Lin: Absolutely. Absolutely. If you look at the curve, the GNP growth, with time, it's like this during the seventies and eighties and nineties, and then it certainly kind of stopped, getting to a plateau. And now it's started picking up again. If it weren't for this political infighting, I think it should have kept going like rockets.

31-00:42:11

Li: So the scientific progress is tied to the political stability of Taiwan?

31-00:42:15

Lin: Oh, yes. Oh, yes. Scientists cannot be immune from the political environment. Yes.

31-00:42:26

Li: Are there any other experiences or insights from ITRI that you wanted to share before we—

31-00:42:35

Lin: Well, I think that's probably it. That's probably it.

31-00:42:38

Li: Okay, great.

31-00:42:41

Lin: My work in ITRI is the return of a student to Taiwan to help the society, serve the country, and I think I have done my part. And to this day, I felt I was given an opportunity few people have. I was happy that I was able to have the opportunity and make good use of that.

31-00:43:10

Li: Thank you.

Begin Audiofile 32

32-00:00:00

Li: So this is June 25, 2009. Robin Li and Emily Hamilton speaking with Otto Lin, tape thirty-two. So we just concluded your time at ITRI and you were at Tsinghua for a very short period of time.

32-00:00:20

Lin: I was at Tsinghua actually for about a year.

32-00:00:21

Li: About a year, okay.

32-00:00:22

Lin: Yes. I was a professor at the IEEM department. At that time, Ada was not very happy with staying here in Taiwan and I figured I wanted to make some moves. This offer comes to me to be a senior vice-president at a company called West Lake. West Lake Corporation.

32-00:00:54

Li: Oh, we talked about this briefly last time.

32-00:00:55

Lin: Yes. In Houston.

32-00:00:57

Li: And you were there just for a year?

32-00:00:58

Lin: Yes, just a year. And it was a private company founded by Mr. T. J. Chao. Chao was an industrialist in Taiwan. He is actually very famous in the league of Y.C. Wong, the Formosa Plastics Group Chairman, who died recently. And these are the pioneers in the petrochemical industry. Mr. Chao, later on moved to the United States and set up his companies to make PVCs, PVC Pipes and PE and PP thin films. Westlake makes tons of them a day. He have about fifteen factories in the United States and five in Malaysia. He knew that I was out of ITRI and I have been with DuPont. Through common friends, he inquired if I will be interested in coming to the United States and to work for

the company. I think about it. I think that it would be a good opportunity for me to leave Taiwan and for Ada to get started with a new life.

I took the offer and came to Houston. We moved to Houston. We bought a house, very nice house. It's hot but you don't really get outside that often. You're always in the air conditioning, house, office, in car, in shopping malls, everywhere. I like Houston.

After about a year's time, I felt I did not work well with the company because the company's basic business is in petrochemicals: ethylene, PE, PP, and that kind of thing. These are traditional commodity chemicals. My interest was more in the management of technology companies. I get involved with a lot of IC development and computers, communication, that kind of thing. These are not the company's interest areas. When I first accepted the job, it was senior vice-president and chief technology officer, with the view that to guide the company moving into high tech area. I thought there might be something that I can do to help them. But after about a half-year's time, I felt that they are really not interested in that. They are interested in, rightly so, making their processes more efficient. They are making tons of polyethylene every day, so every time you can save thousands in a batch, so you can still make a lot of money. So productivity counts. I visited several plants and examined their processes, and tried to help them set up new processes for improvements. But I felt that a lot of the breadth that I have in technology area would never get a chance to use. And actually, I don't work well with the private company family. It's a father and two sons, and the father and two sons usually have different views. It's pretty difficult for me to be in the middle.

And then I felt that I should start looking for other opportunities. And at this time, the vice-president of NUS, Professor C.C. Hang, contacted me. By the way, when I was in ITRI, I received many foreign dignitaries, including the Singaporean prime ministers, ministers, and so on. I think C.C. knew my work. He asked me would I go to NUS I said, "Doing what?" He said, "You would come here and teach a course of two and be an advisor to the university and to the government." I thought it would be fun so I accept the offer. I have family members in Singapore and have been to Singapore many times. I like the city. It was a beautiful city. I think if you have never been to Singapore, you will like the city. Clean, beautiful, ordered. The climate is hot, but everything else is modern. So we went to Singapore. After a year's leave, we return to the Asia-pacific.

My appointment was with the School of Engineering, the faculty of engineering at NUS, and then, very soon, the Faculty of Business Administration, also showed interest in my work. So my appointment became a joint one for the Faculty of Engineering and the Faculty of Business Administration. And actually, particularly in the faculty of business administration, there have just formed the Center for Management of Technology, CMT. I basically had a home base in the CMT and gave seminar

courses. I did not teach a formal course. I was just there, giving seminars and participated in short courses.

I have known many people in Singapore, including Philip Yeo, the chairman of the EDB, the Economic Development Board, and also chairman of NSTB, National Science and Technology Board. Among other business leaders are Brigadier General Lee Hsien Loong, his wife Ho Ching and Liew Mun-Leung, former CEO of the SISIR. They are all very important people in Singapore.

And when I was in Singapore, this is the 1995-96 period. They very much wanted to work with MIT.

32-00:09:09
Hamilton:

Why MIT?

32-00:09:10
Lin:

Why MIT? MIT is a big name school.

32-00:09:15
Li:

So they just had heard of it and thought—

32-00:09:17
Lin:

Yes, heard of it. And they are aware of its research and have many students that went to MIT. MIT is a school of science and engineering and business. These are the kinds of things that Singapore felt very important for them, more so than the literature, the arts, the other things. And they have also a lot of alumni there. They hoped that I can help them set up major institutional cooperation programs between NUS and MIT since I have many friends with MIT, you see.

I accepted that task and visited MIT. However, there was definitely not too much interest of MIT people in working with NUS because, after all, it's half of the world away, on the other side of the globe and it's hot. Singapore is pretty and everything, modern, but it's monotonous, really. And despite his able leadership, Mr. Lee Kuan-Yew does not have a very good reputation of being respectful of diversity and things. And, of course, basically MIT professors are very busy. They have lots of grants in their hands. They don't need money. Why should they bother to work with NUS? They certainly welcome foreign students, but you want this faculty to spend time in Singapore. That is different. Few people is really willing to spend more than two weeks there.

Then I talk to Bob Brown. Robert Brown, who was a chemical engineering professor, also became dean of engineering at the time. I know Ken Smith and Bob Brown of MIT School of Engineering for many years. Ken, particularly, was an old friend, and a consultant at DuPont. Ken and I have developed very good friendship from back then. And because of this, I also knew Bob Brown

and many others. I approached Bob with the idea. Bob says that while he won't mind going to Singapore to see what happens there—heard a lot about Singapore, he can't promise the time. Now, remember, this is about 1995. Singapore's already very big in the economy but not too many U.S. technologists or scientists like to go there. Bob says he did not have the time. He's very busy. I realized that it needs much more preparation to get him interested in it. Since I am going to attend the American Institute of Chemical Engineering, AIChE, Conference in San Diego. I called Bob. I said, "Well, would you be in the San Diego meeting?" He said, "Sure." So I said, "Well, okay. Let's set a time to talk about things in Singapore." I really bend Bob Brown's ear in that. I told him about how diligent the people are, their aspiration, and how much they wanted the help of science and technology and looked forward to MIT as a partner, not just on small projects, but for institutional cooperation for multiple years and multiple fields. This would be unusual opportunities. Bob Brown agreed to visit Singapore with a couple of people. Then I worked on a schedule for them in Singapore with focused objectives: people, place, time and interests.

And when Bob Brown came to Singapore—I think he came with about four or five faculty members to visit NUS. In the meantime, while working on the visit, the NTU people also know. NTU is Nanyang Technological University. NUS and NTU are the two major government funded universities in Singapore, similar to UC Berkeley and Stanford in the Bay area. And NTU has an advantage in that, at that time, their Council Chair or Board of the Regents is the Minister of the Education who is also an alumni of MIT. And he said that, "Why, if you can get an MIT professors to visit NUS, why don't they come to NTU, as well?" Suddenly the collaboration between MIT and NUS becomes collaboration between MIT and NUS and NTU. That means MIT and Singapore.

When a Singaporean wants to make a sales speech, they really put it out. They took Bob Brown to see many sites and reviewed with him the national plan and so on. I think Bob Brown and the group were really impressed with the aspiration of Singapore. They set up A Five-year programs, in which MIT faculties will go to Singapore. So x number of faculty members will go to Singapore for y number of months during winter to teach classes and then the students will also get to come to MIT for their final years to study in MIT and they will get a degree from NUS or NTU. And they also can conduct research programs in there. And this would be multi-million dollars to MIT. I think the figure is like ten million. Ten million in 1995 style is not a small sum. I don't know exactly the final number, but these are the kind of order of magnitude they're talking about.

32-00:17:16

Li:

Was it given as like an endowment or given as a gift?

32-00:17:21

Lin: No, no, it's not a gift. It's a project.

32-00:17:23

Li: Project. Funding for the project.

32-00:17:24

Lin: It's the funding of the project. You need to fund the faculty time, faculty travel, faculty research at both places. And, of course, the university also takes a cut, overhead, maybe half. It's all soft money. I think it's put to pretty good use. That was my first six months, seven months major work, other than the normal regular things in university. My focus was trying to set up that program.

32-00:18:11

Li: And were you teaching at all at this—?

32-00:18:13

Lin: I taught, I taught. Give seminars and participate in short courses.

32-00:18:19

Li: And were they mostly about material science?

32-00:18:23

Lin: Management and technology.

32-00:18:23

Li: Oh, it was about kind of innovation and—

32-00:18:27

Lin: Innovation, entrepreneurship, management of technology, technology transfer, Science Park.

32-00:18:32

Li: Your expertise, it seems like, at this point had shifted from material science to innovation systems.

32-00:18:36

Lin: Yes, that's right. That's right. I was very much a polymer chemist working on composite material. I worked on polymers for electronic circuits and composite bicycles, remember, we have talked about? And now, at that time, I don't do any research or any work in polymers anymore.

If you go back to Singapore, I think if people still remember, my name should be there that for helped set up this program. And I think the MIT Singapore program run for probably ten years. Maybe today it's probably still running. I don't know. There were some changes already. For example, they conducted a lot of videoconference. As it turns out, it's possible, with modern technology, faculty can have a class from 8:00 am to 9:00 am in Boston and the students to meet at 8:00 pm and 9:00 pm in Singapore. That's no problem for the students, or, the other way around. And I think the modern technology, also,

you can ask questions and there's no time lag. They have very good facilities. You need to have a special classroom. I saw those facilities. Students ask questions, faculty in Boston answers. They also can see other students in the class.

32-00:20:31

Li: What effect do you think this had on the university? On NUS? This collaboration?

32-00:20:36

Lin: Well, I think certainly it's made NUS better, to attract better students because of that.

32-00:20:43

Li: Right. The association with MIT.

32-00:20:45

Lin: And NUS, the Singaporean government give a lot of good scholarships. If you come through their program, then they'll give you money that you can stay so many years in the United States for post-docs or if you need to spend it there in the U.S. for final years of a PhD, the government will give you monies. I think it is something that I would say this is something the Singaporean government is good at. They put the money into good use. They need to educate people, train people. They just do it that way. And rarely, though, argument from the Congress for this and so on. The government is a very powerful administration.

32-00:21:38

Li: And you didn't have any problems dealing with the government? The Singapore government didn't give you any trouble trying to—

32-00:21:44

Lin: No, no. Singapore is a very strong government. Yes. I think it's too strong to the likings of some people. And of course, I think it's gradually changing. And Singapore, I can say here that Singapore people—officials ask me, "How come we cannot nurture entrepreneurship?" I told them that your people are so much afraid of failure. By definition, entrepreneurs know that a good probability is that a business can turn sour for many reasons. Most students came out of university, college, wanted to work for the government: secure job, good pay, good stature. Secondly, they want to work for MNCs, multinational corporations: Secure job, good pay. And if you try to work for yourself or instead for a small company, people may look down upon it. And unfortunately, if you fail, lose money, then I guess you become singled out in society. How can you nurture entrepreneurship like that? So the government has been too good to the students.

32-00:23:27

Li: That's interesting.

32-00:23:28

Lin: It's not a social environment that's conducive to entrepreneurs.

32-00:23:33

Li: So you feel like having a culture where it's okay to fail is an important part of entrepreneurship?

32-00:23:39

Lin: Yes, not afraid to fail.

32-00:23:41

Li: And Taiwan has that?

32-00:23:42

Lin: Taiwan has more of that, in comparison.

32-00:23:44

Li: So people wouldn't lose face if they tried to do a business and it failed?

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Lin: Yes, unless you are doing something that is unlawful or unethical.

32-00:23:58

Li: Something shameful.

32-00:23:58

Lin: If it's normal—yes. Otherwise, yes. People understand the risks that you are taking. But this MIT collaborative program has been good to Singapore. I think after ten years, now they felt they are too expensive. Of course, I think now they're on fairly good grounds. They already have many good faculty themselves. I always say any programs existing would need to be changed in five years. I keep saying that if I go back to ITRI again, I would change my programs there. I mean, times change. So that is that.

But this year in Singapore, I was very respected and everything. However, I do not feel very happy in Singapore. Ada was not very happy in Singapore, although she also taught in the university. But somehow, I think it was very much in the Chinese part of us. Chinese have a problem, they usually are chauvinistic. When I go to Singapore, I always talk about the Chinese do this, the Chinese do that. And actually, in Singapore, even Lee Yuan Yew, he was very much of Chinese culture, lot of foreign culture. He wanted to build a nationalism of Singaporean. So the people, they're ethnic Chinese, fine, but they are not Chinese, they're Singaporean. Although I have relatives there, I have cousins there and know these people and speak Cantonese, speak Putonghua, speak English. And that's the common language. And I always felt that it's just like a foreign country. I felt foreign in Singapore compared to the United States. I don't feel foreign at all here.

32-00:26:26

Li: Oh, interesting. Why do you think Singapore felt more foreign than the U.S.?

32-00:26:31

Lin: Somehow, I just felt that the United States is very amorphous in that sense. You are on your own. In Singapore, people look at you. I don't feel very comfortable in there.

32-00:26:50

Li: Did the work feel less meaningful because it was not for Taiwan or not for China?

32-00:26:57

Lin: No. I have basically become kind of global, really. Singapore, as I said, I have many relatives there. I help Taiwan, of course, the Chinese part of that. But in Singapore, there are a lot of Chinese there, too. I thought I would help them, making a better career for them. When I say Chinese, I don't really mean it in the political sense. Just people. The politics means nothing to me. But I think the fact that Singapore is still a very authoritative government does matter. I felt that I'm American or I am Chinese, standing in the middle of Singaporeans. There's some small cultural things. It's not a big deal. But when I come here, I just walk on the streets, I go to the shops, I go to dinner, I got to do anything, nobody's paying attention to me. Nobody bothers me. Of course, I don't bother people, as well. I can do the same thing in Taiwan and Hong Kong. But somehow, in Singapore, I don't feel I can do it that way. It's not as free to do things.

32-00:28:48

Li: So how long did you stay in Singapore then?

32-00:28:50

Lin: Hmm?

32-00:28:50

Li: How long did you stay in Singapore?

32-00:28:52

Lin: Actually, about a year. Bit less than a year.

32-00:28:55

Li: Did you buy a home there or—?

32-00:28:56

Lin: I did not buy a home. We were given a very nice university housing there. I actually stayed at Singapore for about eight month's time. Then one day I got a call from a friend at HKUST in Hong Kong. He said, "Otto, we have a vice-president position open here. Would you like to be considered for it?" Then I said, "Well, tell me about it." Then I start following up on this thing.

Well, actually, when I accepted the offer in Hong Kong, I told my friends in NUS They are not happy about it. They say, "What kind of offer are they giving you? We'll match their offer." Very much like a businessperson

speaking. Well, they really wanted to keep me in Singapore. But I say, “Well, it is not about money, really.”

32-00:30:14

Li: Because for you, was it more like you would rather just live in Hong Kong than in Singapore? It would be a place where you could live more comfortably.

32-00:30:24

Lin: Yes, I think it's that. But somehow, I do not feel very comfortable in Singapore. Probably I did not take the time to allow myself to mesh in with the environment.

32-00:30:42

Hamilton: Did you feel comfortable with other faculty members at NUS?

32-00:30:46

Lin: Not very much. They don't open up that much. Except for a very few, they are not easy to open up. I don't have a feeling that I know them, so that I can be free with them. Probably too short a time. And then I was busy with the other thing and then the offer of Hong Kong came up.

32-00:31:11

Li: And you hadn't lived in Hong Kong since you were a child, right?

32-00:31:15

Lin: A child, that's right. I came to Hong Kong in 1948 or forty-nine. I left in 1952. About three years. Yes, three years.

32-00:31:31

Li: Did you have family there?

32-00:31:35

Lin: Not my closest family. I have uncles in Hong Kong. But when I returned to Hong Kong, then my uncles are already dead, so I don't have any really direct family there. But there were still many relatives, some very dear to me.

32-00:31:51

Li: Now, the university in Hong Kong was fairly young when you went there?

32-00:31:54

Lin: Yes, it was a young university.

32-00:31:56

Li: So was this a draw, that you would be able to help shape it?

32-00:32:00

Lin: Yes. Well, of course, it was a vice-president's job and the second in line, a seat in command. But it's more than that really. Well, I should say it is the vice-president of the university. It's certainly a difference. Most of all, I felt that this is 1997 and Hong Kong is returning to the Chinese sovereignty. Did I

leave a letter [I wrote to the chairman of the search committee in HKUST] to you last time? I thought I left a letter with you.

32-00:32:52

Li: A letter from?

32-00:32:53

Lin: It's a letter that I wrote, a cover letter in my application to this job in Hong Kong at HKUST.

32-00:33:00

Li: Yes, I think I have it down in my office. Yes.

32-00:33:05

Lin: I talk about my interest in coming to Hong Kong at that particular moment. It is an important juncture in history, since Hong Kong is returning to the Chinese sovereignty. China at that time has faced so many problems; and I believed Hong Kong has a special role to play for China. Hong Kong can lead China not only in science and technology, but also, I think, in social developments and political developments. But I leave out the politics.

32-00:33:50

Li: And how did the university position itself to impact not just academically, and in terms of science and technology, but socially?

32-00:33:59

Lin: You're talking about HKUST now, right?

32-00:34:02

Li: Yes, yes.

32-00:34:03

Lin: Yes. Well, the university, new university, intended to be a center of nurturing future leaders in Hong Kong. That's very much what we have in mind.

32-00:34:18

Li: And what types of unique programs did the university have to help students grow in that way?

32-00:34:24

Lin: Well, nothing unique really. But the academic program is American, basically like UC Berkeley, like Stanford. It's following the university system in the U.S., very much so, unlike the other Hong Kong universities. It is a system where you will focus on research and teaching and merits. It is concerned with performance in scientific research and quality teaching. I think that is different. I can talk about Hong Kong more tomorrow. But I'm talking about leaving, Singapore. I think the historical perspectives with Hong Kong make easy for me to leave Singapore. So actually, I left Singapore not after a full year's stay. NUS gives me the flexibility of leaving a bit earlier.

32-00:35:32

Li: Do you think that was an important experience? Was being in Singapore, was that an important experience for you career wise or was it sort of something you did and not that important in terms of your career?

32-00:35:44

Lin: In terms of my career, I think it just adds to my experience. I also got to enjoy the group of friends I met in Singapore. That's basically it. And I think I helped Singapore set up the MIT cooperation program which proved to be a contributing factor for the growth of NUS and NTU.

32-00:36:06

Li: Did it help your connections with MIT and with—?

32-00:36:07

Lin: It did not really help my connections with MIT because I was not a part of that program anymore. I think Bob has now left MIT. Bob is now president of the—

32-00:36:27

Li: Washington University in Saint Louis?

32-00:36:29

Lin: Washington University in Missouri. In Saint Louis, yes. Bob Brown.

32-00:36:33

Li: Do you think you would have stayed at West Lake if you hadn't spent a year in Singapore or do you think you would still have ended up in Hong Kong?

32-00:36:42

Lin: I think I would leave West Lake in any case because I don't feel I was getting fulfillment in my job. I don't like to just look at the factory that's making PVCs and PE.

32-00:37:03

Li: Did Ada like Singapore?

32-00:37:06

Lin: Ada feels pretty good about Singapore. Ada actually felt pretty good about Houston.

32-00:37:15

Li: And what did she think about leaving Singapore and going to Hong Kong?

32-00:37:18

Lin: Oh, she likes it. Of course, it's closer to China. It has many places to visit. Singapore, it's far from China. In Hong Kong, if you have time, you can go to many places in China on the weekend. You can visit the Great Wall over the weekend. But it's hard to do that from Singapore. If you want to go see the Great Wall in your next trip to Hong Kong, think about it, too. Yes. Singapore, in a way, is far from many places. I like China. But I did get to

establish myself in Singapore and meet many good friends in there, renew my friendships in Singapore.

32-00:38:18

Li: You mentioned a few minutes ago that you, at this point, felt more global, not from any particular country. You felt more like a global citizen.

32-00:38:30

Lin: Yes, yes. Yes.

32-00:38:31

Li: Do you remember when that shifted for you? When you started feeling so portable or agile to be able to move between different countries? Do you remember when that shift happened for you?

32-00:38:46

Lin: Well, yes. I think it's a good question, really. I was very much an American when I was here. I have voted in every election. I went to Taiwan. I was very much in Taiwan. I was a member of the National Assembly. I guess I told you about this. And I give up my U.S. citizenship because of that.

32-00:39:13

Li: Oh, okay. So you gave up your citizenship?

32-00:39:16

Lin: I gave up my U.S. citizenship because of being a member of the National Assembly. I did it on my own. I felt that it would give me political problems if I hold onto the U.S. citizenship.

32-00:39:35

Li: Did you ever intend to live in the U.S. again at that point?

32-00:39:41

Lin: Well, I'm sure that I may come to the U.S. but am not sure about retiring, or living my last days in U.S. I had never thought of retiring at this point. Yes. And I will come to the U.S. very often, every several months. And the children are here. Relatives are here, so I know U.S. will be part of me. I was very much an American, very much a Chinese. When I was in Singapore, although I felt it was not the same as China, I was dedicated very much to working for Singapore. I do not look upon them as a different class of people. But it's just that this society is such that it's more difficult to get to know people. Well, I should not say that. My time is too short there. But I find it difficult to break the ice with the Singaporean scientists.

32-00:40:52

Li: But somewhere between feeling totally at home in America and completely at home in Taiwan.

32-00:40:58

Lin: Hong Kong.

32-00:40:58

Li: You now sort of feel like you could be anywhere and do your work. Because it seems like right now that your main sort of career focus is about sharing what you've learned about developing economies and advancing and cultivating science and partnerships. Is that true?

32-00:41:20

Lin: And try cultivating, helping people to attain their goals in life and fulfill their full potentials.

32-00:41:27

Li: For any country.

32-00:41:28

Lin: For any country. Yes. Actually, I went to Ukraine last year. Did I tell you I went to Ukraine just last October to lead the Global Innovation Forum that was run by the Salzburg Seminar. I need to mention the intention of Salzburg Seminar was to see whether we can help the Ukrainian set up entrepreneurship program. But Ukraine was very different. Ukraine is a country that's very closed to itself. I'm very much a foreigner there. So it's different. It's mind-boggling. But I have no problem telling the Ukrainian candidly what I thought they should do. They would be better to do it this way than the other. I have no problem with that. Because I am not talking about national security matters. I'm not talking about their national politics, just trying to help people to have better life, better living. I don't think I have any problem with that.

32-00:42:42

Li: And when you say that the problems seem basically the same in these countries that you visit to talk about developing technologies, are their issues basically the same in terms of cultivating partnership, in finding funding?

32-00:42:55

Lin: Yes, yes, yes, yes. I am basically talking about the national innovation system, this different partner, different groups, and different functions, and how to promote interaction among these groups. And each country may take different approaches. But basically it's the same. My visit to the Ukraine is a very costly visit for us, because that was the time last October, the time of financial tsunami hit and the stock markets nearly collapsed. We have no current information and no way to escape. I think when we came out of Ukraine our savings would be evaporated by fifty percent.

32-00:43:37

Li: It was a bad time to be on vacation or away from the computer.

32-00:43:41

Lin: Yes. Okay, any more questions about Singapore? I helped the CMT set up an entrepreneurship program and the explain the innovation system concept to Singapore. I talked to the EDB and NSTB people and then I think it did make some changes there. And I think the major program is to help establish the

MIT and Singapore program which has very much to do with their human resource development.

32-00:44:21

Li: Just one question. During this period, in West Lake and at NUS, were you in contact with people at ITRI and with things going on in Taiwan? Were you still involved?

32-00:44:33

Lin: Oh, yes. Oh, yes.

32-00:44:35

Li: They would call you or you would call them?

32-00:44:37

Lin: I'd call them and they'd call me.

32-00:44:38

Li: Were you making visits at all to Taiwan? Were you visiting?

32-00:44:41

Lin: Oh, yes. I visited many times in Taiwan.

32-00:44:43

Li: Yes.

32-00:44:44

Lin: Yes. I was then sitting on some boards. I was on some councils, some agencies and so on.

32-00:44:54

Li: So you maintained your ties to Taiwan?

32-00:44:56

Lin: I maintained my ties, yes. At one time, I was director to many universities, director meaning like a board of regents to the universities, to companies, to organizations. The ties are still there.

32-00:45:16

Li: Did you do that on purpose to make—

32-00:45:19

Lin: Well, it's done on purpose. When the natural time comes that I need to resign from a board, that I cannot do it or people will not want me to do it, then I will resign. It happens in a number of times. I find it's too difficult for me to make all those trips. How many trips can you make? I have to gradually cut down a number of them. But my tie with Taiwan is still very strong. My tie with ITRI is still strong. Not formally. I did not interact with my successors and advise them on their current program and things. But a lot of ITRI people individually wrote to me and we have conversations, e-mails and letters that kind of thing. I was very much kept apprised of things.

32-00:46:26

Li: All right. And so tomorrow we'll continue with—

32-00:46:29

Lin: Yes. I think tomorrow we can talk about Hong Kong.

32-00:46:31

Li: All right, thank you.

32-00:46:33

Hamilton: Thanks.

Interview 6 [continued]: June 26, 2009

Begin Audiofile 33

33-00:00:00

Li: This is Robin Li and Emily Hamilton with Otto Lin on June 26, 2009 in the Bancroft Library at UC Berkeley. This is tape thirty-three. Emily?

33-00:00:16

Hamilton: We ended yesterday and we planned to talk about the Hong Kong University of Science and Technology. But first, can you tell me a little bit about when and why the university was founded?

33-00:00:28

Li: The university was founded in the end of the nineteen eighties, around eighty-nine. Preparation of the work is about from eighty-nine to ninety. I think the first class intake was 1991. And the reason for that is that in 1997, there's going to be a return of Hong Kong to Chinese sovereignty. After over a hundred years of colonial rule, the British felt that they really have to leave something to Hong Kong. Previously in Hong Kong, education was poor. The students, the percentage of young adults age from eighteen to twenty-one to twenty-two, the college age group, that goes to college in Hong Kong is about ten. Ten to twelve, maybe. I give a comparison number. In Taiwan it's about sixty to seventy. Singapore maybe fifty to sixty. United States could be fifty to sixty. So the prevalence of education in Hong Kong is very, very low. Very few people can get to go to college. Now, those well to do people that can send their children to UK or Australia, and the second tier people can send their children to the United States and Canada because they can work a little bit and they also go to school. Locally, there's only one university, which is University of Hong Kong. That was a fairly old university. It was built in the turn of the 20th century. It was old but it was built as an elite school. It was build for family who can afford and with the goal for training people to help the British government rule Hong Kong. As a result, the higher-ranking officials now in the Hong Kong government, those over fifty years old, were mostly coming out of University of Hong Kong. That was the basic status. The majority of people did not have a chance to go to college.

And some of them lucky enough, as I said, can go to U.K., U.S., Australia, and even to Taiwan. Taiwan has maintained education as a important national policy, as I explained previously. So some young adults went to Taiwan as overseas Chinese students for university. They went through special entrance exams so that they can be admitted to a college of their choice in Taiwan. I think it was a very miserable situation in terms of education in Hong Kong.

I guess somebody in the government, the British government, felt the situation shameful, or un-supportable. I think they felt that as a leading country in the world, they need to leave something in Hong Kong after they were gone. That's why they're upgrading two polytechnic institutes to universities. These are the Hong Kong Polytechnic University and the City University of Hong Kong. They were upgraded, and changed the name to be university. In addition to the University of Hong Kong, the Chinese University of Hong Kong was built around the 1950s when a lot of refugees coming from the Mainland flooded the colony.

I think around this time, near the end of the 20th century, British government felt that while looking into the future economic and the social development, they wanted to build another university focused on science and technology. This is how HKUST was formed.

33-00:05:03

Hamilton:

Who were some of the people involved with it?

33-00:05:05

Lin:

Well, the key person involved is a gentleman called SY Chung, Sir SY Chung. He is still living right now in Hong Kong. He is in his nineties. He was an engineer educated in the UK and a pioneer and visionary for Hong Kong. So they set up a committee to prepare for this university and they recruited Professor Chia-wei Woo to head it. Chia-wei at the time was President of California State University in San Francisco. It is a state university.

33-00:05:59

Li:

UC San Francisco?

33-00:06:01

Hamilton:

San Francisco State?

33-00:06:02

Li:

San Francisco State. Yes.

33-00:06:03

Lin:

State, yes. It's not UC San Francisco.

33-00:06:05

Li:

Yes, San Francisco State.

33-00:06:05

Lin:

He was at San Francisco State. I think he is one of the few people of “Chinese” origin that was a university president in the U.S. And he agreed to go back to Hong Kong—he grew up in Shanghai and Hong Kong—to prepare for this university. At that time, the government really put in some money, I think on the order of like one and half billion Hong Kong dollars. Let’s say seven to one. It is some two hundred million U.S. dollars. Am I right? And then the Hong Kong Jockey Club, the largest non-profit charitable organization in Hong Kong made matching donations. The Hong Kong Jockey club, manages horse-racing, which is the national sport in Hong Kong. You may know that Hong Kong has maintained a low tax structure, a uniform income tax at sixteen to seventeen percent of net income. But a huge revenue is coming from horseracing, a national sport, like baseball here. Out of the income from the races, about eighty percent was plowed back to the betters, and then after some administrative expenses, another fifteen or sixteen percent, goes to the government and the rest was kept as charitable donations. That’s a big chunk of money, so they’re philanthropic. They use that money for building hospitals or schools and so on. In this case, HKJC put in another 1.4 billion dollars for building the infrastructure of HKUST. Let me check this number. The Jockey Club put in half and the Hong Kong government put in half to build this university. The university was built on the top of a hill overlooking the Clear Water Bay. It’s an absolutely beautiful site. This is how HKUST was formed.

And it was intended to have a special curriculum—not to be a complete comprehensive university, but one that is geared to the 21st century: science, technology, business, and then, of course, humanity and social science. This is very much like Cal Tech, you might say, except plus business management. There are four schools: science, engineering, business management, and humanity and social science, and 19 academic departments.

Chia-wei was a person with vision and energy. Armed with this big war chest from the government, he was able to come to the state and recruit people to go to Hong Kong. And he targeted senior people, experienced people, those with already ten, maybe twenty years of experience in the United States. Those already hold professorships or senior positions in companies, in technology companies, are prime targets for HKUST. And a large percentage of these people are educated in Taiwan. So recruited as vice-president for academic affairs was Professor C. R. Chien, at the time teaching at the Johns Hopkins University in Baltimore. The Dean of Science [S. D. Kung] Dean of Engineering [H.K. Chang], Dean of Humanities and Social Science [H. S. Chi] are also originally grew up in Taiwan and then pursued post-graduate work in the United States. A large percentage of the senior members of the faculty are experienced scientists that were educated, grew up in Taiwan. Therefore the university started at a higher level. With good funding support, good environment, and good faculty, HKUST was able to show its mark in a relatively short time

At that time, while Chia-wei was out recruiting for HKUST, I was out recruiting for ITRI. So we knew each other from that point. He came to ITRI to visit me and grabbed some people on the way. But it's all for a good cause. We have had kind of a friendship from that time. This is the basic situation. So you see the background. UST, it made a big stir in Hong Kong because it started with a group of experienced faculty, good financial support, good academic structure, and good natural environment. I think it has almost everything going for it.

33-00:11:57
Hamilton:

Well, it's often difficult to recruit good faculty for a brand new university. What do you think was the draw for these people?

33-00:12:03
Lin:

Well, I think there are several things. One is compensation. I think the university was paying a compensation package better than the United States. I would say usually we are paying at the time twenty-five percent higher. That is an attraction. Second attraction is that we are providing supports for research. Usually good equipment, instrumentations and research dollars. On the top of that, thirdly, we are picking people who are really interested to help build this university. It's kind of like a venture, like something.

Later on, I myself joined HKUST in 1997. It's about six years after the University had started it was still at the beginning stage. I recalled the CBS News and a number of news media people, went to the university and interviewed our faculty members. They said, "Why do you guys came to Hong Kong? You guys are established professionals in the United States. Didn't you know about the 1997 return of sovereignty to China, any feel of uncertainty because of that?" I think one of my colleagues, Leroy Chang, who was a physicist at IBM for about twenty years, said, "Well, if it weren't for the return to Chinese sovereignty, I would not have come here." I think he spoke for many of us. It's really to show that for these people, like myself, China is very much a part of the upbringing. We went through the Second World War fighting with Japanese and would very much like to see China coming out of poverty and become a modern country. I think [we shared the] feeling that in Hong Kong we might be able to help Hong Kong and help China this way. So you started with this group of dedicated people and you give them good pay and good support structure, they will do wonders. I think that's how the university was able to start out really well, in a good position.

33-00:14:37
Hamilton:

Do you find that the university embodies any traditional values of Hong Kong locally, of China, or do you think that it's more looking toward the future?

33-00:14:51
Lin:

Well, I think we're not interested in building just another Hong Kong University here. We want to build a university which is more like a top, first-class American university. Well, Hong Kong U is, as I said, an elite school.

It's a school for the nobles and the students, will most likely work for the government. We feel the future society is not like that.

33-00:15:30

Hamilton:

What university do you think would be considered the top competitor?

33-00:15:34

Lin:

The top competitors, I would say, Harvard, MIT, Stanford, Columbia, Yale, UC Berkeley, CalTech, Princeton, Chicago, Michigan, Oxford, Cambridge, etc. I think we are aiming ourselves at that group. In fact, when I was in the university later on, I asked to tabulate the cultural background of the faculty., out of roughly 400 full-time faculty—by the way, all the full-time faculty have PhD degrees, which is un-usual at the time, two-third of them have received their degrees from the group of universities I just mentioned. So our colleagues have been there and know what a good university is like and the kind of culture we are building. The lights never went out in the laboratory. Well, on Sundays, you always see people working in the lab. You feel free to come and go and do whatever you want to do. And although we are given leave time, but few people used up their time for vacation. Most were dedicated to the university. Publications in first class journals is very much a part of our life. Teaching is part of that. And I think we have a global view. Globally we know that the future of our students is not just in Hong Kong. So we nurture our students so that they will be fit for the globalization era. This is the kind of culture that I think is different from other universities in the region.

33-00:17:34

Hamilton:

Well, it's interesting to hear that, because also along with its global view, Hong Kong University of Science and Technology wants to impact Hong Kong locally, as well.

33-00:17:46

Lin:

Yes.

33-00:17:48

Hamilton:

And that was striking when I was doing a bit of research on this. That all over the web page, this is one of the major aims of the university. Do you think that that's been successful?

33-00:17:58

Lin:

The university now, in almost all rankings, is in the top fifty in the world. For a university with only nineteen or seventeen years of history, this is kind of remarkable. Business school, for example, I think is in the top five or ten. The MBA program is maybe the top one or two world ranking, beating Berkeley, I think. Globalization is very much a part [of this]. We work with Northwestern, with Kellogg School and aim globally.

Go back to your question. The impact to the local university is this. I always said that it's not so much that the papers we published and the students we

produced, but I think through the working culture we have established a model for the local universities. Previously, having a teaching job in Hong Kong U was very comfortable. Good pay, good compensation package. Most of the faculty members are from UK or Australia. They can return to their home country every year and expense paid, for their families, too. It was a very comfortable life and you don't have to do anything. But when HKUST has established, so all these guys, they knew now you have to teach, you have to do research, you have to publish. We look at publications and we have a lot of visitors come in from different parts of the world. We kind of setting the standards, or pace setting, you might say, for Hong Kong. Our sister universities: HKU, Chinese U, City U, PolyU all began looking at UST and say, gee, we have to aim globally, to strive for excellence in teaching, research, and so on. I think we set the standards for Hong Kong. That's the impacts.

33-00:20:37

Hamilton:

Do you think that UST has impacted Hong Kong economically?

33-00:20:43

Lin:

It's hard to say. I don't think so, certainly. If you're thinking about impacts economically like Stanford to the Silicon Valley or to the United States, and MIT, well, no, I don't think so. No. No. At this point, I think that impact has only started to show. Now, if you graduated with the first class, 1995, you are only about ten years in the company, you might be about to be at the decision making levels. Give them another ten years. Then I think it will be different. And the entrepreneurs, I'll talk a little bit about what I personally did in the university to nurture entrepreneurship, I think some are working on new technology and doing quite well, but not to the extent of impacting on the economy as obvious as we see in MIT and Stanford.

33-00:21:49

Hamilton:

But you do think that that's in the future?

33-00:21:51

Lin:

I think in the future, yes. Yes. Yes.

33-00:21:57

Hamilton:

So let's move on to your particular role. What made you decide to get involved with UST?

33-00:22:01

Lin:

Well, I was in NUS I was doing some teaching. I helped to set up the Center for management of technology, providing consultation to the government and then help setting up the MIT collaboration program with Singapore. That's basically what I did with my time in that period. I myself did not have a career of research or doing something of my own at that point. I was, about this time, to decide whether I want to take Singapore as my home. And then the offer at UST comes. Well, it's not an offer, just a position available that I have to apply for. It also is that in UST, all the major positions went through

international search, including department heads, deans, associate vice-presidents, vice-presidents, and presidents. All the time, just searching all the time. They set up a search committee for VPRDs, vice-president for research and development. That's why the chairman asked me whether I would be interested to offer myself as a candidate.

33-00:23:37

Hamilton: So they came to you first?

33-00:23:38

Lin: Yes, they came to me first, yes. I hope you find this letter.

33-00:23:46

Hamilton: I did. I found it this morning. Yes.

33-00:23:46

Lin: Good, good. Yes. To Professor Chi. Professor Chi, again, he was a senior faculty member in Duke or something and then went to the HKUST. They came to me and they nominated me as a candidate, so I have to send in application and so on and follow up with all those paper work and legwork. I feel that because of the turnover, the return to Chinese sovereignty, it is an opportunity for Hong Kong to make an impact in China. Now, if you're looking at the 150 year history in Hong Kong, 150 years, you're looking back at 1842, the Chinese and British War, the Opium War. You heard of the Opium War, right? The British want to push opium, import opium to China, and the Qing Dynasty resisted. There's a lot of conflicts and then finally it became a war. And unfortunately, the Qing Dynasty lost the war, and signed a treaty with the British Empire. And as a part of the reparation, Hong Kong was ceded to the British Empire. So that was the first time Chinese government, Qing Dynasty, failed, became a victim, an underdog. Formerly defeated country and has to surrender part of its land to the winning country. Hence, Hong Kong is really the opening of the downfall of the Qing Dynasty. It's a special position there.

Around 1900 came Sun Yat-sen. Sun as a student had earned a medical degree from Hong Kong U. At that time, did not call it Hong Kong U, it was a medical college which later became part of Hong Kong U. And Sun Yat-sen started the revolutionary movement which finally brought down the Qing Dynasty. Hong Kong is a very important base for the revolutionary force. It brings down the Qing Dynasty as its first consequence. But more importantly, it is the collapse of the monarchy system. The monarchy rule which existed for over five thousand years in China is ended. A democratic republic is now started. This second consequence is the most important event of the Chinese history which started in Hong Kong.

And then, another fifty years later came Mao Zedong. The People's Republic was established. At that time, Mao has all the power to retake Hong Kong back into China. But Mao Zedong did not do it. Mao and the PRC leadership

have decided not to do it because they needed a place to interact, as a gateway, with the western world. They leave Hong Kong the way it was. So Hong Kong become an entrepot, a gateway city between China and the West. Exchanges of goods, technology, money, people go through this port. I think it's a very important strategic location. It was a strategic action measure for China to take at the time. Hong Kong has played its role well.

And, of course, come another fifty years. Come to 1997, Hong Kong is returning to Chinese sovereignty. I think Hong Kong in the modern history of China has a very special place, and I feel, and many of my friends felt, that it will continue to play a very important role for China. Until today, 2009, I still felt this way. Although China in this last ten years has moved forward, progressed and grew miraculously, but I think Hong Kong has still a special role to play, just like Taiwan.

I think it will be an opportunity for myself to be in Hong Kong during this particular time and do something for Hong Kong and China. That's the reason that I returned, went back to take this position at HKUST.

33-00:28:59

Hamilton:

So it wasn't a difficult decision?

33-00:29:00

Lin:

No, it was not a difficult decision at all. And, of course, the new package helps, to be closer to my family and everything. I think it certainly helps.

33-00:29:18

Hamilton:

And when you went to UST in 1997, you were the vice-president.

33-00:29:23

Lin:

I was vice-president, yes.

33-00:29:24

Hamilton:

And who was the president at the time?

33-00:29:25

Lin:

Chia-wei Woo. He was the founding president. Well, there are three vice-presidents. One we call VPAA, who is the vice-president of academic affairs, who organizes the departments, the curriculum, and recruiting of the faculty members. This is the VPAA's job. He took charge of the educational part of the university. And then there's a VPAB, administration and business, who handles the money, business, the real estate, the services, the management of the day-to-day operation. That is VPAB. We call him VPAB. And then for the research side of the university, VPRD, research and development, who oversees research activities, strengthens research infrastructure, seeks research funding, and explores implementation of research results. He also conducts technology transfer and interacts with the industry that kind of thing. That is VPRD's job. I was VPRD.

When Chia-wei started that, he has a Professor and Dean from the Georgia Institute of Technology, I've forgotten the name now but it will come back to me—to be the VPRD. Thomas Stelson, yes, although I don't know him personally. He is an American, stayed for about a year, found it difficult and submitted his resignation. And then the second VPRD was a professor from UC Berkeley, Professor Eugene Wong. I know Eugene only barely. But at that time, Eugene has left Berkeley and became a Presidential advisor in the White House in the science and technology area. And somehow Chia-wei have interested Eugene to come to Hong Kong to take up this position. I think Eugene stayed in this position for nearly two years and decided he cannot continue on it. I would be the third VPRD. Well, I think he started in 1994 or 95. Then I come in 1997. This probably is an indication that the job was very challenging. I was the third VPRD in 5 years.

I think I could take this job because of the background, because of my understanding of the society, and I can interact with the locals and the Chinese nationals. I was in Hong Kong before and so on. So I took this job. That's why I returned there. Yes.

33-00:32:52

Hamilton:

Did the networks that you had already established help you in this job?

33-00:32:55

Lin:

I think it was very important, yes. And, of course, I know Chia-wei Woo a little bit before I went there and I think these people [my two predecessors] did not know Chia-wei that well. Chia-wei is a visionary, a person with great energy and dedication. But he also was a difficult person to work with. It would not be an exaggeration to say that his type of person has a tendency to be over zealous or micromanage. It could be difficult for Tom Stelson and Eugene Wong. They are very accomplished scientists and their views could be very different with Chia-wei. But I had some of this experience working with people with big egos, I learn to take pain to nurture mutual respect for each other. I think I work well with Chia-wei. When I retired, I was the longest serving VPRD of UST, completing two terms, six full years as vice-president. [Narrator's Note: In hindsight, the fact that I was not as smart also helped make me more tolerant.]

33-00:34:11

Hamilton:

So the other vice-presidents didn't even serve an entire term?

33-00:34:14

Lin:

No. When I was in Singapore, before I returned to Hong Kong, I have participated in other activities which proved to be very important in the later ten years. I participated in a project that linked me to the Salzburg Seminar. This term come up many times in the past. Salzburg at that time was doing a study on the East Asian countries. Korea, Japan, Taiwan, Hong Kong, Singapore. These Asian Pacific economies. Not countries. Economies. It's politically correct to use the latter. The project was led by Professor Henry

Rowen. Henry was a senior faculty member of Stanford University and is still intellectually active today. By the way, Henry Rowen is another person, if you are interested in hearing an independent view of ITRI. Henry has a very illustrious career. He was president of RAND Corporation previously and then later on he worked as assistant secretary for the Department of Defense under Presidents Ronald Reagan and George Bush. No, not GW, but his father. The senior President Bush. right? He was a person of great intellectual capacity and was very much respected. Afterwards, he returned to Stanford and set up the Asian Pacific Research Center and also associated with the Hoover Institution and the Stanford business school. His name is Henry S. Rowen, but we always call him Harry.

Harry led this project to study East Asian economies. So he invited me to be part of that. I first get to know this group of people in Singapore because we have meetings in Singapore.

Because of that, I was involved with the Salzburg Seminar group. And I recalled, very interestingly, that we have studied this project for about a year, year and a half. We wrote our reports which, by the way, was published as book by Rutledge. It's a very interesting book with the title, "Behind East Asian Growth: The political and social foundations of prosperity.". We held a conference in Salzburg in 1998, inviting many speakers and participants of European Asian and American countries. The Title of the Conference is "The Rise of the East Asian Economies". And at that time, I remembered as we arrived in the beautiful Salzburg, the first economic crisis of East Asia erupted. And then the stock market crashed from Malaysia, Thailand, Korea, and spread through the region. So somebody in the Conference crossed out the word "Rise" and replaced with the word "Fall" in the title. A big laughter broke out!. But we have people talked about China, Hong Kong, Taiwan, and some about Singapore, Japan and Korea and so on. The basic reasons and the factors contributing to the "rise" and now the "fall" were analyzed. It was a very interesting Conference. I become part of the Salzburg Seminar from that point on. Later, I was elected to the Board of Directors and was invited as faculty member for several times. And later on, I organized the Global Innovation Forum. The global networking like the Salzburg Seminar, was very interesting and has some impacts in my ten years of stay in Hong Kong.

[Narrator's Note: I have also participated in the Six Country Programmes which is another platform of global networking for innovation and entrepreneurship. Undertaking this oral history project was prompted by a sidebar discussion with Jud King of the UC Berkeley and Lesa Mitchell of the Kaufmann Foundation. I was grateful for their encouragement and support for this effort.]

All right. You have any other questions here?

33-00:39:03
Hamilton: Well, I'm curious how would you describe sort of a typical day as vice-president of research and development. Is there such a thing as a typical day?

33-00:39:16
Lin: Meeting, meeting, meeting probably.

33-00:39:20
Hamilton: With who?

33-00:39:23
Lin: With small groups, individuals and so on.

33-00:39:25
Hamilton: From the university?

33-00:39:25
Lin: From the university, from the society and people in government and that kind of thing. Yes. It's meetings. One funny thing I want to mention in this connection has to do with my son, Dean, when I was in ITRI. At that time Dean was a primary school student and was working on a school project to study father-son relationship. The question is: what does your father do in his work? So one day Dean came to my office. And I have a fairly large office, a desk and table and so on. I let him sit by a desk in the far corner, so he could quietly observe what I did for a day. Afterward he said to me, "Dad, I can do your job." It was his conclusion after the day. He said, "I can certainly do your job." He said, "All you do seems to be talking on the telephone, meeting people, drinking coffee or teas," and he said, "That's the kind of job that I'd like to have." I am afraid that basically most of my days are like this.

Let me tell you what I did as part of what my job in UST. That would involve a lot of people. My job was basically with people. During the time of 1997, Hong Kong returned to Chinese sovereignty. I mentioned this many times before because it was the major historical event. That happened after I joined UST. The starting date at UST was consciously picked by me because I wanted to start from the beginning of Hong Kong's return to China. I think my speech in the Asia Society, you have seen that, right?, is an important record of me. In it I outlined the social background, the new environment and what I see as the future direction for Hong Kong.

Generally speaking, the strength of Hong Kong was perceived as: rule of law, personal freedom, free economy, gateway city, world exposure and a laissez-faire government. The colonial government believed in non-interference of the business, it let the business do it on their own, and believed the world is a level playing field. This is the kind of mind-set in Hong Kong. Not always true, I said so before the Asia Society, I said, "Well, Hong Kong, The world is not always a level playing field and yours is not a laissez-faire society. Because government maintained a strong hand in many aspects, not the least is its control in the real estate markets and the banking business—markets."

In fact, I think protection of the cartel here is significant. So the Hong Kong government plays a very strong role, holds on to the land determines the rules for the money and the banking business, among others. The Chief Executive has a strong hand in the legislature and flexes its muscle in many aspects. It's really not a laissez-faire economy.

33-00:42:52

Hamilton:

Can you say something about when the British left? Who was it that handed over Hong Kong? The Hong Kong government is still distinct from the PRC government, right?

33-00:43:03

Lin:

Well, the PRC government says Hong Kong is an autonomy under several guiding principles. One is "one country, two systems", meaning that whereas the Mainland is a socialist economy, Hong Kong can exist as a market-oriented, capitalistic economy.

33-00:43:28

Hamilton:

And are the politicians in Hong Kong from Hong Kong or are they politicians from the Mainland who—?

33-00:43:32

Lin:

The politicians are from Hong Kong. So they set up a Legislative Council [LegiCo] and a Chief Executive [CE] in Hong Kong. They are supposed to be elected by, eventually, universal suffrage. Note I say the words supposed to be and eventually. But the day-to-day operations are run by the chief executive and his cabinet and also by the LegiCo. You may ask, how are the legislative council produced, and, the chief executive? These are people picked, really, by PRC. First of all, the legislative council, I think, is consisted of, a total of sixty seats. Fifty percent of these are voted by the people, called district constituency members. About 3.5 million Hong Kong legal residents at different districts have the right to vote. The other thirty seats, or 50% of the seats are voted by several business and social groups. They're called Functional constituency members. The functional members are nominated and voted by organizations and individuals from several sectors of the society such as: trade, commerce, banking, construction engineering, professionals [law, accountants, healthcare, education], religion, etc. Groups representing the education sectors focused on primary schools and secondary schools. Since the functional members were nominated and voted from the sectors, they speak for the interests of the respective groups, especially the tycoons who usually have interests in more than one groups. It is not difficult to see that the LegiCo, as it stands, is structurally in the hands of the big businesses and the tycoons. Their interests are generally different from the district constituency members elected by the local residents. Additionally, the nomination committees had a very strong voice in deciding who are the representatives from the Functional groups; they listen to the business leaders.

The chief executive, was nominated again by a committee of 800 people. But who decides who should be in the nomination committee? It is basically the PRC. Tung Chee Hwa was nominated and elected un-opposed, basically. Once he was nominated then he had the position in his pocket. So the nomination was very much influenced by the PRC. Now, after they're elected, the day-to-day operation of the government, I should say, is fairly much by the CE and the Legco. Beijing has little, if any, interference. True.

33-00:46:34
Hamilton:

So if the PRC doesn't like a decision the chief executive makes, is there precedents for the PRC to say, "You need to do it this way?"

33-00:46:42
Lin:

No, so far, this was not known to have happened. BJ has not fired anybody in Hong Kong. But Tung Chee Hwa did not serve his second term. He was elected for a second term but he resigned because people has revolted against him, on a key issue. [Looking at the calendar, I notice that] July 1st will be here in a few days, from 1998 and on, it's a tradition that in Hong Kong there's a parade of the mass. I was in several of those parades. At the parade, people would express different views to the government carrying banners with their appeal. They're all kind of marchers. And one of those marches has brought down Tung Chee Hwa, essentially. Because there's so many people unhappy with him. And right now, Donald Tsang is in the same position. He was nominated by PRC and voted by the Committee.

It is fair to say that the chief executive serves two masters. One is Beijing, because that is where the nomination coming from. Then, of course, the other master is the local people. And sometimes the interests may not be exactly coincide. But for the chief executive, they always listen to Beijing. They have tried to speculate and forecast the needs of the people, Hong Kong people. But by and large, I would say Hong Kong is still under the one country, two-system framework.

The laissez-faire is a British legacy, I think there's some fallacy to that. Just like the "one country two system" concept is a Chinese legacy, I think too there are some fallacy. Hong Kong is a very special and interesting political environment. I think this is the time. Hong Kong has a special role to play. And you read my speech to the Asian Society. I think I talk about some of this situation.

Back to my job at UST—my job was very much in interaction with the society. First of all, I think it's a simple thing here within the university. I am in charge of all the research facilities. Traditionally in the university setting, I think, same as in Berkeley, all the research facilities belong to the department and the faculty members. So if there is an important and expensive equipment, the faculty is generally keeping it close to his chest. If there is e another faculty who wants to use it, really it's pretty difficult unless he knows this

fellow, or they have some program together. Otherwise sharing is pretty difficult. In UST, we have major research facilities under the central university management.

33-00:50:21

Hamilton: Could you just outline the organization structure that you sort of belonged in? So underneath you what's the organization like?

33-00:50:31

Lin: Can I write it on the board?

33-00:50:32

Hamilton: Sure.

33-00:50:36

Lin: As, VPRD, I, of course, report to the President, and then we all sit on the university council. All the council members are appointed by the government, by the Hong Kong government, including the Chairman. The President and the VPs, all three VPs, are members ex officio of the council. Okay? All right. Under the VPRD, I have several offices. One we call OCGA, which is the office handles all the contracts and grants. It manages all the research dollars that comes in to the University, money and proposals. And there was called TTC that handles technology transfer matters. And there is a Center [ATC] that develops special applied technology projects. I will explain this in further details later. And there are many offices that handle all the different research facilities. And under this category, the Materials Preparation and Characterization Facility [MPCF] take charges of high-level instruments such as SEM, TEM, electron microscopy, X-rays, MMRs, and etc. These are expensive and major instrumentation, that you found in the universities.

33-00:52:43

Hamilton: And those instruments would belong to this office?

33-00:52:46

Lin: Belong to the university and we have an office to manage that, okay. The office means that we have technicians, trained technicians, who report to certain managers who schedule the work and take charge of the maintenance. All people that need the service of the equipment go to this office.

33-00:53:09

Hamilton: And would individual professors get grants to buy instruments? But then these instruments would belong to the university.

33-00:53:17

Lin: Well, in the very beginning, the university has the instruments that most faculty members needed. As time goes on, if the faculty needs a special addition or upgrade, he will find some grant for support. But usually the faculty would not have enough money to do it, so usually the university will chip in. And this will be part of these central research facilities. And, of course, these faculty will have special privilege to use them. But the other

faculty members of the university also have access to that. This is like a BMW here or Bentley. Everybody want to get in and drive. No, you have to have special qualifications, training, and then you can wait for your turn to take it out for a ride.

33-00:54:20

Hamilton:

It seems like this would allow faculty to—not only would they have access to these instruments, but also have access to other faculty working on this. Do you think that that increased communication?

33-00:54:31

Lin:

Yes, yes. That increased communication and that also increased their capability. If they figured out how that I can—I've been working on the electron microscope, looking at the morphology of this specimen, and then I need some other equipment to add another facets to that, it's okay. You can easily get access to that. So this promotes communication and also increases the resources that the faculty members have. I think in the university, instruments are usually considered as toys. The faculty will keep it as his own toy and not let other people touches it. Therefore efficiently running this facility is very important. Including in this category is the clean room for Microelectronic Fabrication [MFF]. Usually no faculty, no individual faculty can have that kind of facility. It's only the university that can set up a clean room, a very high cost clean room and then make it available for many faculty members in the semiconductor area, and also the physicists or chemists who are interested in using it for studies.

33-00:55:58

Hamilton:

And is that type of facility something that would be uncommon to find at a university in the United States?

33-00:56:06

Lin:

I would say major good universities certainly have that. Stanford, Berkeley certainly have good IC facilities, but not every university. So UST have that kind of thing. In fact, when we built the micro fabrication IC factory, it was so new and so unique in Hong Kong. It was laid there, locked for about six months. Nobody can use it because we are waiting for the government do a fire and safety inspection. And the Hong Kong government did not know how to do the inspections properly. It was the first time they encountered that kind of thing.

33-00:56:45

Hamilton:

Was this facility on campus?

33-00:56:46

Lin:

On campus. This are good chunks of this. There is a lot of investment in that area. So we provide needed facility, through research proposal, grants and donations.

Begin Audiofile 34

34-00:00:00

Li: Robin Li and Emily Hamilton speaking with Dr. Otto Lin, June 26, 2009. This is tape thirty-four. Yes.

34-00:00:41

Lin: Okay. I was talking about my job in UST, the VPRD job. And I think the first thing I wrote on the board there is research facilities, management of the major research facilities so that they are available to everybody and also maintaining the professional standard. There are scientific instruments and facilities for IT integrated circuits, and others. The biologists need guinea pigs, mice, rabbits, that kind of thing. It's a fairly complicated operation but I think the way we manage it, again was a model, really, for Hong Kong universities.

34-00:01:33

Li: And is it true that UST had research space open for rent?

34-00:01:40

Lin: No. No, we don't. We don't. But let me go back to this. The second part is money. This equipment and the monies, we have research dollars coming through our office, the OCGA. And, of course, a lot of the money coming from the Hong Kong government supported agency- the RGC, the Research Grant Council. There's a lot of alphabet soup here. And, of course, industrial grants. And there are monies coming from the government as block grant to the university and the university can, at its discretion, support research of the faculty and so on. I manage those money. I was chair of a committee on research infrastructure, CORI. Research infrastructure includes what we have talked about, those facilities and so on, and also research monies. And usually a faculty member will write proposals to this committee, which I chair, and say that he want to do this and that. And we tried to focus on those projects that are more futuristic, major projects. There are projects that can draw many faculty members together for synergy. Those are things that we tried to support out of the money that we have legal access to.

Now, for individual faculty, individual effort, their needs might be in a small scale and they can make application with the RGC, which OCGA will provide assistance. There are several channels here. And another area that I paid special attention is to support young faculty and new faculty. They're new in Hong Kong or they're just coming out from the university. I mean younger groups. And they need some support, so we have some special funds allocated for them. Again, this is the work of this committee, that we have so much support for the new and young faculty this year. People make proposals and we review and approve.

And another special group that I focus is for scientists in the humanities, social science and business management, because they do not involve a lot of

research dollars. They do not need chemicals or special instruments. A little bit of money goes a long way. Although a university of science and technology, HKUST have very good research in social science and humanities and business management. I think our business school become top in the world within a short ten years time. They wanted to do special studies, we will provide support. For example, China business management is a special area. Another example is to organize projects to support the growth and management of the new knowledge based economy, in the China setting, that kind of thing. We support that kind of efforts. I usually pleaded with the committee that these are groups should be supported. And I think it bears some fruit there.

Professor P. S. Ting, formerly of UC Berkeley, was later appointed Dean of the HS.S. School, usually made the case to me that they don't really need big money for instruments, and how importance it is for a science and technology university to have good humanities and social science components. I totally agreed with him.

When I came to the university, under the VPRD portfolio there was a block which I had not talked about. It was Research Center. It was a center set up by Professor Woo intended under VPRD, to undertake special major projects. And after the first few years, it has become a problem because it was a fairly large group, maybe about thirty or forty people full time. And the thirty or forty scientists have no teaching assignment. They do not have to teach. They only do research. It becomes a special group for the university and created problems for other Departments and Schools because of fairness issue. They are competing for the university block grants but was not bound by teaching or other obligations. They don't have to earn it. After a year's consideration, I have decided to re-organize the RC, returning most staff to the academic departments but keep just a small number for management of university-wide applied technology projects.

[Narrator's Note: The RC was originally established with the view that it would function like an ITRI inside the university to commercialize research results. Not knowing that HKUST was just starting and, at the initial phase, there was no technology generated worthy of commercializing. Further, it would take major effort, funding and human resources, to do commercialization of any research results, may be ten times more than the research itself. Therefore commercialization as such should be outside of the scope of the university. In fairness, the RC worked diligently as an agent to transfer the wind-shear warning technology from the U.S.-NARC for the benefit of the new Chek Lap Kok Airport. But the revenue earned was far short of the expenses incurred.]

It is my view that the basic mission of the university is education—nurturing leaders of the society; research, advancing human knowledge; and service, assisting the development of the society. Thus, the source of technology is

from the faculty. We should make faculty feel that they are the souls of the university. We should not grow a special group within unless there's a clear shared objective, like the Nansha IT Park which we will talk about later. In that program, faculty with interest can freely participate in it and it will have its funding supports. Other than that, the university should not cultivate any special research group especially to compete for common resources which become increasingly scarce. I disbanded the research center and send the people and budget back to their departments. I think the faculty felt good about it because this was something that should have been done earlier.

And I re-align the Technology Transfer Office and re-appoint its Director. I want faculty members to view the TTC as their partner in the commercial application of scientific results, not one to impose unnecessary rules and regulations. I set up patent policies and patent review procedure. When faculty have uncovered interesting research results with commercial prospects, he is facing a decision of making publication or applying for patents, which appears to be in competition. If you published a paper and the result becomes publicly known, then beyond a certain period of time you lose the grace period to patents. I usually encourage faculty to submit a patent application and then go publish, unless the result is truly basic science and no clear application that we can talk about. Then we go for *Science* or *Nature* or do a quick communication to make ourselves known. But out of the research project, if we see some potential commercial application, I always encourage the faculty to file a patent application, or a provincial patent application first.

34-00:09:55

Li: And the faculty would own the patent?

34-00:09:58

Lin: The patent, the rights of the patent, belongs to the university. The university puts up the money to do it. This is a common practice for any university. The university pays the faculty member his salary, provides the facility, gives him the time to do the research and if there's a patent to be awarded, of course the university holds the right to the patents. But the patent itself does not do anything beneficial to the university, money wise. It is the effort afterwards—the rights that the patent provide to do certain things commercially. And when this is done, then you might have some monetary benefits to the university. Then the important thing is how to share those benefits. I set up a mechanism for the inventing scientist to share the benefits returned.

34-00:11:00

Li: So this sounds like nearly the same type of policy that you had at ITRI for—

34-00:11:04

Lin: Same principle as is at ITRI. Yes, yes. That's right. And, of course, it's ten years from ITRI now and we also studied how UC, the University of California system [mostly funded by public money] is doing it, how Stanford and MIT [mostly funded by private money] are doing it. So I think we set up a

policy which is fitting for the university. And so, I have covered patents. And I do industrial liaisons trying to find major industry to come visit the university to work with our faculties. We hope that the industrial people will know about our capabilities and contacts so that they can establish some direct communication. I worked with Johnson Electrics, Varitronics, etc. These are local companies. Then CLP, China Power and Light, and IBM, and Microsoft, so on. This is networking through which I bring business executives to the university and introduce the faculty to these people.

Li: What type of event would you organize? Would it be sort of a mini-conference? Would it be a lunch?

34-00:12:35

Lin: Well, there's lunch of course. It may be just a short tour to the lab and then coffee and chat, followed by a mini-conference or seminars. There are many different ways. And sometimes we also do exhibits. We participate in some exhibits and then I invite some people to come in and to meet with the scientists who work on those projects there so that they know each other. There are many different formal and informal, and, large and small-scale meetings. Very, very many of those.

34-00:13:10

Li: So your goal is just to increase communication so faculty know what's happening in industry and those in industry know what's happening in laboratories?

34-00:13:18

Lin: Yes, that's right. So the faculty can work on problems, relevant problems, problems relevant to the needs of the industry. For example, in computer science field, when I was at ITRI, we're basically working on computers, the hardware, and some working on software. But then in this last ten years, so much has been happening. The internet was not invented at the time I was working at ITRI. But it has now become a way of life and there are security problems. Coding and de-coding, etc., those things have become important to the industry. Then you have to compress the data to engage in meaningful conversation. There's so much data going around, so they have to compress them to save space, and to decompress them on the user ends. These are new problems, and also new opportunities, coming out. And our faculty may not appreciate the difficulties the industry has. I think contacts like this will help them understand.

34-00:14:35

Li: Now, you talked a lot about faculty, and of course, graduate students and post-graduates would play a role in this laboratory. But what about undergraduates? Did you have any direct or indirect contact with what was going on in undergraduate research life?

34-00:14:55

Lin:

As VPRD, I must say that I have only very limited interaction with undergraduates. Except that when I visit the laboratory, I talked with students working there. And there's some student projects there too. These are basically the extent I interacted. In my later years, I participated in teaching special courses at the undergraduate level. When I first came to the university, Chia-wei, the president, told me, that the VPRD is a full-time job. "You should not teach. You should not teach any courses that will demand time off from your VPRD duties." I said, "Come on. I want to teach. I want to be interacting with the students. This is what working in university is all about" I insisted to be affiliated with an academic department and teach some courses. I did what I did. I have to do this in my extra time, with no extra pay. But I think I did the right thing, against the will of the president at the time.

34-00:16:01

Li:

What department did you affiliate with?

34-00:16:03

Lin:

I'm—

34-00:16:03

Li:

What department did you affiliate with?

34-00:16:05

Lin:

Industrial engineering and engineering management. Because of the technology management part that comes into play. Another part of my job as VPRD that I did not put on the board is the Entrepreneurship Center. Before that, as part of technology transfer, I set up a mechanism allowing a faculty member to do consulting work for the industry. The general rule is one day per week maximum. So a faculty can act as consultant for whatever pay he gets from the company. This is your problem and you don't have to report it, except that you have to report the time out to do that kind of work. And faculty members don't report that to me, but to the department head. This is because I think department head is the person who knows about the teaching load, research commitments, committee assignments, that kind of thing, of all the faculty members in his department. So the faculty members have to report this to the Department Head. But we do not need to know how much they're paying you. We put all this as ground rules and people knows about it and can do within the bounds.

And then I set up an entrepreneurship program. In the science and technology field, there are times that people come up with something new and there are maybe some market and commercial opportunities. And, of course, one can transfer this to outside companies for commercialization. But there are certain times people wanted to try it out themselves. So we establish the Entrepreneurship Centre in which a company can be set up. And usually I will not let faculty set up companies by themselves. I will say, "Well, do you have any former students who can do it? Graduate students, post-docs or anybody

familiar with the business who can help do this?" Because as faculty member, your full-time job is teaching, researching, and so on. Now that you want to pursue a commercial venture with this technology knowing that there's some great potential to society, to yourself, and the university. You can do it, but you have to have other people to actually run the business. Certainly you can provide the guidance and consultation, be a part of the company, but it's not your normal job. During my tenure as vice-president, I think I helped about thirty or so companies to set up and run as business. And we help them to work on a business plan. Usually faculty come to see me and said, "Wow! This is great stuff. Drinking this water will produce longevity." So I would just say, "Well, what is your business model?" Usually the faculty would say, "Business model, what is it?" I think it's obvious to you, but for the scientists, they're not so obvious.

Then I would say, "Well, it's like making dumplings." I talked about the example of making dumplings often and it has become famous. I said, "Say, you have a good idea of preparing the meat inside and also the wrappers. That's technology with special niche, this is fine. But how are you going to package it and sell it for profit?" You can open a little dumpling shop with some pots and pans, and some tables for the people to come and wait while you will do the piping hot dumpling soup for them. And he pays you right there. Business model is how do you let the money runs from your customer's pocket happily to yours. ? That business model, it has very little to do with technology, per se. Suppose you are the one to be selling dumplings or hamburgers, okay. But how are you going to do it? If you're going to actually open a shop to do it. Fine. That's one business model. Another is you can do the dumplings and put it into metal cans and sell it as a can. Then it's not only dumplings that's involved, there are also canning, shipping and distributing. How are you going to distribute the dumplings, to different outlets? That is business model. Or if instead of doing the cans, you're doing freeze-dried and then put them in vacuum pack and sell it in the freezer space of a certain grocery store. Then an important part of that business is getting the freezer space to do it. The charges of the freezer space may be no less than the dumpling itself. The scientists used to think about the technology. Technology is nice and the key elements of the product, obviously. But for a business to be successful, he has to think about how to make the product, how to ship it, how to sell it, how to distribute it, and most importantly, how to collect the money. Selling the product is easy, collecting the money is not. This should all be in the business model.

I say if you think about what product you're selling, the technology to use in making the product, the way of making the product [now the manufacturing part], how are you distribute it, the ways to sell it, what's the cost and the price, the financial burdens, how you're going to finance your company, etc., etc. And then, of course, any safety and environment factors involved, any patents that's involved. We're talking about nine or ten chapters here. Putting all this together is the Business Plan. And this is a plan that you need to show

somebody to finance your project. Regardless of what fields you are in, the bank, or the VCs, everybody want a business plan. That's your business plan. So the first thing that we did is teach the scientists to write business plan.

34-00:22:44

Li:

Now, even if these people learning about this did not, themselves, become entrepreneurs, do you think that the lessons learned in this sort of training made, for instance, scientists more savvy working with industry, made those in industry more savvy with working with laboratory scientists?

34-00:23:06

Lin:

Absolutely. Absolutely. And I think it's great training for students and the post-docs. Most faculty members did not want to become entrepreneurs. They would rather do research and publications and making speech. They're good at that. They enjoy doing it. But doing business is hard. It's difficult. You have to have that kind of mentality to do it. But giving them this training, giving them this thinking will make them think about the entire process.

34-00:23:44

Li:

Do you think that this training made UST scientists more marketable as consultants?

34-00:23:53

Lin:

I think so. I think so. It also certainly makes them more mature in thinking about their work and the society. For the nanotechnology, for example, UST is the first place that makes 0.4 micron single wall nanotubes. It was published in *Science*. The paper centered on making the nanotubes. And then the next step is how can you make some commercial use out of the nanotubes? I think all this will come to pass. Or when you make the nanoparticles in a film, you will be creating some new surfaces.

For example, the lotus. You see the lotus? In the lotus pond, there's some flowers and leaves, no doubt. The water drops on the lotus leave were generally extremely beautiful. The water drops are like beads of pearl sitting on the surface of the leaves. The leave has very low surface tension so water cannot stick to it. The difference in surface tension is such that there will not be any sticking of external particles. That is a nanosurface really. If you can make that surface in the glass like this, that means that water or dirt will never stick to it. Think about your skyscraper of 80 stories or 100 stories high and think about the people who need to climb out and clean the window. That can be a high cost and full of safety traps. Scientists who work on nanosurfaces, nanocoating in the first time, they just think about the surface. But if you think about trying to push that concept to become a self-cleaning window. There's a lot of long process involved. Now it's not only dumplings, but you have to put it into the can, right? Or put it in the vacuum packs. So there's a lot more technology that comes into that. And those technologies, sometimes the faculty that are working on the dumpling did not have, so you have to try to outsource, try to work with other people to get that. So commercial success

usually takes many different scientists to work together. I guess when I talked about innovation system I talk about this. A lot of joint efforts from many groups of scientists to work together. And this is a good business and business model. You need collaboration and communication.

34-00:27:16

Li: Was interdisciplinarity structured into UST so that scientists could work together across disciplines?

34-00:27:27

Lin: Yes. I think so in UST, scientists work very closely together and know each other very well. We have a very small campus and naturally, they come to see other often, and use the central facilities, often. And for the funding to them, they have to come to the meeting, committee, and talk to the deans and department heads often. I think internal communication is much better in the university, in UST. And that helps.

34-00:28:03

Li: When you were teaching students, would you bring in, for instance, people you worked with at ITRI? Would you bring in people from the community to come and speak with students?

34-00:28:13

Lin: Yes, yes. In fact, I taught a course, management of technology, and one of the subjects is entrepreneurship. Let me don't dwell on it too much time. One subject that I told my students was how McDonald hamburgers got started in Hong Kong about thirty years ago. You know how picky Cantonese are in their foods. With roast pork and roast duck readily available, why would they like to eat the chopped beef, hamburgers. I located the founding chairman of McDonald Hong Kong. He is Daniel Ng, a gentlemen of my age. I didn't know him then as he has already retired. He has a PhD in chemical engineering from the University of Illinois and at that time he was retired and he flies his helicopters, going over the Silk Road region doing some cultural projects. And I finally find him. I said, "Daniel, can you come to our class to speak to our students." He was an entrepreneur. "How you get the Hong Kong people to eat hamburgers." Okay. So we spent a lot of time on the email communicating. He said he wanted to know what class is this and commitments and everything. After going through a lot of background, he decided to come to see me and meet face-to-face first.

I remember telling you this story. We had set up an appointment for a certain Wednesday. On the early hours of Wednesday morning, like two o'clock, I was wakened up by the security guard and warned of a typhoon blowing through town. I was a vice-president and they have an obligation to tell me when a typhoon of certain threat is coming. It was Signal Number 8 and the university will be closed tomorrow. I said, "Oh, that was great." I was woken up in the middle of the night. But then it was great because I don't have to go to work tomorrow, right? But at eight o'clock, 8:00 am, I was woken up again

and somebody was on the phone. It's Daniel. He said, "Professor Lin. I'm Daniel Ng. Today we have a problem of number eight typhoon." I said, "Oh, yes, Daniel. We have an appointment today, right? But don't worry. We'll find another time to meet." He said, "No, no. I am already on the campus." I said, "How come?" He said, "Well, it's typhoon number eight signal. Nobody is on the road so I can drive. I get to the campus in no time at all, so I'm here." I said, "Okay. There's a little coffee shop on the main floor, just wait for me there. I will come in about fifteen minutes and then we can talk." After ten minutes time, I washed up and run to the campus. I live very close on the campus and you will see it when you visit. I saw this man wandering around the lobby. So it must be Daniel Ng. Yes, it's Daniel. I said, "Well, why didn't you wait for me at the coffee shop?" He said, "The coffee shop's closed." So I said, "Well, okay. I will take you to my office and make coffee for you." As we started walking down to the elevator, I said, "You know, we have just opened a McDonald hamburger here a few months ago." He said, "Oh, yeah?" He was already retired. He said, "Why, if there's a McDonald's here, it must be open." I said, "Well, how do you know it's open?" He said, "I set the rule that McDonald's hamburgers are to open especially in days of number eight typhoon." The highest is nine. "And the store manager has got to make sure that his employees get to work. If there's no public transportation, then he has to arrange cars or drive himself, to make sure they can go to work, because these are our business opportunities. Other shops may be closed but McDonald's will be open." I thought this was really entrepreneurship, and his own behavior has reflected the entrepreneurial Spirit. So I said, "Okay. We'll see whether they are open." So I took the elevator down to the lower ground, LG5, and the big M sign was shining and we walked into the store. The store manager, seeing Daniel Ng, the founding chairman walking in, was shocked. He rushed to shake his hand said, "Mr. Ng, what brought you here today?" He thought Mr. Ng was making an unannounced inspection. I was so pleased and said, "Well, it was the first time we met, Daniel, and it was the best positive identification for me." I told this story to my students as an introduction to a true entrepreneur: diligence and creditability. When people are sleeping and you keep your appointments and do your work. At hard time, you would work harder than other people. And then we talked about the subject of how to get Hong Kong people to eat hamburgers. He said, "Well, whenever people said not to, that means there's opportunity for me. Most people shy away from obvious obstacles, right? He said, "Well, if there are not too many people who did not want to get into this field, then there may be a window for me." And he said, "Well, then I learned the business. The business is not selling beef, or fish or coffee. It's secondary." He said, "It's the culture." He said, "I sell quality. I sell cleanliness. I sell service. I sell value. That's what you come to McDonald's for. Indeed, that's what you would get from McDonald's." I think about this.

34-00:35:20

Li:

Did he think that his training in science either helped shape his mindset or anything in terms of the business itself?

34-00:35:30

Lin:

Well, I think it has. It has. He thinks about the process, chemical engineering, the process of making it. He said, once, very analytically, he thought about how to set up the process in that kind of setting. I'm giving you an example. Here, I taught entrepreneurs and I tried to get business executives to come in to talk to the students so that they have first hand contact with the business leader. In this case, a very unusual entrepreneur. That's what I did in a days work in the UST.

34-00:36:08

Hamilton:

Well, obviously there's a lot of training for the students. But the entrepreneurship program for students, itself, I know assists in start-up companies. And how exactly did the program assist? Was it simply in training? Was it financial assistance?

34-00:36:25

Lin:

Well, good point. It was a training. We reviewed their business plan and helped them set up. In terms of facility, we just provide lab space and rented the space to them. And then if they need money, we help them to get access to the VCs, to the bankers, or to private investors and so on. And if they need some technology, we tried to introduce them to some other technology people there. Introduce the market contacts for them. They didn't know who can help them to sell this and then we get them to that.

34-00:37:14

Li:

And how did this become a symbiotic relationship for UST and graduated students?

34-00:37:20

Lin:

What did the university get from that? Well, for companies that are qualified in the program, if they really have a good business plan and good people to execute that and so on, at least to start, so the university provides all these services. In return, the university will take three percent of the equity ownership. And one time I have close to thirty companies set up in the center. One company is on selling shoes. Half of the shoes in the world are made in the Pearl River Delta. So I said, "What do you bring to the party, to the industry?" And this is the wife of a faculty. Because she used several graduate students to run this, so we accepted this in the program. She has a computer program of bidding. It was a selling scheme that companies like Macy's can order through the platform and get to the shoemakers readily. So she set up a company, entrepreneurship company. But later that company did not work well.

34-00:39:01

Hamilton:

I recently heard a news story that somewhere in Southern California, a program was set up that individuals could basically get in front of a crowd, stand on a microphone and they would have ninety seconds to talk about a business plan and the audience would give feedback. At the time, I thought this was an interesting story. I'm thinking about it now and wondering

whether the students in the program really helped as the audience, as helping other people develop their plans, or was it a faculty oriented course?

34-00:39:39

Lin:

Well, I think you need more experienced people to come, because just technology is not enough. It's the entire value chains, entire business sequence here. So you need people who can think about the different steps. Someone can ask question like, "Well, how do you collect your money in the end of the day?" A Big problem in China is the middlemen. They come and take your goods away and they will never show up to pay. I know, I think about this. So this is a special problem for the area. So I think you need people that have some real experience to make comments. I think ninety seconds is okay, but it's not a group of just any audience. I think it's a group of experienced people. Then I think they can criticize and can give good feedback.

34-00:40:039

Li:

Is UST already seeing students from the entrepreneurship program coming back and becoming involved in local ventures?

34-00:40:46

Lin:

I think there are several companies that are doing quite well. Are they making profits. But like Yahoo or Google? no.

34-00:40:54

Li:

Not yet.

34-00:40:55

Lin:

Not yet. Not yet. Yes.

34-00:40:58

Li:

And do you anticipate these—now they must be young entrepreneurs—coming back perhaps after retirement?

34-00:41:05

Lin:

Well, most of these will become avid supporters of the university. They come back to teach other young entrepreneur students and give them their own examples. They are not making big money but they are still doing quite well. They can survive.

34-00:41:28

Li:

So that's another thing.

34-00:41:29

Lin:

Despite the financial crisis.

34-00:41:31

Li:

Right. So that's another way that the university benefits from supporting students entering into the world of entrepreneurship. It's self-sustaining, the program.

34-00:41:44

Lin:

Yes, I think it becomes much better now. I set up professional leave for our faculties. Faculty have sabbatical leave. You are familiar with those, right? And nowadays, a sabbatical leave usually is going, say, for a UST faculty to spend a year or 6 months at Berkeley or other universities. And I say, "Well, why do we always have to go to the university?" If you find an opportunity in IBM, in Microsoft or Google, that can help your career, and these companies all have some very unusual technology. Then you can learn, you can contribute, and you can enrich your career, why not? We would like our faculty to do sabbatical leave with that kind of content. And faculty can go to their spin-off company. If they feel it's at the point that one day a week is not enough for them. So I said, "Well, okay. In that case, we'll give you two years leave. During this two years, you'll work for this company that he set up or that he has a lot to do with. You work with the company, but your relationship with the university is like an adjunct faculty, with agreed upon basic assignments. Your major commitment will be with the company. However the company supports you is your problem. University will pay you, say, one-fifth. We will pay you one day a week and then the rest you work with the company. And then after two years, you can decide whether you want to stay with the company or return to the university.

34-00:43:48

Li:

Do you think that you would have thought to offer this program if you yourself hadn't moved back and forth between the academy and industry?

34-00:43:58

Lin:

I think I would. That kind of flexibility is new in Hong Kong. I think it's not too new here, because of thing happens in the Silicon Valley. Stanford's example is that Stanford wants their faculty to be out of the university entirely because of the IP complications. Faculty, if you stay in the university and work on the projects and grow the company, in the future, whether those IP belong to the university or the company is often difficult to determine. And once there are third parties involved, there become legal problems. I think the university has a preference that in cases like this, why don't you just take leave from the university and go with the company. But then some faculty, I'm not sure whether they really wanted to totally be separate from the university altogether. So there's a link there that allowed them to come back. All what I'm talking about the entrepreneurship program and professional leave, I guess probably is first in Hong Kong. So I think to make the researcher feel very stimulated. They can learn from all these things: interaction with a lot of faculty, with industries, outreach, understanding the business situation, and then with all the support and so on, even nominal funding. I think this all contributed to UST becoming a fairly well known university.

34-00:45:48

Li:

Did you find that there was any resistance within the university to allow, for instance, faculty to have such flexibility?

34-00:45:57

Lin: I think people, they're getting jealous, envious of other faculty who can do that. But I think mostly there are a lot of faculty who are happy being just a faculty, being a scientist, being teachers and scientists and that. Because also people who wanted to become entrepreneurs really had to work very hard.

34-00:46:22

Li: And there's a risk.

34-00:46:23

Lin: They don't have much personal life, basically. Social life, family life. None. Because if you are still with the university, you still have to publish, you still have to teach class, and you have a group of people to be associated.

34-00:46:39

Li: You have two jobs.

34-00:46:41

Lin: You have two jobs but not the money. Usually you are borrowing money from a bank and the bank is after you to pay back. So the pressure can be great. A lot of people rather not doing that. I think the point is I understand scientists. There are a lot of people who would rather just be scientists. Not everybody would like scientists and moneyman.

34-00:47:13

Li: Now, at the other side of this, faculty have flexibility to leave for a year or two years, and potentially maybe decide even not to come back, I assume that UST also has a vibrant visiting scholars program.

34-00:47:27

Lin: Yes, yes. UST is very global. I think one time I count the number of nationalities in the university. It's like forty. Four-zero. Four-zero meaning that it's not just saying we have a foreign student from Zimbabwe and be counted one nationality. It's a real faculty or substantial research activity or that kind of thing. So it's very multicultural. Most of the faculty members, I would say the largest group is Chinese. Chinese from Mainland. Chinese from Taiwan. I say in the beginning, the first ten years, a sizable portion are Chinese from Taiwan. Chinese who spend time in the U.S. and then come to Hong Kong. And now there are more and more Chinese from the Mainland that came to the states in the eighties, and then after several years, ten years or fifteen years, came to Hong Kong. Some of them may not want to go back to Mainland China. Hong Kong is a very attractive place for them. So this portion of people become more and more. And there are some Hong Kong students, local Hong Kong, who grew up in Hong Kong and then somehow have education in the States and now returning to Hong Kong.

Let me give you an example. The city university, city university of Hong Kong, the new president of one year now, is a scientist that grew up in Taiwan and then became Dean of Engineering at the University of Tennessee. About a

year ago become president of City U. He is Professor Way Ko. And the president of Poly U, Timothy Tong, who was a native of Hong Kong and then he came to the U.S., got his PhD at Berkeley, a student of Professor C.L. Tien, His last job was Dean of Engineering at George Washington University and now become president at Poly U just this January. The next president of UST is somebody that grew up in Hong Kong, come to the United States and taught in UCLA and become assistant director of NSF and he is going to be president of HKUST in September. He is Tony Chan. So you can see this mix of people in Hong Kong.

And so I think Way Kuo, Tim Tong and Tony Chan, they all have been associated with UST one way or the other in the past. So we are very global. Because a great majority of our faculty have experience working in university big business, or big organizations in the United States, or somewhere of global significance.

34-00:51:13

Li:

Do you think that you will see less and less people coming to the United States to study and instead you will have the higher ranking officials at UST being graduates of UST, staying in Hong Kong?

34-00:51:30

Lin:

Well, I think looking at the foreign students in the United States in the sixties, seventies, most are coming from Canada, China, meaning Taiwan, and India. I think in the nineties, if you don't count Canada—just like U.S., right—then I think it's basically less people from Taiwan, the Chinese students, but many more are from China. The numbers are more. So actually, there's a good sizable group of Chinese foreign students in the United States. And, of course, a lot of Indians.

Yesterday, John Douglass, the Center for Studies of Higher Education here at UC Berkeley, gave me a paper showing that after 9/11, the U.S. government is making—I think U.S. government meaning George Bush government—is making it difficult for foreign students to come to the United States. So some countries, UK, Australia, for example, are taking the opportunity to get more foreign students to study there. Foreign students become a business, fairly good-sized business for those countries. Of course, they are small in the United States. The center of studies of higher education here is concerned with this problem. I think in general there will be less students coming to the United States compared to maybe ten years ago. But the number is still big.

And then if you're talking about Hong Kong, I would say actually we don't have so many space for them. Our university, the size is small. It's not enough to make a dent for the students here. But I think there would be continuously be students coming from China that want to go abroad. And now a substantial amount of students are going to Hong Kong. I must say that from 1997 to 2007, these ten years, in my article about in the Asian society, I quote a

number about the percentage of GDP expenditure on education in Hong Kong. During 1995, it's like 2.5%. I think now it's about 4%. It's increased. And the expenditure on R&D in 1995, in Hong Kong, is like zero point two percent of GDP, compared to about two or two point five in the United States. And right now this number is about one point four. So it's still small but it's increasing. And one important thing that I want to say here is that Hong Kong has five universities: Hong Kong U, China U, UST, Poly U and City U. Now all rankings about 150 or above in the world. For a small city with this concentration of quality universities, is quite remarkable. So this is a very good sign of Hong Kong in terms of human resource development. I think unconsciously this has become an important feature for the future of Hong Kong and I say a lot of what we do here has a lot to do with that. We're making Hong Kong more in education, more focused on education. And because of traditional values of Hong Kong, a lot of Chinese scientists are willing and happy to go back to Hong Kong. So it's easy to attract quality people to go to Hong Kong to teach and to work in the university. My university is an example. But I think the same thing happens also in Chinese U, in Hong Kong U, Poly U and City U.

34-00:56:37

Li:

Is it easy to convince foreign students to stay in Hong Kong?

34-00:56:43

Lin:

A lot more foreign students now, like U.S., American, European students, are coming to Hong Kong more and more. Not because of Hong Kong, but because they want to explore the markets in China. So Hong Kong also becomes a "center" for that kind of education. It served its purpose. My prediction is that in the business of Hong Kong, in the next ten years, not only banking, insurance companies, logistics companies, companies that do financial services, but also institutions that will do human resource training. Universities is part of that.

Begin Audiofile 35

35-00:00:00

Li:

This is Robin Li and Emily Hamilton speaking with Otto Lin, June 26, 2009 at the campus of UC Berkeley in the Bancroft Library. This is tape thirty-five.

35-00:00:16

Lin:

I was thinking that I have travelled to a lot of places and people talked to me about HKUST and was wondering why a young university has accomplished the way it has. I would say the reasons are many and all are around people.

Number one is people. You have to have good, quality people to start with. I think UST was very lucky in that. In the beginning, the starting period, maybe the first ten years, it has experienced scientists, educators that grew up in Taiwan who come to help build the university. And then gradually, we have

quality scientists, experienced people from more broader backgrounds to go to the university. So I think quality people is important.

35-00:01:26

Li:

Well, it's interesting. You had said earlier that your typical day was working with people, but then, of course, when you're talking about the organizational structure, in your diagram over there you have your job as working with offices. But that's now how you describe it. You describe it as working with people because you see the people as being the foundation of this university.

35-00:01:48

Lin:

Yes. Well, you see those offices but you see the office of the grants and contracts. The object is people. It's to help them get grants or see what kind of research money they have, research support they have [Narrator's Note: and make sure they prepare good summary reports.] And the Office of Technology Transfer, again, talking with people, meeting with people, on the disposition of their research results: whether it has been patented or should be patented or whether it can be transferred or how to transfer those projects. And a big part of that is entrepreneurship mentoring, to work with people on how to make the results for commercial ventures.

35-00:02:28

Li:

For people.

35-00:02:30

Lin:

Yes. So those are people. Everything I do, are with people. The concept of offices is just representing a category of activities, you might say. I think quality people is the key to the university.

Secondly, it's that you have to have a support structure. We talk about the facility, talk about the grants, talk about the care, about the young faculties, new faculties and faculty of different interests. We want to have the proper means to support them.

Number three is that we have to set quality standards. Nothing is more important than quality. It cannot be compromised.

35-00:03:20

Li:

Who sets quality standards?

35-00:03:24

Lin:

Eventually I think it lies with the people. For example, quality when you recruit department heads. It is truly recruitment, international search, and the search consists of faculty members of the department or other departments. And they will interview the candidates and they will view whether this is the kind of people that they would call their peer. And when we are in the promotion schemes, assistant professors to become associate and so in every level, you have to insure that kind of thing. Again, it's not up to the president or the vice president who says, "Well, I want to promote this guy." It's the

faculty member who feels that his work or her work, by their peers, is already qualified to get to the next level. I think the quality standards set up by the people, the faculty themselves, is important.

And in UST, there's a lot of global contacts. We have external members as advisor. They also benchmark. Advisors, committee members who are coming from Berkeley, Stanford, and they usually play the role either as devil's advocate or as sounding board to sustain us there. So I think these are how we make up the qualities.

35-00:04:56

Li: So it's building from the bottom up.

35-00:04:58

Lin: Bottom up, yes. And it's not just the numbers. I think there are numbers that people usually go to nowadays. The number of publications, the citation index, those kind of things. And I think those are just one measure; just like looking at the health, the weight and the height, and that kind of thing. Numbers certainly has some relevance. But you cannot just look at the numbers and judge a person's health from that. You have to look at the quality, again, more into inside those numbers, and behind those numbers. I think the standards are very important.

Number four is that we should give people the freedom and respect. Don't ever micromanage. Let them have the freedom to do whatever they want to do. I think in life it is the element of surprise, the element of unknown, the uncertainty that will turn out to be very precious. They add to the value.

And finally, I think it is the leadership. I think either in ITR I or university, the leader should always try to motivate, to give the people, the faculty a sense of contribution that they are doing a very important job not only for themselves but for the science and for the society and for the country. I think that will make them feel more fulfilled. These are the kinds of things that I have certainly felt are my observations and reflections on the university. I have experienced my top years at HKUST.

I was at HKUST six and a half years as full time vice-president of R&D, research and development, and five years as faculty, teach courses, and also as advisor to the president, senior advisor to the president. And also running the Nansha IT Park program who was a joint effort of a private group with the university, which we will talk about later on. So I think these five points are the kinds of things that I think I can summarize. And I am just part of the big group.

There's a lot of other people who contribute to this. I think the two presidents, Chia-wei Woo, who is the founding president. His vision and his dedication, are unparalleled. Paul Chu, the second president, whom I know since ITRI time. I was director of Materials Research Lab and at the time he was working

on magnetics in the United States and not even famous for his superconductor work. But I know Paul and we recruited him to the university as the second president. He was a scholar and brought in a more global perspectives and culture of scientific research. He's very close to the students. I think he's a good example of teacher-student interactions. We have shared many common values.

And there are many other colleagues who also become very good friends. Leroy Chang, well-known physicist with good sense of humor. He retired from the university and died recently, much to our regrets. And there are numerous others I can talk about: W. Y. Hsiang, famed mathematicians, and P.S. Ting, linguist, both returned to Berkeley after retirement from UST. Ping Cheng, dedicated mechanical engineer who has never retired, now pursued a third career in Shanghai Jiaotong, Howard Huang, whom I met in ITRI and again in HK, also younger fellows like Paul Bolton, Y. S. Chan, K. C. Chan, Guo-hua Chen, Roland Chin, Ping Ko, Joe Meiss, Mitchell Tseng, Y. S. Wong, Matthew Yuen and many others. I can recall the fun of working with them. There are many other colleagues and friends who contributed to help build a good group. I can't list them individually. I enjoyed my years at HKUST.

35-00:09:17

Li:

As senior advisor to the president, how was that position different than vice-president?

35-00:09:26

Lin:

Well, in UST, we have terms of service, offices. My two terms is up and I have reached sixty-five years old. There's no retirement age in the U.S. But there is mandatory retirement in Hong Kong institutions from sixty and then absolutely at sixty-five you have to get off. Certainly not administrative position. So I retire in 2003, at sixty-five. Yes.

35-00:10:06

Li:

So this was a consulting position technically?

35-00:10:08

Lin:

Huh?

35-00:10:09

Li:

So this was an external consulting position technically, because you didn't have an administrative position?

35-00:10:15

Lin:

I retired as VPRD. But I become senior advisor, that I do not have any administrative responsibilities. The technology transfer, the OCG grant office, they do not report to me anymore. The special projects do not report to me anymore. But I am still helping the university to carry out some special projects, especially the Nansha IT Park projects, which we will talk about next time. And, of course, I am still a part of the university network. Part of this is

my relationship in China, which has been built up since the day with Zhou Guangzhou, with the Chinese Academy of Science and many others. So that was an important part of that, a continuation of that work.

35-00:11:11

Li: I know this is a large question but could you compare the impact that you think you made at UST—compare that to the impact that you think you had at ITRI.

35-00:11:26

Lin: I think they're different. In terms of impact, I would say ITRI comes first because ITRI's work has really impacted on the economy of Taiwan, has helped Taiwan transform from a low level industrial economy to a technology-based economy. Now people talk about a knowledge based society for Taiwan! We have brought more technology content to the Taiwan economy. If it weren't for those work, of upgrading the technology level in the economy, I think Taiwan would be in the Third World today. So the impact is clear. And because of its economic contribution, it provides jobs to the middle class, SMEs, and I think it has enforced political stability and contributed to the democratic movement in Taiwan. So I think in a larger context, the work in ITRI is important.

And also, because of that, it has served as an example to China, to the Chinese Mainland. In the 1990s, early nineties, China is only just starting its modernization. So they looked to the example of Taiwan, and Hong Kong. Why was that these places are not typically socialistic countries but can prosper?. I think my example, the stories in ITRI, was very welcome in China. I traveled to many places, to many universities, institutions, and talked about my concept of national innovation system. They don't really care about the meaning of national innovation systems, but all cared about ITRI and the impacts of ITRI. I always told them ITRI could do what it did because it was on the foundation of a certain social-economic system and on the value traced back to the Chinese culture. So let's go back to the basics!

35-00:13:33

Li: Do you think that with continued support of the culture of entrepreneurship in Hong Kong, do you think that you would see in the long term any sort of shift in the economics there?

35-00:13:48

Lin: I think it takes time, but the time will come. I think my contribution in HKUST, although it's different from ITRI. I'm more talking about the importance of people, of education, of human resource development. And we have tried not only to help just a number of young people, but we have tried to set up standards, behavioral and performance standards. So I think we set the culture for research and teaching in Hong Kong. I'm very happy to see the rest of the universities while progressed in their own way, certainly not as a clone

to HKUST, but have maintained similar performance standards, and now Hong Kong is a small city with five top ranking universities worldwide.

35-00:14:52

Li: So you would say that HKUST has contributed to a reemphasis on education in Hong Kong?

35-00:14:57

Lin: I think in Hong Kong. Yes, because of the standards, because of the culture that we set. And people recognize this.

35-00:15:09

Li: And do you think that in that way, UST will become a model for other educational centers?

35-00:15:16

Lin: I think UST has become a model for many. When I travel to China, people are always asking me, "How was UST? How did it achieve its level of performance and rise as a top university in the world?"

35-00:15:30

Li: So quickly.

35-00:15:31

Lin: Yes, in a relatively short time. And also, HKUST has made the name "university of science and technology" popular. There are many universities of science and technology in Mainland China, in Taiwan, all over. Previously, there are not so many UST, but there are many, many USTs nowadays. Yes.

35-00:15:53

Li: When I had asked before whether it was difficult to bring in qualified faculty members to the university, the first thing you said was that it was important to offer good compensation to the faculty. Has UST also served as a model for the importance of funding education?

35-00:16:14

Lin: Yes. Well, I think when UST started, good compensation is an element. There's some other elements, too. I mentioned research support. For somebody who went to UST for a short while, they would feel that the time they stayed there would not go wasted; they can actually do research and get something done. They don't have to wait for the instruments to be set up. Usually you take two years, three years to buy that equipment. But when they come to UST, these are already in place. So they can immediately become very productive, scientifically productive. So their time is well spent. That's important. And, in addition to good compensation, people have the environment to do good work and they know that their work is easily recognized. They can make contributions here and they will also have the freedom to do that kind of work. I think these are factors that contributed to the success of HKUST.

Now, I think the advantage of compensation is now basically nonexistent, because the funding is decreasing and all the other universities in Hong Kong are basically on the same pay scale. And the compensation package that we gave to the first group of people has become less and less. The package has been reduced, much reduced. So there's not an advantage anymore. But I think the other advantages are still there, yes.

35-00:17:59

Li: And is that decrease in compensation really just a result of the sort of proven prestigious nature of the—

35-00:18:09

Lin: Well, it's proven. I think all of these universities I talk about are funded by the government, largely by the government. The total dollar the government provided to the universities has, after ten years, I think, been tripled.

35-00:18:26

Li: Oh, I see. I see.

35-00:18:29

Lin: So the burden for the government is big. That's one thing. And also, we found that to be competitive, there's really no use to offer just more money. We cannot afford and do not need to offer that kind of package because we have established a brand name, so success has made you more attractive, more or less.

35-00:18:56

Li: And you had mentioned that one drawer for faculty is knowing that their work will be recognized, which sort of moves me to another question. How many publications, journals in particular, come from UST?

35-00:19:13

Lin: You mean UST published journals? UST has not published any scientific journals itself.

35-00:19:22

Li: So the faculty go to other journals?

35-00:19:23

Lin: Go to journals, *Science*, *Nature*, *IEEE* journal, *AICHE* journal, etc. Our faculty published in many, many different types of journals worldwide. I think there are some journals, scientific journals, that UST manage, or take a leadership role in publishing. But the number is relatively few. Yes.

35-00:19:46

Li: Interesting. I'm trying to think of what the best way to move along here is. While we're comparing ITRI and UST, could you compare the facilities? So could you compare the laboratory facilities at both?

35-00:20:08

Lin:

I think that both places have good facilities. And UST actually has better facilities than ITRI, although ITRI has more production facilities and what UST has are mostly for scientific research. On facility, let me just mention one thing which may be interesting. When I was in ITRI, we're working on optical electronics. In optical electronics, you need equipment called MOCVD. Molecular organic chemical vapor deposition. MOCVD. It is an instrument that you can vaporize metallic ions and making it to form very thin coating on a substrate. Another similar equipment is called MBE, molecular beam epitaxy. These are basically the same. MOCVD, I bought the first MOCVD in Taiwan, in ITRI first. It's very expensive equipment, like half a million dollars. The MBE is one million dollars, or, over a million dollars. We bought the first one in Tsinghua. In that time, they are of scared species, because of the expense. But now, there are about 500 MOCVDs in Taiwan. Five hundred! Probably the number is even larger. And most of these are now in the companies, in factories. People are using MOCVD as an equipment, as a facility of manufacturing molecular layers for LEDs, high brightness LEDs for electronic devices or green energy applications. I was astounded by this. This is a more quantitative statement to reflect the progress of technology level in Taiwan and the role of ITRI in setting standards, for the industry in this case.

35-00:22:20

Li:

And did that happen because scientists at ITRI moved into industry and brought with—

35-00:22:28

Lin:

Because the scientific results moved to the industry, and the scientists and engineers from ITRI moved to the industry and they know that this is the way that they can make good films for optoelectronic applications. You have to invest in technology to do it. I have never dreamed that equipment this expensive can ever become manufacturing equipment, but they have.

[Narrator's Note: My good friend, Dr. Alfred Cho, formerly of AT&T Bell Labs and generally recognized as Father of MBE had forecasted this to happen. Responding to my queries on the difficulties of producing scientifically structured thin films, He told me, while I was director of MRL, that MBE/MOCVD will one day be standard equipment in the factory.]

35-00:23:01

Li:

Is there a formal relationship or informal relationship with UST and ITRI?

35-00:23:06

Lin:

No, no. No formal relationship, no. The scientists, on people to people basis, interact. They are all scientists, they go to conferences and get acquainted. Sometimes they may write papers together. But there are no formal institutional relationships. Usually I don't want to use my influence to force

that kind of relationships. I think relationships like this are important, but they should not be built top down.

35-00:23:42

Li: Should be about people. Yes, right.

35-00:23:45

Lin: Yes. If it's just a piece of paper, it will not work.

35-00:23:52

Li: Were you involved with—I read a bit about this—but 2005, 2020 strategic plan for UST? Were you involved with that?

35-00:24:02

Lin: 2000, 2010? Yes, I was involved in that, at least, initially. Yes. This is a five-year plan. These are five-year strategic initiatives, and was done 2005/2005. At that time, I already was not vice-president but a lot of concepts are before that. There was an outlining paper previously, that we should be working on several major areas, called it the Five Os: Biotechnology, Nanotechnology, Optoelectronics, Environmental, and CEO [for management science]. These are the five strategic initiatives. I have already been working on them much earlier.

35-00:24:58

Li: Do you see UST as becoming a leader in the upcoming years? I know that especially in the Pearl River Delta area, environmental problems are up. Many people are looking for a technological solution to that. Do you see UST as being a leader in that area?

35-00:25:19

Lin: It's hard to say because there's a lot of people working on that area. UST's strength right now is in air. Air modeling, air flow for that region. UST did not yet have any strong position for liquid, water, and solid wastes.

35-00:25:44

Li: But in air, perhaps?

35-00:25:46

Lin: In air, perhaps. Yes.

35-00:25:48

Li: Interesting. What other areas of strength immediately come to mind for UST?

35-00:25:56

Lin: Well, nanotechnology and bioscience. I think TCM, traditional Chinese medicine. I think this is something that UST is working on quite strong. Optoelectronics, polymer processing, neuroscience, etc.

35-00:26:10

Li: Optoelectronics. Is the biosciences program relatively new or was it strong from the beginning?

35-00:26:16

Lin:

Well, it has started from the beginning. We don't have a medical school but we have chemistry, biology, and biochemistry. So these are the people who worked on the biosciences area. And also, by the way, I forgot to mention the Hong Kong Jockey Club funding. Most of the funding for research was from the Hong Kong government, with some small funding from industrial partners. And we have been able to get major funding from the Jockey Club. HKJC was instrumental for setting up the infrastructure, meaning the campus building. After I become VPRD, I talked to Lawrence Wong, CEO of HKJC, also a friend from my days in Taiwan, I said, "Well, really, you need to support our research so that the university can make good use of this wonderful infrastructure." I was very grateful to him for getting the HKJC Foundation research fund to support our biotech work and the environment work. There's a good chunk of money coming from the HKJC for research, better still, the fund was usually matched by the government one to one. I should say thank you HKJC and thank you Larry Wong for supporting education and research in UST.

35-00:27:42

Li:

That's interesting to me. Does the Jockey Club need to support—I don't know how to—

35-00:27:55

Lin:

They don't need to, but they do. In Hong Kong, a lot of people bet on racing horses. Twice a week. Wednesday and Sunday. It's just like the stock markets. There's so much in its trade volume. After the pay back to the bettors, expenses and tax to the government, there is still a big part that's left behind. Chartered as a non-profit charitable organization, HKJC cannot use that surplus for their shareholders, but for charitable causes. No, there are no shareholders. The Hong Kong government supports HKJC to have a monopoly in the field and the HKJC promises to pay back in bettors pay out, taxes, and carrying out various types of educational and charity work. So the Jockey Club has a big fund reserve and is well positioned to support educational, sport, cultural, social, medical, special charity, and also research, university research.

35-00:29:08

Li:

But it's not a government mandate that you need to—

35-00:29:10

Lin:

No, it's not a government mandate. So the HKJC Foundation has a committee that decides what to do. Not the government. Now, let me tell you the importance of the HKJC. The contribution of HKJC to the Hong Kong government accounts for about thirty percent of the total tax income. Larry Wong joking commented one time on the political consequence if the Jockey Club were able to hold off the money to the government. I remembered he said something like this "Well, in any other country, there will be at least two turnovers of the administration. If any administration dare to raise personal

income tax fifteen percent, it will be thrown out of office immediately.” He said they are contributing about thirty percent so they can afford to throw out two administrations.

35-00:30:12

Li: Was the Jockey Club established by the British or was it—

35-00:30:16

Lin: By the British.

35-00:30:18

Li: Is it currently mostly Chinese?

35-00:30:19

Lin: No, I think Chinese, British, American, and every—it started out as small horse racing organization. There’s very little entertainment or anything in Hong Kong in the old days, so people would just go to watch horse race and you can bet on the horses. So the government set rules to make the bettings legal under the management of the Jockey Club. This how it makes money. So as the horse race becomes larger in scale, it rakes in more money. They race horses now in Kowloon and also in Hong Kong.

35-00:30:52

Li: So the club is international? The membership of the club and the board is international?

35-00:30:57

Lin: I don’t know if you can buy the membership. I don’t know how the membership transfers. I cannot become a member of Jockey Club, certainly it would be very expensive. It’s an honor. It’s a kind of statue symbol. It’s for the rich, not your typical professor.

35-00:31:09

Li: For rich Americans, rich British, rich Chinese, all rich people?

35-00:31:13

Lin: Yes. But they do not get any shared dividends or anything. It’s basically an honor. You go to the Jockey Club, be a member, and then you are entitled to a table. You, of course, have to pay. Other people cannot go into those exclusive areas. You have your own boxes that you can see the horse race. Other people cannot get into those. I cannot take you to a Jockey Club dining room because I am not a member. So if we have the opportunity, I have to get some friend who is a member that will get us into that. This is a privileged group.

35-00:31:58

Li: When I was reading a bit about research funding at UST, for the most part, research funding increased, increased, increased over the years, and there was one example in particular that I was wondering if you could comment on if

you know anything about it. So in 2001, 2002 academic year, funding dropped about thirty percent.

35-00:32:26

Lin: Funding?

35-00:32:27

Li: The funding for research at UST drops and then it bounced back the next year. So 2002-2003 and then it dropped again. And it struck me as unlike other years where funding generally tended to increase and I was wondering if you can recall why that was.

35-00:32:48

Lin: Well, I think 2001-2002, we have a financial problem. The bubble breaks. So the government money for research is dropped. So I think it's that and then it kind of bounced back. I think it's in response to the general economic situation.

35-00:33:09

Li: Okay, so it's a larger finance—interesting.

35-00:33:11

Lin: Yes, yes.

35-00:33:15

Li: Can I ask a question about Hong Kong versus Taiwan? Because Hong Kong it seems like culturally has more of a class system going on than Taiwan. Is that true? Maybe because of the British legacy with—

35-00:33:29

Lin: Well, it's not the class. The meaning of the class like India, different class. No, I think you don't have that kind of class structure in Hong Kong. But there is the privileged group, the elites, versus the working people, yes. People associated with the Hong Kong government are generally considered special. During the British rule, the buyers group commanded a lot of influence. So these are the same thing.

35-00:34:00

Li: Does it change the entrepreneurial environment? From Taiwan to Hong Kong, is the entrepreneurial environment different because of the slight cultural differences between the two different countries?

35-00:34:10

Lin: Well, Hong Kong people are more short-term focused. You see, there are a lot of traders. For traders, you do not need to do a lot of investment. You're making connections for manufacturer and the buyer. This buyer may be Macy's, may be Wal-Mart, and the company makes many things. So Hong Kong people sit in the middle, being the middleman. They just make sure that this process flow. They do not have to make major investments. Taiwan people have to make investments in building plants, factories and buy

equipment and so on. They have more long-term mentality. Hong Kong people does not have that. Short-term return is what counts in Hong Kong. They want to go to horse racing because when you make money or lose money, you know it in ten minutes. You don't tell them that you have to wait three years or five years to find out. They're impatient. They don't want to do that. They don't have that kind of long-term mentality, investment mentality. And that's bad. And that's bad for education, too. And that's why it was so in Mr. Henry Fok who would support long-term developments. Some of these other things we will talk about next time. Generally, there people are very short-term oriented.

35-00:35:44

Li: I'm unclear. You were chairman for the R&D Corporation at UST.

35-00:35:50

Lin: Yes, yes.

35-00:35:51

Li: And I'm unclear how that fits into the organizational structure, if that is a conversation we should have next time.

35-00:35:58

Lin: Okay, okay. Well, there's a lot of technologies the HKUST holds on to over times. There are some patents that the university owns. The university itself can license those technologies to companies. But the university itself does not want to get into commercial activities, so it gives all these patents to this company called the HKUST R&D Corp, or the RandD Corp for short. The only owner, sole owner of the Corp is HKUST. But financially, it's separated from the university. So it can make money, it can lose money. When it loses money, it does not come to the university book. When you make some money, you just give it to the university as a grant, as a donation.

35-00:36:45

Li: And when were you chairman?

35-00:36:48

Lin: I was chairman when I become vice-president of RD, kind of ex officio. The company was there already but it was not operating properly. I reengineered the organization. I reengineered the structure there. To be sure, the research facility, central research facility are there, but it was not functioning properly so I kind of re-engineered those organizations too. I may not be a good engineer, but I'm a good re-engineer.

35-00:37:25

Li: Well, it seems like you're a great administrative engineer. Think about how people work and how organizations could work together. It's a kind of engineering. And I assume that your work at ITRI translated directly to your work at the R&D Corporation?

35-00:37:41

Lin:

I think it was only the experience and my attitude of trying to learn about people's interest and people's motivation helps. And I think that's what makes life interesting. They are two different types of organizations. UST, it's nice that every year you have students that come out as your product and research on the side. In ITRI, we don't have students, but the technology is the major product. It's a little bit different but we both are working with people.

35-00:38:20

Li:

Well, I think that we can pretty much wrap up here. I guess my last question is what do you see for the future of HKUST?

35-00:38:33

Lin:

Well, I think if HKUST can sustain the performance—I was hoping that it can. Success has its only problem. For example, our business school is very successful. Number one or two in the world for MBA and for EMBA. It's unbelievable. And because of that, the funding dean, Yuk-see Chan, is now President of the Lingnan University of Hong Kong. The second dean, K. C. Chan, is now secretary of the treasury of HKSAR. The Vice Dean, Gary Biddle, was Dean of the Graduate School of Business in Hong Kong University. A lot of people have moved out and up. The first group of builders is no longer there. Similar movements, if less dramatic, was also found in the other Schools. The incoming university president, Tony Chan, will be the third one of the University. I'm saying that UST is now instituting new generation of leaders. Perhaps the movements of the first two generations are too quick. I retired. Many of the colleagues are retired. All those of the sixty-five year olds are gone, basically out of the university. I see there may be a problem of continuity. [Narrator's Note: This is a situation not seen in any other major universities in the U.S. or UK, where you still see retired faculty members, in the 70s or 80s go to the labs or class rooms and can be as engaging as usual.] These newer generations, whether they can learn all these culture and with the same dedications while the funding is not as plentiful, relatively speaking, as in the first ten years. And the competition for local resources is getting keener, really. Now that Hong Kong U, has become an important research university. So is Chinese U with Lawrence Lau. The City U and the PolyU both have experienced and inspiring leadership. So they're competing for the same resources, competing for the students, competing for the faculty, and a different group of leaders now are in charge in the HKSAR. So the future is not without challenge. The new leadership will have to build its network, re-affirm their dedication, and advance their horizon with time., I think we have to wait and see. I was hoping that they can. If we're looking at Hong Kong, I don't worry about them much because a lot of people moving from one university to the other. So it's there. In a larger context, it's okay. In HKUST, it's more difficult. So I would say the new president has a very challenging job in his hands, but then he is a man of extraordinary talent and guiding an institution with recognized records of accomplishment, unlike fifteen years ago when all it could talk about was promises and uncertainties. So while time has changed; opportunities are plenty

35-00:41:58

Li: Well, thank you. Thank you.

35-00:42:01

Lin: Thank you.

[End of Interview]

Interview 7: October 15, 2009

Begin Audiofile 36

36-00:00:00

Li: This is Robin Li and Emily Hamilton speaking with Otto Lin on October 15, 2009 in Ann Arbor, Michigan. This is tape thirty-six. Otto, I thought we would begin talking today about your time at HKUST. Could you talk about your arrival there in 1997.

36-00:00:32

Lin: Yes. My arrival to HKUST is actually timed to be before the turnover of Hong Kong to the Chinese sovereignty, you see, which is going to take place on July 1, 1997. Thinking about all my adult years, starting from Hong Kong and Taiwan and the United States, I wanted to go back to Hong Kong really before that day, while the turn-over is to happen. I decided to go back before this historical date, not to join the celebration activity but to be a part of this historical transition, to see how Hong Kong might change from a system that I'm familiar with.

36-00:01:32

Li: Did it feel like a different kind of work with China? Working for China? To be at Hong Kong at this moment when it was changing?

36-00:01:39

Lin: I think there are a lot of uncertainties, certainly. And people asked us, asked myself and many of my colleagues during that period of time, "Why did you come back to Hong Kong? Modern day Hong Kong is going to return to the Chinese sovereignty." And actually, we do not see it this way because most of my friends, certainly most of my peers, are interested in trying to help China and trying to make China move forward from the "oligopoly" of communistic rule. We hope to bring something new to China. We felt that this is an opportunity; and Hong Kong would be a good place to do it. I think in my letter to—did you see my letter—to HKUST when I expressed my interest in the job, I say specifically that I foresee there is a special role Hong Kong can play in the future development of China [Appendix 606]. This is the reason we go back. A friend of mine, Leroy Chang, who's answering to the question from news reporter, I think it's from, New York Times or something, why would you want to come to Hong Kong now? He said, "Well, if it wasn't for this event to take place, the return of Chinese sovereignty, I would not come back to Hong Kong.

36-00:03:12
Hamilton:

And did you feel the same way?

36-00:03:13
Lin:

Yes, I think I feel the same way. He put it very nicely. Leroy worked for IBM for many years. Did tremendous work in semiconductor physics. I think he was speaking of the feeling of a number of our people, our friends at the time. Yes. That's the reason why I go back to Hong Kong. At that time I was in Singapore and the NUS people really did not want me to leave. They tried to put some sweeteners in my job and everything; but I say, "It's kind of different and personal that I want to go back to Hong Kong." And that's opportunity to do something for the Chinese people. We are going to do what we can to make that part of the world a constructive member of the global society.

36-00:04:20
Li:

How did you see this fitting in with the work that you had already done in Taiwan? Like did you see Hong Kong as an expansion of the work in Taiwan or as a new problem?

36-00:04:30
Lin:

Well, it is a different situation. It's a different job because in Taiwan, basically I was working with ITRI which was in the center of the innovation system, which dealt with the relationship of university, institute, business and government, the four elements of the national innovation system. In the past in Taiwan I worked for Tsinghua University part of the time and worked for ITRI most of my career, over eleven years with ITRI. And then, of course, I do a lot of work with the industries in the Hsin-chu Science Park, which is really interlinking with government. But principally I had the opportunity to work on these elements in Taiwan from the standpoint of the institute.

But now coming to Hong Kong, Hong Kong is a total different place. It is a place of commerce, place of trade, place of tourism. A place that has little manufacturing industry per se and the government doesn't care to have manufacturing industry in its fold. They don't care about science and technology. The mindset of Hong Kong leadership is that, "Well, why do we need science and technology? If we do need to use it, we just go out to buy it, to get it from anywhere," right.

36-00:06:03
Hamilton:

It's much more of a consumer mentality.

36-00:06:04
Lin:

Yes, that's right. That's right. And so it's a different mentality here. In Taiwan, science and technology seems to be the major avenue that they can leverage on. They don't have anything else to lean on. No natural resources or anything. They have to rely on science and technology to rise to the economic strengths. But for Hong Kong, it's typically trade and commerce. It's a gateway. It's a place where the East meets the West. The British government

handled that that position well by building the infrastructure, the communication, the banking, etc and then to rely on the rule of law. To enable the people in doing their trades. So these are the things.

The British colonial government, I must say, did not pay much attention to education. You see, why do you need education in the colony? People only need to read and write and then do their bookkeeping. That's basically it. If you really need technology and science or law or anything major importance, you can go to UK. A lot of companies with headquarters in UK have their operations in Hong Kong. Actually, before the year 1997, I talked to a friend in the government service in infrastructure and environmental area. He said, "Well, whenever a thing we need, we just go through consultants." Out of a hundred projects during the pre-1997 period, maybe in the period of three years, he said there would be about a hundred projects that went out. Ninety-eight reached companies with headquarters in London. These are the kinds of normal—so I'm just giving you indication that the British government—I respected the British, but they governed Hong Kong with a colonial mentality.

We can look at the school aged, college aged young students, from the age of seventeen to twenty-one, at that period of time. The percentage of this age group that received college education was less than eighteen percent. Eighteen percent! In Taiwan it's about seventy-five. In the United States, I think it's around seventy. So university is only for the elite, those who have the money and the student has to be good and motivated for higher learning. And most of them, either go to UK or Australia or New Zealand. The next group would probably come into the United States. They can do some part-time work. And then those people who do not have the financial resources, but they're good and motivated, perhaps go to Taiwan. Because in Taiwan education is free or basically free, at very low cost anyway. Overseas Chinese students are welcomed in come to Taiwan. That's how the higher education in Hong Kong is like. Only a very small percentage of people get to go to Hong Kong U or Chinese U. Not only the student has to be academically good but their parents have also to be fairly well to do. The status of higher education was generally depressing.

And in terms of R&D, if you calculate the percentage of national investment on R&D in terms of GDP, during that time, I think for United States the number is like 2.5 percent [of GDP invested R&D]. We're not counting military R&D. Just civil. And for Taiwan, at that time it's about 1.5 percent. For countries like Israel, it's probably 3 percent. But for the developed countries, the number is generally 2.5 to 3, around that time. I say Taiwan is about 1.5. Do you know what's the percent number in Hong Kong? The percent of GDP invested in R&D in Hong Kong is 0.2. 0.2! I mean, that's incredible ! Again, why do you need R&D in Hong Kong? If you want science, if you want technology, just go to UK, you just come to the United States. There's no need for the Hong Kong government to invest in education or science and technology in Hong Kong.

36-00:11:45

Li: What was your vision for how Hong Kong could fit into this idea of Taiwan designs and Mainland China produces it. What would Hong Kong—?

36-00:11:52

Lin: At that time, China is producing only very low value added materials. So when I come to Hong Kong at that time, we felt that the opportunity for Hong Kong is to play its role as the gateway for East and West. But Hong Kong itself has to build up as a city not only providing tourism and trade, also provides science and technology and culture. And you can use this as a leverage to help China.

36-00:12:35

Li: Do you think that it was useful in that Hong Kong had a legacy of being a consumer and being able then to reach out to the rest of the world?

36-00:12:45

Lin: Yes. I think Hong Kong can leverage its position in trade and to reach out to the world and make itself as an avenue or a conduit for science and technology.

36-00:13:04

Li: It just strikes me that Hong Kong invested a higher percentage in research and development earlier, perhaps Hong Kong wouldn't be in the position of having these ties with other countries. Is that true?

36-00:13:20

Lin: No, I don't think so. I don't think so. You see, a world-class city has to be supported by world-class institution or world-class education. Education in science and technology development. Look at New York City. There's no manufacturing in New York per se., In New York, all basically is trade. Right? Commerce. You have the New York Stock Exchange, you have the banks and financial institutions, you have the insurance companies and so on and the retails and everything. But New York is supported by Columbia University, NYU, Rockefeller University, many higher education [institutions], and Cornell. Some of the activities in there are unquestionably world-class. You also find the best hotel with best medical school and excellent arts and science museum, hospital facility, that kind of thing. They supported the livelihood of quality professional people in New York. Similarly you can talk about the competitiveness of Boston. The strengths in education, in science and technology help its position in trade and commerce. Look at San Francisco. I think without Berkeley in the area, without Berkeley and Stanford, San Francisco would be just another coastal harbor.

This is the model that we see, that I and a few of my friends see for Hong Kong. That Hong Kong has to build up its position in the new era. It can be a place of education, science and technology, and global mindset which will enhance its traditional advantage. It needs to attract the best quality people to

come to Hong Kong. Come to the area. And make this area a leader of development, for example, a role model for China.

36-00:15:16

Li: So the university would be a critical piece in making Hong Kong into this world-class city?

36-00:15:20

Lin: That's right, that's right, that's right. And we feel that Hong Kong, the concept of rule of law, the respect of human rights, these are the kinds of things that can play a role model for China.

36-00:15:36

Li: So how was Mainland China envisioning this handover of Hong Kong? Like what was the importance of Hong Kong to Mainland China, do you think?

36-00:15:45

Lin: Well, I think Mainland China sees Hong Kong as an important place to get resources, capital from the world. Also, a technology source, and a place where it's goods can go out to the western world. The Chinese government sees Hong Kong as an important position, as a place where foreigners can relate and interact with China. And China can communicate with the outside world. This is, I believe, a role that the Chinese government has seen for Hong Kong.

36-00:16:29

Li: Because of geography?

36-00:16:31

Lin: Geography. And not only geography, but also a source of history and a source of new ideas. I think the Chinese top leaders themselves, they have that kind of thought.

36-00:16:45

Li: And it sounds like a source of new relationship to the world.

36-00:16:49

Lin: Yes.

36-00:16:49

Li: Like through Hong Kong, basically, as an intermediary to—

36-00:16:53

Lin: Yes. One thing to understand is Hong Kong's special position in history. In 1842, as the result of the Chinese and British war, the Opium War, it becomes a British colony. This kind of rang the bell for the downfall of the Qing Dynasty, the monarchy. And then another fifty years later, Sun Yat-sen led the revolution force to over throw the monarchy and built a republic in China. It was Hong Kong that played the role of major bastion. Again, many people from all countries, come through—most of them went through Hong Kong. So

it has a special position. Then came 1950, another fifty years later. The Chinese communists took over Mainland China. KMT was driven to Taiwan. At that time, China, the Mainland Chinese, has the power to recapture Hong Kong but Mao Zedong made the decision not to do it that way. Why? Because they wanted to have Hong Kong as a place that they can trade with the United States, and with the outside world. It's a place that can get foreign technology, foreign capital, and the oversea Chinese contribution.

36-00:18:36

Li: So it was a strategic decision?

36-00:18:37

Lin: It's a strategic decision. It's a very smart strategic decision of Mao Zedong and Zhou Enlai. I think as we know it now. So just keep Hong Kong under the British colony. But they say when 1997, when the lease expires—

36-00:18:56

Li: Right, the ninety-nine year lease.

36-00:18:56

Lin: —then they will like Hong Kong to come back home. This an important strategy position for the Chinese leadership at that time. They feel that somehow China will have to change. It is better to leave a place that you can have some fresh air, get nice fresh idea. I think this very much in Mao and Chou 's mind.

36-00:19:25

Li: To go back for a second. I'm interested in what you were saying about the importance of the university and higher education. You would need to have elite schools but not elitist schools. So to change from the pattern of having only the very wealthy families being able to send their children to school, but still maintaining a really high standard of education. What were the challenges in developing that?

36-00:19:54

Lin: Well, I think it is very difficult and I think that's why HKUST play a very special role in that place. Now, take a look at the two major universities, the Hong Kong U, first. Hong Kong U is a hundred year old university and it's good but I think the major mission of the university was to educate people so that their graduates can help the British govern Hong Kong. Today, if you go to look at HK SAR, Hong Kong's Special Administrative Region, government, you will find most of the middle and upper ranking officials are graduates of Hong Kong U. Today, it's in a very strong position. And then, of course, Chinese U was established in the 1950s,. The wave of refugees has come from Mainland to Hong Kong. And somehow you have to take care of the young adults [even if it's for tokenism sake]. The government put together three Chinese language colleges and say, "This will constitute a university." So the Chinese University was born. And the graduates, they have a very strong alumni base now. Most of them become active in the business

community. They work for the various kinds of Chinese trades and commerce and business, newspaper and journals. The Chinese University has built up a very strong background in the society.

But these two universities, around that time, were not research oriented. They do not take the excellence in research as a—I would say they did not pay a lot of attention to that. And our view is that in this day and age, you need to pay attention to the development of science and technology, because science and technology is just not only changing the life of scientists, but also the life of everybody.

36-00:22:32

Li: Now, scientific facilities at the university are expensive. Not just pay attention, but who paid for that?

36-00:22:40

Lin: Yes. Well, I think at that time the British government tried hard during the middle of the eighties. Margaret Thatcher actually made a trip to Beijing and meet with Deng Xiaoping. At that time, they're working on a proposal. Basically it was for Hong Kong to return to China's sovereignty but for the British to continue manage it for China. Like you are the board directors, and board chairman. We will be your CEO so we will still manage Hong Kong. But Deng Xiaoping did not go along with that. And after that, I think the British realized that in only ten years time they have to return Hong Kong to China. So what do you have to show to the world, that after a hundred years of the British rule, what would be the state of affairs in Hong Kong? And they look at the education. It's terrible. Look at R&D. It's terrible. So they decided that they need to build a university. That's why HKUST is to be formed. They need to build a new university dedicated to higher learning and also to focus on the latest, newest scientific developments of the world.

36-00:24:15

Li: How did the other universities respond to this?

36-00:24:19

Lin: Yes. There are also two others. Besides Chinese U and Hong Kong U, there are also two polytechnic colleges at the time and the colonial government, just upgraded them and called them university. So one of these is the City University of Hong Kong and the other is Hong Kong Polytechnic University. So there are now five. With HKUST, there's five major universities in Hong Kong.

The colonial government, at the time, felt they have a need to do something, so they put some money for UST to be built So I think UST benefited by this opportunity. They put out, let's see, I guess 1.5 billion Hong Kong dollars to build the university and then the Hong Kong Jockey Club, horse racing being the national sport and big money making machinery, also put in another 1.5 billion.

36-00:25:41

Li: And this is in the eighties?

36-00:25:43

Lin: This is in the late eighties. In the late eighties. Well, actually, on to early nineties to build the infrastructure of HKUST.

36-00:25:53

Li: In anticipation of the handover in ninety-seven?

36-00:25:56

Lin: That was before the handover.

36-00:25:57

Li: But in anticipation of it?

36-00:25:59

Lin: In anticipation of that. And they recruit people. Chia-wei Woo, who at the time was president of San Francisco State University, came to take the lead. Right.

36-00:26:12

Li: Right.

36-00:26:14

Lin: Yes, Chia-Wei first came to plan for the university. And I must say Chia-wei is a person with extraordinary foresight and great energy. He went around the world in the late eighties and early nineties to recruit people to come to UST.

36-00:26:44

Li: Do these other Hong Kong based universities, have they put money into science and technology?

36-00:26:54

Lin: Yes. They do. Because the government cannot give the money just to HKUST alone. HKU and Chinese U, their alumni are very strong. They certainly want to get some money for the university. I think there is a special fund, special fund layout for building HKUST but there are also funds for other universities to build up their educational programs. That is true. Now, I think it's a good point to tell after ten years, after fifteen years time at this point. If you're looking at the latest Financial Times, the London Financial Times and the world ranking of top universities, I think Chinese U, Hong Kong U, HKUST, Hong Kong Poly and City U, these are all rated in the top two hundred universities in the world. That is not a trivial thing. Come to think of it, I think it's a very remarkable contribution. A remarkable scorecard. You're talking about fifteen years time.

36-00:28:15

Li: This is currently? That's the ranking?

36-00:28:17

Lin:

Yes. This last five years I think has been—well, UST, Hong Kong U, Chinese U has been in the top hundred I think since five years ago. And I think these last two years, UST, Chinese U, UHK, City U and Poly U also moving further up. This is very remarkable. Actually, I have some number and I can give it. So among the universities in Asia, I think they are doing very well. HKUST, Chinese U, Hong Kong U maybe become the top fifties or thirties now.

[Narrator's Note: According to the 2009 QS-THES ranking of top universities, six in the greater China region were placed among the top fifty: three from Hong Kong [UHK, HKUST, CUHK], two from the Mainland [Peking U and Tsinghua U], one from Taiwan [National Taiwan]. On the Asian top universities ranking, sixteen in the greater China Region were placed among the top fifty: five from Hong Kong [UHK, HKUST, CUHK, CityU, PolyU], seven from the Mainland, four from Taiwan.]

6-00:29:12

Li:

Can I ask you? At this time period in the nineties when you were at HKUST and all this transition is happening, who were the colleagues or people you were talking to about Hong Kong and China and what would happen in the future? Like who were the people that you were speaking with at this time about—?

36-00:29:28

Lin:

Well, a major group of people is the scientists, engineers, educators who were brought up in Taiwan. And they came to the states. I would say Hong Kong U is basically a British university. Chinese U is kind of mixed. But UST is mostly like an American university because of the President and most of the team of senior academic leaders: Vice Presidents, the Deans, the Department Heads. I would say half of the senior academic administrators, are people who grew up in Taiwan, like myself, and came to the States and get their PhDs and then worked in universities or major companies like IBM or Bell Lab for some ten years or more. So they have the experience and they have the connections. When they come to Hong Kong with adequate funding at this point, programs are rolled out quickly.

As said, the British Hong Kong government wanted purposely to treat it as a major program in building up UST. So money is not a problem. The University was sitting on the top of the bay, Clear Water Bay. It's a beautiful scenery. I have some picture here. And the staff were paid well. I think they are very competitive. They are actually ten, twenty percent higher [than the U.S.]. We have gotten several faculty members, senior members from UC Berkeley, Stanford, U Michigan, Columbia, MIT, all the cream. So when these people came, they are established, they have networks, they know what to do and the money is adequate, so they can immediately set up their programs, academic and research. And this group of colleagues is key because they attract people. They know where to find the junior faculties. They know how to help the junior members do research. I think right now HKUST is

about top thirty in this world ranking. I just get an email from the school of engineering. They say, well, they are twenty-three or twenty-five in this latest round of ranking in the fields of engineering and IT. That's considering as peer to Berkeley, Stanford, MIT. That's not too bad for a university of only fifteen years.

And the business school. The business school has a very interesting program. Most of the business leaders in Hong Kong, of Chinese origin, are mostly HKU and Chinese U alumni. The dean of business school at the time, Professor Yuk-shee Chan of USC, is a native Hong Kong scholar. I just said about half of the people are from Taiwan. And they would be maybe thirty percent, twenty-five percent Hong Kong people that went out and returned. And then the other is international. UST is very global, very international. There are about thirty-six, I counted one time, nationalities of faculties and graduate students at HKUST. They get connections everywhere.

I'm talking about strategy of development here. The strategy of business school is that instead of working with the local business, they would focus on doing high quality research as top ranking business schools in the world do. So for publications, they targeted the best journals in the field. And also, they set up a joint program, EMBA program, I guess probably the first EMBA program in Hong Kong, with the Kellogg School of the Northwestern University. The EMBA program is now number one in the world.

36-00:34:32

Li: And that's an engineering master?

36-00:34:33

Lin: No, no. That is EMBA. Executive Master of Business Administration.

36-00:34:37

Li: Executive MBA. Okay.

36-00:34:47

Lin: The EMBA program is number one and number two all these last five years. Arm-twisting with either Wharton School or Sloan School as number one in EMBA program. And the MBA program I think is number one in the region, in Asia.

36-00:35:07

Li: I had a question about this because I think R&D and science, it's one thing to bring that to Hong Kong, but changing the business culture, the mentality, to make it more entrepreneurial. Those sort of changes seem more difficult to—

36-00:35:26

Lin: Yes. Before I answer your question here. I think one thing that UST has done—I'm still talking about UST, actually, it's not fair because Hong Kong U and Chinese U, are doing also very well. One of the major contributions of UST to Hong Kong is that it kind of sets the standard and the culture of

research in Hong Kong. Previously, when you get a teaching job in Hong Kong U or Chinese U, that's very comfortable and enviable. You just teach and you do not need to do much research. You can do whatever you want and publish a paper or two, in a year or two. That's great. But at UST, this group of young Turks from the United States know what research is like and have the supports to do it, so they worked hard in their laboratory with their students or their post-docs and they publish good technical papers. That really sets the pace and establishes a different culture for academic life. All the other universities are the same now. Together, in this ten-year period, my guess was that there would be probably about 3,000 fresh PhD level scientist/ engineers coming to Hong Kong. And then the universities also sent people over to Europe and North America. Hong Kong is gradually changing from a city of trade, commerce, tourism and logistics to a city of education.

36-00:37:33

Li: Almost a generational shift.

36-00:37:35

Lin: Yes, a generation shift. Actually, I was talking to Tung Chee Hwa the other day. He say this was beyond his expectation and he was pleased. I think quite obviously so when you have all these five universities ranking in the top hundred or 150 universities in the world, that is not bad for a small city.

36-00:38:04

Hamilton: Who's Tung Chee Hwa?

36-00:38:08

Lin: Tung Chee Hwa is the first chief executive of HKSAR. The governor. After the return to Chinese sovereignty, in 1997, he was appointed as chief executive of Hong Kong.

36-00:38:27

Li: So it sounds like what you're saying is the disposition of Hong Kong, it happened by intention, by changing the way that you're teaching business or teaching science, but by all of these new people coming to Hong Kong and by the work that they do, by example changing.

36-00:38:49

Lin: Yes. I think now is time to talk about the making of R&D strategy in HKUST. I have established a Six Points R&D Strategy.

Number One is promoting academic research. Promote academic research means that we get good people, good scientists from abroad and give them the resources, provide them with the funding they needed to do research. That's important in any field, engineering, science, or any field of interest. And as VP RD, I also specifically support research in business management, humanities and the social science areas. Because in these scientific fields, the faculty and colleagues, do not need a lot of money for capital expenditure, just give them what is needed for consumable will basically be adequate. Actually,

compared to the engineers, they have no need for million-dollar equipment. They don't. Hence, we consciously, and quite purposely, provide them with adequate research dollars. I think UST and all the other universities, right now, are doing broad based research. It's not just science and technology. And I think this also is helping China, helping the transformation of China, entrepreneurs, innovation, that kind of thing. This all in our strategy of promoting academic research.

The second strategy is establishing multidisciplinary programs. I have talked about this in discussing Taiwan. All high tech development are multidisciplinary. From the very beginning, we have tried to bring scientists of different disciplines together. For example, biotechnology is not just bioscience. Professionals needed are not just biologists or medical scientists. There are a lot of engineers, physicists, mathematicians are coming to the field. Likewise, IT, environmental science and technology, electronic technology, nanotechnology, genetic engineering. all are multidisciplinary. Diversity and excellence are the key components that I laid out as a R&D strategy.

Number three is cultivating core excellence. I talked about placing focus in a number of fields: IT, biotech, environment and sustainability, electronics and advanced packaging, traditional Chinese medicine, advanced manufacturing, cultural studies, Chinese business and management, e-business, etc. These have become our core excellence. And I have some criteria how to select projects as core excellence. One of the elements is that in the university, we should already have some basic capability in the subject and secondary and that this is a field which the society has a growing need. These are key criteria for a field to become a core excellence.

Number four is strengthening industrial linkage. We told the faculty that the time is gone when you can just close your door and do you work in the laboratory until result comes out and then write a report to your industrial partner. I think that day is over. The industrial client wants to know how have you progressed in your work, and perhaps participates in the process. You need to interact with them so that you can modify your approach and tailor it to their needs, and they can readily apply the results of your work. Well, if you're a company, industrial company, you give some money to the university for them to do research. You must have a problem in mind that you want to solve. In the typical way, in the old days, the university will receive funding from this company, support one or two students, [through master degree studies]. In one or two years the university will give a report to the client. Or if it supports a few students to do PhDs, in four or five years the university will give the report. That day is gone because if the industry has problems, he wants the problem solved quickly, if not, tomorrow. He cannot wait two years or four years. So the company will need to interact with the university very closely to know how the university is doing it and who else should be participating in the work. And, therefore, after two or four years, the result the

university have developed in the laboratory will likely be immediately applicable and immediately beneficial to the companies, so there will be no waste of effort. Otherwise you're doing a lot of research and when you come out with your written paper, the company who founded the project may find it is not relevant any more.

36-00:44:16

Li: So was this a matter of developing new communication strategies or just opening up the lab and the universities or private companies come into the—

36-00:44:25

Lin: Both. So this was the strategy that I use in HKUST.

36-00:44:32

Li: And were you looking at answering questions for industry beyond Hong Kong companies or Taiwan companies? Internationally?

36-00:44:38

Lin: Yes, Hong Kong companies. Yes, yes. Mostly it would be Hong Kong companies. But MNC is in Hong Kong and also most companies now in Hong Kong have operations in China, many in the Pearl River Delta. So they're also Chinese companies. One of the things that Chia-wei Woo and I told our colleagues is that if you view Hong Kong as just Hong Kong, the island the peninsula with some small islands around, then Hong Kong has no future. You have to see Hong Kong as a base or as a front, for China, especially in the Pearl River Delta. Then you have a large home base and a large area to grow.

36-00:45:26

Li: And where does Taiwan fit into that?

36-00:45:28

Lin: Taiwan is more difficult to fit in at this point. Because Taiwan is a politically rival to the communist China. Later on, the Taiwan issue was also complicated by the talk of separation from Mainland China. This becomes a even larger political problem. These difficult issues are floating around and are making it complicated politically with Mainland China. And Hong Kong is part of Mainland China. It's difficult to work with Taiwan under that kind of political environment. But the way we were trying to do was this. We said, "Well, let's not talk politics. Let's try to work on science, technology, and education." And that way we established a link.

36-00:46:16

Li: Technology becomes a neutral ground.

36-00:46:20

Lin: Yes, it's a neutral ground. It's a common ground that people all are interested and it's something that can bring benefits to everybody if they work together. So I think this is the strategic approach we took, an approach that we used very well in Hong Kong.

Number five is, after strengthening industrial linkage, nurturing entrepreneurship. This is something new for the Chinese people. There are two kinds of entrepreneurships. One is entrepreneurship out of necessity, and the other is entrepreneurship to take advantage of new opportunities. The first kind I think everybody knows well; it is a survival issue. If I have lost my job, then I'll try to go out on the street, do everything I can, right. Those are entrepreneurs out of necessity and Chinese are very good at that. If you go to Chinatown, you see a lot of people are like that, laborers, workers and so on. They're out of necessity.

We're talking about another type of entrepreneurs, which are those that see opportunities and don't mind giving up what they have now and venture into those new fields—creating opportunity for himself and for others. These are the technology entrepreneurs. They see some niche advantages here and there because of new technology. They would take the efforts working with people to make the advantage a reality. These are the generation of entrepreneurs. These are the kinds of technology entrepreneurships we want to nurture.

36-00:48:10

Hamilton:

Could you comment on the relationship between interdisciplinary programs at HKUST and then the sort of ensuing entrepreneurship that you're hoping to foster as these students go out into the economy?

36-00:48:25

Lin:

Yes. Around 1999 or 2000, this time, I encouraged and helped those students or faculty interested in setting up entrepreneurship companies. We reminded our faculty that your major job is teaching and research. This is the major function of the university. But if there is an opportunity that comes up and you feel you'd like to carry through this to another stage, then I think we'll help you to set up a company to do that. And you can work with the industry on some programs. In the university, we'll give you some leave. Faculty usually has sabbatical leave, that after six years you can go to another institution, to study and get into a new field. I said we will give you a leave if you want to pursue professional development through this venture.[But the commercialization should be done outside of the university.]

36-00:49:43

Li:

Would you say that students and faculty are still being encouraged to pursue entrepreneurial activities even in today's economic climate? Has that changed at all?

36-00:49:56

Lin:

Well, actually, it has. It was because of the year 2000, the collapse of the dot com bubble; it did hurt some people. At that time, I set up The HKUST Entrepreneurship Center. I think we have one time about thirty companies in the university, from faculty and students and alumni. Back at the time when I graduated from university, with a BS, a Master's or PhD or whatever. What the graduate liked to do, most people like to do, was to work for the

government, it was generally secure job. Or, work for big company, secure job, nice pay. Very few of us think about working for ourselves or to be an entrepreneur to pursue a technology opportunity. We are telling our students that in the future, this can be another avenue for you to pursue your career. You still go ahead to find good jobs to university or government or industry. That's fine. But you can also consider entrepreneurship as an option.

36-00:51:08

Li: Well, and you said that—

36-00:51:10

Lin: It would provide that kind of opportunity for them.

36-00:51:12

Li: You said that there are over thirty companies in the university?

36-00:51:17

Lin: Yes.

36-00:51:18

Li: So what's the administrative structure? Is it self-employed people?

36-00:51:24

Lin: These companies are totally independent companies. They have nothing to do with the university per se, except that the university is functioned as a mentor. The fact that they're under the university confine, have access to faculty members, have access to the library, and can still go to seminars.

36-00:51:51

Li: So the R&D for these companies can be done on university property?

36-00:51:56

Lin: On university property, on those space the university has the right to rent. We will lend the laboratory facility, if needed, to them.

36-00:52:03

Li: So it's not like Berkeley where you do research there, then the university owns that research?

36-00:52:10

Lin: No, no. Well, coming from ITRI and from the industry, I know it's difficult and it's very important to keep these two elements connected but separate. This is the essence of the innovation system concept. I don't want the university to be mixed up with any commercial operation with the companies which run into any liability or anything like that. This is not good for the university. And I don't want the university to interfere with the business operation of the company. This is not the job of the university. If the company has the technology source and have the management—a lot of times they don't have management structures, so we need to help them to find managers,

to help them find marketing managers and that kind of thing, to help those companies. But those are all outside the confines of the university.

36-00:53:07

Li:

Right. Now, this could be a difficult question but if one of the missions of the university is to encourage students and faculty to go out and pursue these entrepreneurial activities, of course part of this is to help build up Hong Kong, to help build up China, but it seems like the university has something to gain if these students and faculty are paying for laboratory space.

36-00:53:37

Lin:

Well, I think we do not encourage faculty to do that. No. I think the key is we provide assistance to those faculty or those students who wanted to do that kind of thing. Then we provide some assistance to them. Provide consultants to them and provide convenience to them. Convenience meaning that, well, instead of going out and setting up a company in a remote location, we will rent part of the university laboratory or space to you to set your company. And if you need to go to the laboratory to do work, you can pay the university times for the use of that particular laboratory.

36-00:54:27

Li:

So was this an important source of income for the university?

36-00:54:31

Lin:

The university has never really made money out of this kind of thing. But the university will usually have as a condition to get two or three percent of the equity of this company. It's not a large sum. It's three percent of the entrepreneurship company. There's thirty companies after the bubble breaks. I think probably half of them die. Half of them is still around. And now this last couple of years, there's still new companies set up like this.

36-00:55:16

Li:

Did you help set up this program or was the program established before you came?

36-00:55:21

Lin:

No, I established this program.

36-00:55:22

Li:

You established this program?

36-00:55:23

Lin:

Yes. I talked to people in Berkeley, MIT, and Stanford. In Stanford, for example, the university encourages faculty to go out of the university to set up a company like this. But in Hong Kong it's difficult to totally disengage from the university because it's difficult to find space, it's difficult to find technological support. That's why we have to adjust for that. But this question of whether you're using public money to support private commercial pursuit is very much in our mind. We are very careful about that.

36-00:56:09

Li: It seems that the university also stands to benefit. That these companies would, by necessity, have state of the art facilities because they're working with industry that asks for the most state of the art facilities. And is this useful to the university to sort of be on the cutting edge of knowing what these industries want, of having these facilities then established at the university?

36-00:56:38

Lin: Well, I think the university gets updated linkage and network in the industry through these avenues. But so far, in terms of dollar, it has not yet, if ever, become a source of income for the university at this point.

36-00:57:02

Li: Right. But does it create an infrastructure at the university of having good facilities, having the right facilities to be working with industry?

36-00:57:10

Lin: Yes, yes, yes. The term is very popular now in China, and actually, in many other places, too. It's called "incubator." The university tried to play the role as the mother hen and provide an environment for these little eggs to hatch and to nurture. It is this kind of thing. But it's still the little chicks by themselves. But the universities provide that kind of environment. So this incubation concept [is key].

Begin Audiofile 37

37-00:00:00

Li: Robin Li and Emily Hamilton speaking Otto Lin in Ann Arbor, Michigan. Tape thirty-seven. You were last talking about the university having sort of a mother hen type of relationship. And was this a conscious effort to keep people in Hong Kong?

37-00:00:28

Lin: No, no. I think it's a conscious effort to grow business in Hong Kong. And obviously Hong Kong itself is a very small place; anything you do, you have to have a market with the world, so the company can go anywhere. But we're hoping that Hong Kong will be a base, will be a source of more technology companies or that more technology [companies] can find their place of operation in Hong Kong.

37-00:01:03

Li: Do you feel that most of the students and faculty would stay in the area?

37-00:01:10

Lin: Most faculty will stay in the area for reasons of their own, but I think for some of the disciplines, electronics, software, biotech, environment, those faculty members they found program like this will help them to launch another career or help the students to launch new career. Now, you see, the thing about the graduates, the students, the graduates from the university, there's really very few employment opportunities for them if just looking at Hong Kong. So

where are the jobs? They have to find jobs anywhere outside of Hong Kong. But if we can build the Pearl River Delta into a stronger industrial base, then there will be more job opportunities.

37-00:02:14

Li: Can you talk a little bit about the relationship with the university and the Pearl River Delta region? And we'll get to that region a little bit more soon but—

37-00:02:23

Lin: Yes. Well, before 1997, at that time, there's very little relationship between university and the society. In the past, particularly in the British setting, the university is kind of like an ivory tower. You do not need to interact with the people. And the society views the university this way, too. Those are idealists, those are academics and so they don't want to interact with the university. We bring a different culture there, in that we're telling our faculty members that the university will help change the model and create a paradigm change into a knowledge-based economy. That economy will require a very strong interaction between the university, faculty, students and the society.

37-00:03:30

Li: And this seems like it's more long-range thinking, because the students leave the university and then need to do something. So having a stronger tie with the outside society makes some sense if you're thinking about the long-term plans.

37-00:03:45

Lin: Yes, yes, yes. We certainly took a more macro or longer and global views of things, yes. And that's how we feel that the university has to be able to position well for the future of the society. I think so far it looks quite successful in this approach. It takes decades for Berkeley, for Harvard to accumulate all those knowledge and everything. So you can go to the very bottom and the forefront of a field of knowledge. I think that kind of opportunity is not very large in Hong Kong. So I think for the university in Hong Kong, you have to work on a different model. That is that you build a strong base with interaction with the society right from the beginning and then you grow this way. And, of course, are you sacrificing any academic depths or integrity? I don't think so because if you are intellectuals or scientists, you have to work on problems of interest to people, relevant to people. By working with the people, you know their needs, you know their emotions, you know their desire, you know what the futures be like. You cannot really work back in the ivory tower.

37-00:05:35

Li: But it does seem like somewhat of a chicken and egg question, that the university becomes important to the society but the society really changes because of the university, as well. And I think the Pearl River Delta region is probably a good place to look at that. We've been talking about the Pearl

River region. But could you situate on a map, just for the record, sort of where this is in relation to the university?

37-00:06:04

Lin:

Yes. My laptop has a map. But if you're looking at Hong Kong—how should I say it? Hong Kong from the north side to south side – you should understand China this way. There are about thirty provinces or states of China. But actually, let's put political divisions aside. From north to south, one important region is the Yellow River. And then it is the Yangtze River. And then the Pearl River. These are the rivers. They are very important for any place, right? So this is one way to look [at China]. The Yellow River region in the north, the Yangtze River region in the center and the Pearl River region in the south. Now, in the Yellow River region, the important cities are Beijing and Tianjin. And these are the old historical places of China. For the Yangtze River [region], the important place is Shanghai, Wuhan, and Chongqing. These are rising cities, with lot of populations. You might say if the Yellow River is more important in the politics, then certainly Yangtze River is more important in the commerce and industry. And the Pearl River is in the south and the important cities would be Guangzhou and Hong Kong. And one of the features is that it has a strong interaction with the outside world, especially with the Western countries of the world. Hong Kong is situated right here at the mouth of the Pearl River, called the Greater Pearl River Delta. So we are focusing to build this region. And if it can be built to become a strong technology base and human resource base, then it can become a very important region in the knowledge based economy era [Appendix 701].

Now, actually, all through the year 2000, one-third, about thirty-one percent of the output, industrial output, of China is from the Pearl River Delta region. Which is very large. By itself, it's larger than the Yangtze River Delta or, the Tianjin and Beijing together.

37-00:09:24

Li:

Was the Pearl River Delta a special economic zone early on for the Mainland government?

37-00:09:30

Lin:

Well, there's a lot of special economic zones all over China, but this is a special one. In fact, the Pearl River Delta is important because people in Hong Kong, those people, the capitalists, they have money and if they want to set up their manufacturing operation, they just go north, northwest to Pearl River Delta. Because Hong Kong is a small place.

37-00:09:57

Li:

So when did that start? Was it in the eighties, seventies?

37-00:10:00

Lin:

This got start from, I would say, probably 1960s. 1960s. As more refugees came from China to Hong Kong, Hong Kong become very populated.

Because you have to provide a livelihood for those people, they set up companies. But when the companies set up, then you have shortage of electricity, shortage of water, but plenty of pollution, so the British government purposefully encouraged people to go out, to move in to China. It was economically attractive for the low labor costs in China.

37-00:10:41

Li: And the PRC was okay with that?

37-00:10:43

Lin: The PRC was okay with it because the area are originally agricultural based, full of hungry farmers. I Industrial companies come in will set up factories, provide employments and raise their productivity. They are very happy with that, not knowing that the environment will change and everything has a cost.

37-00:11:03

Li: What's the geographic difference between Hong Kong and Mainland? Like how many miles is it from—?

37-00:11:07

Lin: Well, the Mainland Hong Kong, it's just across a line. Just like Canada and the United States.

37-00:11:16

Li: Yes. And the border is fairly fluid?

37-00:11:20

Lin: The border is real and tight but there are several designated points of entry that allows people and goods to go in and out. Later on, I'll show you some pictures that you will see the relative positions. I'm just trying to point out the importance of the Pearl River Delta. One way to look at China is these three rivers. Another way to look at China is the coastal states and the inland states. The coastal states are where you have the ocean on one side, then you are open, have easy access to foreign capitals, foreign technology, and people and goods can go in and out. That's another way to look at that. Regional polarization of development therefore is the problem. The coastal area is also where economies are doing very well. Their GDP, right now they may be in a few thousand, several thousand, or maybe close to 10,000. But GDP for some of the inland provinces, maybe still in the hundreds. So there's a polarization between coastal states and the internal inland states. And there's polarization between the river area, the estuary and the mountainous states. All this is within the term regional polarization. There are also real and subtle polarizations between the people lived in the city and people lived outside the city. They are similar but facing many different problems.

I think these are ways to look at China, look at these three rivers and look at the coastal states and internal inland states. Hong Kong sits here. And, of course, China is a huge body of land area in terms of geography. You have to picture this like Europe or like basically the United States. In one end of

Europe, you have England the other end, Turkey. There are so many differences in between. And, of course, we have New York, New Jersey in one and California the other. So United States is large, and all the fifty states are very different. To understand it you need to think of the different economic makeup and culture. This is the same thing here. China is a very large country. There are many, many Chinas you can talk about.

37-00:14:20

Li:

You started talking about this, but how have the demographics changed in that area? It used to be an agriculture area and then you said in the sixties, that started to change. And how did it continue to change?

37-00:14:41

Lin:

Well, you go to Hong Kong, it's just like any major modern city in the world. And you now go to Shanghai. When you see that there are more tall buildings in Shanghai than in San Francisco, than in Chicago, and the population in the greater Shanghai area is close to twenty million. It's unimaginable. If you go to Beijing, go to the national palace where the kings used to live, in the Zhongnanhai. Right now the Zhongnanhai is still the area where the top leaders live. In this little compound, the traffic around it is very heavy. Serving as boundary for the area is Second Ring Road. Outside of the Second Ring Road, traffic is good in 1992. But inside, it's pretty bad so they say, "Well, we're building a Third Ring Road to relief the traffic" A Third Ring Road made sense. But if you are simply expanding the business area from everything inside, in two years, it will be full of cars and jammed traffic. So they have to build more roads and so on. Pretty soon, they're building the Fourth Ring Road. Fourth Ring Road would take you to Tsinghua University and Beijing University, CAS. Those used to be in the suburbs. Now with this [new road] they are all in the city confine. And this will lead naturally to the Capital Airport. Now, the Fifth Ring Road is actually finished and in service. All this has happened in the span of less than twenty years. Actually, the Fifth Ring Road is already too crowded at peak traffic hours. They are now working on a Six Ring Road. I am not kidding. Sixth Ring Road is under construction. The 2008 Beijing Olympics games, are located mostly between the Third and Fourth Ring Road in this region here. That's how rapidly China grows in these last twenty years. In comparison, the change of Hong Kong is minimal compared to Shanghai or Beijing. So technology entrepreneurship, the openness to technology, is very much a part of China.

If I might refer back to the R&D strategy that I established at HKUST, I was talking about six items. One is to promote academic research. That's really to do research and strive for excellence in that area. And then establish multidisciplinary program. That is basically intended to answer the need of the society, industrial needs. Third, cultivate core excellence; Forth, strengthen industrial linkages and Fifth, nurture entrepreneurship and then the number Six is to develop major institutional impact. The last item relates to our work

in a number of technology fields and in the China proper, Nansha in particular.

The researchers everywhere nowadays like to talk about citation index, number of publication, those kind of things. But great universities are remembered, not by the scientific index of the faculty publications but by what the university has brought to the society. MIT people were proud of their contribution to the space program, or to automation of the manufacturing industries, or the development of the computers, these are of fundamental importance to the society. Stanford can talk about their driving the microelectronics industries, and the IT society. Berkeley can talk about their many areas in biotech or electronics, those are the things. I think these are important impacts a university will leave to the society. I want HKUST to be thinking and aiming for what it will be known by the society overall..

37-00:19:34

Li: So did you bring your emphasis on patents to HKUST? Like the system that you had at ITRI with focusing on acquiring patents.

37-00:19:42

Lin: Patents. Yes, right.

37-00:19:42

Li: Did you bring that to ITRI?

37-00:19:43

Lin: Yes. I also bring that to HKUST. It's not that we want you to write patents instead of papers because you need to write papers. But if there are certain subjects where you should apply for patent first, then you put a patent application in there before you go to publish a paper. Because usually after you publish it, then there is a one-year's lead time. The grace period is one year. After this one-year period, everybody know about it can apply for patent in the same subject. In other words, if you apply for a patent, you give it one year's time to write your paper and without prejudicing your IP right. So try to make use of that kind of strategy.

When I worked in DuPont, and whenever a scientist wanted to publish a paper, the supervisor would usually ask "Well, if it is so good, why would you want people in the other companies to know about it?" That's typical industrial mentality, but with an inspiring message. I In the university, you need people to know about it but you still want to maintain/retain certain privileges so that in the future you can do commercial pursuits. We tried to provide guidance to our faculty members in this regards. It's both publication and patent. So you can see the numbers of patent applications and awarded rapidly increased after 1997 [Appendix 702].

37-00:21:30

Li: You mentioned the importance of the impact the university has on the surrounding region. Can you talk about the visible changes, let's say, in the

Pearl River region, the visible changes in that region after the establishment of UST?

37-00:21:49

Lin:

Well, I think it's difficult to talk about just the influence of UST alone, [it would be premature.] We should focus on the influence of the universities of Hong Kong as a whole. I mentioned earlier that the impact of HKUST basically is to set out the research structure, research culture and make people think more about science and technology for the whole region. And actually, the effort of all sister universities are important because, after all, you have more people coming into this areas. The cohesion or the synergy becomes important. I'd say thirty percent of the industrial output of China is from this area back from the early 1990s and middle nineties. And one of the problems there is that products in PRD are generally low in added value. Low added value-in-use. And we need to bring up the values here. The total effort of this is that we try to make a change in bringing out the industrial values in that area.

37-00:23:25

Li:

Is there a visible change?

37-00:23:27

Lin:

Is there a visible change? I think there's visible change.

37-00:23:30

Li:

What change?

37-00:23:32

Lin:

Well, say, the IT industry. You can see the product that came out from this area. It's no longer air conditioner or refrigerator anymore. Digital camera, computers, communication equipment, those are the kinds of things that are coming out from the area and there's also a lot of biotech company in the area. This has been a real change there.

37-00:24:14

Li:

Are the older companies still there? Are air conditioner industries still there?

37-00:24:19

Lin:

Those companies are kind of gradually moving to Vietnam, to Thailand, and also some companies gradually moving to the other parts of China, the inland China that I was talking about. It's something that I don't like to see happen but it's kind of natural law of economies.

37-00:24:40

Li:

I have a question, because the handover of Hong Kong kind of coincided with the Asian economic crisis.

37-00:24:46

Lin:

It's later. The economic crisis is about two or three years later.

37-00:24:51

Li: Okay. Because I was wondering about Mainland China rethinking its economic plan in the light of their GDP slowing down, those sort of things, kind of meeting this increase in R&D happening in Hong Kong.

37-00:25:08

Lin: Well, China is very much focused on R&D, on science and technology. I think in terms of GDP, the number that we have talked about, percent GDP in R&D, China now is about 1.5 or 1.6 percent. And the thing about China, the economy is huge. 1.6 percent or 1.5 percent, is a lot of money. Nowadays, a lot of faculty in Hong Kong try to work with scientists in China so that they can get access to research funds from China.

37-00:25:50

Li: So this is happening on Mainland China at the same time that Hong Kong is changing—

37-00:25:53

Lin: Yes, yes. And Mainland China is doing it much faster because of their size. You see? So I think that China, look at Mainland China now, over these last ten years, it has become the largest holders of U.S. Treasury bonds. It's funding a lot of U.S. government's work here. Can you imagine? In the eighties, I think it was Japan, Germany, Singapore and Taiwan. These, I would say, are the major countries that hold U.S. savings bonds and treasury notes, and similar financial instruments. But now I think China alone, as the largest debtor, holds over a thousand billion dollars of U.S. loans.

37-00:26:47

Li: I wanted to back up, actually, and ask a question about the Hong Kong government after the handover. How supportive or involved was it in HKUST? What was that government like to work with, sort of the new Hong Kong government?

37-00:27:03

Lin: Well, I think for the new Hong Kong government, science and technology and education is not their major concern. So long as the university is striving, they like to take their mind off that. Their major concern is pretty much similar, like pollution, traffic jams, and then the relationship with China. Relationship with China and the process to attain universal suffrage in Hong Kong are key concerns of the HKSAR government.

37-00:27:43

Li: What was the relationship with China at this time? What was Hong Kong's relationship with China at this time?

37-00:27:47

Lin: Well, when Hong Kong returned, the change, the sovereignty change occurred. As Deng Xiaoping said, Hong Kong would be under the "one country, two system" framework which would allow Hong Kong to pursue its market economy system for fifty years. For fifty years there would be no

change. In other words, while China would be under a planned, or socialist economy system, Hong Kong would be free to continue its market economy system. And he guaranteed that there will be no change for fifty years. Also, Hong Kong would become a highly autonomous region. That is means that local people can run their own government, and have their own currency and passport. The chief executive has to be appointed by Beijing through a process, through an election process.

37-00:29:04

Li:

Is this autonomy because of the economic benefits or is it political or both?

37-00:29:09

Lin:

It's political. It's political. In the Chinese government's mind, it holds the supreme sovereignty. They hold the claim to everything on this land so it would not let the local people claim to have it all. So the locals have to listen to this supreme leader, which is in Beijing. But with a certain process, you can nominate and elect the chief executive through an election process. And there can be more than one candidate. You can have an election for these candidates. But the question is the election is not by universal suffrage. It was by an election committee. This election committee consists of 800 people. Remember, Hong Kong has a population of about seven million, with nearly 3.5 million registered resident voters. But only 200,000 people, according to the stipulations of the Basic Law, are eligible to participate in the selection of the 800 member Election Committee which votes on the Chief Executive. The 200,000 voters are produced through four social and professional groups, dominated by big businesses or elites with strong government connections. Obviously, it is the government's view, meaning Beijing's view, that dominates the outcome. So the present election system is such that the candidate is basically nominated by Beijing and confirmed by a committee which represents about 5 % of the registered voters. All in all, the Chief Executive got to be somebody handpicked by Beijing. And the people in Hong Kong is upset about that, for obvious reasons.

There is a city Legislative Council. The makeup of the Council is again along similar lines. Half of the 60 seats are coming out from district direct vote and half of the seats is voted out by special groups, called "functional divisions" representing different business sectors. This sector may be the commerce, real estate developer, the entertainment and the professionals. And if you are a business tycoon, like Li Ka-shing whose claim to fame is pretty much like Warren Buffet in the United States, and has influences in the in real estate development, financial services, commerce, telecommunications, transportation, etc., will have 10 times more votes than the ordinary citizen. It is a system that is not truly democratic as we understand it. The Hong Kong people are upset about that too.

But Beijing holds on to the system. Right now, I think the status is by 2017, there will be a direct election of chief executives in Hong Kong. By 2021,

there will be a direct election of the city council. People feel the timings are too far and want to move them up. This is a major problem that confronted the Hong Kong government.

[Narrator's Note: To be fair, the LegCo election scheme was originated by the British colonial government in the mid 1980s. It was intended as a measure to enhance Hong Kong's stability as it moves toward the 1997 turnover. Obviously it is an appeasement to the business leaders and domestic nobles for them to stay in Hong Kong. The scheme was unfair to the general citizenry and was understood that it would be repealed soon after the turnover. However, the "Functional" LegCo members and the tycoons, having tasted the joy of power, naturally resisted any change. Curiously enough, the Beijing Administration stood behind the rich and the few which might, after-all, be easier to be persuaded. Hence we have seen the scene of communists singing the tunes of the capitalists. Politics makes strange bedfellows. Shouldn't it be curious after-all?]

For education, every year there is a bare-bone budget appropriated. With that, you are on your own. We are still in this group of people who try to promote or to influence social and cultural changes under the present constraints and boundary conditions.

37-00:34:16

Li:

You had mentioned, sort of in passing, about environmental laws. What role did Hong Kong's science and technology influence have in working with the new environmental legislation that started in the mid-nineties?

37-00:34:38

Lin:

Well, we provide data. We provide data of air quality to the government. We provide understanding or analysis of weather pattern to the government, hoping to change their thinking, to institute new laws and regulations. It has not been very successful.

37-00:35:05

Li:

And have you seen changes in industry in the Pearl River area, trying to be more forward thinking about—?

37-00:35:17

Lin:

Yes. I think in general people have recognized the importance of science and technology. People have paid attention to new ideas, innovative ideas, creative ideas in the Pearl River Delta region. That I think is something that is happening. How fast? In comparison to Yangtze River Delta, and compared to the Yellow River region, it's difficult to say. The northern regions are also changing rapidly. I think the trend is clear for the entire China. I think what's important about it is there is a changing culture in science and technology. The people demand more changes. In looking to globalization era, Hong Kong and China hope to become members of the global community. There's no question about it. Go back to what Deng Xiaoping's guarantee of no change in

fifty years, people asked what about after fifty years. I think it is a mute point. In fifty years, China will change. Hong Kong will change, too. And perhaps there will be so much changes that the two will be more like one another. You have seen the change in the United States in the last ten years. So I think in fifty years the United States are going to change even more. It's difficult to forecast beyond fifty years.

37-00:36:53

Li: This is just a small question but did the dominant language in Hong Kong change at all in this time?

37-00:37:00

Lin: Yes. The official language in Hong Kong was English, before the turnover. You speak, you write, the business papers, everything is English. But after 1997, Chinese was also equally held as the official language.

37-00:37:21

Li: And the simplified characters?

37-00:37:24

Lin: Yes, it's the simplified characters. Yes. The Putonghua. And Cantonese is very difficult to understand. You go to Chinatown; there is a very special community here, people speak [Cantonese]. But that's because these are the people that moved out to the United States and Canada long ago and Cantonese was the spoken language. After 1997, there's more people speaking Putonghua, or Mandarin.

37-00:37:59

Li: From Taiwan?

37-00:38:01

Lin: From Taiwan and from China and for the very simple reason that the largest market is in China. You want to sell things to your customers. During spring festival, New Year's time and the holidays, a lot of tourists coming from China to Hong Kong. They buy gold jewelry, luxurious watches, much to the delight of the local business community.

37-00:38:28

Li: Are they mostly from Shanghai and from Beijing?

37-00:38:30

Lin: Yes. Although Shanghai is every bit as open, business as good as in Hong Kong, but a lot of people still like to visit Hong Kong because of its special position in the past. In Hong Kong, we speak English. In the university, in HKUST, English is the spoken medium.

37-00:38:59

Li: Right. I was wondering. So HKUST was run in English?

37-00:39:03

Lin: Yes. It's English. Yes. And Hong Kong U, most of them are speaking English. Chinese U is half and half. Other universities I think is mainly half and half. In HKUST, the only class you can speak Chinese is if you go to a Tang Dynasty poetry class. Then obviously—

37-00:39:22

Li: And the Chinese are speaking as Putonghua?

37-00:39:24

Lin: Putonghua. And in UST, because we feel globalization—I think this is a culture that we have to play a part in bringing in. That it's the globalization era. You need to know Chinese but you have to keep English also. So I think we speak, our class, all our materials are in English.

37-00:39:57

Li: And they still are?

37-00:39:58

Lin: That's still it. Yes. And the university was being run totally independent of the Chinese government, independent of China.

37-00:40:09

Li: So the four part system that you had in Taiwan, where you have government, university, business, that does not apply in Hong Kong, those—?

37-00:40:16

Lin: No, not as yet. I think that kind of concept still is operating in Hong Kong, although the government's role is very small.

37-00:40:23

Li: Very small. Much smaller than in Taiwan.

37-00:40:26

Lin: Than Taiwan, yes. You see, I talk about these four units. Four units.

37-00:40:35

Li: The overlapping circles. Yes.

37-00:40:36

Lin: The government, university, the institute, and business. You see, this is the typical pattern of our interaction because university does not want business to interfere with them. BP want to give \$500 million to UC Berkeley and a lot of faculty did not like it, because, well, if money comes this way, we might one day become part of BP. University people, academic people, did not like interference from business world. They want to pursue their work independently. University people did not like the government interference either, for obvious reasons. This is the typical paradigm or pattern of operations. Another extreme is all these four are together.

37-00:41:34

Li: Right. Because of Mainland China.

37-00:41:36

Lin: It's Russia, old Russia, it's like Mainland China then. The system would be very efficient, but the system would get nowhere and produce no concrete results. After all, government and business are different. University and business are different entities with diverse interests. What I had been promoting all these years, my life, is trying to establish a relationship like this, where the four interact with each other, knowing each other's problem and try to help each other, but retain its separate focus. Retain its—

37-00:42:09

Li: So separate but with overlapping areas.

37-00:42:11

Lin: Yes, overlapping. Yes. Yes. That's the kind of thing that I like to see happening. In Silicon Valley, you see this happening. You see Berkeley, Stanford work very closely with companies, not only just the entrepreneurship companies, which is obvious, but with established companies. And the government, particularly in Silicon Valley, is very open to the needs of the business. The institute role actually is smaller in Silicon Valley but there is a definite institute role. The Lawrence Berkeley National Laboratory, Lawrence Livermore National Lab, EPRI, SRI International, Ames lab, etc. These are kind of promoting, linking the various groups together. So you might say this is the general pattern but each has played different roles at times.

In Taiwan and twenty years ago, I would just try to build ITRI as the leader for this group. But now Taiwan has changed because the business has become very big. You have many major businesses. The role of ITRI has to change; ITRI has to reposition itself.

37-00:43:42

Li: Do you see a similar relationship in Shanghai and Beijing?

37-00:43:45

Lin: In Shanghai, in Beijing? Yes. But then in Shanghai and Beijing, they are more here like this.

[Narrator's Note: The national innovation system in China was originally very close to the Type 2 that I discussed- the four groups tended to be collapsing to one. In the last ten years, I have attempted to pull them apart to their proper place by making speeches and illustrations in China. Once they started doing this, the results on growing technology business was marvelous.

I have advocated the overlap but separate model for another reason. It would allow the university and the technology business each to develop to its full potential. In the collapsing system, it will be difficult to grow first-class

university or first class business. The fact that Hong Kong's three research universities [HKU, HKUST, CUHK] have quickly gained world recognitions ahead of Tsinghua and Beida was, in no small part, I believe, due to operation under this model.]

37-00:43:52

Hamilton: One with everything all together [in China].

37-00:43:53

Lin: Yes. And I try to pull them apart.

37-00:43:56

Li: So how would you say that that impacts science education? And let's use the example of Hong Kong and Shanghai and Beijing? What are the differences in science and engineering, education in those three areas?

37-00:44:12

Lin: Well, in the education area, basically it's not much different. But in the business area, the interaction of the university with the business and the government interaction with the business are different.

37-00:44:26

Li: So if a student was interested in being—I'll say a pure scientist, a pure research scientist, would they generally not pursue education in Hong Kong and instead pursue education in Beijing and Shanghai or no?

37-00:44:42

Lin: No. Actually, I think it's just reversed in these last several years because of the rise to fame, perhaps, of HKUST, Hong Kong U, Chinese U. There are more top rated students, high school students, in China wanted to come to Hong Kong to study.

37-00:45:06

Li: Instead of going to Tsinghua in Beijing?

37-00:45:07

Lin: Yes, instead of Tsinghua in Beijing. It's more students like to come to Hong Kong. So when I visited China, my friend there looked at me, and at times, would comment "You try to steal our students." So that's how fast conditions had changed. Because students and parents have recognized that the universities in Hong Kong provide a special need, provide a special education for the student, make them more globally minded and in training them. Our classes are normally conducted with lot more discussions. When I teach classes, usually there's a lot of discussion. If there are no questions asked, I would ask students questions. But in a Chinese university, typical Tsinghua and Beijing, it was the faculty who's speaking all, or most of the time. These are the kind of subtle changes happening here.

37-00:46:13

Li: So it sounds almost like in HKUST, you can get like an American style education in China, because of all of the American educated professors who are teaching there. So for students from Mainland China, instead of going to the U.S., coming to HKUST, would that be sort of a compromise to stay in Asia?

37-00:46:31

Lin: Yes, yes. And also, they can communicate with their family much easier. So actually, that's happening here.

37-00:46:40

Li: And it's affordable for a Mainland Chinese student to go to HKUST?

37-00:46:43

Lin: Well, I would say yes. Yes. And secondly, there's another attraction, is that we provide scholarships. All the graduate students, when you talk about graduate school, all graduate students will have some kind of fellowship, scholarship, assistantship provided for the students. So you add up this money together, and the tuition, which may be about five times higher than China. So adding up the tuition and the stipends every month, this is big money. So when Chinese student in Mainland come to our university, they will be given this parcel of grants, or awards. This was big news in China. So that's why they say, well, we are going to buy their students. But actually, we're just paying for their tuition, and just providing the stipend and the subsistence, living expenses. Some of the students did not have their own funds to come to Hong Kong. They're provided with scholarships. And they're top students, they would be near perfect GPA, like 3.9 or four, that kind of thing, and then they go through their selection process in China. It was a very tough selection process. So we got top rate students. So we are very happy to get good students from China. And again, this is something that Chia-wei Woo and myself, the first group of UST faculties, wanted to do. Because for the undergrad students, ninety percent of them is from Hong Kong.

Now we are opening up the university to accept entering graduate students. But not too many graduate students, native Hong Kongese, or Hong-Kongers, wanted to go to graduate school. Because they would go to business and make more money. So the sources of good quality students, students worthy of graduate studies, is something that very much in our mind. And so from a long time ago, right from 1999, ninety-eight, we have our eyes in China. Why should those students all come to UC Berkeley, take all this distance? So we are aiming to attract part of the students from China to come to HKUST. So we work very much with the Chinese Ministry of Education. We worked very hard with friends in Tsinghua, in Beida in Jiao Tong and so on to entice their students to come here.

37-00:49:50

Li: With the sort of unique educational style at HKUST—we've talked a lot about how this has impacted the science industry link, but how has this changed how basic research is done, as well? So this idea of having students come into the classroom and have discussions. How does this provide them with new and better skills for conducting basic research?

37-00:50:17

Lin: Well, science, engineering has changed so much. We feel that if we just go to textbooks, we are not doing the student justice. I give a class. Actually, I have to prepare a lot of hours to go to the class. We have to encourage students, to let them know about what's going on in the world. Yes, the earth is round, but the world is flat, there's a lot of things that are different. They have to learn. What they learn in the universities, in the class, is only this little, little bit. Much more depending on themselves to learn through the other sources. I think this is the kind of concept that we are giving our students. I always told them that the day you graduate from the university is the day you will recognize how much you do not know and how much you need to study more, on your own time and effort.

37-00:51:31

Hamilton: And do you think that this is transferred to the laboratory? I guess reinforcing the idea that laboratory scientists need to not only stay focused on their work in the laboratory but be reading appropriate journals, be talking with other colleagues. Do you think that HKUST sort of gives students that message better than perhaps other universities?

37-00:51:58

Lin: Yes. If you do not do research, then you have no way of identifying what's news, what's emerging. You cannot understand what's going on. Taking myself as a student, I think I was benefited by the ability or the interest to learn new things. When I was president of ITRI, I do not use computers myself. It was my secretary who reads the emails and say, "Well, you get some mails here."

37-00:52:37

Hamilton: She'd print them out for you?

37-00:52:38

Lin: Print them out for me. I don't know how to work the Microsoft, the internet.

37-0052:43

Li: The email.

37-00:52:46

Lin: Now I can do all these things myself. And, of course, ten years ago or fifteen years ago, before the Googles, the Wikipedias, the whole world's different. These are the kind of skills that I have never learned in university. If I said I have gotten my PhD from Columbia, it's all that I need to study, then I'm done forever, right. So I think this is the kind of attitude that we tell our

students. That you don't know how rapidly the world will change, so you have to prepare yourself for the ever changing environment. You have to give yourself the habit of learning.

37-00:53:33

Li: Do students learn that at universities in Beijing, for example?

37-00:53:38

Lin: Well, I think they're learning that too. We also have faculty exchange, a lot. I recalled we have recruited somebody from Michigan, David, Li Dao-kwei, actually. Another L-i here. I think probably has no relation with the former Premier Li. Probably.

37-00:54:00

Li: You never know.

37-00:54:04

Lin: To HKUST. I took him to dinner when he came to UST, during the first weeks. And he was in the department of economics, which I only have a general interest and thus do not see him often, I suddenly awakened to the that he has become Director of the Center of Economic Research in Tsinghua University, Beijing. I was told that Tsinghua had raised a fund, some huge endowment and pay him more or as much as we can pay him. In any case, Tsinghua has established a new center for him. I was surprised but pleased for David.

And you heard about Justin Lin? You heard of this name? He is now vice-president of the World Bank. Fifteen years ago he was a professor at UST and then joint-appointment with Peking University. Most of the time he would stay in Beijing and have a center of research and now he grew in that field and become a world recognized scholar. I think his becoming the vice-president of World Bank has to do with China, but the fact that he is well qualified is what counts. He has built up enough credentials to be that. I was pleased for Justin too.

37-00:55:34

Li: So HKUST has become a gateway between west and Mainland China?

37-00:55:40

Lin: Yes. Mainland China – so this is a definite role. We are very globally minded. Globalization is very much in our mind. This is instilled into our strategy and philosophy of running the university.

37-00:56:01

Li: How much competition is there between the Hong Kong region universities and Beijing and Shanghai?

37-00:56:19

Lin: Well, I think the competition is very subtle. And Shanghai is a good example. There's a very good educational institution in the business management area,

CESB, The China Europe School of Business, I hope I say the name properly. But if you look at the ranking, I think it is in the top twenty, or twenty-five business schools worldwide. It's an interesting institution in Shanghai. It was funded by the Chinese Merchants Association or Chambers of Commerce and the EU countries because a lot of business has come to life between EU and China. They want to provide proper education and training to Chinese students and European students, so that they understand each other, and can do business. Actually, it was structured as part of the Shanghai Jiao Tong University. And Jiao Tong University has its own school of business management. So under the umbrella of SJTU, CESB operates independently and is different from the An-Tai School of Business Management of SJTU. And it becomes a competitor with HKUST because of its global contacts: European, American and so on. So a lot of times we have faculty members been raided to Shanghai. Those like to live in China would find Shanghai an easy place to live, good pay for their work and can speaking English as a medium. So quite a few of our faculty went to this place. So this is a competition.

But this is the kind of competition I feel is natural. It cannot be avoided. And I think actually when we know of situations like this, we help the individuals. I think it is a friendly competition. I think in that way we have a partner in Shanghai. By David Li going to Tsinghua, I think many of our faculty will know Tsinghua better. And the same was with Peking University. So I think that's how we establish partnerships. Looking at the U.S., I think Yale was established by Harvard graduates, right? Otherwise, there will be too much inbreeding. It's not good. So you have to do this kind of thing. So they are competition, obviously, but I don't see this as bad competition.

Begin Audiofile 38

38-00:00:00

Li: This is Robin Li and Emily Hamilton speaking with Otto Lin in Ann Arbor, Michigan, October 15, 2009. This is tape thirty-eight. Could you tell us a little bit about some of the important people who were involved in the continued development of the Pearl River region?

38-00:00:34

Lin: Yes. Actually, let me mention first Professor C.L. Tien, who was Chancellor of UC Berkeley. In 1997, I went to UST. And during this time, as we at UST talked about the importance of science and technology and education, there are also other players. MIT at the time conducted a major program and came up with an excellent report under the title of "Made by Hong Kong." It's a project that was carried out under the management of the MIT Sloan School of Management. So the talk of science and technology become quite audible and getting more prominent to the local people and the MNC groups as well.

So Mr. Tung Chee-Hwa, chief executive of HKSAR, felt that he has to do something. So he set up a Commission on innovation and technology trying to plan for Hong Kong. And he has invited C.L. Tien to be chairman. C.L. is a personal friend of Tung and of course a very prominent scientist and educator, being the president of a UC Berkeley, a major university in the United States. I have known C.L. back to the days in Taiwan and C.L. knows a lot of UST faculty very well. So we all are happy about it. CL, pondering over the invitation, met with me a few times in his favorite hotel, the Island Shangri-la. He was concerned with the commitment of the HK leadership and asked, "Do you feel that the leadership circle is serious about it ? Does Tung really want to develop science and technology in Hong Kong?" Would he be wasting his time trying to consult for Hong Kong recognizing that doing this would take a good deal of his time and effort. Tung himself is a businessperson. He runs a company, OOCL, which is the Oriented Overseas Container Liners, and in the container carrier business. And I told C.L. that although we don't know whether Tung means business or not, but it is at a historical moment for Hong Kong and he should take the opportunity to provide guidance to Tung. Why, Tung, understandably, was under pressure, to do something for Hong Kong. And, of course, the Chinese government will be watching his performance. China would genuinely like to see Tung succeed in building something special for Hong Kong to increase its world competitiveness. So I say, "Well, under this environment, now that Tung invited you to do it," I say, "you have to do it because it's an opportunity we can make him a believer." So I promised to provide technical supports to C.L. in terms of data collection, analysis and consultation with faculties and so on. So I think Professor Tien finally convinced Tung to put some money together, set up a fund called ITF, Innovation and Technology Fund, to provide support for major R&D projects in science and engineering and urge the government to invest in the universities, all universities, to promote education and scientific research. So I think this is a very important event that should not be forgotten.

Thus, the 5 billion HK Dollars ITF fund was established. Then later on, the Hong Kong Science and Technology Parks was created and was followed by the ASTRI, Applied Science Technology Research Institute, which is basically like ITRI,

38-00:05:06

Li: Also in Hong Kong?

38-00:05:08

Lin: And I help write the paper for ASTRI. I also sat on the Board of Directors of the HKSTP. So these are the kinds of efforts during that time. I think the time factor is very important. So C.L. Tien is a key factor and I think I should mention his name and contribution. [I recalled vividly what Premier Sun Yuan-suan has advised me about the essence of time in 1982 when I was pondering to return to Taiwan for good.]

Just a little bit of digression here. There's five billion Hong Kong dollars, ITF dollars. When CL told me about this, I said, "Well, ask Tung whether this five billion Hong Kong dollars fund is for one year or two years or five? I would settle for two years." He said, "Well, we have spent all this effort to come to this point, let's not push him too hard." I was thinking that five billion is good, but not very much.

38-00:06:14

Li: Five billion Hong Kong dollars, right?

38-00:06:15

Lin: Hong Kong dollars. Hong Kong dollars. Yes. Divided by 7.8 it would be U.S. dollars. So it would not be too bad. But under the bureaucracy of Hong Kong government as of 2007, out of the total five, there are three billion that has not been used.

38-00:06:46

Li: As of 2005?

38-00:06:47

Lin: Yes. More than fifty percent is still there, kept by the government. So I questioned it. Well, isn't there enough people to apply for it? No. In this ten-year period, there's so many scientists and engineers that came to Hong Kong and wanted to do scientific research and seeking funding support. The government just hold on to this money and would not release it. They micromanaged the projects. Bureaucracy. So I said to them, "Well, it's really a shame because the scientific community really want to do something for Hong Kong. With financial help, they can do a lot of things." But for the bureaucrats, it's just fun to hold on to it because they are afraid of people, may the Legco, would ask "What results have you produced out of this five billion dollars?" I told them, "Well, you cannot calculate the return on investment on this five billion." You have to take a macro view. I talked about the benefit cycle of national R&D. When I talked about the ITRI experience. It's that government allocate this budget for the university, for the institute which enabled them to develop this technology. The technology has to be quickly transferred into the business and the business will produce products and services and also opportunities for employment. So the taxation and the employment and the increased competitiveness would be the return of R&D dollars. I said, "That's the way to look at R&D investment of the government." You should not just say, "Well, okay. I spent a million dollars on this. What do I come back from this million dollars? The prevailing Hong Kong mentality is to expect the university or the institute to return this million dollars to the government in a few short years. I said, "This is not the way to do research and technology development." So that's the innovation systems that we're talking about. When you have developed the technology, you try to push it to the business community and let the business people, those who are good at running business, do the commercialization. [The government should count the taxation, employment, and competitiveness as the return.]

38-00:09:24

Li: It seems tricky because it's like on the one hand you want clear benchmarks of success. At the same time, you don't want to have a micromanaging bureaucracy always looking for getting their exact money back.

38-00:09:33

Li: That's right, that's right.

38-00:09:35

Li: That seems like a difficult balance to me.

38-00:09:37

Li: Yes, but you see, the measurement cannot all be in dollar signs. People. In the process, you produce a lot of people. People who have the experience, expertise, knowledge, and ability. People is a very important asset to any country. So these are the kind of thing that we should be talking about.

So I'm just going back to a point that you mentioned, that indeed important people like C. L. Tien has helped promote this concept and tried to make a difference for Hong Kong.

38-00:10:15

Li: At ITRI, you were involved with sort of evaluating the worth of people. How would you translate that to the government of Hong Kong? How is the government able to sort of make these measurements, or should they, if you were to be advising them on this?

38-00:10:38

Li: I would advise the Hong Kong government to give the money to the university or to the institute and let them do their work.

38-00:10:51

Li: Right.

38-00:10:51

Li: I would focus on their output, technology output, and see whether those technology outputs are being transferred to the business side.

38-00:11:03

Li: So just as businessmen should be involved in the business side, the university should be involved in evaluating the intellectual work?

38-00:11:12

Li: That's right, That's right. And by the university itself, it's difficult for them to commercialize. I explained this with the Benefit Circle. Putting it on the top of the other, this is the Mainland Chinese model or Soviet model in the old days. I try to pull them apart. Tsinghua University, for example. Tsinghua in Beijing runs many companies. And I told my friends in Tsinghua, I said, "Well, this is no way to run a university, because if a good part of your best people left to become businessmen, then you will be difficult to become a first class

university.” In the university, you need people to teach, you need people to do research. But you are now taking the best teacher or best researcher to run business. They might become a very lousy business manager and you are losing on both sides. You try to nurture, try to recruit, try to put people out from the university or outside of the university to run the business and make it a commercial success. This is how you can go on to build a great university and go on to help build a great business.

38-00:12:42

Li: So you should have people doing what they’re good at, essentially?

38-00:12:45

Lin: Yes, right. That’s right. That’s basically it. Yes.

38-00:12:49

Li: What were some of the flagship industries in the Pearl River Delta area that helped to really grow that area?

38-00:13:00

Lin: Well, for example, we can talk about the electronic packaging project. Did I show you some slides? This has become a major industry now in Pearl River Delta area. In the past, the company are just making cell phones or computers based on the imports of raw materials and technology and they’re just purely assemble them. Instead of doing assembly, they now can do the design. So I think it’s a level up on this value chain.

38-00:13:46

Li: Is there a growing petrochemical industry in that area?

38-00:13:48

Lin: Petrochemical industry in the area is much smaller. Yes. It’s small.

38-00:13:55

Li: So I’ve read that that area is referred to as a sort of cluster area, that you’ll have like industries—

38-00:14:05

Lin: Lighting industry, yes.

38-00:14:07

Li: —in a small geographical area. Do you think that that’s true and why does that happen?

38-00:14:12

Lin: Well, I’m glad you mentioned this. Lighting industry is a good example. In the neighboring counties of Foshan. F-O-S-H-A-N, okay, it’s a county that has thousands of people working on lighting, putting together household lamps, Christmas tree lamps, all kind of lamps, so they become an important cluster in the area. But what they put in is mainly labor. So nowadays we’re talking about energy savings and green lamps, and different types of design. One of

the important technology is solid-state light emitting diodes [LED] that lamps without light bulbs. Light bulbs without filaments or these traditional light bulbs. It's just a piece of semiconductor, like our fingertip. So this piece of semiconductor was packaged into this folder and under electric voltage, it will generate light. And this light illuminates our house or the building or the airport or the highways. Now, think about this. For this industry to grow, you need people to understand semiconductors. There are only certain types of semiconductors that, when you put an electric voltage there, that can create light. Not just any semiconductor. When you put a voltage into a standard silicon semiconductor, you just cause electrons to move and that's how we have our computer and things. But in this case, certain material, when you put voltage on the two ends, you create lights. So this go up to applied electronics.

One example is laser. Laser science is basically related to this. So you are converting the electric current, electric signal, to a light signal. As it turns out, these types of light, the energy efficiency is much higher than any other kind of iridescent lamp or fluorescent lamp. And electricity is a very important commodity. So I think that an estimate shows that by 2020—that's not many years from now—if twenty percent of the new buildings in China can use this kind of lamps, then China can save the electric power output of the big Yangtze River dam power plant. That's tremendous. So we are talking about energy saving, green process, low carbon economy. And precisely from space lighting.

Now, it will generate many new industries, for example, lamp and fixture designs. Now that light bulbs will not like standard light bulbs anymore. They can be in any shape or size or array. The element that produces light is like a small piece of fingernail, with a quarter inch square. So they can be arranged very much differently. Our house will be arranged much differently. Just think about this, the chips can be designed to implant on our dining table, anyway you want it.

38-00:18:24

Li: Instead of one overhead light.

38-00:18:27

Lin: That's right, yes. Right. So this would be a whole new General Electric.

38-00:18:35

Li: So was that area of China then involved in these new technology advances?

38-00:18:40

Lin: No, no, no. Pearl River Delta is very much involved in that. One of the companies in the Nansha IT Park which works with a company in the HK Scientist Park. They have focused on the semiconductor materials and the design of that.

38-00:18:55

Li: Is that related to the fact that there is this huge lighting industry right nearby? Is that—?

38-00:19:00

Lin: Yes. Actually, they will be supplying to any company, any place. But Foshan is very much one. They want this company to move to Foshan so they can serve the local industry there. So I'm just saying that there is just a demand, a great demand of that, and this will be forming of clusters because the Foshan lighting industry people have recognized the value of this new lighting element. They want to make full use of that kind of lighting element to design their new lamps for export or for sale. So this is a rising industry that I can see. Because you have been asking questions, want me to give you some examples, and I'm glad you picked an example for me.

38-00:19:52

Li: What are some other examples of industry clusters that have grown up in that area?

38-00:19:55

Lin: Well, this is one and then another area, I think, is related to biotechnology, particularly in the Chinese medicine area. Chinese medicine works on a different principle from Western medicine. Western medicine asks why is it you have a sickness and tries to work on the disease. Or if there's a problem that can be identified with a certain organ, it tries to take surgical actions to cure it. And, of course, the action is usually quick and decisive. But a lot of times, if it's cancer, for example, you have to follow through with chemotherapy and others and then the treatment itself may cause further illness and kill people. But western medicine is very important. It's good and proven successful in many, many cases.

Chinese medicine works on a different principle. When you are sick, then certain part of the internal organs, must not be working properly – they have an internal traffic jam in blood, nerve signals or “chi”. When the traffic jam occurs and the bronchial becomes clogged. So it must be something in other part of your body that was not working well, so it sends a lot of fluids and other signals to your bronchi, which may also weakens the passage. Chinese medicine tries to improve the general well being, trying to make sure that all the functions and the organs, are working the way they should, in equilibrium and well balanced. And when they are working this way, you do not have an illness anymore. The treatments do not necessary work on the area that shows the ailment itself. And there's a lot of herbs, natural products, that when taken with the right combination, will help you improve the function of the liver, function of the heart, function of the lungs, etc., to facilitate them to work together. They make you become a better human being. That's the principle of Chinese medicine.

38-00:22:19

Li: And how does biotechnology fit into that?

38-00:22:23

Lin: Now, in looking at any herbs, there are usually consist of tens, or even hundreds of different chemical components. What is the most effective component? It's hard to define. In the past, it's difficult to define. Now, with modern technology, you can do that. You can analyze different peaks and traced them to different chemical groups.

38-00:22:47

Li: So how is that differentiated from biochemistry?

38-00:22:52

Lin: Well, and you can see whether and how this compound, would it fit into the metabolism of the body functions. And also, how they relate to the genetic structure of the body. In UST, there is a group of colleagues who analyze— ginseng, ginkgo fruit and the like that are known to show efficacy in curing certain genetic diseases. I was told that Ginkgo fruit that can help cure Alzheimer's diseases, for example. 38-00:23:29

Li: Yes, they sell it in the gas station now here. You can get your little like Ginkgo capsule with the—

38-00:23:33

Lin: Yes, right. Well, there are scientists who are able to analyze the active ingredients of ginkgo fruit and do the DNA sequence, analyze the sequencing and identify which segment of it is important for Alzheimer's, for example. They cannot cure Alzheimer's yet but I'm just talking about some TCM that can provide some relief to the symptoms. So there's the people:, biochemists, biotechnologists, gene engineer, who are able to identify that and make them in capsules or tabulates or other forms and sell it. So this is another business that is growing with big potential.

38-00:24:25

Li: Would synthetic materials be made? Is that something that would be done in a laboratory?

38-00:24:30

Lin: Well, this can be done in the laboratory. It is not something to synthesize the component. It's more like taking the natural product and kind of grinding it up or separating it.

38-00:24:47

Li: Right. It's distilling it.

38-00:24:47

Lin: And extract the ingredients, the essence of that, and then repackage as a capsule or disperse it in certain liquid as a tonic.

38-00:25:00

Li: Do you think the systemic concerns of Chinese medicine affect the way the scientific research is done? Like the ways in which the Chinese approach to the body is so different than the western approach to the body. Does it change the kind of biochemical work one does as a scientist?

38-00:25:21

Lin: Well, I see the benefit of both.

38-00:25:27

Li: But does it change the kind of research projects or kinds of research questions?

38-00:25:32

Lin: Yes, I think so. I think for like acupuncture. Acupuncture cannot cure everything, but acupuncture for certain muscular, skeletal, or nervous system illness may be very effective. If you have tendonitis, acupuncture is very good. How does acupuncture work? I have been to many acupuncturists. Sometime it can look very scary. But if you meet people who really knows how to do it, then it can be very helpful. They push needle, long and short into your body and you do not see any taint of blood seeping out. If you do see blood gushing out, that's not acupuncture, it's just somebody trying to drain your blood or kill you.

38-00:26:23

Li: And so do you think the scientific method changes when you're used to doing Chinese medicine during western?

38-00:26:27

Lin: Yes. I think this really give western medicine people a shock.

38-00:26:35

Li: That it works?

38-00:26:35

Lin: That it works. So there's some areas that the western medicine did not cover. So I think western medicine talk about muscle, talk about bone, talk about blood and nervous system. The Chinese talk about *chi* [氣] and *xieh* [穴]. I don't know how to translate this.

38-00:27:01

Li: There's no translation?

38-00:27:01

Lin: Yes. They must have. I just don't know. Talk about neurosystem, I think the function of *jing-loh* [筋絡] is something so different, and completely outside the scope of western medicine. Now, back to Pearl River Delta. There are a lot of people in Pearl River Delta working on This field.

38-00:27:21

Li: Well, it's interesting. That's why I was asking about whether or not scientists would work on developing synthetic materials and I think that's probably where the difference is most obvious, is in the biotechnology, not necessarily the biochemistry. But in western medicine, I think you would be more likely to see an attempt to create a synthetic material to put into a capsule, whereas you're saying that in Chinese medicine, you're far more likely to have the scientist working on extracting natural materials and finding a way to package that.

38-00:27:53

Lin: Yes, yes. And it's taking some of those medicines. Extract from herbs. So I think both approaches have their virtues, advantages.

[Narrator's Note: Chinese medicine seldom believes in a single magical agent for curing of diseases. It usually concerns with a combination of four ingredients in a typical medicinal formula: the course setter [君 *jun*], the target identifier [臣 *cheng*], the functional mover [將 *jian*], and the facilitator [佐 *zoh*]. It's the team, not just the quarterback. Borrowing the idea of American football, if I may. So identifying just one specific active ingredient is not compatible with the philosophy of traditional Chinese pharmacology. While I have taken a lot of herbs medicines in my younger days in Chaoyang, I have never attended a single class of Chinese Medicine, not even 101. Therefore my description above was a really out-on-a-limb attempt, just to show that how ignorant or risk taking I can be.]

38-00:28:13

Li: Do you think that the way in which Hong Kong and the Pearl River region has entered into globalization, do you think that the work on Chinese medicine that's being done in an area that is respected globally for all sorts of different industries, do you think that that's changed the way, for instance, medical professionals in the United States see Chinese medicine?

38-00:28:42

Lin: I think so. I think so. I think nowadays more science needs to be done in that area. One of the things needs to be done is standardization. I think that's very important. Before you can globalize, you have to standardize and quality assurance will follow. Then you know what to sell and what to make. So I think they are still working in this area. Once this is done, then I think this will have a lot more impact to the western medicine. And I think this is coming.

38-00:29:21

Li: It's interesting. For instance, a western market would be interested in advanced learning options and if down the geographic road there are sort of new medical options, as well. I would think that would also be important.

38-00:29:42

Lin: But I must say that the new solid state lighting that we talked about and the Chinese medicine we talked about, are also being pursued in many other

places—in Shanghai, you also see companies working on all kind of thing. In Beijing also. It's not only just Pearl River Delta. But Pearl River Delta is very fast catching to that and I think it has the advantage of being in Pearl River Delta, being in a region that is very open to the western world and get a lot of flows of information and people and capital and new business models. So I think it has that kind of advantage.

38-00:30:32

Li:

Are there particular areas of science and technology that Pearl River Delta area is ahead of Beijing and Shanghai?

38-00:30:42

Lin:

Well, I think they are very competitive. Well, they are doing well and in many of the electronics related industry, the Pearl River Delta is doing very well because they have a cluster of companies in that area. A cluster of companies, means that they have people who are in the broad general area. They do not compete with each other but they complement each other, or supplement each other. Like when you want to do Chinese cooking, making a good meal, you not only need to have the fresh fish, for example, if you want to cook fish, but you have also the other ingredients and spices, and the right utensils that come together. So these are the kinds of things. The associated related industries that can provide values to each other. It's the cluster. There is a lot of clusters in the IT and communication and electronics area in the Pearl River Delta.

FoxConn, for example. You heard of company Fox Conn? It is the largest electronic device manufacturers in China. Pretty much like Cisco in network devices. This company employs over four hundreds thousands people in the Pearl River Delta area. The company originates from Taiwan and have many managers from Taiwan to run the company. So this is an example of a Taiwan industrialist that work in the Pearl River Delta producing many, many products to sell to China and elsewhere in the world. It's hard to find a company in Shanghai that can do that in the same scale. So it is the geographical place and the historical place of being a gateway helps the development.

38-00:33:21

Li:

And did you say that there was one other industry that sort of sets the Pearl River Delta area apart?

38-00:33:28

Lin:

No, I'm saying that these are the type of industries. There can be more, yes. And I talk about the entrepreneur's company. Recently, one of my student's company, university student's company, is doing so well they are now moving from university back into Science Park and they want to expand the business. They are really doing internet marketing. You might say, well, what's so particular about it? But back in the year 2000 when he talked to me about it, I still kind of have some speculations about really how good they can be. He say, well, his technology is to help other companies do marketing. I said,

“Well, tell me how.” He said well, if you’re buying through the internet, then they automatically recognize you’re a customer. I am buying a book, okay, “Tomorrow Never Dies.” Then they say, okay, you are somebody who likes to read James Bond stories. So in the file they have my account and they will keep sending me James Bond books or movies. And not only James Bond. There will be Mission Impossible, and the like. So it helps the bookstores target their customers. Instead of giving prospective customers junk mails, it can target a certain customer and give him more relevant information. And only computer can do that. So you are buying Barbie Doll. I guess then you will be quite different from my interest here, you see? So buying this technology, they have ability to sort, to categorize, to associate and then to do that kind of marketing. So I think the business is doing quite well. So this is in the service area. So I’m saying that this kind of thing is happening now in Hong Kong and Pearl River Delta.

38-00:35:57

Li:

So you see this region as being able to adapt to changing Hong Kong, changing China, changing world? So this industrial center will have to change in the next fifty years, a hundred years, and 200 years and you think that this is—

38-00:36:12

Lin:

No, I don’t want to predict fifty years. Deng Xiaoping was doing fifty years. I can’t. But I think certainly our students will have the ability to recognize the change of the time and the ability to learn more technology, more new things, new ideas, new business model and to strive for excellence for that.

38-00:36:41

Li:

And do you think that the culture of the Hong Kong universities is important to this?

38-00:36:46

Lin:

I think it’s important in doing that. I think that’s what we have talked about in these ten, fifteen years. We try to tell students about that and the society about that. And I think they’ve become a believer. I think my speech on the Asian Society talked about the importance of using new technology, new ways of doing things in the new economy, for everybody. And I think at that time, the financial people still did not fully understand. Take insurance company, for example, technology has changed their ways of developing new products. In my day, when I was your age, the insurance companies would sell me just straight life insurance. I’m betting on the odds that if I win, and die, they’ll give my children some money, but if I lose, and live, I’ll pay them a penalty right? But now, you see, there are all different types of insurance products: protections, savings, investments, all different types are available based on information technology and this new tool. So I think technology will continuously upgrade the industrial productivity.

Another example is the aircraft industry. All the airlines companies, United Airlines, Northwest, buy their planes from either Boeing or Airbus. The planes are with kind of standard price with similar kinds of standard feature. So how do they make money? They are making money through their management of the seats, the routing, of course, and the maintenance. That all relate to technology.

38-00:38:38

Li: The logistics.

38-00:38:40

Lin: Yes. So these are all how IT is helping these company. So I think companies now in Hong Kong, financial, insurance, logistic or manufacturing, most of them, they now recognize that. They need technology to help them to get ahead.

38-00:39:04

Li: During the break, you were showing us where the Nansha IT Park is. And could you just describe for the record where that is in relation to—we've been talking about Hong Kong and the Pearl River Delta region, so—

38-00:39:18

Lin: Yes, yes. I think another major important people that I met is Fok Ying Tung, Henry Fok. First of all, Nansha is located in China. Actually, it's in the mouth of Pearl River, where Pearl River meets the South China Sea.

38-00:39:47

Li: And about how far from Hong Kong?

38-00:39:50

Lin: It's about fifty kilometers or sixty kilometers.

38-00:39:55

Hamilton: And how far from Guangzhou?

38-00:39:56

Lin: It's about fifty or sixty kilometers. It's right in the middle. And you can go to Nansha from Hong Kong by driving, go thru Shenzhen and then come north or you can go there by taking a ferry, a speedboat ferry. It will take about one and one half hour to get there. Now, you can go from Guangzhou to Nansha by driving but also and now by subway.

38-00:40:21

Li: And that subway line was developed specifically to go to Nansha?

38-00:40:26

Lin: That subway was specifically designed to go to Nansha. I think I should talk about the history a little bit for the record.

38-00:40:37

Li: Yes, I wanted to ask you. Can you just talk us through how it came into being, where the idea first came from?

38-00:40:42

Lin: Okay, okay. Yes. Good. I want to say before that, who led into that, is Mr. Henry Fok. Henry Fok Ying-Tung [霍英東]. He grew up in a very poor family. In fact, his family is so poor that they cannot afford a house. They lived on a boat and the boat was kind of floating around.

38-00:41:08

Li: So they lived on a boat?

38-00:41:08

Lin: They lived on a boat. Boat people.

38-00:41:11

Hamilton: On the Pearl River?

38-00:41:12

Lin: On the Pearl River region, yes. And there are quite a number of people like that. They do not own land or the property. So the boat floats around shipping stuff for people, or sometimes do some fishing, and sometimes do some entertaining by providing meals for people, and transportation, that kind of thing. So Fok was in a very poor family like this.

And then he grow up. If he lived, he would be eighty-eight or eighty-seven now. He worked very hard. And then finally he was able to live on the dry land in Hong Kong. He went to high school and later engaged in the transportation business, the shipping business, the ferrying business and real estate. His previous history, there's were many books about it but I am not a good person to talk about all those. In any case, he comes from a plain and humble background. He was recognized as a man of integrity and fellowship. During the Korea wartime, he was already very much in the local shipping business and the real estate business. At that time, United States and British, the UN side of the warring parties, imposed an embargo on China. Embargo. So there's nothing that can ship into Hong Kong or ship out of Hong Kong intended for China. And China has suffered severely. At the Korean War times, one of the things that's most needed is medicine, penicillin, that kind of things. Reportedly Fok Ying-Tung was instrumental in maintaining a supply of those medicines to China. So I think from Zhou Enlai down, Deng Xiaoping and others, are grateful for him because he was a friend in need. And Fok Ying-Tung did this at the risk of his own life and safety. And because of that, his business in Hong Kong was very much controlled and oppressed by the colonial government. In one instance, he has a large real estate development in Kowloon with the choicest property. The Hong Kong government just cut off electricity to it and forced him to give up the investment incurring great financial loss.

38-00:44:29

Li: That's subtle.

38-00:44:34

Lin: Right. And they cut off the telephone wire too. So Fok Ying-Tung really suffered because of his help to China. And the Chinese really recognized that. Fok was a man of few words and kept very low profile, but the Chinese government, the old leadership always consider him as a truly friend in need. Unlike many other tycoons or millionaires who went to Mainland China in this later days and tried to make millions on investments this and that.

In 1986 or eighty-five, at that time, it's about twenty-five years ago, China was like a third world country. But he recognized that China can be good for manufacturing, selling and making product because of cheap labor. And to do that, the product has to be able to get out. And to get out, you have to be able to let people know. So he advocated to have exhibits and product expo. To attract visitors to Guangzhou, it needed good hotels. So he built a hotel with his own money which is the White Swan Hotel. In 1986, at that time, China was still very much communistic. There were few hotels available. Travelers would stay at dormitory on campus, camps or official hostels. Not hotel. And he want to build a luxury hotel with full western standards in the 1980s. And that was pretty good, right? In Guangzhou, they were many doubters.

So the government let him do it but he had to do it all by his own efforts. So he has to manage all the material supplies, buy all materials and everything from outside and manage the construction project. It was like a thirty or some forty stories hotel. The White Swan. Still today, if you go to Guangzhou, I will suggest that you stay there because in today's standard, it's still a five star hotel. At that time everything was so difficult, not the least was government bureaucracy. Although the bureaus on trade and commerce were sympathetic to his cause, the security people was very skeptic and suspicious. When finally the hotel was up forty stories high, they wanted to put up their cannons, big cannon at the top of the hotel for security measures! This is a true story. I'm just telling you the difficulty that he went through locally despite the goodwill from the top leadership.

After he builds the hotel, he operates for ten years. In 1995, he donated this hotel to the Guangdong government without asking any return.

38-00:48:16

Li: Did he make his money back and then donate it?

38-00:48:18

Lin: No, he did not make his money back. I think probably he promised to donate the hotel to the government at the outset that he would do that at some point in time. Then he felt ten years is about that time. So he kept his words and donated the hotel to the government. So the White Swan Hotel is a kind of landmark for Guangzhou. And not only that, he built a lot of roads and bridges

in the Pearl River Delta region to facilitate transportation. One of the stories that came out is that four years ago, in the Guangzhou People's Congress, somebody was asking the government, why this bridge between Guangzhou and Dong-guan, a 20 year old bridge, is still collecting or even thinking about raising toll fares. It's like the George Washington Bridge, a very important bridge for the area. And the government replied, "Well, this bridge was built on loan and we need to pay back the loan." And then news reporters, dug into it and found that the people who gave the loan was Fok Ying Tung. And then they came to see ask Fok and inquired at the loan and the balance. Fok said, "All these years I have received nothing from the bridge because it was a donation." He gave the money to the local people to build this bridge as a donation and nobody paid back any money to him since he did not require them to pay back. After the story came to light, many red faced bureaucrats hastened to scrap the toll. Mr. Fok made no public comments.

38-00:50:26

Li: He made his money importing medicine to China? How did he make his money?

38-00:50:31

Lin: No, no. He make his money mostly in real estate business.

38-00:50:33

Hamilton: Real estate.

38-00:50:33

Lin: And also shipping business and may be others as well. I was actually not familiar with his business, except for the Nansha IT Park. I'm giving you this story just to say that he is a visionary and a patriot. I don't know him at all before I went to Hong Kong.

38-00:50:55

Li: How did you meet him?

38-00:50:56

Lin: Well, his son, Benjamin, came to my office accompanied by my colleagues Professor Ping Ko [Dean of School of Engineering] and Professor Roland Chin [Head of the Computer Science]. Apparently the Foks knew that I had worked with ITRI and Hsinchu which were quite famous even in Hong Kong. So his question was that he was given the rights to develop a twenty-two square kilometer land in Nansha. The location is in the geographical center of PRD and the landscape is beautiful. And of course he knew how to build transportation hubs. He build ferries. That's his business. He build ferries, bridges, roads, and he can build hotels. But he don't know what to do with the rest of it next. What to do on this piece of real choice land.

Later Mr. Fok and I got together and I said, "Well, what do I know?" All I know was development of human resources and development of technology. And I told him, "Well, better education and better technology are what the

Pearl River Delta needs in the future to enhance its competitiveness and to support its transformation in the knowledge based economy.”

38-00:52:20

Li: So does he approach you? Did you meet with his son at HKUST?

38-00:52:23

Lin: Yes, he did. I was the vice-president, new VP to HKUST.

38-00:52:28

Li: So recently after your arrival?

38-00:52:30

Lin: Yes. About a year after my arrival.

38-00:51:32

Li: His son came to see you.

38-00:52:34

Lin: Yes. And of course I made many speeches in many places and I guessed he knew many common friends, so he came to see me to say, well, what can he do with the area? So I say, “Well, what about build a science park as a center of technology support?”

38-00:52:56

Li: Do you know if he went and spoke with other people asking their advice?

38-00:53:01

Lin: Well, I think he did. He did. Certainly he consulted Professor Chia-wei Woo. But some of the people probably told him it might be better to building hotels and entertainment park. He did build a golf course in Nansha. And he did build a place that can do expos, product exhibits and that kind of thing. But he was not very successful in there. So to him I said, “Well, If you look at the examples of Taiwan and Singapore and Korea and many other places, you will know that building the support to the future economy is very important.” And the support was to come from technology, which was originated from people. So I say the best thing then to do is to build a science park to attract people to come in and new technology to be developed and new business would follow in time.

He liked the idea. I showed him the data that I just showed you, similar data which show that the values from the PRD region was low and the need to upgrade. So he says it’s good. So how are we going to go about doing that? So he signed an agreement with HKUST to build a science park in Nansha.

So Professor Woo and I went to see the Ministry of Science and Technology in Beijing. The Minister is Dr. Zhu. Zhu is a lady whom I have met a few years back when I first visited the CAS in Beijing in 1993. After our visit, Mr. Fok also met with Dr. Zhu on another occasion

38-00:54:53

Li: What's her first name?

38-00:54:56

Lin: Zhu Lilan. [朱麗蘭] Zhu.

38-00:54:58

Li: Lilan.

38-00:54:58

Lin: Lilan. Zhu Lilan. She's retired but still professionally active. We explained what we planned to do in Nansha and if the Ministry could join us for the effort. I hoped at least the ministry would support it with the same policy for similar national science parks. So technology company comes in to the science park will be eligible for all the policy measures such as text holidays, etc. I hope that the government instruments can be extended to the Nansha science park.

And she said that at that time China has already fifty-three science parks under the sponsorship of the State Council. Some are successful, most are not. So the government has decided not to build any more national science parks. Guangzhou already has one. But the Nansha case does look to warrant special consideration since it is a project supported by both HKUST and Mr. Fok Ying-Tung and Dr. Lin will be taking charge. Of course, Mr. Fok is a respected friend of the State. So she felt that with all these elements, the Ministry should find way to support it.

We also discussed with other high-ranking officials of the Ministry including Dr. Xu Guanhua [徐冠華] who two years later succeeded Dr. Zhu as Minister. Finally the Ministry suggested that the Nansha Park can be recognized as a part of the Guangzhou High Technology and Economic Development Zone. The Park size, 2.5 square kilometers, should be included in the Guangzhou High Tech Zone which would subtract the same number of land from its original plan to accommodate Nansha IT Park. In this Zone there will be multiple parks. One of them will be in Nansha while the rest of the parks will be in Guangzhou city proper. With this, the Nansha IT Park was to be under the jurisdiction of M. O. S. T. In other words, in all formal documents, 2.5 square kilometers of the Guangzhou High Tech Zone will be located in Nansha. And, therefore, the Nansha IT Park will be administratively considered as part of the Guangzhou high tech zone and all governmental policy instruments regarding science parks will be applicable in Nansha.

38-00:58:34

Li: So it was not a new science park, it was an extension of an existing science park.

38-00:58:40

Lin: It's not a new science park.

- 38-00:58:40
Hamilton: Interesting.
- 38-00:58:43
Lin: Right.
- 38-00:58:43
Li: Bureaucratic.
- 38-00:58:46
Lin: Yes. Well, it merits special consideration because of HKUST and of Fok Ying Tung. I think my credentials also sounded rather unique at the time. With all these conditions together, she felt that the government has to support it. And we do not need government's money, just the policy, nothing else.
- 38-00:59:06
Li: It was just a stamp saying this is okay, this is okay to do this.
- 38-00:59:09
Lin: Yes, yes. So then we go ahead to build this park in Nansha.
- 38-00:59:16
Li: And how about the neighboring community? Did any—
- 38-00:59:18
Lin: A very good question here. First of all, Mr. Lin Shu-shen [林樹森, Mayor of Guangzhou, extended his welcome and offered his assistance. Why? The focus on technology in Nansha will highlight the importance of the Pearl River Delta in the national landscape and complementary to his future plan of Guangzhou. He is also a visionary person whom I have enjoyed working with. Mayor Lin said, "How can I help in this project?" Then I said, "Mr. Mayor, two things. One is to become an investment partner. Mr. Fok will put in a total investment of about 200 million dollars.

Begin Audiofile 39

- 39-00:00:00
Li: This is Robin Li and Emily Hamilton speaking with Otto Lin October 15, 2009 at Ann Arbor. This is tape thirty-nine. Sorry. So I interrupted you. You were saying?
- 39-00:00:21
Lin: The community.
- 39-00:00:21
Li: How the community responded.
- 39-00:00:23
Lin: Neighbor. Yes, right. The major community of course is Guangzhou city. The mayor of Guangzhou recognized this and I said well, there are two ways you can help. One is to become a partner with HKUST and Fok Ying Tung

Foundation. So he said okay. So I said, “Well, it’s not just okay, you have to put some money into it.” So he agreed to put ten million dollars hard cash to tag on Mr. Fok’s 200 Million. This is very rare in China.

39-00:00:56

Li: Hong Kong dollars?

39-00:00:58

Lin: No, Renminbi. This is fairly sizable at the time.

39-00:01:00

Li: Okay.

39-00:01:01

Lin: At the time, one Hong Kong dollar is about 1.2 dollars Renminbi. Now today it’s just reversed. And the second item I said is to build the rapid transit system [subway] to Nansha area to make it easily accessible to and from Guangzhou. So the Guangzhou people will be able to come. This is important especially locally. In China, you are not allowed to live anywhere you want. You are only allowed to live as a resident with all legal rights and privileges only if the government approves it. People are not allowed to just move into Guangzhou unless for a cause approved by the government. This will help our recruitments.

39-00:01:58

Li: Twenty million?

39-00:01:59

Lin: Ten million. So with 200 million from Fok Ying Tung, so it totals 210. And then the GZ Nansha IT Park Ltd was formed. All the corporate structures are very complicated and I don’t think we have time to explain. But Fok Ying Tung Foundation form a company with HKUST in equal partnership, fifty/fifty. Mr. Fok, the foundation, will put in 200 million Hong Kong dollars in cash. UST would put in just the brainpower.

39-00:02:41

Li: Priceless. Priceless, right?

39-00:02:43

Lin: Yes, our intellectual property, past experience in working on science park, innovation system and future institutional efforts in working on it: this represents our IP. So a corporation is formed with the new partner with Guangzhou municipal government to put in twenty million. So they formed the Nansha IT Park Corporation. If you look at the website, you will see the three pictures, Fok Ying Tung, Mayor Lin and myself still on the [original] website.

39-00:03:08

Li: And what about Beijing? Did they have any—

39-00:03:09

Lin: No. Beijing has no other roles.

39-00:03:13

Li: Okay. It doesn't voice any opinion?

39-00:03:15

Lin: No. It won't happen because this is how the science parks are formed. Because we told him that we do not need any Beijing money here.

39-00:03:25

Li: Right. So it's just the local government?

39-00:03:26

Lin: Just the local government. And over ninety percent of the money is coming from private. So there's no problem. Before all this is settled, I told Mr. Fok, I said, "Well, Mr. Fok, in building science park, it's not a profit making position." I say, "Well, if you want to make money, you can build the infrastructure, the access roads, bus company or ferry company or hotel. Or you can invest in companies to develop certain technology products in the park in the future. But the park itself, this is more or less a government function." Mr. Fok looked at me firmly and said, "Well, Professor Lin, I'm doing this not to make money. If the park does make money in the future, I will donate every dollar to me for charities, education, cultural, scientific developments." So I feel pretty good with his commitment. I feel in Nansha IT Park, I'm really not working for the benefit of a company, for a private person, but to help enrich the community, the society at large.

39-00:04:57

Li: Did this seem similar to Hsinchu or more satisfying? Did you feel more free with this science park than with Hsinchu?

39-00:05:06

Lin: Yes. In Hsinchu, it's very interesting because the government basically put their trust in me. And we're doing it totally for public good, to build Taiwan. Not for any personal return or anything. At that time we do not talk about exit policy. I think if you are talking to any VCs, they always ask what's the exit strategy. We have no exit in ITRI or the Hsinchu Science Park. We simply will put in our best efforts. Well, if we have problems then we will resolve those problems, we're make those projects a success. There's no exit. So that's our attitude in Taiwan.

But now in Hong Kong, Hong Kong government will not do anything in the Nansha IT Park. You see, Hong Kong government cannot spend money in Mainland China. I was told, this is the "one country, two system" principle. Even Mr. Tung is a very good friend of Mr. Fok and the program is good for the future of Hong Kong. He cannot spend money in Nansha. Actually, I was disappointed. I said, "Mr. Tung, you do not need to spend money in Nansha, but I think there are some policy matters you can do in Hong Kong." Just like

Guangzhou government will do to help Nansha. Make people easier to go to Nansha. Facilitating the education, research, and the transportation, between the cities. That will help.

39-00:06:57

Li: He wasn't interested?

39-00:06:58

Lin: He could be interested but nothing has come out from the HKSAR government. This is not his priority really.

39-00:07:07

Li: Did this feel more satisfying to you because it was Mainland China? Did that seem like a special opportunity to you?

39-00:07:16

Lin: Yes, yes. And to me, I think it's an opportunity to build this place in the Chinese Mainland which is a bare piece of farmland. To do this kind of thing, to transform this farmland to a base of high tech, I think, is fascinating and it certainly can be a role model for the rest of the country.

39-00:07:41

Li: Was S.S. Shu still alive at this time?

39-00:07:45

Lin: Shu Shien-siu?

39-00:07:46

Li: Yes, your mentor.

39-00:07:47

Lin: Yes, my mentor is still alive at that time. Actually he helped. He has met Mayor Lin on a later visit to Guangzhou. I think he was very happy to do this. And he also visited the park.

39-00:08:00

Li: Well, because I'm reminded of his initial vision of the property in Hsinchu when you showed us earlier that slide of Nansha.

39-00:08:07

Lin: Right, right.

39-00:08:09

Li: Of him taking you to the—

39-00:08:10

Lin: That's right, that's right. That's right.

39-00:08:10

Li: It did seem like a similar situation.

39-00:08:11

Lin: Yes, that's right. And he's a great supporter of that. And when he met with the Mayor and other officials, he spoke out for me. He's a great person. So really, my motivation is to try to build this place and be a role model for the rest of Pearl River Delta. And not only for Pearl River Delta, for the rest of China. How a city, how a region, how a community can transform itself.

39-00:08:44

Li: What was the stated mission of the park?

39-00:08:47

Lin: The stated mission of the park is to build this as a center of technology support for PRD. Specifically, this Nansha Park is to expand opportunities for Hong Kong business, to nurture high tech business in the area and to help increase the productivity of the Pearl River Delta. Those are three stated missions.

39-00:09:17

Li: And what was your official role in the park?

39-00:09:20

Lin: The park company is formed. Mr. Fok is the chair and I am the vice-chair plus CEO. We do not worry about those titles. And at this point we should talk about Mr. Ho.

39-00:09:38

Li: Right. I was going to ask about him.

39-00:09:40

Lin: Ho. M.S. Ho, his name.

39-00:09:43

Li: What's his full name?

39-00:09:45

Lin: Ming Sze Ho [何銘思].

39-00:09:47

Li: Ming Szo Ho.

39-00:09:47

Lin: Ming Szo Ho is the right hand man of Mr. Fok. I think I spelled out his name here. Mr. Ho is an exceptional person not conforming to the normal rules of games in business. I have never saw him wore a jacket and tie. He appearance was curious, it seemed, reflecting his unusual background. He was a hardcore communist. He was a revolutionary zealot. I can use many terms to describe Mr. Fok: pioneer, patriot and philanthropist. For, Mr. Ho, it would be: idealist, revolutionist, hardcore communist. How can a hardcore communist become friend with a dedicated KMT member? As I told everybody, I am a resolute believer of Sun Yat-sen, and a member of the KMT which he founded.

Mr. Ho has done something very special that show his true color. It was with the Tiananmen Square incident. As you know the tragedy took place in June 4 of 1989. At that time, Mr. Ho was the second in command of the Chinese Communist machinery in Hong Kong. He was the associate director of the Xin Hua [New China] News Agency. Xin Hua was the unofficial Chinese government representative in Hong Kong. And he is the second in command. So when Tiananmen took the turn with un-armed students been slaughter, Mr. Ho was distressed with it. The scenes of tanks marching and crushing through the Tiananmen Square had wrenched his hearts. So what he did is that on the next day, he put an ad in the newspaper that said, "I hereby surrender my membership in the Chinese Communist Party and resign from the position of the Xin Hua News Agency." Wow. What a courageous person. I think it's not easy for anybody to do that. And for this reason, I have held Mr. Ho in high regards.

39-00:12:03

Li: He could be put in prison for that, right? He could be put in prison for that?

39-00:12:07

Lin: Yes, he could be put in. And then, of course, he ran to Canada.

39-00:12:13

Li: As all the revolutionaries do.

39-00:12:16

Lin: He ran to Canada.

39-00:12:18

Li: He fled to Canada.

39-00:12:18

Lin: He ran to Canada. And, of course, Mr. Fok knew Mr. Ho over the years of interactions in Hong Kong. Mr. Fok was very respected by the Chinese government and Mr. Ho was the person that run the Chinese machinery in Hong Kong, so they know each other. And Mr. Fok admired and respected Mr. Ho for his action. So he went to Canada one time, two times, three times.

39-00:12:59

Li: Mr. Fok did?

39-00:12:59

Lin: Mr. Fok. To get Mr. Ho to work for him. So Mr. Ho become the advisor of the Fok Ying Tung Foundation.

39-00:13:09

Li: And did he go back to Hong Kong?

39-00:13:11

Lin: And then he went back to Hong Kong.

39-00:13:12

Li: And that was safe for him to do because Mr. Fok was—

39-00:13:15

Lin: And then so Mr. Ho was working under the Fok Foundation. And with Mr. Fok, the Chinese government just closed its eyes, just basically let him do whatever he wants. And actually, Ho was still a great patriot and was concerned with the future of China. He still supported Mr. Fok to invest in Mainland China and to build Pearl River Delta. His disagreement with the leadership was on the Tiananmen Square situation. He is still an advocator of the Chinese communism, of the socialist system and so on. Although nowadays he has many different thoughts about it. But he's basically very much a PRC person, you might say.

39-00:14:13

Li: So what did he make of the national innovation system idea, the importance of a science park?

39-00:14:17

Lin: I talked to him. He respected me.

39-00:14:21

Li: And he thought that there's a place for that in a communist economy?

39-00:14:24

Lin: Well, he just said that that's the way to go and you will do it. Mr. Ho and Mr. Fok's had a curious combination of working relationship. Mr. Fok is a person of few words. In a meeting, staff meeting or something, he will just sit there and fold his hands and when he need to say something, he just ask Mr. Ho, "What do you think, Mr. Ho?" [laughter]

39-00:14:57

Li: So they were very close.

39-00:14:59

Lin: They were very close. Mr. Fok trusts Mr. Ho for all the PRC projects. Mr. Fok builds the Friendship Hotel in Beijing and there are many others. And I think like the many other people, he is a sports fan and played the soccer. He made numerous donations to many of these athletics and sports events all over the country. But as far as Pearl River Delta and South China goes, it's Mr. Ho. Everybody knows that what Mr. Ho does was what Mr. Fok wants. Mr. Ho is a writer and well versed in the Chinese literature. He write speeches and major letters for Mr. Fok.

39-00:15:45

Li: So in the day-to-day building of the science park, I was wondering how the collaborative relationship worked between the Foundation.

39-00:15:55

Lin: Basically I run the place.

39-00:15:58

Li: And consulting with Mr. Ho?

39-00:15:59

Lin: I just brief them maybe once or twice a month what the situation. And they have so many other projects. This is just a small pie in the plate.

39-00:16:11

Li: And Guangzhou in terms of Mayor Lin? Did he—

39-00:16:13

Lin: Mayor Lin He has a representative in the company in the board of directors.

39-00:16:23

Li: So also not really involved in day to day?

39-00:16:24

Lin: No, not involved with anything. They're interested in the program. The park, when the park was built, they might have some companies in there and might need some money. The city runs a VC fund, so that VC can invest. So actually, they're very supportive in that. But we did encounter many problems and the problems did not come from Guangzhou. The resistance is coming from the neighboring community.

At that time, when this company was established, the administrative hierarchy is like this. Nansha [南沙] is a township under the jurisdiction of a county called Panyu [番禺]. Panyu reports to the province of Guangdong [廣東]. Guangzhou [廣州] is the province capital city, also reports to Guangdong. So in that sense, Gaungzhou and Panyu, although different in size and importance, are kind of in the same level of administrative hierarchy. But inside Nansha we have this little park, the IT Park, which has some national status. However, everything we want to do we have to report to the township of Nansha which in turn reports to Panyu. Everything. Suppose we want a install a new fire door to a lab, we need to get Nansha's and Panyu's people to approve it. We want to have a chimney or a vent or sewage, we need to get their approval to do those. We want to do any landscape and gardening, which may involve zoning and need to get approval. It's so very difficult.

The local authorities are more interested in selling the real property and be in the real estate development business. This is the fast way to make money. But then this Otto Lin comes along and says, "Well, you should not make money now but later, and probably more." right. [laughter] It's difficult for them to see why they wanted to do that. And most of all, this IT Park, has no bearing in their performance. Technically, it reports to Guangzhou high tech zone.

39-00:19:02

Li: Oh, right, because you took that small part out of the original Guangzhou.

39-00:19:05

Lin:

Yes, yes. Right. So you see, the difficulty is in the daily operations. Every time we want to have somebody to have a fire inspection, you have to go to them and they just sit on it. We want them to come to inspect our laboratories so that we can operate. They just sit on it. We want to build an small, winding footpath around the lake, they insisted on the fire code that any pathway has to allow passage of fire trucks. So government bureaucracy has become very frustrating for the park.

39-00:19:43

Li:

Yes. So did you have to find an advocate within that level of government to help you?

39-00:19:48

Lin:

Yes, yes. But actually, everybody said Fok Ying Tung should be the person. Everybody knows him. Everybody respects him. But even Mr. Fok cannot lean on the local people to approve every papers that come along the way. And he did not want to exercise undue privilege. So it makes things very difficult for us. All these local bureaucracy was just unbelievable. It's monumental, I should say.

39-00:20:22

Li:

Worse than Berkeley?

39-00:20:25

Lin:

Much worse. During this time, I talked to Mayor Lin and he recognized this problem immediately. He has a very innovative idea. Without saying much he was doing something in the background. He has instituted a merger acquisition for Guangzhou to acquire Panyu.

39-00:21:02

Li:

The whole city?

39-00:21:03

Lin:

The whole county, to become part of Guangzhou city.

39-00:21:12

Li:

Wow.

39-00:21:12

Lin:

Wow, yes. And therefore Nansha, under the new system, would be at a par with Panyu and become districts of the city of Guangzhou.

39-00:21:28

Li:

So does he just need to get permission from Beijing to do that?

39-00:21:30

Lin:

Of course. And then Nansha will become a district of Guangzhou.

39-00:21:34

Li:

Right. Yes.

39-00:21:35

Lin: So this means that the local Nansha administration will be reporting to Guangzhou. Right. So everything we want to do, we can just go through this route with the Guangzhou city government has the final say.

39-00:21:44

Li: How did he do that?

39-00:21:46

Lin: How did he do that? He had to go through the National People's Congress to get the permission.

39-00:21:49

Li: And this wouldn't have happened if it weren't for the science park, right?

39-00:21:54

Lin: Well, I will say this. Certainly the science park is a major catalyst for this. Because after we started this work in Nansha, they reviewed the situation and concluded that it is time for Guangzhou to expand grow. You see Shanghai has its Pudong. You know Pudong. Pudong is now very big, become a very important international city of trade, and air transportation hub.

So where can Guangzhou grow? There's really no other place if you look around. On the east side is Dong-guan, which is already a very established industrial zone and it's the major tech business center for the Guangdong province. Guangzhou cannot touch that. On the north side are the mountains. There is nothing you can do. On the west side, there are historical cities. And, of course, Guangzhou city is banking with the Pearl River and is recognized as important river port. And once you come to Nansha, it is at the mouth of South China Sea. It will become an ocean city and can touch the world. Somehow this further give Mayor Lin the incentive of wanting to come to Nansha. So he set up a plan to build Nansha a part of Guangzhou. He want to develop nearly 400 square kilometers in the Nansha and the neighboring area in his new Guangzhou Master Plan.

39-00:23:59

Li: So do you think this seed existed in his mind before he supported the idea?

39-00:24:02

Lin: Yes. Whether he had this idea before, I think success has many parents, right. But I think he has very much in his mind that Fok Ying Tung will be supporting it, HKUST will be supporting it and Beijing would be very warm to this development, as evident from the extraordinary endorsement of the Ministry of Science and Technology for the Nansha IT Park. So I think it is natural for the city to talk about science, technology, entrepreneurship and globalization. So it is natural for him to join the Nansha IT Park. And once he does that, Guangzhou city is not just a river port anymore. It's the ocean port. It's an ocean city. Then he can build piers for ocean liners to go in out of Nansha. And somehow he would attract the people in the western China to

ship their goods using Nansha as a seaport. Previously manufacturers in the western part of China have to move their products through Yangtze River to Shanghai. Afterwards they can truck products on the land to Guangzhou, then to Nansha and can be shipped around the world. This is another major economic feature for Guangzhou. So he made a plan to annex Panyu into Guangzhou.

39-00:25:30

Li: And when did he do this? Do you know?

39-00:25:34

Lin: 2002.

39-00:25:35

Li: So just right around when the science park opened.

39-00:25:38

Lin: Well, it's just before the Park opens. If it were not for this, I think the park could not be opened in 2002. So the annexation is around 2000-2001, I think. Yes, 2001.

39-00:25:48

Li: So this helped support the—?

39-00:25:50

Lin: Oh, yes. This helped support the park. But the People's Congress has to approve that first. He made his case, made his appeal with the People's Congress which approved it. Therefore Panyu is no more a city. It become a district of Guangzhou and he elevate Nansha also to become a district. So in that way it helps the park.

39-00:26:22

Li: The mayor of Panyu must have been very distraught by this.

39-00:26:25

Lin: Yes. Well, it doesn't really matter because the mayor of Panyu, as it turns out, was soon to be put in the jail because of corruption; so was the Party Secretary. They are not in anyway poor, however. I have just said about fire inspection. We have to get a local company to inspect this first to prepare for formal government inspection. The local company is run by his close relative, or brother-in-law, or something. If I need to have the sewage done, the sewage may be done by his neighbor or relatives or something. So it's, all in one family. A very closely knitted system there. Around 2003, Mr. Ho had written a series of articles in the newspaper talking about the difficulties of Mr. Fok's venture in Nansha. And he said, "Well, even a man like Henry Fok, whose integrity, fame and patriotism were proven, has encountered such difficulties. Can one imagine the challenges to a common investor or person, the monumental difficulties that he will encounter." His passionate articles has become very widely circulated.

39-00:27:48

Li: So popular opinion supported this annexation of Panyu?

39-00:27:52

Lin: Yes, yes. That's right. Yes, yes.

39-00:27:56

Li: So in developing the park, what did you do differently than you did in developing ITRI?

39-00:28:03

Lin: Well, during that period of time we are just building this park and then we just put a certain number of different laboratories into that and try to introduce it to MNCs, multinational companies, hoping that they'll come and play the role of the anchor. Once we can put it as an anchor, we would try to set up some entrepreneurship companies to go around it. It turned out that some of the companies, do not have the financial resources. A lot of MNC companies are interested in that, including the Cathay Pacific Airline. They are using that as the base for developing customer service package.

39-00:28:58

Li: So instead of having a group of scientists with a specialty in working with industry, you really developed a space and asked industry to come in and to have a scientific center there?

39-00:29:10

Lin: Yes. And we can provide a group of technical people to support them at the university. Faculty can become consultants, students can work for them. And if they need computers, any facility, we can provide them with that. So this is a collaborative relationship.

39-00:29:36

Li: Who was the facilitator in sort of knowing the strengths of the faculty and especially the students at the university and connecting those people with each other?

39-00:29:47

Lin: You are speaking to him now. Yes. And, of course, we have a group of faculty that work with me on that. Now, recognize that that time is 2000. This is before most other universities in Hong Kong wanted to build relationship in China. We are very early. And people are very enthusiastic about that. All right. So the park was built and finished and I think we have a soft opening in 2002, December 29. And then come 2003, the first of April. I would be to retire from HKUST after six full years of service. But the University asked me to remain as VPRD for a bit longer until the new man comes in.

Now, the vice-presidency in UST is kind of tricky because there are two VPRD before me. One is Professor Tom Stelson, formerly of Georgia Tech and the other is Professor Eugene Wong of UC Berkeley. I don't know whether I have talked about it, they both did not serve their full terms.

Basically they had returned to the U.S. early. Obviously, there's some difficulties working in this environment. First of all, Chia-wei was not an easy person to work with for these two gentlemen. They are very distinguished scientists and academic administrators, but they do not know the culture of the locals, Hong Kong, and China. So when I came to take this position, I have a feeling that it's not a typical academic job, and I will have to do better. Eventually I have lasted for six years, serving two full terms. At that time, I am about to reach my sixty-fifth birthday. When you are reach sixty-five, you must retire under the Hong Kong system. Usually people retire at sixty but you can go on to sixty-five. Actually, I go on a little bit longer than my terms, just a few months waiting for the new man to come. So it's okay. That's just a few months. So I served my two terms. So in the end of June, 2003, I retired from the university.

But I have retired from the university, from the position of VPRD, I was still appointed as senior advisor to the President on a part-time basis. I was still on the University's roll, but not on a permanent position. And it was on part-time basis. While serving as senior advisor to the president, I also hold professorship with two departments: Industrial Engineering and Engineering Management Department and also the Chemical Engineering Department. So I gave courses on innovation system, management of technology, that kind of thing in the departments.

39-00:33:21

Li: So how did your day-to-day job change after you retired?

39-00:33:26

Lin: Well, after I retired, I still have an office in the university. I still go there every day.

39-00:33:36

Li: You still teach. You still advise.

39-00:33:40

Lin: Yes. I got more time to myself and less pay, of course.

Note Added: During the six years as VPRD, I have written a number of pieces on my view of the future Hong Kong, Pearl River Delta and how to prepare ourself for the knowledge based economy. A number of these are shown in Appendix 706, 707 and 708.]

But things never stand still for me. Around this time, a local Hong Kong business leader came to me with a proposition. He is Herbert Lee. Herbert is a true gentleman; a man of integrity, very caring and cultured. He has accomplished well in the textile business with worldwide contacts. He has heard me talking about technology, innovation, entrepreneurship and became interested in investments to high tech companies. So he wanted to set up a company with me as CEO to run it. I have always maintained some interests

in VC. So I took the offer and got into the VC business from mid-year 2003, which lasted until 2005, for two years. We called this company Tsing-Tech Innovations. I don't know whether you know my website. I was president of this company for two years. For most of the time I talked about the innovation system, I was associated either with the university or with the institute. Now it would give me a chance to work on the business side. So that was kind of interesting. I was working not on high tech business per se, but as a VC to support different types of technology ventures.

I told Herbert that I would not be supporting projects from just HKUST, I would try to identify projects from any place in China. So we worked very much with Tsinghua in Beijing, with Nanjing University, and with many other institutions. We would also find other vc's as partner on specific project. At this time, the VC business is tough. Particularly after the IT bubble breaks, it's kind of depressing. And I told Herbert that it would take many years for the VC to bear fruit; and he promptly understands this.

But at this time, Nansha still occupied a soft spot in my heart.

39-00:36:07

Li: I was going to ask you, were you still visiting?

39-00:36:09

Lin: I was still a director of the Board and Mr. Fok did not want me to leave Nansha. I told him that I could not and should not be vice-chairman of the IT Park company." I was vice-chairman because I was vice-president of HKUST and took charge of the program because of it.

39-00:36:26

Li: So whoever's vice-president of UST should be—

39-00:36:27

Lin: Yes, I think so. But Mr. Ho was unhappy with my dis-engagement. He said, "Well, we want you to be that person to run the Park" So I said, "No, you've made it difficult for me." So I only agreed to still be a director of the board of the Nansha IT Park Corporation.

39-00:36:45

Li: And did you still have an office in Nansha?

39-00:36:47

Lin: I have an office in Nansha, in fact, more than one offices all together. I was still a board director of Nansha Science Park Corporation, while being president and CEO of Tsing-Tech innovations. Tsing-Tech had an office in Beijing, beside Hong Kong. I also have an office in UST. So I was busier than when I was VPRD.

39-00:37:07

Li: It's making me wonder about this retirement.

39-00:37:11

Lin: So that's why I have no credibility with Ada and the children as far as retiring goes.

39-00:37:17

Li: About retiring?

39-00:37:17

Lin: Yes, yes. On the other hand, I have often told people that my expertise is retirement because I've done it several times. So it was a two-year period that I work with the company. It was cut short because, all around this time, Mr. Fok and Mr. Ho, came to me many times. He said, "Well, if you have retired from UST, then you have more time available and should be full-time with the park." You see, originally I did not want to be full-time with the Park for reasons that I cannot tell them. This was that I did not feel I would be adept to their management style. Mr. Fok is the nicest person, patriot, pioneer, but passive and left decision making to Mr. Ho. Mr. Ho is a scholar in heart, an idealist, and revolutionary. A revolutionary does not do things like most business person. He does not conform with normal business process where you do analysis, discussion and take actions. A revolutionary is someone who has his own idea in mind and just going for it. Although for the science park itself, it was very limited and defined in scope and basically whatever I do, he agrees. And however I build this park, he agrees. They of course have recognized my dedication and that I have no axe to grind. Because of my past records, they gave me total freedom. But basically I know that it would be a difficult position to work with Mr. Ho and Mr. Fok. Because all are strong willed persons and like to operate with their own corporate culture. So I have some hesitation in that.

39-00:39:21

Li: And what was your fear? Just that you wouldn't be able to make decisions?

39-00:39:29

Lin: Yes. Well, at that time, for the first phase of the Nansha IT Park, I was a guest. I was representing UST. I have my own stature. But if I were to work for their company there, the Fok Ying-Tung Group, I would become one of their employees.

39-00:39:54

Li: Right. And the hierarchy was—

39-00:39:57

Lin: The hierarchy is something that I feel a bit uncomfortable. So I did not want to work for the company itself. I guessed they finally recognized that. He said, "Well, we can set up a company for you and you will be CEO for this company."

39-00:40:16

Li: Separate from the—

39-00:40:18

Lin:

From the Fok Ying Tung Foundation. So we set up a company called China Nansha Technology Enterprise [Ltd] which is to manage a new large-scale investment from Fok on building an innovation system in Nansha. With that, I will have to work full time with China Nansha. Accordingly, with much regret, I left Tsing-Tech. Herbert is a very understanding person, to this day, we still see each other often.

Actually, I had tried to bring out the down side of all this. I told Mr. Ho that, when we set out to do the first phase of the Park, Guangzhou has played only a small role in Nansha. But now, in only 5 years, Mayor Lin has put out this 400 square kilometer master plan in action and wanted to make Nansha larger than Pudong. Basically this is what he has in mind. Therefore, in the new Nansha, he build pier and warehouse facilities to make it a port for ocean going containers. Now it's doing quite well. It's become one of the top five or six ports in China now. And he has also carried out the promise to build a subway linking Nansha to Guangzhou. He was also able to attract Toyota to build a state of the art automobile assembly line in the neighborhood of Nansha. And because I talked repeatedly on the importance of education, he has supported and get the Guangdong government to build a metro university city between Nansha and Guangzhou.

How this came out is that all the universities in Guangzhou area, Sun Yat-sen University being the most famous one, and the South China University of Technology, being the number 2, included, have no room to grow. They are all in the city. They are all restricted in a confined environment. And with more people wanting to go into education and want to learn technology, all universities are in need of space.

In Mao's time, in Mao Zedong's time, Mao hated scholars. Mao dispatched the scholars to the countryside or the farmland to feed the cattle, plough the field and doing similar kind of thing. He wanted the scholars to be "down to earth" and to learn from the farmers. You know about those stories, right? But after Mao was gone, Deng Xiaoping came in and recognized that you need the people: the brain and the heart, to improve technology and boost productivity. So university, education, scientific research gradually returned to its place and gradually moved to the limelight as national priority. Now there's a lot more students wanting to go into university. And, of course, some of them can afford it, some can't.

So all these universities want to expand but there's no room in Guangzhou to enable them to do that. So Mayor Lin convinced the governor of Guangdong to put up the money as loan to the universities. Land is no problem when the government wants it. So between Guangzhou and Nansha they built a mega university compound and give more space to all the universities, all the institutions of higher learning in Guangzhou area. You want to expand? Okay, I'll give you a piece of land there.

39-00:43:46

Li: So move them out of the city and into this mega campus ?

39-00:43:48

Lin: Yes, yes. They can retain their campus, their old campus. But whenever they want to expand, they have moved into this area.

39-00:43:57

Li: So they could all have extension campuses.

39-00:44:00

Lin: Yes, extension campuses. Not just University A, but University B, University C, D, F, G. Ten universities of the Guangzhou area all share this this mega campus. Initially I took a dim view to this idea. I said, well, different universities have different cultures, traditions, and emphasis. Putting them together like production lines seems to be against the individuality that institutions of higher learning need. But he felt that if the land is big enough, each will have their separated campus with the convenience of common facilities for service: dormitories, perhaps, big football field, gym, library. And then the government got the money so he got the go ahead signal to do it. He did not need my advice. In any case, I heard it has been going quite well. It now houses more students than all the original university campuses in Guangzhou. How successful are they as education institutions, I think only time will tell. My view of university education might be more traditional. and his might indeed be better for the time. But each university in the extension, in this new campus, can pick their own design, architecture, layout and so on to remind them of educational independence and uniqueness. So I think that part I was fairly happy about.

39-00:45:51

Li: What were you doing for China Nansha Corporation? What were the duties of that?

39-00:45:45

Lin: I'm talking about this as things evolve, jumping a bit here and there. The world is also moving very rapidly. So I told Mr. Fok that, well, originally Guangzhou was not doing very much but now in these last five years, it has put forth and moved along a lot of projects in this region. So you are stand to gain from all this development. He said, "No, that will be too slow." And he said all this development would be coming from many directions and digressions. It would probably detract from our original thinking of technology and human resources development. He said we should pursue our original route to make Nansha the focus of human resources, technology development and business innovation. He has authorization to develop twenty-two square kilometers in Nansha. That parcel of land sits in the center of this 400 plus square kilometers in the Master Plan. It's become a very small and central part. So he wanted to build a special feature to give his piece of land some differentiating characteristics to show competitive advantage for the future.

So I said, “Well, if you want to do that, then you really want to build an innovation system there.” I said, “You cannot wait for the university to develop.” We can ask HKUST to build a graduate school there and also to set up some research centers. Also you need some fund to use as a VC. So he said, “Okay, let’s do it.” So I was working on the Phase II Program of the Nansha IT Park with an injection of 800 million HKD new money. Appendix 703 is a summary of the Nansha IT Park Phase 2.

Mr. Fok and Mr. Ho agreed on the 800 million dollars figure and the establishment of China Nansha Technology Enterprises as the manager of the program. Out of this 800 million, 300 was given to HKUST as a donation. The only strings attached is that HKUST should be working on educational initiatives in the China proper, with the understanding in Nansha. A contract agreement was signed between Henry Fok and Paul Chu on July 2005 outlining these principles. [Appendix 704].

Because of this private donation, UST was able to gain a matching fund from UGC, the Hong Kong government run University Grant Council, of 150 million dollars. So UST gained a total of 450 million dollars in a year. It made news headlines for HKUST and President Paul Chu.

So I think this speaks well for the HKUST, the president and everybody involved. Through the University Council, UST embarks on setting up a campus in Nansha Science Park. In the park itself, facilities that you just saw in the picture is not enough to support the faculty, the students and its educational and research activities. It needs a new campus. Then we will take another 300 million dollars, out of the 800, to build the facility that can be used for the campus.

39-00:49:32

Li: Is this like apartments and grocery stores and all the—

39-00:49:35

Lin: No, it’s not that. It’s the laboratory, the library, the classroom, the offices. Some dormitories yes. But the grocery store, all those kinds of things, will be outside of this fund, they will be set up by other private investments in the neighborhood area. Yes. It will be a kind of community effort. We would like the community to do that so that they can participate in it, too. So this is the idea. Hence, a sum of 300 million was given as donation to UST. Another 300 million will be to build the infrastructure for the campus. The remaining 200 million will be used as venture fund to support technology businesses. So this is the “3-3-2” Investment Program of Nansha IT Park Phase 2. Adding to the Phase 1, it represents a total investment of 1 billion HKD of Henry Fok. Should we take a few minutes break?

39-00:50:23

Li: Sure.

[Narrator's Note: I gave a speech at the Bay Area Mt. Jade Association meeting in the summer of 2005 explaining Nansha as a gateway to future opportunities of China. The presentation appears as Appendix 705.]

Begin Audiofile 40

40-00:00:00

Li: This is Robin Li and Emily Hamilton speaking with Otto Lin, October 15, 2009 in Ann Arbor, Michigan, tape forty. So we were discussing the second phase of the Nansha IT Park.

40-00:00:23

Lin: Yes, yes, okay. So Mr. Fok decided to invest his 800 million dollars and set up the China Nansha Technology Enterprises Ltd [CNTE] for project management and asked me to be CEO of CNTE. But basically the money does not come to CNTE directly. It's Henry Fok's personal money, not the FY.T. Foundation, and rests in a company he has established: The Fok Ying-Tung Ming Yuen Development Company, FY.T.MY. Okay. I may also refer to it as Ming-Yuen in our discussion here.

The company was chaired by Fok himself and later by Mr. Ho. These are money that Mr. Fok gave to Mr. Ho in several installments starting in 1997. In April, 2006, Mr. Fok summed up in a piece of legal documents, witnessed and signed, at his attorney's office that, "I give this money, a total of 3.52 billion Hong Kong dollars [as of this date], to Mr. M. S. Ho for the development of Nansha at the Pearl River Delta," and, "This money comes from my own fund, not from any of my companies or businesses. And I give it to Mr. Ho. It would, hereafter, be considered as Mr. Ho's own money. He is free to make use of this. My family members should not raise any questions about it." Ho then used this money as capital for FY.T.MY. It was quite clear that Mr. Henry Fok trusted Mr. Ho, more than anyone of his children, to carry out his wishes in the development of Nansha.

40-00:02:05

Li: Why would he go to those lengths?

40-00:02:06

Lin: Why would he do this? Because he did not feel that any of his children can do those jobs for him but Mr. Ho can. 40-00:02:20

Li: And was Mr. Fok getting older? Was he concerned?

40-00:02:23

Lin: Yes, he was very much concerned. Mr. Fok has three wives and 13 children. My recommendation to my friend is never to have three wives.

40-00:02:34

Hamilton: One is enough?

40-00:02:36

Lin:

One is enough. One is okay. And thirteen children. Each branch of the family has children. And all the children are basically engaging in different lines of activities. It appeared that they hold different values and have different views from their father on the development of the PRD. Mr. Fok is a visionary, pioneer, and in Mr. Fok's mind, none of those sons will be able to carry out his vision except for Mr. Ho. So that's why he gave this money to Mr. Ho. And out of this money, Mr. Ho took out the 200 million dollars to build the first phase of Nansha Science Park. He also intended to take 800 million out of it to build the phase two. Of the 800 millions, 300 millions was already given to HKUST as a donation. The other 500 million was still be holding by FY.T.MY which Mr. Ho was chairman.

Note Added: In hind sight, the behavioral patterns of Mr. Fok and Mr. Ho can now be understood. The fund for Nansha was already given to Mr. Ho who, by Mr. Fok's own trust, has the full authority to engage in any project as he pleases. This was why Mr. Fok always yielded any decision making to Mr. Ho in any meeting regarding Nansha. None of the Fok children or the core employees has any inkling of this and was thus surprised at their meeting behaviors.

40-00:03:55

Li:

So this company was established—

40-00:03:56

Lin:

Before.

40-00:03:56

Li:

—like in 2000?

40-00:03:57

Lin:

The company was called Ming-Yuen Development Company 1n 1999, but renamed Fok Ying-Tung Ming Yuen [FY.T.MY] in June 2006. All the 13 Fok children and 7 core employees of Fok's Nansha Initiatives were invited by Ho as shareholders. Ho was chairman of FY.T.MY.

When Mr. Fok was alive, all his children just follow through whatever he said and Mr. Fok always had Mr. Ho to express his view on what to do, how to do, and everything else. On all the operational details, Mr. Ho is the head.

And then came October, 2006. Mr. Fok died. Before he died, he was cared at the intensive care unit of a hospital in Beijing. The Chinese leadership took special effort to take care of Mr. Fok in his final months. But like everyone else, the day came and he suddenly disappeared from the scene.

At this time, I have already resigned from Tsing-Tech, joined ChinaNansha as CEO. I also helped the UST to prepare for the Graduate School In Nansha. The UST Council, after receiving the donation money, accepted and decided to build a graduate school in Nansha. The Council also named the School after

Mr. Fok, thus the HKUST Fok Ying Tung Graduate School HKUST FY.T.GS]. The naming is something that Fok Ying Tung never asked for.

In fact, it's interesting to note that around the time of July 2005, when Mr. Fok made the 300 millions donation to UST, entirely independently the UST Award Committee has decided to confer an honorary doctoral degree to Mr. Fok for his visionary leadership in service to the society. And when they come to Mr. Fok—

40-00:06:28
Hamilton:

Mr. Fok or Mr. Ho?

40-00:06:30
Lin:

Mr. Fok. Mr. Fok declined the offer. Basically he said, "Thanks. But, no thanks. Because I've just made this 300 hundred million dollars donation to the University." This took place in July. And if the university were to confer him an honorary degree in November, it does not seemed to be proper. He said, "No, I don't need the title." So he did not accept. I am telling this story now because I know it first hand. This simply shows that he is that kind of person who seeks nothing for himself on charity.

So when he died, the company is under Mr. Ho's chairmanship. Mr. Ho was thinking that he himself is in the same age as Mr. Fok. At the time he was eighty-four or eighty-five. And he had gone through several surgeries in the previous months. He felt that he would not be able to carry out all this work that Mr. Fok has expected of him. He wanted to transfer the helm to one of Fok's sons. So he picked the youngest of Fok's sons, Michael, to be chair of this company, FY.T.MY, which is the mother company of China Nansha and also of many other projects in Nansha.

Previously, Mr. Fok and Mr. Ho have plans to build a hospital, or clinics, in Nansha. Also in the plan was a yacht club, a residential community, and others, just so to make good use of the land to take advantage of the time and opportunity. Those would be profit-making operations, unlike the Nansha IT Park. And Mr. Ho felt that he would not be able to carry out this in his physical condition. But then also, he was under tremendous pressure from all these children. The children were saying, "Well, why would my father give this money to you? Why not me, or us? If you were not around, then this money will come down to us naturally" Right?

And Mr. Ho, I mentioned earlier, that his style of management is that of a revolutionary. He did not care about these children because Henry himself trusted him and gave him all this power to carry out programs. So he did not care to pay attention to protocol or courtesy or making even lip service to the children.

But now the situation is different. The father died, so many children are looking at this pot of gold and also questioned why the old man wanted to do

this or that. Although Fok's total estate, unknown to the public at this point, was estimated to be at least ten times more. Regardless, more is obvious better.

My observation is that, with all those children surviving him, Fok, like most business tycoons, did not have a well thought out succession plan. He was under no pressure to do it. Then again, Henry Fok was never known as an organizational man; what I said might be too much to ask of him.

Unquestionably, Henry Fok is a visionary, a pioneer. He was chairman to eighty some companies and loyal to the people who worked for him. And before his last months, he always thought that his health was good, that he would be able to live for much longer and make all necessary arrangements later. Just like Chiang Ching Kuo. You remember the case of President Chiang Ching Kuo in Taiwan. So this is pretty much the situation. So he did not have a good succession plan. I think more stories will be unfolding on the family regarding how the negotiations and horse-trading go: who takes control of what company, gets what chairmanship and holds which piece of real estate. I am not privy to any of those and I don't bother to find out.

All I want is the commitment to build, Phase II of the Nansha IT Park be carried out. The 300 out of the 800 already given. Another 300 is going to build the park, the infrastructure. The money should go to the park.

40-00:11:35

Li: And what was phase two going to be specifically? What was phase two supposed to be?

40-00:11:38

Lin: The phase two supposedly is to build a campus.

40-00:11:42

Li: A UST campus?

40-00:11:42

Lin: In the park. I showed a picture, a photograph before and I pointed out—this is the Park Phase One and then on the east side of that park, there's some lands there. That will be where the campus is going to be. It has architectural concept design done, engineering design has been finished and all it need is to open for the tendering process. I hope it would soon start the building and construction phase, which is already two years behind schedule.

[Narrator's Note: Appendix 1 is a photo album. Part 4 of the album shows an array of photographs in relation to Nansha IT Park and the personalities including Mr. Fok, Mr. Ho, Mayor Lin Shu-sen and other. It may be of interest to note that Mayor Lin was promoted to become Party Chief of Gunagzhou in 2003, and at 2006 to become Governor of the Kwei-zhou

Province. Deputy Mayor Zhang Guan-nin in charge of Nansha was promoted to be Mayor, now Party Chief of Guangzhou succeeding Mayor Lin.]

Well, actually, in mid 2007, I advised Mr. Ho not to relinquish the position as chairman of FY.T.MY. I said, “What the company needs is a young and vigorous CEO. You are in the eighties.” I said, “Let’s go out to recruit somebody as CEO, somebody who shares the vision, has a respected stature in China, familiar with the government and can pull strings as needed in China. ” I have suggested several candidates but Mr. Ho was suspicious of outside contenders. I have recommended a certain candidates for him. He interviewed, and asked Ian Fok, the second son of Mr. Fok who took charge of the Fok Foundation to join the interview. Both felt good about the candidate but was very hesitant on making a final offer. Finally he ask Michael Fok to take over the chairmanship of FY.T.MY.

40-00:13:12

Li: I’m sorry. What was your official role in the company at that time?

40-00:13:14

Lin: I was a director of FY.T.MY and CEO of China Nansha, which was a wholly owned subsidiary formed to manage the Phase II Nansha IT Park program. And I’m also a vice-chairman of the IT Park Company. All set?

[Narrator’s Note: In November 2007, I gave a presentation to a group of visiting business leaders to the Nansha IT Park reviewing the status of the CNTE involvement on the NITP. The presentation appears as Appendix 710.]

40-00:13:42

Li: I think so.

40-00:13:44

Lin: So it’s very complicated, yes. Yes.

40-00:13:50

Li: So he interviewed someone, he liked them, but he decided not to hire them.

40-00:13:53

Lin: Not hired him.

40-00:13:55

Li: He felt like he should go with a family member?

40-00:13:56

Lin: Yes. He said he felt that it should be a family member. If somebody is going to hire a CEO, that’s fine, but it should be the new chairman to do it.

40-00:14:12

Li: But wasn't that a strange decision, because wasn't that going against Fok's wishes?

40-00:14:19

Lin: In a way, Yes.

40-00:14:21

Li: Because Fok didn't leave it to his children.

40-00:14:23

Lin: Yes. That's right. That's right. I think it was a very good point that you raise this. And Mr. Ho, himself, he felt that he has some problems. One is his age, he was eighty-six now. Number two is his health, he had a surgery a few years back which has taken out part of his kidney and bladder. So he would not have the right health condition. Number three, he felt that his early conviction and action responding to the Tiananmen Square Incident did not sit well with the top leadership of the Chinese Communist Party. So he felt the best thing for him would be to resign from the Chairmanship.

40-00:15:14

Li: And did he lose the protection when Fok died? Did Mr. Ho lose some of the protection when Mr. Fok died?

40-00:15:20

Lin: Yes, to some extent. Fok has acted as his protector and warded off any pressure from the hardcore CCP. He felt that in the hardcore communists' eye, he was a rebel. So he would have difficulty now that Fok is gone. Obviously, he would not be able to help the program as much as in years before, so it's better for the younger generation to take the helm. I have argued with the view that the company should look for a professional manager to lead, not any of the Fok children, which the old man himself had no confidence. But he felt he needed to get off now. He has consider all the three points mentioned above. He told me recently, "Well, I did not go along with you because I have all the more reasons to vacate the chairmanship."

40-00:16:18

Li: You said that there was a sort of poor managerial strategy. Did Fok and Ho know that?

40-00:16:27

Lin: Know what? I'm sorry?

40-00:16:28

Li: Did they themselves recognize that they didn't have the greatest managerial style or were they not cognizant of that?

40-00:16:37

Lin: I think they know that. But as long as they both are alive and physically able, they will be in the position of command. So long as they are on the scene,

things will work out okay. I think his children has very little contribution to all these things we talked about here. Very little, except for providing some information and consultation, part of that. None of the second generation was known to be the go-getter like their father was.

On value judgment, the children and the father are on opposite camps, so it seemed. I think they were born and raised from entirely different environment. Henry has to work for every penny that he has; so he was very grateful to the society for the opportunity that allowed him to make all those wealth. He wanted to return some of what he made to the society. And as anybody who was well borne and fed with the golden spoon, “These are mine. Why should I share my toys with anyone ? Everyone has got to keep his own. ” It’s different mentalities there.

So a year after Fok died, Ho resigned as chairman. The youngest son, Michael, become chairman. Michael, a trained accountant, came to me and bombarded with these questions: “ Why do you want to invest in Nansha? Why do you want to do all those work in the Park? How much money can you made with the graduate school? Have you done any due diligence before deciding to invest in Nansha” I said, “Well, this is all from your father’s vision.” I almost have to go back basically to tell him what his father was like.

He’s about forty years old. He has never set foot on Nansha IT Park before his father died. To his credit, he worked for the Fortis Group-HK as a professional account, which unfortunately was among the first companies to fall in Hong Kong in the 2008 financial tsunami. He might even has gotten a MBA somewhere but was carefully hiding it.

40-00:18:34

Li: So he has no interest in this project?

40-00:18:36

Lin: Very little if any. His interest is how much money he can make out of the investment, like any good bean counter does.

40-00:18:42

Li: Did you tell him what you told his father, that science parks are not a moneymaking—?

40-00:18:46

Lin: I told him. He listened and said, “Well, I know my father. Nobody knows the father better than the son. ” You can’t argue with that. So I basically have to go back to illustrate the vision of his father by facts. He asked me, “Have we done any due diligence before we invested in Nansha IT Park?” I was lucky that he did not question the White Swan Hotel or the Lo-xi Bridge in Guangzhou. Right?

40-00:19:29

Li: You said that you had to go back and teach. But why did you still feel a responsibility?

40-00:19:35

Lin: Why do I feel—?

40-00:19:37

Li: Why did you still feel a responsibility to see through phase two?

40-00:19:43

Lin: I'm sorry. Why do I—?

40-00:19:44

Li: Why did you feel a responsibility to continue to advise to make sure that phase two was completed?

40-00:19:50

Lin: Yes. I am a retired person. I did it because of my interest in education and my motivation to help, to be of service to the society and China. Why I do have to put up with all this nonsense? Why do I have to remind him of his father's legacy? You see? So that's why I resigned from China Nansha in March 2009. So I am no longer with China Nansha at this point. I resigned from all the positions, from Nansha IT Park. I am still a shareholder the FY.T.MY. Other than that I have nothing to do with Nansha IT Park Ltd anymore. I am still interested in seeing HKUST-FY.T.GS completed, a witness to Henry Fok's legacy. Most of the Fok children argued that any company should be aimed at maximizing the benefit of the shareholders. Precisely this was not the vision of the company FY.T.MY which Henry Fok established as a charity.

40-00:20:56

Hamilton: But it seems like so much changed in that region around the IT Park. Do you feel like it was a success, the project overall, even if phase two didn't happen and even if it's future is now uncertain? Do you feel like the IT Park was a success?

40-00:21:16

Lin: I think the IT Park is a success. IT park is a success in that it has built up its name and a leader in advocating the development of human resources and technology for PRD. It has served as a catalyst to speed up government developments in technology and innovation in the region. Nansha was a barren land before but now a community of vitality.

Between 2006 and 2008, those two years, I have conducted ten major science and technology forums to examine major technology issues of our times. It is called the Nansha Science Technology Forum. It tried to convey to the society that here in Nansha we're going to have a graduate school, we're going to have science and technology development. We're going to educational activities and cultural activities. The Forum was a prelude to this.

I was hoping that the fund for building the infrastructure, which still lies in FTYMY will come through smoothly as construction work proceeds. When Michael became chairman, the fund that was designated for the infrastructure, has been kept on hold. I have argued with him that He cannot refuse to give this money on legal, business and ethical grounds. The money had to come through that to China Nansha, then to the Park. To make the issue public, I have resigned from ChinaNansha as CEO and FY.T.MY as director in March 2009.

I'm sorry for the digression. I think the Science Park Program is a success. We have successfully built the name of Nansha IT Park. These ten forums, one is on IT, which discussed "Seamless Digital Life". I think it's a very up to date subject. One is on "Bioinformatics", talking about traditional Chinese medicine and genetic technology. How does ginseng or ginkgo fruit have to do with improving our health through our understanding of our genetic structure. One has to do with "Energy Alternatives- green energy". Wind power, solid state lighting, that kind of thing. One has to do with "Pollution", how are we going to do about it in the Pearl River Delta: air pollution, water pollution, the land erosion. One has to do with "Globalization of Technology". One has to do with "Logistics and Global Supply Chain". What's modern logistics look like. One has to do with "Advanced Manufacturing". The future of manufacturing technology and industry trend, how it's going to run efficiently. One has to do with new "Materials", new scientific materials, nanotechnology and its implications. And then, interestingly enough, I run this forum on "Natural Disasters" to talk about typhoons, earthquakes, tsunamis, fires.

[Narrator's Note: Appendix 710 is a leaflet showing a session of the Nansha Science and Technology Forum.]

40-00:24:42

Hamilton:

It's important for that part of the world.

40-00:24:43

Lin:

Indeed. The "Natural Disasters" Forum was run two years ago. I invited the President of UT Dallas, Professor David Daniels to give a keynote speech. He was the chairman of a committee to review Katrina Typhoon. Why was that half of New Orleans was submerged in water. Why did t those dikes and dams, failed to perform the designed duties? What lesson does it have for us? I wanted to learn about those things. I wanted China, the people to learn from those tragedies. These are all very up to date.

40-00:25:29

Li:

And relevant to China, yes.

40-00:25:32

Lin:

Yes, yes. And I have a session, " Technology effects of the Society and Population". It looked at the one child policy in China. I think the danger is

looming in this policy. It create polarization between the genders, between the city and the rural area and future economic and social ills. So these are major subjects. And I have very good speakers to cover those subjects. For example, the president of UT Texas to talk about Katrina, typhoon. I have Tim Tong to talk about energy who has now become president of Hong Kong Polytechnic University. I have Way Ko to talk about advanced manufacturing and he later became the president of City University of Hong Kong. I have Gung Ke as a speaker on digital life. He is now president of Tianjing University. I invited Li-Jen Chen as a speaker on materials and he is now President of Tsinghua University at Hsinchu. So we picked good speakers. Yes. So we are building the name of Nansha IT Park as an education center while the infrastructure is being built. I have high hope that when the physical structure is being erected, people will recognize that it is not like any other park. It's one with an elegant academic environment. So I think it's going to be its distinguishing feature. 0-00:27:11

Li: If that never happens, do you think that that will threaten the longevity of the park itself?

40-00:27:18

Lin: Well, I think without a campus, the park will be like any other park probably in China in time. Now, because the area has become prosperous, so there will be companies looking to the park to want to run their technology center there. When I started, I wanted the park to be a leader of technology so that companies can come in but now I think it's the other way around. So it's okay. Either way, it's fine. It is building up innovation system. [It is of interest to note that one of the company that ChinaNansha invested, the Advanced Photoelectronic Technology, Ltd [APT] has established in the Park to develop solid states lighting materials and devices. APT has become a prominent player in the field of green energy in the PRD area. FY.T.MY has already tripled its investment value. In 2007, I have also lined up Cisco-China to come to the Nansha IT Park as an anchor partner. But at the last minute, the agreement was over-ruled by the Fok Children.]

40-00:27:59

Hamilton: It's sort of ironic. I think hearing about this project, my initial thought would be the challenges of dealing with Beijing and the communist government and that would be a danger in trying to do a science park in the Pearl River Delta. But what it sounds like is actually what was dangerous to the project was something very capitalist, which is sort of family greed and succession and who gets what money. And it seems like there's an irony about that.

40-00:28:29

Lin: Well, I'm just trying to give you a life situation. That these are real factors.

40-00:28:37

Li: People and emotions. Yes.

40-00:28:39

Lin:

Yes. It's people, it's life. It's like this. So Beijing government is very supportive but the local government may not because their self-benefit was not served in the first order. The short-term interest was not served. And the local officials, they do not care about long-term benefits for the society or the city. They only care about whether this project or this program will make any money that they can show in their scorecard during their term of service. So this is a different type of vision that we have talked about in China. This is the problem with China right now. For the business side, indeed for a lot of companies, lot of family business, the family succession is a big problem.

In HKUST, I have helped set up a center called China Business Management. What's so particular about China Business Management? It's because in China, a lot of them are family and a lot of them has to deal with the social setting, with mentality like that, so they have special problems. So succession problems is very much of that.

40-00:30:17

Li:

Did you have any more of the questions about the science park?

40-00:30:18

Li:

No, I don't.

40-00:30:23

Lin:

Is this a good point to stop?

40-00:30:24

Li:

Yes, yes. Should we stop here? Okay.

40-00:30:25

Lin:

Okay.

40-00:30:26

Li:

Okay, great. Thank you. Sorry, just to wrap up. So was the timing of your retirement this year, the spring of 2009, was it prompted by sort of a frustration with the current state of the foundation?

40-00:30:45

Lin:

The Fok Ying Tung graduate school was supposed to have a grand opening on December 29, 2008.

40-00:31:01

Li:

It was supposed to be started this year, right?

40-00:31:02

Lin:

Started, yes. Phase II was supposed to finish in the end of 2008 based on the original plan. And now the building is still in the tendering process. So I have felt that it still may take another two or three years for the infrastructure to be built. So I think it'll be a long process for me to wait and I don't want to spend my time just for that. So I think probably that's the time to leave and the time

for the second generation to think about what they want to do and how to do it.

[Narrator's Note: A news item was published in the South China Morning Post on March 2010 regarding my resignation from CNTE, see Appendix 712. The news has prompted many inquiries regarding the future of HKUST-FY.T.GS. It also coincided with a flurry of discussions between the University and the FY.T.MY and renew activities in the Park. The engineering and construction work for HKUST-FY.T.GS has finally started in August 2010, targeting for completion by the end of 2011.]

40-00:31:42

Li: And why come to the U.S. now?

40-00:31:44

Lin: Come to the U.S. is basically for my own family situation.

40-00:31:49

Li: So just to be near your family?

40-00:31:49

Lin: Yes, yes. I have no close relatives, immediate family, in Hong Kong or in China or in Taiwan. All my children are here. My brothers are here.

40-00:32:06

Li: I read one article about your resignation and it seemed like it was, in substance, intended to be a statement, so to sort of say something to those who were still in charge of the park. Is that true?

40-00:32:22

Lin: I told them that I am not happy. I think they're wrong. I think they did not understand their father's vision. They are not faithful to their father's vision. They did not faithfully carry out the commitment, a formal commitment, of the FY.T. Foundation to the university. So they're wrong. I want to make that statement today. And it's something that I will not deny.

40-00:32:53

Li: You've built your entire career around loyalty and service to family and to China and to Taiwan and it must have been frustrating to sort of end your career on that note.

40-00:33:09

Lin: Well, the Nansha project is one of the things that I have done in Hong Kong. My major duty was serving HKUST. I think HKUST is doing quite well. One of these additional things is trying to build something in China, in China proper.

40-00:33:34

Hamilton: Which you actually did. You managed to build—

40-00:33:39

Lin: Yes, which I actually did. But I have encountered these difficulties and we have resolved some of these difficulties and I just did not have enough time myself, that I don't want to spend another ten years to do that. Everybody has his time. I think my time is now.

40-00:34:02

Li: Yes.

40-00:34:02

Lin: Yes. Nobody forced me to retire. In fact, if I had stayed there, any arguments will stay inside and covered. But is it worthwhile or enjoyable for me to spend my days arguing with them. It would be a waste of my life.

40-00:34:22

Li: Right. Well, that goes back to what you were saying about how people do what they're good at. Managing the Fok family is not what you're good at.

40-00:34:31

Lin: And nobody can do all. So that's why Mr. Ho want to resign, he's relinquished his chairmanship. I was not very happy with his decision. I recognized that his retirement might bring something to that, because particularly Michael has known nothing about his father's dream for Nansha.

40-00:35:03

Li: Mike Fok?

40-00:35:04

Lin: Michael Fok.

40-00:35:05

Li: Yes, yes, yes.

40-00:35:06

Lin: Yes. He has known nothing about Nansha and appears over-whelmed by the opportunity to sit on this pile of money. It was big time for him. But Mr. Ho has created many family enemies with the other Fok's children, so he has become their common target. Ironically, Mr. Ho gave the Chairmanship to Michael for a very personal reason. He felt Old Henry has taken care of his older children very well and have given them a lot of money and business opportunities. But Henry might not have taken care of the third branch of the family, his youngest son included, that well. Most of the companies that Henry owned had named his elder sons and daughters are directors. The younger ones, were of young age when Henry was in full swing, are under the legal age to become directors, so they were not getting their fair share. So I think in Ho's mind, as a good friend to Henry, he wanted to help and make some compensation. But the chosen one was so overjoyed and wanted to keep all those toys to himself. And the older children were unhappy because they felt they have been sidelined. This is life's irony for Mr. Ho.

Li: Thank you very much.

40-00:36:53

Lin: Thanks.

[End of interview]

Interview 14: October 16, 2009

Begin Audiofile 41

Hamilton: This is Robin Li and Emily Hamilton speaking with Dr. Otto Lin, October 16, 2009 in Ann Arbor, Michigan. This is tape forty-one. So Otto, I had just a few wrap-up questions after having reviewed the hours of interviews that we've done to this point. There were some things that struck me about your career. Perhaps the biggest overarching thing I was thinking of is that it seems like throughout your career you've been developing technologies of measurement that in some ways—I guess I was thinking about the story you told of being at the kitchen sink washing the juice glasses and thinking about measuring viscosity.

41-00:00:53

Lin: Yes.

41-00:00:55

Li: And then yesterday when we were talking about the national innovation system and you showed that slide of Asia at night and you were looking at how the countries were lit up as a way of understanding technological advancement in Asia. And I feel like both of these are really perceptive ways of measuring things and evaluating the world and that how important establishing useful and relevant forms of measurement have been for your career. So instead of just saying, "Oh, the importance of a science park is how many dollars it produces for the region," you're saying, "No, that's not the only way of measuring success. There's other ways." And so I guess I was struck as at different stages throughout your career, being able to understand a situation, to figure out what are the appropriate ways of measuring success, or what are the right ways of evaluating project, evaluating research, evaluating what sort of opportunities to pursue, it seems like it's been a really important part of your career and been a major contribution of yours, to help people understand things, saying this is a way we could look at and understand when a nation is succeeding or when technology is succeeding. Have you thought about this at all or could you reflect on this a little bit?

41-00:02:12

Lin: Well, I think certainly it's difficult to measure success and when you're talking about success you're always from a certain angle to look at this and recognizing that everything's relative. I measure success in the larger scope compared, say, Taiwan's status in the 1980s. 1980, that year, compared to say 1990 and the year 2000. We can examine various factors in education, society,

way of life, technology, economy, business, and the changes. I think the difference would be a measurement of how the society changed during this time. And then you can see in what way, whether I have played a role, or my institutes has played a role in bringing about these changes.

Instead of saying to measure the number of patents or the number of publications, citation index, I think probably what I just described was a call to evaluate the final result. To see whether the world has felt some impacts of your work, or life. And from this standpoint, I am quite happy that we have made an impact in the industry and the society of Taiwan, and some of the changes in Taiwan have impacted the Mainland Chinese. An example is in the establishment of what I call “Global Chinese Inc.” business model, where you do design work, R&D work in Taiwan and manufacturing work in the Mainland market it to everywhere in the world. Now, I’m not saying that this is the right model forever or the best model of all times. In fact, the Chinese people, Mainland Chinese, now has problems with that because they also wanted to be a designer or initiator of the source of technology rather than just to be a place of manufacturing. This is very understandable. [Nevertheless, this business model has impacted on the phenomenal economic growth of the Chinese Mainland for the past two decades.]

I In any case, during this period of time, I think the efforts that we made in Taiwan has made Taiwan a better society and then that effect has spilled over to the Chinese Mainland. And, of course, in China, because of its vast size, whatever the people have accomplished is immediately recognized by the world. So I like to think the scene of a barbeque party where you put charcoals in the grill. Usually it takes a long time with anxiety for the first few charcoals to catch fire. But if you put enough charcoals in it, and after the first few caught fire, in no time the whole grill will come to life and you can do all kind of barbequing with it. So I think what we did is basically putting that first few piece of charcoals, back in the days of early 1980s But, of course, these few pieces could well be burned to ashes before everything else fired up. People would savor the final meal, enjoy the good taste and the aura not knowing their pleasure was the efforts of some with only ashes to be found. But this is life.

So I think for me, my work, my major career is with the institute ITRI. The Institute is not a university. It cannot measure the number of graduate students or the number of papers it has published. The Institute is not a company. It cannot give the numbers of the sales or revenues or profits. But the Institute is a catalyst. It’s an agent of change. It’s the agent that bring the university, the business, and the government together to create innovations. And under that kind of innovation system, you create better quality of life and values for the people. So I say the end result, whatever the degree of success, has to be taken in perspectives with that kind of timeframe. To see how it was started and how it was propagated and whether it could sustain over a long period could

be revealing. So this is, perhaps, one way of looking at the work of this twenty-some years.

41-00:07:48

Li:

It seems like also key to your success has been your fluency in both American culture and in Chinese culture. How important has the U.S./China relationship been for Taiwan's development?

41-00:08:04

Lin:

Yes. I think this is very important in several ways. First, it's people. If you're looking at ITRI, I like to draw analogy to a pyramid, a solid triangle. The base of the triangle, in terms of people, are those in the engineer's level. Most of these are locally trained. When I was with ITRI, most of the engineers are educated, trained in Taiwan. The middle level may be managers. In terms of qualifications, these might be the masters level people. You see again a major part of this was trained in Taiwan but some was trained outside and America is the major place. At the top of the triangle, the pyramid, the executives. Senior managers, vice-presidents are in this group. I would say eighty percent of those are trained in the United States. They have their advanced degree and they have worked in the companies or in the university for several years, ten, maybe twenty. In fact, you might recall that one of my human resource management schemes in ITRI, was targeting to retain this group of people through many different measures that they can remain in ITRI.

So the final result is the over-reaching influence of the American way of doing business, the business practice of analyzing problems and the way to solving problems and team management. This is very much American business culture.

Now, Chinese culture is also very important. So I think you have to take this into consideration as you talk about the inference of American. I have showed how some American scientists have helped ITRI and Taiwan greatly in different ways. Mostly they provided an advisory function. In ITRI, we set up many technical advisory committees [TAC] in electronics, in computers, materials, green technology, you name it. And all those are participated by senior scientists, educators in the United States out of their compassion of wanting to help China. And actually, the most senior levels of advisories are provided by many Americans. I should thank Professor Frederick Seitz who was once President of the U.S. National Academy of Science. Others in this category included: Prof. Norman Hackerman, President of Rice University, and Chiang-Lin Tien, UC Berkeley. There's many others. These are senior American scientists and because they willingness to help Taiwan, help China, they provided assistance, pro bono. So I think this is the influence of America to Taiwan.

41-00:12:09

Li:

I'm sorry. Can I ask you something. Do you think some of these American scientists are motivated by wanting to help Taiwan but not China? Like was

there a strain of—because traditionally, historically in the fifties, America wanted to help Taiwan in the sixties, but not the communists.

41-00:12:26

Lin:

Well, at that time, I think the eighties and the early nineties, these people are intentionally to help Taiwan. Because you look at China at that time, it was a very miserable situation. Before the Tiananmen incidence, there was the Cultural Revolution, the Gang of Four. So most scientists, educators, are put into prison or go through miserable treatments. So China at that time appeared to want anything only it's red. [Mao Zedong preferred people red to expert]. He does not need specialists who has technical knowledge, only people who believes in the communistic doctrines. [Ignorance is power!] So science and technology and education was not respected in China at Mao's time. So I think these groups of senior intellectuals placed their hopes of China in Taiwan. Hopefully in Taiwan you can preserve the Chinese culture of respect for knowledge, respect for people, and with that becomes an influence to Mainland China. I think some of this would be in the back of their mind. So I think this group of Americans provides tremendous help to Taiwan.

So the influence of America to Taiwan is again through many organizations, universities which provided educational opportunities to the students from Taiwan. I have to admit that the training and also the network that they provide, I think, are of invaluable help to Taiwan.

41-00:14:36

Hamilton:

I thought that Robin's question about measurement was really interesting and I'm wondering how you would measure your success.

41-00:14:48

Lin:

I have never really thought about that. This thing is coming to my mind but I have never really cared about my own success or things. Let other people do the measurement. As long as I am at ease with what I have done, I am happy.

41-00:15:03

Hamilton:

Are you proud of your accomplishments?

41-00:15:05

Lin:

I am proud and happy for the opportunity to participate in these things. I was happy for what I have done to motivate this group of scientists for this cause, to help build technology and economy for Taiwan. I am proud of it and that was the highlight of my career, the ITRI involvement.

And for my Hong Kong situation, I am also very happy that I was able to participate during that particular moment of Hong Kong. And again, with time to help Hong Kong and help China through education, through the infusion of a culture. You might say not only the Chinese culture but some western culture of doing things and looking at things. So this would help to bring China to be in a better position and to interact with the outside world. This basically, come to think of it, is my life long dedication. It's all by that. It's

working through people to help people. That's basically what I did. And I'm very proud of what I have done, was able to do.

41-00:16:29

Hamilton:

China, in large part because of ITRI and the work that happened in Taiwan, China is now the second largest economy in the world. It's poised to become the largest economy in the world and a true world leader. What do you think that will mean for the U.S., for China to be a major economic world leader?

41-00:16:52

Lin:

Well, I think this is a subject that needs to be studied. I'm just speaking from a very superficial way, from my own observations. In the 1980s, middle eighties or late eighties, the National Bureau of Standards, NBS, which is headquartered in Gaithersburg, Maryland, changed to become the National Institute of Science and Technology, NIST. As it's known today, NIST. I think it is a realization of the United States government that indeed companies like IBM or Microsoft or Dupont's do not need any other help. They have their own technology source. But a lot of SMBs, small and medium businesses, really can use some additional assistance from government, from the governmental or the public institutes. So they changed NBS to be an institute called NIST and the function is really to provide assistance to the SMBs. So through technological collaborations or transfer of technologies, the institute of the U.S. innovation system can provide many types of assistance to the industry. I would say this is a model similar to, if not after, ITRI.

But, of course, America has been a leader in technology transfer, like in 1986, the Technology Transfer Act, generally referred to as the Bayh-Dole Act has set the stage promoting the commercialization of results of government funded research. The legislation allows the government agencies to relinquish the ownership of patents or intellectual property rights and to give it to the institutions or the universities that undertake the research. Let them have the right to execute, to practice those patents. I think this is a tremendous pioneering work from the U.S. Otherwise, what good is it for the government to hold on to those patents. So you have to give people the incentive to practice. So I think a lot of government dollars was dedicated to invest in the R&D. So there's the result. Well, they will come back to the government treasury through ways of private business practice in terms of taxation and employment. This is, again, is the benefits cycle of R&D that I talked about during this course of our review.

In short, I have a chart showing how the benefits, or the return of government funded R&D or public technological institutes. It's not by the institute to commercialize those results. It's by the institute [the technology experts] to transfer those research results to the business community [the business experts] for commercialization and in so doing they can create jobs, they can provide employment, so that they can provide return to the government through taxes. So this is the kind of benefit cycle that I proposed. And I think

what I did in Taiwan at that time is basically in line with the development of the United States.

And during those times we have had a lot of contacts with the U.S. ITRI has good communications with the U.S. through different levels of interactions. So I think this might have facilitated the transformation of NBS to NIST, and to promote the agency for SMB, small business administration efforts. to help the business. So I think we have been reinforcing each other. It's hard to say who comes first but it's been reinforcing. This is actually a subject worthy of further research.

41-00:21:08

Li: Like it seems sort of like a healthy competition.

41-00:21:11

Lin: Yes, it's a healthy competition. Yes.

41-00:21:14

Li: So there's a lot of nervousness in the U.S. as China's intentions as China becomes a greater world power. There's anxiety about China's intentions. What do you see as China's future plans? It seems like the priorities of the Chinese government are very different now than they were fifteen years ago and the development of the Pearl River Delta and the products there seem to indicate that there's a change going on in terms of China's vision of itself for the future. Could you talk about that a little?

41-00:21:47

Lin: Well, China is a very difficult subject, complex subject, and I'm not the one to talk about all this. But from my own perspectives, and my personal understanding of the Chinese culture and the interaction with the leadership and the people, I can say this—China has no intention to conquer the world. China wants to be respected by other people and treated as true friends.

41-00:22:16

Li: America can relax?

41-00:22:18

Lin: America can relax. I think China has so much land area, so many people and so many complicated challenges at its hand, China has no intention to be the ruler of the world. I think really America can relax and the rest of the world can relax.

Now, the impression is this: During the last two hundred years, China has also always been as the underdog. The world was accustomed to see China in that position and suddenly alarmed to the fact that the underdog was able to stand up. Look at what the Russians has done to the Chinese, how the Japanese has done to the Chinese, they had inflict great injuries to the Chinese people. And to a lesser extent, the German, the French, the British. They came and took away the land, took away the resources, and may still wanting to claim certain

rights and privileges. America is much better in its position with China. America was a member of the eight foreign countries that attacked Beijing in the Qing Dynasty in the Boxer Rebellion. But it was to the credit and wisdom of Teddy Roosevelt, the United States made no claims of territory and used the sum of monies from the Qing Dynasty, while all the other countries spent it for their enrichment or enjoyment, to set up scholarships and to promote cultural exchanges.

41-00:24:00

Li: Right. The Boxer scholarships.

41-00:24:01

Lin: The Boxer scholarship. Is that what you call them? Yes. In China, this has very much to do with Tsinghua, how Tsinghua College was established. And a lot of students was sent to the United States to study. And these people returned and became a force of modernization for China. So I think America traditionally has left a very good impression with the Chinese. And, during the Second World War, the war against Japan, America has provided a lot of help to China, to Chiang Kai-shek, to Mao Zedong, to the Chinese people. So I think traditionally America and China has been on a very friendly and mutually reinforcing roles. I don't worry about the future relation of China and the U.S.A. Again, American practice of freedom, equality and justice is very much a part of Dr. Sun Yat-sen's ideal which underlines the founding of the Chinese Republic.

I think now American businesses are seeing the threats from Chinese businesses. True. The question should be asked is who can provide better values to the customers? American business are afraid of being displaced in the marketplace. Frankly, they should rightfully be afraid. They cannot force American consumers to buy inferior products at higher price. This would be an insult to the intelligence and against the spirit of America.

I've traveled many places and lived in many places. The best life, most comfortable lifestyle and affordable, I think, still is in the United States. People in the United States are enjoying better products at lower price. A large part of that is provided by China. And the U.S. government was benefited by the Chinese surplus that turned U.S. treasury notes. So I think China has been helping the U.S. government and the U.S. people in many different ways. I like to think about the Chinese-American relationship in this vein. There will be competitions. Let General Motors compete with Ford and with any automobile company in China. Let them compete for customers in the marketplace, in China and in U.S., under a free economy framework. I think the governments should institute the rules and regulations to make sure it is fair competition and let the free economy play its role there. So that's how I see this and I'm optimistic about that.

41-00:26:43

Hamilton:

I wanted to actually ask you about that, because increasingly, China has an internal consumer society, which is expanding and making America perhaps less important or less relevant for Chinese businesspeople because the market is no longer necessarily the rest of the world. It could be China itself. So how does the sort of Global Chinese Inc., look? What does that look like with a new larger consumer Chinese society?

41-00:27:11

Lin:

Yes. Well, I think it's a natural consequence of the national building process. I guess you think 200 years ago in the United States, life was pretty rough. I think most people did not have much to eat, so they were eager to celebrate the turkey during the last Thursday of November. And then the pioneers marched to the west. Life was pretty rough in the new national front-line then. But then after these hundred years of development, life becomes much more comfortable. It's an improvement on life style and on health and on education and everything.

And obviously in China, people looking for the same thing. It was very rough thirty years ago, twenty years ago, and now with the growth of economic power, they like to enjoy a little bit more. They like to have a more livable house. They like to have cars. They like to have all the major appliances and everything. So I think this is a natural consequence for China to focus on internal consumption. The increase of internal consumption, I think is necessary, because people want to have a better life.

Now, in this regard, I can say that the Japanese social economic policies in the 1980s through the nineties, I think, was wrong in the sense that the government did little to improve the life of the hardworking Japanese people. Japanese lifestyle was frugal in my view. I have many well to do Japanese friends that live in very small houses, practical and cluttered. Financially, they can afford to live much better, but the culture is to save. The government encourages people to save money instead of enjoying a better and healthy life style. They are overly afraid and overly uncertain of the future. Of course, this is just a comparison. So I think a lot of Japanese dollars end up in the United States Treasury in terms of bonds and loans and so on. And as the U.S. currency dwindles, I think that reserve shrinks accordingly. If the market meltdown as we saw last year repeats, their savings may simply evaporate. I have real doubts that this is the right policy.

I think government certainly needs to have savings and reserves, but it also needs to make use of the resources to make life better for the citizens. So I think that's what China is doing at this point. And certainly this will change the China Global Inc. concept that we talk about. But I think the China market is for everybody; businesses worldwide can be selling products to China so long as the consumers perceive their values.

Now, I wanted to caution, not to the United States but to the Chinese industry, is that by selling product internally, you cannot be complacent in selling cheap products, low quality products, unsafe products to your people, thinking that they may be more accommodating. This would be wrong. Instead, I think business should raise the quality, the standards, and make it equal everywhere in the world. So I think the vice of protectionism works both way. It is something that we do not need. So this is the caution that I will place here.

41-00:31:21

Hamilton:

I'm interested in talking with you a bit about your thoughts on this interview. So we've now sat together for almost forty hours. You've talked a lot about your vision for globalization, your vision for technological development, and you've talked to a number of people at institutions and universities about this vision. Why is this interview important? What do you hope will happen with this interview?

41-00:31:53

Lin:

Yes. Well, I think it's a very thoughtful question and I think it points to a weakness of my career during the last two decades. I, myself, have been very busy working on ITRI and the university and everything, doing the work that I'm supposed to do. But I really did not take the time to sit down, to summarize, to record, to document, to reflect. I think experience is knowledge. There may be good examples, or bad examples, and both can shed light for the future generation.

What I'd like to do this time—I appreciate this opportunity—is so that I can have a chance to kind of summarize my career experience just a little bit so that for the future, people who are interested in this period, might learn something from this personal perspectives. I wish I had published more papers on that. I wish I had a group of people that worked for me for this documentation. I could have that during the time but I did not think it's a priority. I think there are some merits for ITRI to document, to help publish, to contribute to the literature so that the information and experience would be helpful for people anywhere.

Actually, when I left ITRI, I gave many speeches, but mostly on innovation systems. I seldom talked about ITRI itself. Very seldom I talked about the operation of ITRI because most people only interested in the surface and glory of success and not too much concern deeper into the how's and why's: principles of operations, management practices, human resource development, technology transfer rules and practices, etc., etc. Another point is that I do not feel comfortable to talk about what could become self-serving. No doubt I could be bragging unknowingly and perhaps I should reserve it for the present and future managements of ITRI. I don't want to leave the office and then to comment about the office. This is not really a good mode of behaviors.

I have appreciated this opportunity, and was very much indebted to the assistance of Kauffman Foundation, because for one time in all I get to talk about myself quietly. I can really come back to think about ITRI, the operation of ITRI, the why, what, how and who. Now, with that said, I have given a lecture just two months ago in Shanghai. I was invited by the Chinese Executive Leadership Academy at Pudong and I give them a number of subjects to choose: innovation system, globalization, soft power and so on. But they say, “Well, we would like you to talk about ITRI, the operation of ITRI.” So it was the first time I have kind of a complete lecture on ITRI on just a glimpse of we talked about here. Only about three hours to give. And people has a lot of fun in that. ITRI has become a role model of innovation for many places. And in China, wherever I go, people always want to ask me about ITRI. So I think this interview is a good opportunity for that. I see it this way. So that we can document this knowledge and transfer this to people who might be interested in knowing it.

And therefore, I was especially appreciate of the Kauffman Foundation for their willingness to provide this grant so that we can do this work.

41-00:36:14
Hamilton:

Can we talk a bit about sort of particular groups of people? For instance, what do you hope that scientists will take from this interview?

41-00:36:23
Lin:

I'm sorry?

41-00:36:26
Hamilton:

To look at a few specific groups of people. What do you hope that scientists will take from this interview? What lessons do you hope to transfer to them?

41-00:36:37
Lin:

I think for scientists, I hope they'll realize that science itself, it's just a part of any social development. I talk about the trees, the two-tree theory. For the tree, the science is but one root of this tree in development of high tech economy. So scientists should be humble and should dedicate their work to do good science. And they should coordinate and cooperate. They should work with other people, engineers, economists, businesspeople to bring their discoveries to become products or services. I think scientists should really understand that their role is limited, just like everyone else. We have a positive but limited role in the process of innovation, the creation of wealth from knowledge. [Narrator's Note: I have accepted an invitation during the 1995-6 period to participate in an internet discussion of the American Association for the Advancement of Sciences [AAAS] regarding the future career of young engineers. The interview was later published by the South China Morning Post in Hong Kong, as shown in Appendix 706.]

I was hoping that this discussion and these documents would be helpful to leaders of organizations. I think the concept and operation of National

Innovation System, should be useful for national leaders when they think about how to structure their country or their province. When I use the term national innovation, the word national does not carry political meaning. But some people may take it as if I was promoting a political view. It's not. When I talk about national innovation system, I'm talking about an innovation system for the whole entity, or in a macro scale. It maybe a city, maybe a state, maybe a region, maybe a country. So I think for leaders in city, in province, state, county, it will be helpful to learn more about National Innovation System.

So these views are from two ends of the innovation process. Route one for the scientists or engineer, the individual end. The other is the policy end, for people who are in the position to make policies. I think there are points for both to ponder.

41-00:39:06

Li:

Do you get that there are different lessons to be extracted from your legacy in places like Taiwan and China and the United States and countries that are still in the process of developing a technology infrastructure?

41-00:39:24

Lin:

I think any country or any place, interested in developing technology and economy, can learn something from this interview, either from the success or the failure. I think they can learn something from it. And I think the most important thing to learn is how we structure the innovation system, promote the interaction of the players and how we motivated the professionals to realize their potential. The need of a reinforcing partnership, or establishing such a reinforcing partnership among university, institute, business and government was clearly indicated. I think this is the key to any success of any specific system really. I look at Taiwan, China, Singapore, Korea, in the United States, in many different regions in the United States as well as countries in Europe, these basics come through. Therefore promoting an open, synergistic relationship between these four groups of players in the national innovations is key.

41-00:40:44

Hamilton:

Well, and it's been wonderful getting the chance to meet some of your family this week. But I wonder what do you hope that this interview will mean to your family?

41-00:41:00

Lin:

Well, my wife, Ada, was a colleague for ITRI and I think she understands what I was doing. But even Ada did not really understand everything, all the thought that I put into running ITRI and running HKUST and then Nansha. Because out of respect I don't want to bother her with all this and she kind of respect me for doing my job. I have tried to minimize the amount of chemistry or work into my home and, at times, found it quite unsuccessful. For my children, I think what I did was a mystery to them. If not a total mystery,

something that they do not fully understand. Before I return to Taiwan in 1983, Ann, at her teen, asked me, “Dad, why do you want to go to Taiwan, and give up this life and friendship and everything in the United States. ?” So I told Ann at the time, as I remembered, “The next twenty years is an important period of China, in its development. I am concerned with China. I like to be in America but I’m concerned with China and I want to help. And I don’t want this period turned out to be a blank page for me. I want to do something for China at this point. ” That was basically what I said to Ann. And I think Ann understood it and accepted it.

So I think perhaps up after this interview, and if Ann, Gene, Dean and my other relatives takes the time and efforts to read about it, they will understand why I went to Taiwan, what I did and certainly some of the results and impacts that come out of it. I think that probably will give them some sense of satisfaction and a better understanding of me which was a part of them.

41-00:43:20

Li:

Ada had said today when we were talking to her about the decision to return to Taiwan, that she was saying that you had to make certain compromises or risks in terms of your children’s education to go back to Taiwan.

41-00:43:28

Lin:

Yes.

41-00:43:30

Li:

And she said that as parents, your dream was to give your children the best education possible so that they could hopefully contribute to society, have an opportunity to contribute to society. And she said that her thinking was here is my husband, who has that opportunity to make a major contribution to society. Who am I to deny him that opportunity? Because we hope the children will have that opportunity but here we know that Otto does have this opportunity. So do you feel that this was sort of a once in a lifetime moment for you to go back to Taiwan and really fulfill this? Did it feel like fulfilling a lifelong aspiration to go back to Taiwan and do this work?

41-00:44:10

Lin:

Yes. I certainly think so. I certainly think so. Many of my friends become millionaires. I have many millionaire friends, and many of my friends become ministers and so on. Ups and downs. Several good friends become ministers in the new Ma Ying-jeou administration. One of them is Dr. C. S. Liu who was appointed prime minister and was forced to step down in only about a year. I have friends who was millionaires and maybe billionaires and now get bankrupted. Life can be fleeting even for scientists. But we are fortunate to have our own chance to serve the society.

So I was wondering. I’m looking at particularly this last instance of Dr. C. S. Liu, who was a colleague back from Tsinghua University days. I couldn’t help asking myself, would I be feeling better if I were him? While I would

welcome the opportunity, I don't really miss burdens and its pressure on my family. So I feel I had my own opportunity during my time in a position that I can do some useful things. Afterward, I was able to travel to the Mainland, establish new friendship, worked in Hong Kong and again, establish new network. I also have many opportunities to visit many other places around the world, establish many networks and friendships. So I think all of this have enriched my life. I'm very grateful for that.

41-00:45:58

Li: Right. Because it seems like you gave up some of the more tangible measures of success? Sort of like the science park you described to Mr. Fok. It's not necessarily a money making venture to contribute to one's nation but it's important anyway.

41-00:46:13

Lin: Yes, right. Yes.

41-00:46:14

Li: But I wanted to ask you, do you think it's possible for China to become a knowledge-based economy? For Mainland China to become a knowledge based economy? And if so, what kind of timeline do you envision for that?

41-00:46:27

Lin: Well, it is very difficult for China to become fully a knowledge-based economy because of its size. You have to put China on the map of Europe. From one end you have Turkey and then it goes all the way to France and to England so on. And there are many different regions. I talk about a co-existence of agricultural economy, industrial economy and knowledge-based economy all at one time in China. China has all three. I guess it will have all three for the next fifty years. So every region in China has to have planning. I talk about the importance of regional planning. They have to plan for their region and to build their region a good life for their people, be it an agricultural economy, or industrial economy or knowledge-based economy. So I would say that it is quite impossible. I do not see how it is possible for the entire China to be a knowledge-based economy in the next 50 years. But I think each region will attain a much better developed state of their own.

41-00:48:02

Li: I wanted to ask specifically again about the Pearl River Delta region. Why is it important for China's international reputation, what happens in the Pearl River Delta? Do you think that the development there effects China's international reputation?

41-00:48:33

Lin: Well, I don't think it will effect China's reputation worldwide but I think if successful, it can transform a significant part of China to become a knowledge based or more industrialized economy with the right kind of combination of good life and good environment and sustainability. I think it will do just that. Recently, in Guangdong, because of the financial tsunami and the subsequent

downturn, economic downturn, the party leader in Guangdong wanted to move part of his people from Dongguang, or the business from Dongguang, to the southwestern part or northern part of Guangdong. Those are typically agriculture.

And I wrote an article in the Hong Kong Economic Journal, which is in Chinese. I questioned that kind of approach. It is not right. I think moving a business from one place to the other, is a decision to be made by the business itself. It is a difficult issue, a major decision because you are not just moving the production facility, you have to consider whether I have all the infrastructure and support at this new location. People, knowledge, logistics, how the raw materials comes in and the products gets out and other infrastructure matters. So it is a major decision. It's not a decision made by the government.

So instead, I'm advocating that Guangdong should build up its soft power. And the key to the soft power here is people, human resource development.

[Narrator's Note: I have emphasize the importance of human resources to an economy, in general, and the PRD, in particular. During the last ten years, I have written several articles to this effects. Two, appeared in the South China Morning Post are shown in Appendix 707 and 708.]

41-00:51:08

Li: What do you mean by soft power? We've talked about it many times.

41-00:51:12

Lin: Many times, yes.

41-00:51:12

Li: Yes, but could you say it again?

41-00:51:13

Lin: Yes. I'll come back to this. But just to go on. What they need is to build up the base for developing soft power, which is human resources development. Together with technology, they should be working for a sustainable environment and a good government. This is what the government should do instead of just moving one group of people to the other. So I have talked about this.

So I think if successful, our development in Nansha can be a role model, can be an example to show people what the future is like. And, of course, regretfully, that will have to be delayed.

Now, let me talk about soft power. I think the term soft power becomes popular after 2004 or 2005, with the publication of a book of that title by Professor Joseph Nye, of Harvard. Nye talked about the ways one country influences the other. Of course, one country can influence the other by several

ways. Among these, military power is clear. And economic power, that for a country to offer financial and economic assistance is also clear. Military and Economy are hard powers. He also talked about influence by culture, by education, by arts, by music, by the ideals of democracy, by the rule of law, and other elements in the way of life. These are called soft powers.

For example, I would like to take example of President George Bush. George W., against broad-based international oppositions, let U.S. military to invade Iraq. With all the firepowers and U.S. dollars, and, after 5 years, what has he accomplished? He has burned most of Iraq to ground and dragged the U.S. into financial chaos. The United States has lost a couple of thousand lives and burnt hundred billions of dollars. Did he find weapons of mass destruction? No. Did he defeat the terrorists responsible for the 911 tragedy? No. Nothing. This shows vividly the limits of hard power. So I think Obama appeared to be smarter. He was thinking about other means of influences such as diplomatic negotiation. Hillary Clinton in the Congress hearing for the confirmation of the appointment as Secretary of States, talked about mastering all the elements of influences, in short, soft power, and to bring to bear on the situation in Iraq. This includes military and economic, obviously, but also cultural, system, and other kinds of avenues. I think she referred this to as a smart power approach. So this is what soft power is like.

And after 2004 and 05, I have become also an avid speaker for soft power. It is not only that soft power is a sexy term but actually if you're looking at the Chinese culture, Laozi, who was senior to Confucius, you will be amazed to know that Laozi has originated the concept of soft power. Laozi, in one of his chapters said, "If you are milling and molding clay to make vessel, you have to empty the clay, for its use as vessel; Likewise, if you building house with bricks and stones, you have to take out the bricks and stones for its use as house." Look, come to think of it, if this jar is full of ceramics, where is room for storing liquid. If the house is full of bricks and stones, no life can be sustained, this is what we call the pyramids. It is unfit for living people. So Laozi said the "haves" and the "have-nots", are all in one. The "have" defines the application. The "have-nots" provides the usefulness. This is my words, okay, this is my translation. So I think this is the real and the virtual, the full and the empty, the hard and the soft. I asked my students that in the modern day transportation and trade across continents, what does the cargo container provide? It's space. It was the empty space in the container that makes the money. You can put paid loads in the space, in the emptiness. So you are basically making money by shipping the space back and forth. Shipping the "have not's" back and forth. When you are constructing a big building. You are really just building the shell and leave as much space as possible inside the shell, to realize the usefulness for the building. So this explains Laozi's theory of the hard and soft power.

So let's turn to soft power and hard power. And, of course, soft power and hard power are meshed together in any entity. Really, it's hard to separate one

from the other. Like in the case of computer, when you have the hardware, the laptop, for example, you have to equip it with the software inside. It is the software that give you the utility of the computer. Without the software, the laptop will not give you anything.

41-00:58:06

Li: So what you're saying is that hard power leaves no space for people to participate and make use of the influence of the other country but soft power leaves space for people to engage voluntarily and make use of the opportunity?

41-00:58:22

Lin: That's right. That's one way to look at it. And the other way is that there are many forms of soft power. One form is a music. When I was a young student, I admired the United States because of Elvis Presley. A lot of people would follow him around and be thrilled to do what Elvis suggested. So music is a power that persuades people to turn around to your way. So is Culture, Science etc. A lot of people talk about United States not because of how many nuclear bombs it kept in the arsenal but because of Nobel Prize winners, because of the great universities, and the spirit of freedom and democracy. All these are forms of soft power which attracts people.

Interview 7 [continued]: October 16, 2009

Begin Audiofile 42

42-00:00:10

Li: This is Robin Li and Emily Hamilton speaking with Dr. Otto Lin, October 16, 2009 in Ann Arbor, Michigan. This is tape forty-two. So we just were talking about the concept of soft power and I was thinking as China's position in the world changes, what does it mean for China that the world is now more China-centric? That instead of being a foreign power, China's more in the center of world concerns.

42-00:00:28

Lin: Well, Chinese people, if they understand fully their culture, they'll recognize that the most powerful advantage in China is the culture, the Chinese culture that you can date back to Laozi, Confucius and Mencius and others. Previously I have talked about Confucius and Mencius. I recognized Mencius as a pioneer and front-runner of democracy. Mengzi once said in his teaching, "People comes first, then the states, then the ruler." Isn't this democracy? We're talking Mencius dated back to about 400 BC. Unfortunately, with that kind of vision, Mencius' career did not go far anywhere with any ruler. Nobody gave him any good jobs. But this is the political philosophy in the Chinese culture. I think Confucius and Mencius work are very well known. But Laozi's concept was so advanced and in a higher level of abstraction including the fullness and emptiness, reality and virtual, hard power and soft power.

Confucius and Mencius talked more about the relationship between people: husband wife, parent and children, brothers and sisters, employers and employees, people and the states. They illustrated the relationships and the importance of knowing one's place in any organization and how to treat with friends on the basis of trust. Laozi, on the other hand, focus on men and the nature. Laozi was concerned with harmony and equilibrium between man and the nature and he want people, to learn from the nature. He argued that nature operates with four seasons which allow all living beings to have sustainable lives. Nature runs in cycle. An other example is the day and night with sun rises and sun sets." He said, "Does nature utter any words to us?" No, It did not say anything because it has no needs. It teaches man quietly by setting performance examples. So he emphasized that, man to learn from the nature.

42-00:03:46

Li:

So do you think it's important for Chinese to understand this culture as they become world leaders, global leaders?

42-00:03:50

Lin:

I think so. I think these two schools of thought will be of immense value to China. People should learn about the relationship in the society and be friends with other countries. People should also learn from the nature and to attain sustainable development, really. So I think China has to learn not only from Western culture of systems, of scientific methods of analysis and of scientific way of doing things. but also to learn from the Chinese culture in dealing with the people, society and the relationship with nature.

42-00:04:42

Li:

So it sounds like you're saying that you can see China being a very good world leader if it learns to harness its own soft power.

42-00:04:49

Lin:

Yes, yes, yes. I think so. By the way, this is a favorite subject of my speech in the last several years. My writing, as well.

42-00:05:02

Li:

I had one more question. Could you talk about how you think the legacy of the PRC, the communist party and the KMT, the legacy of that conflict, is it still relevant in China today? If so, how is it affecting China's development as a world leader?

42-00:05:25

Lin:

Well, a curious thing happened in these last couple of years. I would say in the thirties or forties when they both fought the Japanese invasions, there was a coalition between KMT and the CCP, the Chinese Communist Party. Mao was echoing people to say, "Long live the Republic of China, and long live Chairman Chiang Kai-shek." Zhou Enlai was a faculty member of the militant academy where Chiang Kai-shek was the schoolmaster. So these people, they are very close at one time and politics broke them apart in the mid forties. They separated and became arch enemies ever since. And Chiang accused

Mao as a bandit and Mao called Chiang with similar names. It became uglier with time.

And fifteen years ago when I visited China and I looked at their history book, Chiang was portrayed as a bandit and warlord that did no good for China. And the fact that Chinese defeated Japanese in the Second World War was all by the Chinese communists and Chiang himself was just drinking wine and womanizing all the time.

Now in this last couple of years, or five years, a funny thing has happened and people wanted to learn more about the facts of the Second World War. Chiang was gradually recognized as a national hero for his leadership in defeating the Japanese invaders. Of course, people in the Mainland realized that they were cheated by Mao's propaganda all this years. And, of course, one of the big lessons is the Cultural Revolution which has portrayed Mao as God but was silent on his causing tens of millions of death and suffering. The country was turned upside down on behalf of Mao. So even Deng Xiaoping was openly appraised Mao as "Thirty and Seventy Split." It was never clear which number was the evil end. Generally speaking, people in the Mainland gave credit to Mao for establishing the PRC but gave him de-merits for ruining the country including his personal responsibility on the "Great Leap Forward" and the Cultural Revolution. Is it a seventy/thirty split or more justly ten to ninety split? In any case, people are trying to have a more objective view of what goes on in the past.

42-00:08:52

Li:

And is Taiwan doing the same reevaluation of Mao?

42-00:08:56

Lin:

Yes. Well, Not really on Mao but on Chiang Kai-shek because of the Taiwan separation movement groups. They want Taiwan to move away from China and they condemned Chiang's tyrant rule of Taiwan. My simple answer to that is that if it weren't for Chiang Kai-shek resolute resistance to Mao, Taiwan would have already fallen to become part of PRC in 1950s and therefore separation will be a non-issue. If it weren't for Chiang Ching-kuo, Taiwan would still be an agriculture economy and no universal suffrage would ever take place giving the separationist its power base. It was the two Chiang's efforts and leadership that have sustained Taiwan today, that give Taiwan the chance of survival and give Taiwan the start of democracy. I think we talk about this previously.

So there is a reevaluation of Chiang, really Chiang's role and Mao's role in history. I was told that come October 1 there's a new book coming out from China affirming and praising Chiang's efforts in fighting the Japanese. So I think there is a realization of the historical fact. The truth will set you free.

One thing that I told my Chinese friends in Mainland is to be honest to history. I pointed out that Chinese has been repeatedly blaming Japanese for not accepting the responsibility of the Second World War, the rape of Nanking, and the like atrocities elsewhere in the Asia Pacific.” The Japanese will say, “Well, it has never happened.” The textbook just said that the action in China was just a kind of movements to various cities. Invasion? No. Rapes of Nanking? No. I would say this was sheer cowardice. It’s unlike the Germans who can stand up and say we are wrong. The Holocaust is wrong. Hitler did that and we are sorry. What Hitler did was wrong. But Japanese has never been able to stand up and say that we are wrong. So this is the cause of unrest, unhappiness in the Far East and Japan will never be able to assume a leadership role in the world if they do not have the courage to face the truth.

Many a time I said to my friends in the Mainland that how can we blame Japan for failing to recognize its past if we do not have the courage to face our own history and said Mao was wrong, the culture revolution was wrong and the Tiananmen Square murder was wrong. Burying our heads in the sand does not give us the righteousness to blame other people. So this again go back to Confucius, “ To recognize shame is to have courage.” [知耻近乎勇]

42-00:12:09

Li:

So what is your frank assessment of the future of Taiwan/China relations?

42-00:12:14

Lin:

Well, I think they will become one. They will become one eventually. Taiwan will not likely to be a province of China. But there will be some arrangement that provide the room for a a harmonic relationship.

42-00:12:37

Li:

Like Hong Kong and Mainland China?

42-00:12:38

Lin:

No, I don’t think like Hong Kong. Perhaps like Canada, Australia and UK. There is a governor appointed by the Queen of UK to Canada, a governor appointed by the Queen to Australia, being all members of the Commonwealth. So I think that is just one possibility, among many. The key is for both sides to recognize a common source and share common culture. Instead of talking about sovereignty, let’s focus on the common ancestry and common aspiration. Neither side can have its own way and prevail on the other. It will need more communication, mutual respect and enhanced collaboration.

42-00:13:36

Li:

So Otto, I’m sure you reflected on these interviews and have a few sort of closing thoughts that you’d like to share.

42-00:13:41

Lin:

Yes, I have given this some thoughts and particularly in light of what we talked about in these couple of days. Just two points. One is about Taiwan, my work in Taiwan, and actually about Taiwan. And then, about Hong Kong and the Pearl River Delta. I'd like to make some comments on these.

I think the success of Taiwan in the last quarter of the twentieth century was extremely significant because the success was not limited to the development of the economy, but also to a broad based democracy and the development of social justice. This is possible because of technology progress which leads to economic strength, which provides the stability and the condition to nurture democracy, universal suffrage, and so on. And I think when people have enough to eat and can elect their own officials, this will lead to the development of social justice. I think this contributed to sustainability of the society. I think ITRI's challenge was not only to develop the technology but to make sure that those technology can be transferable equitably to the society, to the business sector. Therefore knowledge can be used to create wealth instead of just becoming a paper in the library. I think this is innovation.

I think one time I talked about setting up a laboratory is nothing new, is nothing difficult but it is the transfer of the result, the diffusion of this result that is difficult. So I think that was a big challenge and ITRI has answered to. So the end result of ITRI's work is employment opportunities to the people and taxation to the government. The research dollar was returned, multiplied by a hundred times, or a thousand times. And, the economic strength becomes the base of the national power. So I think that's kind of the situation in Taiwan. And in China, the difficulty and the opportunity is a hundred times larger. So that's why China's accomplishment was so remarkable.

I think for all this to happen, for this process to happen, the country has got to have the vision, the will, and the structure, the culture, and the ability to implement. And I think in Taiwan the vision was provided by Dr. Sun Yat-sen's revolution. It was on October 10, 1911, the country Republic of China, the ROC was born. By the way, Sun Yat-sen was admired by Mao Zedong. Mao did not recognize many historical leaders of China except for Sun Yat-sen. This is why Sun Yat-sen's portrait was displayed in Tiananmen Square when there's important occasions. I talk about the vision.

Talk about the will. I think the will for Taiwan was very simple. It's survival. The survival from Japanese invasion and the survival from the constant threat of foreign powers. The culture was rooted on the respect of humanity. I think about Mencius: people come first, human decency. Confucius' teachings: Knowledge, family and fellowship. These are what we have talked about, the culture of China represented by Laotze, Confucius, Mencius and others. The leadership nurtured by Chiang Kai-shek and his son, Chiang Ching-kuo. The team of leadership. Sun Yuen-shuan, S.S. Shu, and K.T. Li and the others.

Chiang will tolerate no corruptions. So this is the culture that was established. The vision, the will, the culture.

The structure, I cannot talk about it too much. It's the national innovation system that I talked about, the structure, the interaction of these four groups.

The ability to implement. I think ITRI is an example of that. And I think there are other organizations in Taiwan during this period that perform like ITRI in their own fields. We can name them. So I think this is the reason why Taiwan was able to come to economic strengths during this period of time. So it's not just by any one person or any one administration. This is the foundation of its growth and prosperity. I would say. The vision, the culture, the will, the structure, the ability to implement. It's a whole setup that make Taiwan what it is today.

And I was fortunate my years at ITRI coincide when Taiwan when it was at a crossroad of history. I was fortunate to have the opportunity to guide the institute. And after ten years, and now twenty years, I think it was proven that the institute has kept a right course. I was grateful for my mentors, for many mentors, S.S. and Sun Yuen-shuan and many others who has made it possible for me to have the opportunity. And my colleagues. Their fellowship, dedication, has really sustained me. Every time I went back to Hsinchu. always was greeted by colleagues in ITRI and by clients of ITRI and now they are active in many places.

In a nutshell, I think what we have developed is a number of important and relevant technologies at the right time, transfer them to benefit thousands of entrepreneurs and SMEs. And they provided jobs and opportunity to millions of people which was to become the mainstream of the Taiwan society and who has a voice in determining the government. In a way, I think we have helped enable Taiwan to decide a future course. I think this combined effort has spilled over in certain ways to the Chinese Mainland in the last decade and at a time when they need such help. And I believe that also, in a little way, we also helped the modernization of the China and the globalization of China that we see today.

Well, I think the progress on the democratic transformation of Taiwan was by itself a phenomena of much concern and much interest. I'm sure more study will be on that. In the last decade, we have witnessed the political defeat of KMT in the year 2000 by the DPP and KMT was forced to transfer the government to DPP. And again, the defeat of DPP of 2008 returned the government to the KMT. This was a twice turnover of government through bloodless and peaceful means and through popular elections. I think this reflected what Sam Huntington and many political scientists had talked about for a stable democracy. He said you need to have two turnovers to establish a democracy. So I think it says that the democracy in Taiwan is fairly mature and therefore I'm fairly hopeful. How well Ma Ying-jeou has done will be

determined by the people of Taiwan in three years through public election. So I think you can see this pattern repeats and will sustain Taiwan.

Now, something happened in September 11, 9/11 this year, 2009, is that on that day the court in Taipei, after about one year and a half's investigation, persecution and trial process, sentenced Chen Shui-bian and his wife to life imprisonment. Life imprisonment. Chen Shui-bian got two terms, two life imprisonments, for their corruptions and their abuse of power of the office of the president. Now, this is very unusual. A lot of people will say that we should shoot Chen Shui-bian right away in the public square a year ago. In fact, in history, there are two usual ways of exit for a formal ruler. One is having his head chopped off in the public square and the other is a disappearance to an offshore haven. But not in Taiwan, not this time. So committing a former president to a legal process, I think this was unprecedented in China history and I guess unprecedented in the developing world elsewhere. I think this was a testimony to the establishment of the judicial process, although it was long and tortuous. But I feel good about it.

So overall, I think my view of Taiwan is optimistic in all these three fronts: economy, democracy and judiciary. I think the major threat we talk about actually just a moment ago is coming from political extremists who advocate a separation of Taiwan from China. I think this will bring disastrous consequences because this is something that China will not tolerate. That's my closing about Taiwan and developments.

Hong Kong and Nansha. I returned to Hong Kong in 1997, at that historical moment of the return to Chinese sovereignty. I believed at that moment that Hong Kong needs some help and my dedication and experience can be helpful to them. I was hopeful that because of the special position in history, economy, and geopolitics, Hong Kong might have some influence in China in the future. So I took the opportunity to come to HKUST. At the time it was a very new university and it has an ambitious vision. My job there was to help guide the research and development of the University. I strived to establish a R&D strategy, which we have talked about quite extensively, and foster a research culture for Hong Kong. I think the strategy and the culture was basic for the university to achieve excellence in research in the chosen fields, establish linkage with the industry, nurture entrepreneurship and play a leading role for Hong Kong and the Pearl River Delta for its transformation to a knowledge based economy.

Over the last fifteen years, HKUST has firmly placed itself among the top fifty universities in the world. It was a university known for research excellence as well as one of entrepreneurship. It was an agent of change for Hong Kong and China. I played my role. It was a small role, but a definite one in the process.

I was very pleased to be able to start the Nansha initiative. I guess few academics were able to do that. I was fortunate to know Mr. Fok, Henry Fok and his close associate, Mr. M.S. Ho. They had worked on Nansha since the late 1980s. When I came to UST, we discussed and then we agreed to try to position Nansha as a model of future Pearl River Delta. A model for Nansha would be equipped with the infrastructure, logistic, transportation, convention facilities, golf course, yacht club, bilingual schools, hospitals, that kind of thing. And, of course, these are quite common for any city. But we also wanted to highlight Nansha with knowledge, technology and innovation, and that's why the work that ensued.

Mr. Fok was very enthusiastic with the concept of building an innovation system, where government, university, institute, and industry, would work concertedly. And, of course, I, personally, was very gratified to his repeated re-iteration that his concern was for the sustainability, not profitability of the Park. And further his vision of using every dollar it makes on charity, education and further technology development. So that's the values that I admired and shared.

As I said, Mr., Henry Fok is a man of vision and action. For those many obstacles that I talked about yesterday, he could have called Beijing and Guangzhou to get someone in the right place to pull the right string. But he did not want to do that because he did not want to seek special privileges or shortcuts. He wanted to set an example for people that these are the kinds of behavior that we should follow in a civilized society. To set a standard of performance, you might say, of behavior.

Unfortunately, for a project of this scale and this scope of Nansha, I think we need much more. We certainly would need excellent teamwork, outstanding organization and commitment from all stakeholders, and a good succession plan. I think there's a gap in Fok's succession plan. The gap become more apparent toward the end. So I think Henry Fok will be a person of many studies in the future and I think all studies will show that he is a common man with uncommon integrity. Buildings will run down and money will run out but the legacy of Fok will remain. His legacy was not to be found in the wealth but in his dedication to his country, colleagues and fellow man. I think this is the common value that I share with Henry Fok Ying-tung.

42-00:31:36

Li:

Thank you. Well, Otto, I have to say, I think I speak for Emily and I, this has been such an interesting set of interviews.

42-00:31:43

Lin:

Thank you. I think I should like to thank you, Emily and Robin, for your hard work and also certainly Richard Cándida Smith for his guidance. Most importantly, I'd like also to thank the Kauffman Foundation for providing the funds and supports. A special thank is due Lesa Mitchell, vice-president of

Kauffman Foundation, for her foresight and support. She has initiated the thought of doing this oral history program.

42-00:32:21

Li: And for Judson King for introducing you.

42-00:32:23

Lin: Oh, Jack King for introducing. Jack King introducing ROHO to me. Yes.

42-00:32:27

Li: It's been such a personal pleasure, too, to know you and to meet Ada and to meet Ann.

42-00:32:34

Lin: Thank you.

42-00:32:35

Li: So thank you very much.

42-00:32:35

Lin: Thank you. Thank you.

[End of Interview]

[Editor's Note: Since March 2009, Professor Otto Lin has consulted for the Hong Kong Polytechnic University in the capacity of Senior Advisor to the President on academic research and knowledge transfer. On September 1, 2010, he accepted an invitation to be Senior Advisor to ITRI, to focus on matters of ITRI's relationships with China-based businesses, cultivation of entrepreneurship and training of industrial executives. Thus, after a leave of about 15 years, Professor Lin returned to ITRI to work with colleagues and friends in an organization that he has long cherished.]



Dr. Ada Won Song Ma Lin

Interview 8: October 16, 2009 [Interview with Ada Lin, by Emily Hamilton and Robin Li]
Begin Audiofile 43

43-00:00:16

Li: This is Robin Li and Emily Hamilton speaking with Ada Lin in Ann Arbor, Michigan. It is October 16, 2009, tape number forty-three as part of the Otto Lin Oral History Project. Ada, could you state your full name just for the tape?

43-00:00:35

Lin: My name is Lin Ada Won Song Ma [文松馬]. Ma Won Song [馬文松] is my Chinese name. Ma [馬] is maiden name, Won Song [文松] is my name. But after I come to United States, I got an English name, Ada; and after I get married, I also got my husband's name, Lin. So now my name is Lin, Ada Won Song Ma.

43-00:01:01

Li: Can you tell me what your Chinese name means?

43-00:01:03

Lin: Ma Won Song [馬文松]?

43-00:01:07

Li: Yes. Does it have a meaning? Won Song?

43-00:01:10

Lin: All Chinese have their name choosing nice words. Won [文] means elegant. Song [松] means pine tree. My mother wish that I would be very elegant and my life would be as long as the pine tree.

43-00:01:33

Li: And how did you pick your American name Ada?

43-00:01:38

Lin: Oh, That has a story. We all have some English name when we start to learn English. Mainly it's the style. It's like a foreigner, if you go to China, they give you a Chinese name or translate your name. So I did have the name Margery and I always spell it wrong. Before I came I said to myself, "Gee, I'm going to United States. I'm not going to write my name wrong." So they say, "How about Jen or Mary?" "Well," I said, "these names are too common. I don't like it." Then Otto said, "How about I pick a name for you?" I was joking. I thought he's joking. I didn't pay attention. I said, "Sure, if you got a good name." So he said, "I do, I do." I said, "What?" He said, "I pick one for myself. Otto." I said, "Why you pick Otto for yourself?" He said, "Look at my Chinese name. It's twofold symmetry." You know, if you write his name in Chinese, and if you put a mirror in the middle, it is twofold symmetry. He looked at the dictionary, O-T-T-O. is also twofold symmetry. So he picked as his name. He said, "How about A-D-A? It would be also twofold symmetry and it's definitely easy and you will not make a mistake by spelling." So I accepted his offer.

43-00:03:26

Li: Where and when were you born?

43-00:03:30

Lin: I was born in Nanking ten days before July 7th. That's the beginning of the Sino-Japanese war.

43-00:03:47

Li: So were you living in the city of Nanking?

43-00:03:51

Lin: Well, it's a long story. At the time, we are living in my great grand-uncle's house in Nanking. He was the mayor of Nanking city. The reason is like that. My father worked for Dr. Sun Yat-sen's son in his organization doing a lot of translation. He's in charge of the English translation part and he got a scholarship to go to United States. At the time we are in Nanking so we stay in my great granduncle's house because my mother is pregnant. I will be delivered after he left. So we stay in there.

And at the time, actually, it's pretty interesting. My mother is my great grandaunt's secretary. She took an assignment from Madam Chiang Kai-shek. You see, my great grandaunt is also one of the great women during the revolution.

She was very brave. She was sympathetic to the revolutionary people, so she did a lot of things for them, as a nurse for carrying out babies, because she was trained by the church as a midwife. In the area, she is like a doctor. Has the most of the knowledge of emergency treatment. During these times she's using her position to help a lot of those revolutionary people, helping them during the war, etcetera. So she get to know my great grand-uncle And then they get married, and because my great grand-uncle was very active with Dr. Sun Yat-sen during all the revolutionary time, And he [my great grand-uncle] is one of the persons that was in the United States for a long time, Trained as a mechanics, and he can speak English. So he becomes one of the persons fairly important for Dr. Sun Yat-sen.

And when Chiang Kai-shek become the rising star, and later, he become in power. He appoint my great grand uncle as the mayor of Nanking. He married Madame Chiang Kai-shek. Because my aunt was doing a lot of small clinic hospital work. She was trained by the missionaries, so, doing these things is quite natural, doing all these kind of things. And Madame Chiang Kai-shek liked to do some social welfare things. So that is a very nice thing. She immediately thinking that China need a Red Cross. How do you say? Red Cross Association or Red—

43-00:07:58

Hamilton:

Organization.

43-00:07:59

Lin:

Organization Chapter in China and she organized these and asked my great grandaunt to be her deputy chief. So actually, my great grandaunt was in charge of the Red Cross organization in China at the time.

My mother graduated from Nankai University. At those times, of course, She was consider as a very knowledgeable women. Very few women got through college. And since she is trained as an engineer, especially [rare] at that time. After she graduated, she worked as an engineer in Shanghai. But because my great grandaunt took over this job and my father is going to Nanking, she is offered the job of secretary. Actually, my great grandaunt need her help, so my mother became an ideal woman. Knowledgeable, and could easily get around with all the people that she knows. That's why we were living in their house and I was born there.

Now, actually, my great granduncle has very close relationship with my father, because when my father went to high school, he was sent by my grandpa from the countryside to the city, to Guangzhou. He went to a missionary high school to study. Then, He usually go to my great grand-uncle's house in Guangzhou during all the holidays, because at that time was the time that Sun Yat-sen was in Guangzhou. He was going there very often. And my great granduncle, although he's the uncle of my grandpa, he's actually younger then my grandpa. My grandpa is one year older than him. He's the youngest son in the family and my grandpa is the oldest son's son. And they were very close.

43-00:10:28

Li: So were both sides of your family members of the Kuomintang? Both your mother and your father's side of the family?

43-00:10:33

Lin: No. Not in my mother's side. Only in my father's side. Yes. My mother is not. My grandpa of my mother's side, he is a very famous medical doctor.

43-00:10:54

Li: What's his name?

43-00:10:56

Lin: Wong Hai-tow [王海壽]. It's also very interesting. He is the first tier of the graduate of Xiehe [協和醫院]. Xiehe is the first American hospital established in China to start to train Western medicine doctor. [Editor's Note: *Xiehe yiyuan* is the Chinese name for the Peking Union Medical College.] My grandpa, when he join the school, he's already a famous Chinese doctor. But his mother died of stillbirth, so he felt very sad and regret. He thought he wanted to learn. He heard that the Western medicine can do operations, can help these things, so he want to learn, particularly on how do you manage the miscarriages, stillbirths, etcetera. So he's the first one when he heard that the American hospital is going to accept the Chinese student. Now I thought of it, it's very hard for him because he never learned any English, not to say Latin. How he got through of that?

43-00:12:38

Li: Now, was this in Beijing?

43-00:12:40

Lin: The school is in Beijing.

43-00:12:42

Li: Yes. And Rockefeller funded it. Is that right?

43-00:12:46

Lin: Xiehe still exists. It's very famous. I don't really know. I don't know.

43-00:12:52

Li: So did he live in Beijing?

43-00:12:54

Lin: No. He's from Wushi [無錫].

43-00:12:57

Li: Wushi. So that's where your mother's family is from?

43-00:12:59

Lin: Yes, yes.

43-00:12:59

Li: Wushi.

43-00:12:59

Lin: And he practice medicine very successfully, so becomes a fairly rich man.

43-00:13:08

Hamilton: And he sent his daughter to school to be an engineer?

43-00:13:15

Lin: Well, you see, at the time, it's already in the end of the Qing Dynasty. Actually, my mother was born one year before the birth of the Republic of China. My father was born the same year as ROC. My mother was born one year before that. my grandfather's kind of modern and open minded. all the kids get the chance to go to school. But still only a local school. He didn't really think need to send my mother to have a lot of education. He did not against the idea that woman has education, that is because his own sisters are very smart. One of his own sisters, very smart, want to learn but at the time the women are forbidden to learn, so she doesn't have any opportunity. But when my grandpa and his brothers study with a teacher in the study, she would stand outside of the door. The door is closed. She can only stay outside to listen. But she's very smart. She could recite the whole thing. she recites everything. that the boys learn, Afterwards, she'll ask my grandpa to help her, to knows which word is which word. She learns that way. And she's also a very courageous woman because when the first women's school started to accept student applications somewhere near Wushi and Shanghai. Actually, maybe Suzhou or Hangzhou. I don't really know. So she just sneak out and take the examination and apply for that and she was accepted. She's very gracious. At the time she's already engaged, but is not yet married. So she decided she wanted to go. Of course, the family would be against it very severely but my grandpa support her.

43-00:15:50

Li: Where did she meet your father or was it arranged by the families? Her marriage to your father.

43-00:15:58

Lin: Oh, you are talking about my father and mother?

43-00:16:01

Li: Yes.

43-00:16:01

Lin: Okay. But I was talking about my mother's aunt.

43-00:16:04

Li: Oh, your aunt. Oh, okay, okay.

43-00:16:06

Lin: So she escaped and she went to school. Of course, from then on she decided she will not marry. But she become an educator. When I know her, she's in her sixties. She's already retired. She was a principal of a school. That is why my grandpa is not that against the women to go to school, so my mother and her sisters all got the opportunity to go to school, but most of her sisters finish only

the so-called high school. The high school at that time in Wushi is only four years, so you have about ten years education. But the women, at that time, if you have ten years education, your education already considered to be very good.

At the time, my mother told me her biggest ambition is that she will go to Shanghai to go to a missionary high school where the women learn six years and learn English. She very much want to go to this. Now, as you see, some things happened and in a way it's good luck for her. At the last year of her high school, that's the four-year high school, her mother died. So my grandmother died and my youngest uncle is very young, I think under ten. My mother is only like fifteen or so. My grandma, on her deathbed, said to my mother, "You will take care of your baby brother. Bring him to the safe place and see that he will get education, because if I die, your grandpa may remarry and my son may not get the best treatment. You have to try to fight for all his rights, etcetera." Of course, this is unnecessary because that doesn't happen. But at the time, it was a war. It's the war that Chiang Kai-shek fought to remove all the warlords.

At her hometown, the war is coming, my grandpa told my mother, "Why don't you bring the youngest brother to Beijing, because my number one uncle, the oldest one, he and his wife is in Beijing." They are medical doctors. They are trained medical doctors also from Xiehe [协和] and then he went to United States and got his master's in public health in the United States. So he at the time is one of the big shots, got all of the education, and he works in Beijing. So my mother bring the youngest brother to Beijing and live in their house with the big brother and sister-in-law.

My mother is the big brother's most favorite sister, because my mother likes to study and he likes to teach, and they have a age gap. The age is very different, something like more than ten years. This uncle thought of her as his kid sister and likes [her very much]. So they were very close before. They stayed and she meet all their friends, women that were the sister-in-law's friends. They are all college students, educated. My mother was so envious, so longing to become one of them. So when Nankai University and Tsinghua University start to accept students, she went to apply.

Now, she only have four years of high school, so she is not qualified for college. She's only qualified for the prep school. Now, only Nankai has prep school. So she take the exam, she pass the exam, now [the time] comes that she want to enroll the university. So this is her luck: if she had not been there [at my uncle's], she would never have got the opportunity to go to university. But she wants to go and my uncle support her, so she talk to my grandpa because it's a tremendous amount of money. And also, women go to college most [people] think it's unnecessary. You will get married. Although my grandpa is very open-minded, but not to that extent. It's too much money to spent because it's not four years, it's six years, right. And that long, you already pass your wedding age. So my grandpa is not very agreeable with it. But since he got remarried, the stepmother want to make friends with everybody. She's very young. She's only thirty. I think

my grandpa is something in the fifties and she married a very wealthy man. She want to make friends. And besides, she doesn't care. Maybe these very capable women not at home is even better, right? I don't know what she think. But anyway, she told my grandpa, she said, "Well, it's a lot of money." She said, "Didn't you already prepare their dowry for every daughter?" My grandpa said, "Yes." She said, "Well, if she's only using her own portion, then it's not going to affect others." So somehow my grandpa agreed.

43-00:23:01

Li: She used her dowry to pay for college?

43-00:23:02

Lin: Yes. She will use her dowry. So if she go to college, she may end up with no dowry at all, because when my other aunts get married, it's very lavish and it's famous. Everybody knows. Dr. Wong is having wedding. And you can marry very prominent people. But my mother thought of that and she said, "I want the education. I will go to the university." So that's how she went to the University of Nankai. And she went there and there is another man from Canton. That's my father. And they were schoolmates, so they met over there.

43-00:23:53

Li: So they had a very modern marriage? They met at university and fell in love and got married?

43-00:23:50

Lin: Yes, yes. They fell in love, of course. Ask both families.

43-00:24:06

Li: Were your families, were they Christian? Your mother and father's family? No.

43-00:24:10

Lin: No.

43-00:24:13

Hamilton: So I want to ask you. So you were born in Nanking in 1937. Did your family stay in Nanking through the occupation or did they leave?

43-00:24:21

Lin: Just my father and mother.

43-00:24:23

Li: So your father and mother stayed through the Japanese occupation and then—

43-00:24:26

Lin: No, no. No.

43-00:24:27

Li: No? They left?

43-00:24:28

Lin:

I told you that I was born ten days before the war. My father's already not in the country. After my mother came back from the hospital, stayed in the house, the war get more severe and severe. At the time, my great granduncle is the mayor of Nanking. Nanking is a major city. It's like a province. It's a very high position and it's also the capital. He told my mother, "The war is coming and your husband is not home. I will not be able to protect you. Since I'm the mayor of this city, I am determined to die with the city if we lost the war. But you don't have to die. So you should escape. You should leave here first, because in Nanking I expect the war will be very fierce and I have to stay. So why don't you either go to your father-in-law or go to your own father? You have the choice. If you want to go to your father-in-law, which is in Canton, it's in the countryside, I think the Japanese come, they will occupy all the big city but they will not go to the rural area because they won't have the manpower. China is too big to be occupied. So the rural area probably won't have much of the change, so you can stay there until after the war. Or you can go with your father and that's your own place, where you grow up, etcetera." So my mother said, "But my baby are so young. How can I go through all the transportation? It's already chaos like this. Can I just stay here? I buy enough things, not going out until after the war? Close the door." My grandpa said, "No, I don't think so because the war will be very severe. Probably burning and rape, etcetera. A young woman living here is definitely not safe, so you have to leave." Because he decided that he would die with the city if necessary and so he sent his kids away, too. Well, my uncle, his son. At the time, he's like my father's age. So it's the time for going abroad to study. Well, he's already there, so he left. And my great grandaunt, right before that, also with a lot of the Red Cross people left by truck going to the south.

43-00:27:55

Li:

To Guangdong?

43-00:27:57

Lin:

No, to Chongqing 重慶. To the part where they were fine. But my great grand uncle would stay. Yes. But in the last minute, of course, Mr. Chiang Kai-shek took him out because he said that now my decision for doing that is changed. We will reserve our power not to do all the unnecessary sacrifice, because we will fight until the last person. We will not surrender but continuously fight so we will retreat to the back.

43-00:28:36

Li:

And where was your father?

43-00:28:38

Lin:

My father, at the time, I said, already went to the United States. He got the scholarship. He was sent by the organization to the United States.

43-00:28:48

Li:

Where did he go to school?

43-00:28:49

Lin: He actually is in Michigan University.

43-00:28:54

Li: In Michigan, okay.

43-00:28:55

Lin: Yes. Political science.

43-00:28:58

Li: So your family had a history of coming to the U.S. for schools? You were not the first?

43-00:29:02

Lin: I'm not the first. Actually, my father, when I was ten, he came back, he already said he was going to send me. But at the time he said send me to the London School because he got his PhD of economics in London School of Economics.

43-00:29:27

Li: So where did you grow up? Where was your childhood?

43-00:29:31

Lin: So the war come. My mother had to bring me, escape. So we went to Wushi, his father's place, and we go through the time. We went to Shanghai. We were there for about four years and my grandpa died. So no one supported the family. The whole big family, thirty, forty people, everybody have to take care of themselves. So my mother, in Shanghai, she find a job for teaching in high school. Teach science.

But in Shanghai, it's very expensive. Before, it's easy because his father is providing the housing, the food, etcetera, but now you have to pay the housing, you have to pay all these, and she also need a maid to take care of me, otherwise she cannot go to work. She thought it's too expensive. So she went back to Wushi where my grandfather has a house. When he died, he said, "You'll all get a small portion." The woman doesn't get a lot of it, because you're already married. The son all has a portion, etcetera. My mother also has some portion of hers. But there is a big house. This big house is three generations already. It's more than one hundred rooms. This one belonged to my two uncles, but the house is forbidden to sell. These will never sell. It will be generation to generation. All my family members, my children, girls or boys, doesn't matter, can come home. If they need it, they can come home and live in the house. So my mother went back to there and we live in Wushi and my mother teaching for another four years until the war is over.

43-00:31:48

Li: And then your father came home?

43-00:31:51

Lin: Then we go to Nanjing and then my father come home. The first time I met my father, I'm already nine years old.

43-00:32:01

Li: Did you go to a missionary school for your grade school?

43-00:32:08

Lin: No, just ordinary government school.

43-00:32:12

Li: And where did you go to high school?

43-00:32:15

Lin: Well, in 1949, we escaped from Nanjing as refugees because the communists was coming.

43-00:32:30

Li: And you were twelve at the time?

43-00:32:32

Lin: No. I was eleven. So we went to Guangzhou because we are Cantonese. Not only the government is going to Guangzhou, but we moved to Guangzhou, it's easier than anybody else because we have family there, relatives there. We go to Guangzhou, we can stay in our relatives home first and then to do the other things. So we went to Guangzhou. So I went to the school. It's a missionary school. It's a famous missionary school, Pui Ching [培正小學]. And I went there, I think it's only less than one year until I graduate from that school. It was very hard because I think at least here are about one and a half years I didn't really have any school, only studied by myself because of traveling, running, all these things.

But in Canton, everybody learned English starting from third grad. I don't even know that. I entered the classroom. That was an English lesson class. The teacher put me in the front seat. There is another boy sit there, an empty seat next to him. I sit next to him and start the class. I got the English book and I open it up. He very kindly slowly turned my book around. I put it upside down. I couldn't read English. I was so embarrassed. But there, I get through my last year in elementary school because the war pushing near, so we came to Hong Kong. I was in Hong Kong and go to missionary school, the Christian school, then a Catholic school for one and a half year before we decided Hong Kong is not the place we can stay and we went to Taiwan. My father went to Taiwan. We all go to Taiwan.

I was very lucky because when we were in Hong Kong, the life is very difficult. We are using our savings. It's very difficult. We kind of downsized our expenses, etcetera. At the time, my father has a lot of friends in Hong Kong. Most of them, their children cannot go to school. If they have six children, only the oldest one and only the boys can go to school because it's very expensive. For example, I go to the missionary school, it's supposed to be fairly reasonable, but it cost me thirty dollars a month. You know what thirty dollars means? The maid in my house is thirty dollars a month. She will do everything. I think it's twenty-five, not even thirty, but I have to spend thirty dollars for my tuition only. Then I need uniform. I need my lunch and I need my bus fare and other fare, too. So it's fairly

expensive. Luckily, I'm almost like the only child. I just said my father came back when I was already nine years old, so although I got two younger sisters at the time but they are all in the infancy. One year old and three years old. So they don't need school.

43-00:36:44

Li: And all girls?

43-00:36:46

Lin: All girls at the time. Yes. So luckily, my mother find a job. Because she teaches science. At the time, it's very funny. My father said, "There is no hope for you to teach in Hong Kong. Absolutely no hope." First, Hong Kong only hire people who are British graduates. They don't even recognize your degree, your education in China. Even if the degree is from the United States, they don't recognize. They only recognize the British, or there colony only this. So there is no chance. The second reason, they only speak Cantonese. You don't speak Cantonese, there is no hope. My mother is a very determined woman. She don't really believe so. She was the principal in Nanking and very famous principal, too. She thought she would be able to find something. So she went. There are a lot of people in Hong Kong but few people can teach science. In the school, especially a lot of Chinese schools, they don't care whether you are a graduate from British and they paid relatively little. So my mother got a job and we were living here. But, of course, the earning is not that much so we still have to consider [finances]. Later we decided it's too difficult to stay in Hong Kong so we move to Taiwan.

43-00:38:39

Li: In Taiwan, the schools were free, right?

43-00:38:41

Lin: Free. Once you go to Taiwan, then education is no problem because Chiang Kai-shek thought education is such an important thing. So he made it compulsory education. In Taiwan, even the most remote place, the kids, you are forced to go to school. If you don't send your kid to school, actually the parent will be jailed. You have to send for six years. After six years, the high school, if you can pass the examination, it's practically free. You pay very, very little. But even that little you can be awarded for scholarship if you are poor. So once you get there, we all have an education, as long as you can pass the examination.

43-00:39:41

Li: So is that where you met Otto? In Taiwan?

43-00:39:44

Lin: We met in college.

43-00:39:45

Li: In college?

43-00:39:46

Lin: Yes.

43-00:39:47

Li: And what college did you go to?

43-00:39:48

Lin: Taida [台大]. National Taiwan University [國立台灣大學].

43-00:39:52

Li: And can you tell us how you met?

43-00:39:55

Lin: Okay. He told me about the first meeting, actually I did not even know. I was the class leader of chemistry department and he's the class leader of chemical engineering department. That's freshman year. And he want to be elected to be the leaders representative, because the university is very large. The freshman year has many, many classes, all different, so they have a union and you elect one representative of the union, the leader. So he went into this contest to [represent] everybody. When we went to vote, he said he already know me. He wanted to make an impression on me, so he suggested that I be the one [to] read who got the vote. He suggested [me] and I would have to want [to do it]. This is not a big deal, right, so I do that. Now he says that [even] before we really become friends, I call his name. I was calling his name 400 times because reading the name [on the ballots].

Actually, we didn't know each other at that time. But since we are all freshmen, there are classes together. Then the second year I transferred from chemistry to chemical engineering because at the college entrance examination I think I was maybe one point shy so I could only get my second choice. That was chemistry. I didn't know what is chemical engineering, I thought chemical engineering is the one who is in charge of chemical industry. I was fascinated with chemical industry. At the time we went to the school, the first girl's middle school is one of the most famous school in Taiwan, the best girls' school. And we were very lucky; because of the retreat from Mainland China, the best teachers all went to Taiwan. So we were lucky enough to have a lot of teachers. Some of them are qualified to be professors. For example, I had a teacher of chemistry, she had a PhD degree from MIT. I was very much inspired by her and she liked me very much because most of the Chinese girl doesn't want to do laboratory work and I'm interested in the laboratory. So she teaches me to make soap, to do a lot of the experiment. I was fascinated to generate hydrogen, etcetera. So I thought I want to devote my future to the chemical industry. If I can make things better, the world will be better and people will have a lot of the things now that are so expensive they cannot [afford them]. And that is what I thought I'd like to do.

43-00:44:15

Li: So you chose science but out of a sense of doing something good for society? That was your motivation?

43-00:44:20

Lin: I think the very original [motivation was] probably a little bit vanity because everybody thought if you are a science major, you are smart. And since I can do the science pretty well, naturally choosing science is easy.

43-00:44:43

Li: Did your mother encourage you to do science since she had studied science? Did she encourage you to choose that field?

43-00:44:54

Lin: If she did encourage me, it's very subtle. As a child, I'm very curious. I was curious about everything. When I asked her, she never denied a question. She explained to me. At the time, we don't have too much spare money, so in the spare time my mother spent time with me, sometimes we do some art. The Chinese artwork is sewing, because, of course, that's very important. Every girl has to learn. And then the other thing we will do is study. My mother will teach me [how to] study. And I don't like to do the reciting, which I did pretty good in schoolwork, it's no problem, but extra work I don't like. And there is no children's book, so she usually would tell me some science story. I think that's the encouragement. All we did was mathematics. Now, I love mathematics because she gave me a problem that's hard, I always can solve it. And if I solve it, I thought it's very big satisfaction. We will play these things, so in a way I think she did encourage [an interest in science]. We always took the book one year advanced in the summer, for the next year I need to study. We would open the book, start to do some of the homework, etcetera, so when I get to school I already one step ahead of other people. So [it made school] kind of easy. But this teacher, my chemistry teacher, she really inspired me.

43-00:46:52

Li: And she was a high school teacher?

43-00:46:53

Lin: Yes.

43-00:46:53

Li: But she had gone to MIT?

43-00:46:55

Lin: Well, at the time there is only one national university, so if they already had a professor, there is no professorship for you. Later, a lot of my teachers all become professors. My Chinese teacher, my mathematics teacher, my history teacher, my geography teacher, all become professors because they are education, experience, qualified. But at that time, everybody just fled from Mainland China to Taiwan.

43-00:47:33

Li: What was her name? Your teacher who mentored you?

43-00:47:36

Lin: Actually, I forgot. Her last name is Wong.

43-00:47:42

Li: So did she encourage you to apply to Taida and continue your work in chemistry?

43-00:47:46

Lin: Well, she don't have to encourage because there is no application. After you graduate from high school, you want to go to the university, you take unified entrance examination. There is only one entrance examination. You will be accepted according to your grade, and of course, according to which one you want to go. So Taida is the highest mark, so at the time when we were in high school, they enrolled students still in small numbers. I think at Taida, the total number of students is about a thousand students, but the [number taking the] entrance examination is 10,000. But now it is more than this. But at the time, 10,000—in other words, every graduate from high school, if they intended to go to college, their first choice will be Taida. So like in chemical engineering, they accept thirty-six students, you really have to be the first thirty-six. If you are thirty-seven like me, you will go to your next choice. Yes.

43-00:49:21

Li: So you took the exam and you ended up in chemical engineering?

43-00:49:26

Lin: No, ended up in chemistry.

43-00:49:28

Li: In chemistry, okay.

43-00:49:29

Lin: Most of the students in chemistry had lower grades than chemical engineering.

43-00:49:35

Li: Right. It's a second choice.

43-00:49:36

Lin: Yes. Because some people may be very high score, their first choice is chemistry. But I have an illusion. I thought if you are majoring in chemistry, you can only be a chemical teacher, but I want to make something different, so I want to go to chemical engineering.

43-00:49:59

Hamilton: So can you tell us a little bit about what it was like to study chemistry at Taida?

43-00:50:05

Lin: I was going to tell you how I met Otto, right? I transferred to chemical engineering. So actually, he knows me already. He already knew me for one year, tried to be friends, didn't get the opportunity. He didn't really dare. And we didn't know each other really. But since he's class leader, he have opportunity to arrange the classroom seating. We all free seats, so there are no seats to arrange, but in several class, there is seat arrangement. One is the class for chemistry lab, physics lab. You have to have seating, because you have to have a table. You cannot just go to anybody's table because you have your own equipment. I was a transfer

student, right? We all have class numbers. We all have our class numbers. But my number is from chemistry so obviously I will be put in at the end of somewhere. So he put me at the end of the women and he put himself at the first of the men so he would sit next to me. That's how we met.

43-00:51:38

Li: And what were your first impressions of Otto at that time?

43-00:51:42

Lin: I thought he's short and I thought he has red eyes. Wasn't too good, the impression.

43-00:51:54

Li: Did you admire him as a student?

43-00:51:58

Lin: No. At the beginning, I thought he is one of those overseas Chinese students because he looked like a Hong Kong[er]. He looked very much like Cantonese.

43-00:52:13

Li: And what does that mean? To look Hong Kong at that time, what would it—

43-00:52:17

Lin: At the time, Chiang Kai-shek thinks he need the support from Chinese. Since the Mainland already lost, he cannot get support, so he want to win overseas Chinese support. So they decided they will accept a lot of overseas Chinese students to come. And the United States agree for these things, so they appropriated funds, a large fund. This fund is designated for only overseas Chinese going to college. Later on, they expanded it to senior high school for refugees of Southeast Asia because there was war and there are refugees. Their children can send to here.

43-00:53:18

Li: To Taiwan?

43-00:53:18

Lin: To Taiwan. But at the time, it's only overseas Chinese students. So most of the overseas Chinese students go to Taiwan for college from Hong Kong, because at the time I told you Hong Kong only have one university. Not even the Chinese university. Only Hong Kong University. And you cannot go. Even if you are very good, you have to be elite. If you are just an ordinary kid from ordinary school—unless you are really, really exceptional, and you maybe get a recommendation letter from a missionary or something—there is no chance.

43-00:53:59

Li: So were the students from Hong Kong sort of poor?

43-00:54:03

Lin: We thought they are second-class because there are no comparison for our competition. We have to go through such a hard time but the Hong Kong student, actually, they are very good student but they don't have to be that good. Although

they also have to pass the entrance exam but they only compete with themselves. They are not competing with us. And we cannot take their quota. So usually you take thirty-six local students. Like chemical engineering, we took seventy-some students of the overseas Chinese. But, well, he is not an overseas student.

But he tried to approach [me], to be friends with me. We all liked to study in the library because it's quiet and has tables and you can meet friends and such. I usually go to the library to study with one of my best girlfriends. We do not belong to the same department but we still study together, so we usually go there to study. And in the library, the seating is very difficult. There are many people. Many times he will go there first with his friend and they occupy more seats. Usually, if you find your friend, your friend will raise their hand. If they have a seat, you can sit next to him. So he would raise his hand we sit there. So I thought I was just lucky, right. I didn't know he was purposely doing that. So we sit together and sometimes we do the homework together. Slowly, you know [we became friends].

43-00:56:01

Li: Because you were the class leader, he was a class leader, were you—

43-00:56:04

Lin: But that year we both were not the class leader

43-00:56:08

Li: Any others. But were you both fairly popular at the university? Did you socialize a lot?

43-00:56:15

Lin: Well, I was quite popular, university-wide, so people know me, it's no surprise. He's probably very popular in his class. Because I was in competition for speech, for debate when I was in high school and also in drama, so when I get to the university, I think it's the tenth anniversary or something to celebrate. It's a big deal and they're going to put out a big drama and the drama is going to perform for seven days. They selected people to be actor and actress, and I was asked to play one of the fairly important positions in that drama. So, of course, people know me, that would be fairly common. But Otto told me later he didn't even go to see that drama.

43-00:57:32

Li: How long did you know him before you began dating?

43-00:57:37

Lin: I think he considered that he date me immediately, as soon as he sit next to me. But we were very subtle. The whole class has 108 students. Among them, eight students are women, so these eight women are stick together all the time.

43-00:58:02

Li: A hundred men and only eight women?

43-00:58:04

Lin: Yes, in chemical engineering. The eight women would stick together all the time. Most of us stayed in the dormitories. Some of them don't. So he sometimes just come to [see] all of us. So he wanted to invite me for a movie, he have to invite all eight of us.

Begin Audiofile 44

44-00:00:00

Li: This is Robin Li and Emily Hamilton speaking with Ada Lin, October 16, 2009 at Ann Arbor, Michigan, tape forty-four of the Otto Lin Oral History Project..

44-00:00:10

Li: We were just talking about you and Otto and how you met. Did you introduce Otto to your family then fairly soon after that?

44-00:00:22

Lin: The first year I want to live in the dormitory. Of course, the dormitory is eight people in one room. It's a bunk bed. You have an up and down. And everybody has one small bookcase and one small desk. It's a lot of fun with your friends but it's really not that comfortable. And in my house, I have my own room. So, of course, my home is better. And my home really is not that far away. So slowly, I changed. First I go back to home to take shower every day and have dinner every day and then go back to work. And then I slowly am not living in my dormitory anymore. I still occupy the bed but living in my own home. When I live in my own home, sometimes I go home somebody riding a bicycle behind me would say hi. That's very common. We have a lot of friends that would say hi, so then we would ride together for a while. It happened to Otto many times, suddenly coming from the back and riding with me, almost get to my house, he said, "Bye-bye," I said, "Bye-bye," so I go. And the next morning I get out, he's there again near my house and we ride back together, back home. So I thought he's living very close to me. It happened he doesn't live there. He live in dormitory. He go all the way to there and met me in the morning. So that's the way. He never there to knock my door because he's afraid of my father. I didn't introduce him to my parents either. Actually, my parents are fairly open-minded.

But he came to my house to visit me and he make friends with my brothers and sisters. I think if he came, probably most of the time he choose [to come] when my parents are not home. I have five brothers and sisters. They're all younger than me. The youngest at the time is only three or four. So when he come, all my brothers and sisters, welcome him, he's very happy. He makes friends with them, brings candies to there. He treats them, he tells stories. At that time, the woman is shy. It's not that the woman and man are not making friends, but you are not that outgoing. Sometimes I don't want to come out so I only sit in my room. He was outside waiting and waiting, making friends with my kid brother and sister. Sometimes he came, I told the maid that I'm not home. But my little brother and sister already run out, and cry "Lin-ge," [林哥哥] that means brother Lin, "jiejie

[姐姐] [older sister] is home!” So he [was] already welcome, he made very good friends with them.

44-00:04:33

Li: At this time, how old are you?

44-00:04:37

Lin: I think I'm nineteen probably.

44-00:04:40

Hamilton: And did you already know then, because of your mother and father, that you were going to go to the U.S. eventually for college? Was this already decided by high school?

44-00:04:50

Lin: No, no, no. In my mind, pursuing studies had never been a question and my father always said that he would send me abroad, etcetera. I was academically quite able. Among all my cousins, I went to the best high school, best university, and doing academics is not a difficult thing for me. So I wasn't really afraid of doing a lot of activities. So in Taiwan the parents, even if they don't have money, they are only the street vendor, etcetera, everybody hope they can educate their children. Everybody hope they can educate their children to the most possible [extent]. In Chinese custom, you look at the past, Qing Dynasty or earlier. In China, there is no class, so everybody essentially is equal. Even if you are poor to death, but if your children somehow got education and they are smart, if they're smart, people will help you to educate your kids. And if your kids is really a learned man, smart, you pass the national examination, you will become highly respectable over night, become important official. So to go to school is such an opportunity, [can] change the fate of the whole family or maybe even whole village. So sending kids to go to school is not a question to the Chinese parents. They really don't have to be honorable or whatever. This is everybody's wish, just like you wish your kids will be alive. It's very common.

I didn't really have this in mind. But then, of course, after I finished high school, there are a few of my friends go to the United States to study and make me very envious. I wanted too. But at the time, we really fairly poor. So unless I got a scholarship, there is no hope for this.

44-00:07:46

Li: Had you learned English by this point?

44-00:07:48

Lin: Oh, we all have to learn English since your first year in high school. But the way of teaching is very poor. Practically I cannot speak. You can write but not very fluently. You can read. We all read textbooks in English but only textbooks, not any novels, etcetera. And besides, I'm pretty lazy. My father, his English actually is very good. He was a reporter at the Times. So he wants to teach me but I'm very lazy. He wanted me to recite Churchill's speech. He will pay me one dollar

or two dollar for reciting one. I never got ten dollars. The extra work I usually don't like to do.

But at the time, Taiwan is very poor so usually if you got one kid to go abroad it almost means that's the hope of the whole family. Well, my family is not that bad. But, of course, my father will be encouraging me to do that. When I approach him at the end of my college life, I started to know that I'd need to apply because there are other people applying, so I'm just following, doing the same thing.

44-00:09:47

Li: And did you have aspirations at that time? Did you want to get married and have children or were you just focused on your education? What were your main priorities at that time when you thought about your future?

44-00:10:01

Lin: I'm naïve enough never thought of marrying and getting children, but I didn't think this is something you need to think. I never thought I don't want to get married either. I think I never thought of "I don't want to get married." But I certainly wasn't ready to get married with Otto at the time, or anybody.

44-00:10:29

Li: So then once you had decided that you wanted to try and come to the U.S. for school, what was the process that had to happen? Did you apply to schools in the U.S. first or did you have to take an exam? How did that work?

44-00:10:40

Lin: Yes, we have to take exam, but I apply first. Of course, when I applied I got the great advantage because my father knows all the process of applying to school and he had students, and many times he helped them. So I know where to get the names and Otto will help me because he will be interested, too, to find the name of the university that my father would suggest. And I'd write the letter, he'll correct it and it's very interesting.

At the time, we all take part-time jobs as a tutor. You try to find some tutor job tutoring other people's kids. Since you are a student of National Taiwan University, you are very easy to get one. We can get about \$300 per month for three nights teaching, two hours per night. We ride our own bicycle to the place to teach the kids, etcetera. So I have the pocket money of \$300. Otto probably have the pocket money of \$600. He teach maybe two places. I only teach one place. So that's my pocket money. In addition, my father give me \$300 for my pocket money every month. So that's the money I have.

When I want to apply, the postage to the United States is very expensive. It's ten dollars. So every letter is ten dollars. So if I send out ten or twenty letters to ask for application forms, I'll spend \$200. So my father said, "Okay, all the letters I will mail for you." I applied and then [there were a] lot of forms. In every university, you need to send out at least ten letters, because I need four letters of recommendations. I will ask my professors to write it for me but usually I need to

prepare the stamps for him to do it, because otherwise it'll be too much to spend for him. Imagine he has 108 students—it's a large amount of money.

So I applied. In the first year, I really didn't have too much luck. I only got two universities, maybe three universities, because that's my third year, to accept me. My first two years score is not that great. I participate a lot of activities and excitement. Who wants to go to study, right? I didn't realize another important thing. I was pretty good in my high school, but in my high school, we are only 150 students. And among the 150 students, only thirty students are science majors, [and they] compete together. I'm not too bad among the thirty students but when I get to the university, only two or three get to the class, and there are 108 all from other high school, and also are among the first two or three present. I'm not competing with the same level, same peers anymore. Among these, of course I'm not that good. Luckily, there are the students from overseas, otherwise I'm probably already thirty. Why, even thirty is not too bad since you have a 108. So we are very pleased to have them [as a] buffer [for] us.

The first two years are really not that great. [By the] third year I'm already applying, so I only have three years of classes. And I only got, I think, Wisconsin University to accept me. Michigan doesn't. And I got a Texas women's college to accept me and give me a scholarship of \$600 or maybe \$400. And then I got Rice University accept me. Rice says I can have all tuition free and \$600 for stipend. No, Rice I did not apply in first year. [That's] the second year. But that's the first year I applied. At the end of the year, I need to take the examination to go. It's like a GRE, but it's mainly for English, etcetera. So I took the class. Actually, among the students, I'm a pretty good student. Not that bad. But my grammar is poor because I never want to really work, doing all those [exercises], etcetera. So I didn't get a score very high. I was two points shy to be accepted, past the point. So I cannot go that year. I have to go the next year to take another exam. So I become a teaching assistant in the university. Otto went to the military. He's happy that I'm not going now, will delay one year. I'm pretty happy, too. At the time, we already fell in love.

So I applied again. But at this time, just at my graduation day, one of my best friends, she is a professor's daughter and she was born in the United States, so she doesn't have to go through the examination, go through the application, etcetera, because she holds an American passport. She doesn't have to get visa. She can leave for U.S. right away. And although she's my good friend, she kept the secret for all year. She applied to Columbia University and she got a scholarship, which is \$3,600. I'm really envious. It's with some luck because Yang Chen Ning [楊振寧] and Lee Tsung-Dao [李政道] just got their Nobel Prize at the time, maybe one or two years ahead of that time. So Columbia decided that the Chinese are very smart so they will accept more Chinese students. at the time, the students from Mainland China cannot come to the United States, so the only Chinese students will be from Taiwan and Hong Kong.

At the time, I want to apply to Harvard, Yale. My father said you don't need to do that because you are not good enough. You will not be accepted. If you are not accepted, we will be wasted for the stamps, because stamps are a lot of money. So I did not apply. But my friend, this Eunice, she got accepted by—she's from physics department. We have a lot of classes together. She got accepted by Columbia. My goodness. I couldn't stand it. I must apply to Columbia because I felt she's good but compared to her I'm not bad. So maybe I have an opportunity, too, right. I told my father I must apply to Columbia University. I go ahead to write the letter. I've already got the application form, etcetera. My father said, "No, you don't have to because there is no chance for you to get. And I'm not going to waste this money." I think Columbia needs something, fifteen or sixteen letter all together,. It's very lengthy and I also have to send the application fee, which is forty dollars. It's a lot of money. And at the time, in Taiwan, we cannot send U.S. money abroad. If I want to send the money, I have to go to the black market. My father said no. He said, "If you throw the money to the pond, it will make a sound, pl-tuk. But you apply for the university, they won't even make a sound back." I was sad. I was really sad because he thought I really had no chance. But I determined this was the money I wanted to spend.

At the time, I was actually already teaching in the university. Teaching in university I got \$1,000 per month which is considered a fairly good salary, higher than any high school teacher. And at the time, in Taiwan, everybody their salary is kind of uniform. For example, my mother is a principal of high school. Her salary is very little different from mine but she got other benefit which, of course, I don't have. For example, she has a rickshaw. There is someone to ride the tricycle, to carry her to the school every day. She got a maid and she has other benefits as a principal. But, of course, I don't. But the salary is about the same.

44-00:22:24

Li: So you had graduated from Taida and then were teaching.

44-00:22:27

Lin: One year.

44-00:22:27

Li: You were teaching one year while you applied again for university in the U.S.?

44-00:22:30

Lin: Yes, yes. As a student, I don't have too much money. But when I go to teaching, I really have \$1,000. But I give all my check to my father. Didn't keep one penny for myself. I give the whole check to my father every month and he still give me the \$300, my pocket money. It's still like college time. I decided that I wanted to [apply to Columbia]. So I use my own money to send the mail. And then the university come back to me that you have to send the forty-dollar for admissions fee. I really don't have the money. At the time, one U.S. dollar is forty Taiwan dollars. So forty dollars is a lot of money and I don't have it. So I wrote a letter to the university. I said, "We have the foreign currency control in this country," which is true. "I have no way to buy the money unless go to a black market and I

couldn't do that, so could you please excuse me for this administration fee? If I did get accepted, when I come to the United States, I can pay you back of this admission." I didn't ask for waiver, I only asked for postponement of this. But in my letter I told them that, "My father is a professor," etcetera, etcetera, my history. "My mother is a principal. And I wish to come to the United States to study but my father has six children so it's not possible to support me for the education. I need a scholarship. I think if you consider my scholarship, you will not regret because I will work very hard to satisfy you. But if you think I'm not deserving for that, please don't admit me because I will not be able to do that." I think maybe this sentence move them.

Well, anyway I was accepted and I was awarded. When I awarded a scholarship, I couldn't believe my eyes because it was \$3,600 a year. \$3,600 a year is bigger than the first prize of the lottery in Taiwan. I really cannot believe. Otto was there. I said, "You read this. I awarded full scholarship. That's what that amount must be." We decided that I awarded a scholarship. I make a phone call to my father to tell him this good news. He was in the cabinet having the meeting, cabinet meeting, joining the cabinet, having that meeting. I told his secretary. I said, "I received a letter from Columbia. It looked like I got a full scholarship of \$3,600 a year." Remember I said Rice only \$600. I said, "Can you slip in a note to my father to tell him this news?" But I'm not sure. So he did and my father sees that, and when he found a chance to call me back, I read the letter to him. He was so thrilled. He was so thrilled. I think the whole cabinet knew that I got a scholarship right away.

44-00:27:25

Li: So when you found out the news, your father was very proud. How did the rest of your friends in the university respond?

44-00:27:32

Lin: Well, at the time, we already graduate. A few of the girls already come to the United States to study. Most of them only have a portion of a scholarship or very little as such. So they all have to work and study. No one really get a full scholarship except my other friend, Eunice. But she doesn't share this with us. She's from the physics departments. I think she's probably the only one got and no one else. Now I got this scholarship.

44-00:28:14

Li: And was Eunice already at Columbia?

44-00:28:17

Lin: At Columbia. Now I got this scholarship. I was really thrilled. Probably among the first in Taida got a full scholarship from a major university. I think before there are also but usually not so fast. It's already several years, etcetera. All my friends know. Otto knows so his friends know, etcetera, and I don't keep it a secret. I told everybody the whole thing, as much as I could. And I think it make a big shock to most of my classmates and then effect the whole graduation class in

the engineering department because my classmen think, “Ada is not that exceptional, right? So if she can get [that], maybe we can get [that], too.”

In the beginning, a lot of people, usually the local people, very few think about going abroad because if you don't have the money, there is no chance. Why you apply? First of all, they don't know how to apply. Well, now they still don't know how to apply, but if Ada know, we can find out, too. And if Ada can get, then the scholarship is not that far away. So most of the people start to apply and from then on a lot of people come to the United States to study to various different universities. Of course, not all in Columbia.

44-00:30:06

Li: So Ada, you said that you and Otto were in contact that year, even though he was in the military and you were teaching at Taida. Were you talking as you were applying to colleges, applying to the same universities in the U.S.? Was that part of your plan, to try and apply to the same schools? Was it part of your plan?

44-00:30:31

Lin: Actually, we were doing all these things together.

44-00:30:37

Li: Working on the applications together?

44-00:30:38

Lin: Yes. Right, right. But mainly at the time it's focusing on mine because I'm leaving immediately and he couldn't. He has to wait. But I think we are doing that all together. We're sending the things out because there is no reason we cannot apply to the same university. Their accepting me is not going to affect his application. It's not competing for one position. But we didn't do it on purpose. For example, like Columbia he didn't do it. At the time, I'm trying out first so he don't have to try at the same time. And he tried Yale. He admired Yale. And later, he took another examination, the Rockefeller Scholarship, so he got that. But he give it up. Yes.

44-00:31:52

Hamilton: Were you basing your choices of American universities based on name recognition or did you know about the chemistry department, for example?

44-00:32:02

Lin: Well, I actually don't know the chemistry very much but I did know a little bit about Columbia, which excited me. Actually, I was working as a teaching assistant. At the time, Taiwan's starting to want to build the nuclear power plant. Tsinghua used their endowment to build first the nuclear reactor. What is the name? You know, the—

44-00:32:53

Li: Generator?

44-00:32:54

Lin: Generator to build these thing. They need a whole group of scientists to learn about isotopes, about the radiation chemistry, radiochemistry. They want to select some students to go to have a short course. I think it's two months or three months. A crash-course. There are some American professors who come and a car come mobile lab inside with all the equipment, so we start to learn all these isotopes, how they work, how the radiation effect to the human health, etcetera because that will be the important part when you start to build the power plant. And I was selected as one student because I was teaching in the university. So, of course, I had this opportunity.

The professor I worked with—teaching assistant is formal employee. It's not like here in universities, a scholarship or anything—the professor I worked with, he was in charge of that plan [to learn about nuclear power generation]. So I'm automatically selected as one of the candidates to go there for the training with a lot of other engineers or scientists from the other university. That's the first time. I think all together sixty-seven or seventy-six students in Hsinchu have the first training.

There I was exposed for the first time [to learning about] atomic energy. What is the peaceful application of atomic energy? Well, of course, this is a fascinating new field, [and] is something I cannot learn, I didn't learn in high school and in university.

44-00:35:17

Li: What year was this?

44-00:35:20

Lin: That's 1960.

44-00:36:23

Hamilton: And you said that the equipment was brought in by car. Where did the equipment come from?

44-00:35:31

Lin: United States. Yes. I think Argonne Laboratory.

44-00:35:35

Hamilton: And you might now know this, but do you know who funded this project, this entire crash course?

44-00:35:44

Lin: Funded by Taiwan.

44-00:35:46

Hamilton: The government?

44-00:35:47

Lin: Yes, because they're going to establish this department in Tsinghua University and before they have this department they want to train some scientists to attract student.

44-00:36:04

Hamilton: And what kind of equipment did you have?

44-00:36:08

Lin: Oh, we have Geiger counters, other things. It's mainly, actually, training us for health, for safety, to introduce isotopes effects to human body, isotopes using as, for example, you can study the movement of nutrient in plant. We put the plant grown in isotope solution, containing solution as fertilizer. Like nitrogen, right. So you look at the stem, look at the leaf, and look at the time, how fast it will get to what point, etcetera. We mainly studied these kind of things.

44-00:36:58

Hamilton: And who was doing the training? Were they scientists from the U.S.?

44-00:37:03

Lin: I think from Argonne Laboratory. Yes. I'm not sure but I think. So I got this opportunity to receive the training. I was very fascinated.

44-00:37:16

Hamilton: And is this after you were accepted at Columbia but before you had gone?

44-00:37:19

Lin: No, no.

44-00:37:21

Hamilton: Before you were accepted?

44-00:37:22

Lin: Yes, yes. But I determined to apply to Columbia, it's not because of that, but because my friend got the scholarship. However, I got this opportunity, I learned there, and I know that Manhattan Project and I know that Manhattan Project has a portion in Columbia and I know there are several professors are still there who was involved in this and I thought, "If I get accepted, I will be going to listen to the lectures of these professors." Wow. That thrilled me. So I write in my application I want to study radiochemistry, radioactive chemistry. That's the knowledge I have, only knowledge. I didn't know anything else. Of course, later, something else attracted me so I forget about it.

44-00:38:31

Hamilton: Did you take any lecture courses with any of the Manhattan Project professors?

44-00:38:34

Lin: Oh, yes, yes, yes.

44-00:38:33

Hamilton: Oh, like who?

44-00:38:35

Lin: Miller. I forgot Miller's first name but I think Otto knows his first name. Yes.

44-00:38:46

Hamilton: So in addition to Eunice, this experience of being trained on safety, dealing with nuclear power is what got you thinking about Columbia as a place that you would like to go?

44-00:38:57

Lin: Well, that enhanced my interest. The first time I had some idea of which kind of branch I will go into. Yes. But I didn't [end up pursuing that].

44-00:39:11

Li: At this point, when you are applying for graduate school, do you know that you want to get your PhD or do you think you might get—because you could go get a master's and come back and teach at Taida.

44-00:39:20

Lin: No, I wanted PhD from the very beginning.

44-00:39:25

Li: But your plan was to come back. So at this point you at least thought you were interested in radiochemistry and the idea was you would come back to Taiwan.

44-00:39:36

Lin: Well, actually, the Chinese train their children from the very beginning to have a very high goal. The goal the Chinese always set in the scholar is you always have your country in mind, you always have the mankind in mind. You want to do [something] for your country, you want to do for your mankind. So patriotism is not something special. At the time, mine is not that clear but I never had the idea I will just stay in the United States. But I'm very sure—actually, I answered this in the embassy question. They asked whether I will come back. I say, "I will." He said, "Even if communists may come over?" I say, "No. I will go anywhere in the world if communism come over," because my family, Otto have family, has very bitter experience with the communists. So at the time I know this is not only advertisement campaign, political campaign and I know what they're doing is really very terrible.

44-00:41:13

Li: When you were living in Taiwan at this time, did you feel like you were in exile? Did you feel like your country was Mainland China and you were in exile in Taiwan?

44-00:41:23

Lin: Actually, the education in Taiwan, Chiang Kai-shek's education, always [made us] think our home is in Mainland. All the campaigns tell us we will go home and we will rescue the people over there. A lot of people doesn't believe it because it's too much, the propaganda but I do believe it because my grandpa was punished to death and with no reason at all. He had never been an officer or done anything. He was only an elementary school teacher in the countryside and my

grandma was starved to death and we were supporting my uncle's whole family every month and they wrote to us. Every letter is saying if we don't send them money, they will starve to death. One of my cousins, she married and she told my father, because I was the one writing the letter for my father because my father doesn't dare. If he writes, they know he's working in Kuomintang, maybe even give them more severe treatment.

44-00:42:58

Hamilton: Right. So to protect them.

44-00:42:59

Lin: Yes. She said that if we don't send [money], her kid and she herself will die. So it's very bitter. Very, very difficult time. The only crime they accuse my grandpa of is because he didn't teach his son right and his son got PhD in foreign country, which means he is a traitor. And he [the son] worked for the Taiwan government, is a traitor. They punish him to confess his guilt by kneeling down on broken glasses. They break the bottle, used the broken glass and ask him to kneel down when he's already over seventy and this is his only crime. To me, this is very bitter. Otto's mother and his brother and sister were driven out of their house and she had to live in an old temple just like a beggar and she has no food. No one dare to give them food. So in the night, somebody pretend they are going to pray in the temple and left some food on the table and left. His younger sister, only three years old, was so hungry she grab the bread and eat too much. She died. These things make me feel that I definitely don't want to live in a communist-controlled country.

44-00:45:04

Li: Was your dream then to go to America, get your PhD, and then go back to Mainland China and help the people?

44-00:45:09

Lin: No, no.

44-00:45:11

Li: No, but if the communists—basically, when Chiang Kai-shek takes back Mainland China. Was that a dream that seemed possible?

44-00:45:19

Lin: Most Chinese students, even your grandpa, etcetera, after they finish, they always would—to think we want to help our own people. It's not a big deal. It's not a noble—

44-00:45:39

Li: It's what everybody thought.

44-00:45:40

Lin: Everybody will think. Just like think your brother, sister's hungry, as soon as we come to the United States, we start to send money back.

44-00:45:48

Li: But did it seem possible to you that the KMT could take back Mainland China at this point? Did that seem like it might happen?

44-00:45:56

Lin: Actually, we all believed that. Maybe [it was the] propaganda. The main reason we believed that is we thought we'd lost the Mainland China because of the corruption, because people think they will get a better life in communist China. Now they get worse life in communist China. That is something they want to get back. The belief is really not only fighting with gun. The belief from the beginning is a choice. So it's still possible. It's a choice. But it's not so clear. It's not so clear. But I tell you what is my real feeling. When I first come to United States, I went to San Francisco and then I went to Los Angeles. I saw a highway, the elevated highway. The car was running. I was so envious. I said to myself, "I hope one day China has the same thing." That's was my first feeling. And then I saw the kids wearing shorts, carrying a book bag very happily, going to school. Everybody is fat, red-faced, very chubby. I look at them. I said, in the supermarket, "I really hope our own kids can be like that. And there is so much food all over the shelf. I can't understand very much. *My Fair Lady*, she's singing, lots of chocolate, lots of heat. I can't understand than. Because at the time, I'm not starving, but seeing the kids so well fed I really hope our kids in China can have the same thing. But I think for a young woman come to here and have that be the first impression, probably is not like everybody. But that's my reaction. But overseas Chinese will think about how he want to help his country to gain these things. It's not anything special.

44-00:48:52

Li: Now, when you were in college you were saying that the Taiwanese students looked down on the students from Mainland China. So this was—

44-00:49:00

Lin: Not Mainland China, overseas Chinese student.

44-00:49:03

Li: Okay, okay.

44-00:49:04

Hamilton: And so those were Chinese from Hong Kong, Malaysia?

44-00:49:07

Lin: Yes.

44-00:49:07

Li: I see, okay.

44-00:49:08

Lin: Mainland China, no students can come.

44-00:49:12

Li: Oh, okay, okay. They can't get out. Did you feel guilty?

44-00:49:18

Lin: Of what?

44-00:49:19

Li: Being able to be in Taiwan. Did you feel guilty thinking about your relatives in Mainland China?

44-00:49:25

Lin: No, never. Never.

44-00:49:26

Li: No. Because you—

44-00:49:26

Lin: Never a minute even later. We all felt we need to help them. We're willing to help them. I never had the guilt feeling. And actually, I resented the feeling. I really resented. I forgot whom. There was one person saying, "You kind of feel guilt?" I said, "Why I feel guilt? I didn't make you stay there." Right? "I have no part that causing you to stay there. Nor did my father or my grandfather. I don't even think of Chiang Kai-shek. We fight a war we lost. What can we do? Right? You select to stay there or you cannot escape. It's not my fault. Why I feel guilt?" Well, I want to help him. It's not because of my guilt. Because he's my brother. He don't have to be anybody, he don't have to do any good. Because he's my brother I want to do that. But I don't feel any guilt even to Otto's mother. Why guilt? I don't owe them anything. Neither Otto. If you want to say any guilt, maybe his mother, right? She wasn't able to take care of him.

44-00:51:06

Li: Do you find a lot of people share that feeling of not—?

44-00:51:12

Lin: I think actually many people feel that way because, look, Otto's father would feel guilt because he cannot afford to bring them out. And some people maybe didn't do that. They may be able to do it, but they didn't do it in time. Then they lost the opportunity to do it. But not us. You see, that's why there are many brothers, sisters here helping, sending money to Mainland China, helping them to get ticket and then when they come out they kind of feel, "Why you have such a good life but I don't?" And that make a lot of families feel very bad to each other because we came here with nothing. I worked hard, came here to earn my things. I share with you in the goodwill. It's not mercy. You don't have to return me but I don't owe you. You're not entitled to share with me, right.

44-00:52:18

Li: So when you got to the U.S. and got to Columbia, did you start sending money home, part of your stipend right away?

44-00:52:27

Lin: Actually, I don't have much money. I can't do that.

44-00:52:30

Li: Right. So you have to wait until you get a job after?

44-00:52:35

Lin: No. I actually take up the job as a proctor when the university has a proctor. I got the money. I send it. Because my father really doesn't depend on my money. I send the money to my mother just for being loved and it's very little, something like five dollars or something like that and also send money to my younger sister and brother to make them happy, so they have a little bit extra. I did. I also sometimes do babysitting to get a few dollars and send it back.

44-00:53:23

Li: So when you came to New York, did you get in touch with Eunice? Did you have friends that you got in touch with when you arrived?

44-00:53:30

Lin: Oh, we go to the dormitory immediately together. Yes.

44-00:53:39

Li: So you weren't alone in America at any point?

44-00:53:42

Lin: I was alone before she came back. I was alone for a few weeks because I go to the dormitory actually before they formally open. They accept me, the only reason is I'm from foreign country, far away, and there are several other ones, too.

44-00:54:07

Li: How did you get from Los Angeles to New York?

44-00:54:11

Lin: By plane. So my uncle pick me up at the airport, send me to the dormitory.

44-00:54:21

Li: And what was it like being in America, to all of a sudden be a minority, to be in this new country?

44-00:54:33

Lin: Well, actually, I didn't think that much. We were in the dormitory. It seemed natural. I had a few good friends. One is from Korea, one is from Vietnam. I think people usually look at the face. They look like you, you will be automatically closer.

44-00:55:04

Li: Did you speak in English?

44-00:55:06

Lin: I don't speak and they don't speak English. I don't know what kind of things [we talked about]. But then when the school started, we met other Chinese students. I even have a few classmates [from Taiwan] entering the same year. There is another woman from National Taiwan University and another man, so in my class, actually, they only accept the thirty students, thirty incoming graduate

students, in the chemistry department. I think seven or eight is Chinese. Three from Taida. I'm from chemical engineer. Another is from Hong Kong. He's, I think, one or two years ahead of me and then another girl from the chemistry department. We knew each other. All in the same class. And then I think there is one girl, Joy, from Texas. Another girl is also from Taida but she didn't finish and she came to the States already. I think five. Oh, another one also from Hong Kong, Paul. Six already among the thirty-six students. And when we [took our] qualify[ing exams], only thirteen students stay and among the Chinese, there's only three, all from Taida, qualified to stay for the PhD.

44-00:57:04

Li: Did you feel prepared in comparison to the other students?

44-00:57:08

Lin: Oh, no. Not at all. Totally not.

44-00:57:11

Li: Why not?

44-00:57:14

Lin: Well, my English is very poor. I really couldn't understand what the professor said, particularly the jokes. I usually laughed after everybody finished because it's not the joke I understand, because everybody laughed. So I laughed, everybody laughed at me. Actually, I wasn't young among the students.

44-00:57:50

Li: But you were not prepared?

44-00:57:52

Lin: Oh. And then I take the examination.

44-00:58:03

Li: Your qualifying examination?

44-00:58:06

Lin: It's not really called qualifying exam but in a way it's called placement test. Really means where they place you.

44-00:58:16

Li: When you got to graduate school?

44-00:58:16

Lin: Yes.

44-00:58:17

Li: Oh, okay.

44-00:58:18

Lin: Before you start everything. But they really mean where to place you means where to place you for the degree. And I didn't really know that. I didn't really understand. I know there is examination coming but I really didn't prepare for it. I

really didn't know I should prepare, I should study. So when I take the exam, I did terrible because they asked you about organic chemistry, which is three years ago I took the exam. And since I'm a chemical engineering student, I really don't have chemistry in the last two years anymore. It's not like chemistry student you will have the chemistry every day until the last day. After you work, it's still chemistry, right. I really forgot most of that. So I did terribly. But since I'm already here, I still go to class. And my English also has to blame. I also did terribly. But the professor thought I speak all right, although my written test is terrible. I think the comprehension is not that bad but the words—

44-00:60:01

Li: Vocabulary?

44-00:60:03

Lin: The vocabulary is fairly poor. Actually, there is a reason. All common life vocabulary I don't have.

44-00:60:14

Li: Right. Scientific vocabulary.

Begin Audiofile 45

45-00:00:02

Li: Robin Li and Emily Hamilton speaking with Dr. Ada Lin in Ann Arbor, Michigan. It's October 16, 2009, tape number forty-five of the Otto Lin Oral History Project. Sorry. So we were in the middle of you talking about your English and your struggles with it. You had primarily a scientific vocabulary, not everyday language.

45-00:00:22

Lin: Actually, at that time, my advisor, appointed advisor is Ronald Breslow. He now is very famous. Get lot of honor in the chemistry field. They discuss whether they should send me to go to study English for one year and then come back for this.

45-00:00:58

Li: Where would you be sent to do this?

45-00:00:59

Lin: Oh, in Columbia, of course. Well, of course. And my scholarship may be applied. Or just let me go. And then I think Breslow and the other professor think maybe it's easier for me just go to the class than go to the English class because my difficulty will be learning all these vocabulary and grammar but not necessarily cannot communicate in chemistry.

45-00:01:38

Li: Did you agree with that?

45-00:01:40

Lin: I was very happy. But they decided that I should have a lighter role in class. There are two courses, very difficult. One is advanced organic chemistry. It's reaction

mechanism. The other is chemical physics. It's to talk about all these quantum chemistry. So they said why don't I take physical chemistry instead of chemical physics, so next year take this. It just go to a lighter course. Then I would not be able to finish in one year. Actually, in a lot of universities, it's two years or three years, but Columbia has a different philosophy. They want to put students in a high pressure. They want to test your background, your preparedness and then they want to test that you are enduring and they want to take your accepted capability, how much capacity you have to accept. Their exam and coursework are beyond your capability and then they see how much you can do. It's not expected [that] everyone [would] totally [succeed]. Adaptability is very important. How much can you adapt in a short period of time? But this way I will finish the Master degree in one and a half year instead of one year, if I can get through. So I did. And I was very lucky.

I was taking physical chemistry, and physical chemistry has a lot of new things I didn't learn in college. It's a college physical chemistry because at the time, it's the time to change—during that several years, [the field] start to change because [it was now] including all the quantum chemistry. The atomic structure. Before that, there is no atomic structure. No one knows what is an atomic structure. And the movement of this electron. All we learn is only the atom has electrons outside but no other things. Because of that, I have time to learn the prerequisites for chemical physics. I did very well in Physical chemistry because I'm taking the Physical chemistry with college students and especially I'm taking my class in General Studies which is not that good in academic. So I'm really getting an easy time. I'm doing very well and that helps for my further study. I think if I did Chemical Physics in the first year, I would fail for sure. And then, because I'm lighter Course load, of course I take my inorganic chemistry, organic chemistry all much easier.

The first time I prepare for the examination. Almost every word I have to look at the dictionary. The word "ceiling." There is a ceiling value. I don't know the word, I had to look. And I find ceiling means *tianhuaban* [天花板], means a ceiling. But I immediately understand what does that mean. It means a top value, couldn't go any further. Although my English is not that good, but my chemistry is pretty good, even among all the Americans. And another thing is I'm from Taiwan. I'm from National Taiwan University. I have to take hundreds of examinations. I'm expert in taking examinations. I know how to study, to prepare for the examination. I know what examination exactly require to get a good score.

But many American trained students, in America, particularly in the south, etcetera, if you're good, your exempt from the examination and that is very bad. They are very knowledgeable but they are not precise. And many times you have open book, it's also not precise. You can talk about it. You can talk about it doesn't mean you can write on the paper, calculate on it. And in examination, there is not allowed even one tiny mistake. There is no next time. Although I was worried to death because I only read fifty percent, never in my life I ever got fifty percent and walked in the examination room. Never in my life. I didn't even

finish the book. I couldn't finish because I have no time. But whatever I studied, I know it fairly clear. I wouldn't say a hundred percent but fairly clear. I took the exam. I probably did fifty percent. So I was worried to death. Fifty percent I surely fail, because sixty percent is a passing mark in China. But I didn't know in the United States you don't do that. You do the comparison. You do the class average. So if the class average is thirty, then 50% is pretty good. That's how I ended up passing the exam.

45-00:08:22

Li: I'm sorry, I just realized we didn't have this. What year did you start at Columbia?

45-00:08:28

Lin: 1960.

45-00:08:29

Li: 1960?

45-00:08:30

Lin: 1961. 1961.

45-00:08:32

Hamilton: That was the year you matriculated. Were you impressed with the laboratory facilities?

45-00:08:39

Lin: Oh, I impressed with everything. But it's lucky I was a teaching assistant in Taida and I have to prepare the laboratory for the students. That gave me tremendous help when I come to here and knew the laboratory a little bit better, better than most of the average students and I know prepare the laboratory. You see, there is not much laboratory I need to do in chemistry in the first year, but I have teaching duty. I have to teach.

First year I teach inorganic chemistry, the second year I teach organic chemistry. That is lucky, too. If I teach the organic chemistry the first year, second year, that would be a totally different story. I teach inorganic chemistry, the hardest part is the calculation. Most of the students don't know how to do that balance a chemical equation. As a teaching assistant, the class is for students to explain the homework, etcetera, they ask, etcetera. Since I cannot speak very well, so I can only say, "Understand? Come from here? And that?" So I cannot speak too much, right. So I'm very kind, just do the whole question on the blackboard. Everything. Wow, the students love me. I wasn't good in English but I was good in chemistry. Some assistants cannot do it. They come to me. I come from chemical engineering, so takes more mathematics than chemistry, so it's not hard for me. And actually, I'm very good in comprehension in chemistry. I didn't read stories that good but in chemistry I'm very good. So since I cannot argue with them, I just do whatever they want. And I cannot get mad with them. I'm very kind. I was skinny. I only have ninety-some pounds. And young and pretty good looking. So I'm like a Chinese doll.

45-00:11:33

Li: Who gives them the answers of the chemistry equation.

45-00:11:35

Lin: ME, Most of the people like me. I got this advantage. I got a lot of sympathy, kindness from people. Since you look like a Chinese doll, no one want to really insult you, right.

45-00:11:50

Li: So was it a disadvantage at all being a woman student from China at Columbia versus being a man or did it affect your career at Columbia by much?

45-00:12:05

Lin: Not very much. But at the time, the inequalities are still very clear. Of course, the university, there's no one discriminating us but I think among the professors, probably not take women that serious either. So if you are delicate, you are good-looking, you are Chinese, maybe advantage. It's not equal. For example, our stipend is different. Men's is \$200 more.

45-00:12:49

Li: And so at this time, was Otto in Illinois?

45-00:12:51

Lin: Yes.

45-00:12:52

Li: Okay. And so were you just corresponding by letter and talking on the phone?

45-00:12:57

Lin: Oh, he call every day. He got his admission in Illinois, a full scholarship, and he also got a Rockefeller Foundation Scholarship. He could go to Yale. But the Rockefeller Scholarship is an exchange student scholarship. In two years you have to go back. So he cannot finish his PhD. When he came to the United States. The first thing he did is came all the way to New York to see me first. He came around Christmas time and he intended to stay here, find a job, maybe work in the restaurant for half a year and earn enough money and maybe we can get married and then apply, maybe stay in Columbia.

45-00:14:04

Li: At this point, did you want to marry him? By this point?

45-00:14:11

Lin: Well, I think I do. Yes. Actually, I didn't really know. I actually ask him both of us cool down for a while because my mother said since Otto really proposed, ask his father to ask people to come to my father to ask the proposal.

45-00:14:39

Li: He did this in Taiwan?

45-00:14:42

Lin:

In Taiwan. He want to do this, at least. My mother think that's good and my mother think he's good. My father also think he's acceptable but he told me, "This is wartime. If you can go, he can't go, then, you will be separate, in two places. Either get married here and you both go out together, or not to go. If he cannot go, you just stay. Or you go and you get married over there if he can come. If he cannot come, I'd rather you not marry then you divorce." Otto agreed that we will wait. He came to the United States. He never thought he will have difficulty to do that. But when he started to go to the embassy, he was afraid. He didn't have money. We usually need some guaranteed money. But we didn't know that with a full scholarship, you really only need the pocket money. But he don't even have money to take the airplane, so not much pocket money either.

When I come to the United States because I got a scholarship, my father gave me 600 U.S. dollars. Originally he was saying if I didn't get a scholarship, all he'd prepared is 600 U.S. dollars. I can bring it with me, go to work. And if I go to Rice or women's college, it will be enough for me to study one year and after one year I can support myself. And after I work, I have to return this \$600 because that's all he has. So when I got the scholarship, I come here. He still give me the \$600 for me to keep. In case I have difficulty, I can use it to buy an airline ticket to go back home. Don't have to be just in the United States and don't know what to do. But he told me that I must return this \$600 after one year. After one year. So I have \$600 in my pocket.

When Otto need to come, but he doesn't have his guaranteed money. You usually need some guaranteed money, make sure that you won't be in the United States, needing social welfare. So I send this money to him without my father's knowing. I give it to him. I think at that time I already agreed to accept him. He doesn't have a phone. At the time, Taiwan, not everybody has a house phone. We have a phone in our house, so I make a phone call. At here, it's so difficult and it's so expensive. I need to use coin. It was very expensive. Ten dollars, for the first three minutes, and then three dollars a minute afterwards. So I have to make change for twenty dollars all in coins and I thought, "Suppose I call, I cannot get Otto." So I was told, that I can have an appointed call. You can ask the operator, "We will make a person to person call tomorrow." And I ask not only for my father, but also for Otto. Aren't I smart? So I did that. I specifically ask Otto come and I talk to my father. I want my father to help him to get the visa, come out, and do whatever he can. So I guess I committed to that.

45-00:19:30

Li:

Is that the first time your father and Otto met?

45-00:19:32

Lin:

No. They already met. Yes. We weren't a secret but he's afraid of [my father] so he kind of avoid [him].

45-00:19:43

Li:

So when did Otto actually propose? Do you remember?

45-00:19:49

Lin: I think before I came to U.S.

45-00:19:52

Li: And so was it a factor thinking about your career and whether or not you should get married or when you should get married?

45-00:20:01

Lin: My father told me if you want to go to study, you should finish your studies first. Get the master's first. His analogy is very simple. He said, "If you get married, you might get pregnant. You are living on a scholarship and he's on a scholarship too. If you have a kid, you cannot go to school. Then you won't have your scholarship. Then he has to work to support the little family. Then he can't go to school either. So you have to finish, at least one of you finish one degree, then if you have the family, if you have kids, at least you can work to support [yourselves]." And we both agreed.

When Otto come, he really want to stay in New York, so his father was nervous because what if he doesn't go to school, right? And my father is more nervous than his father. So my father called me to tell me. Also called my uncle to have my uncle tell me that I should not get married now with Otto! because I will ruin his future. If I love him, I have to think of our future and no man will be happy if he cannot support himself and support his wife. And then your marriage will be in danger, because if he's not happy, there's no way you'll be happy. So he said I should insist, because Otto wanted to stay and his father think he has no way to stop him. So my father said I should stop Otto from staying and ask him to go to Illinois to pursue it until he can either move to New York or I am willing to go to Illinois. And we listened to him. I think his decision is really for Otto, not for me.

45-00:22:24

Li: So then Otto left. He stayed in New York that spring and summer?

45-00:22:28

Lin: No, no. He only stayed in New York a few weeks. Maybe two weeks.

45-00:22:33

Li: Oh, right. He started Illinois in the winter term.

45-00:22:35

Lin: Yes, yes. Yes, he went to there.

45-00:22:37

Hamilton: Was that difficult, to ask him to go to back to Illinois? Was it not difficult because you knew it was the right choice?

45-00:22:46

Lin: Yes. I'm very sensible to make that decision.

45-00:22:50

Li: Would it have also been difficult to pursue your own studies if Otto was around?

45-00:22:58

Lin: No. When we were together in the school, we really studied together. Otto's grades improved tremendously since he met me. I was a very proud child and I was doing fine. He was very proud because among the incoming students examination, there are ten students. Their composition [were evaluated and then they] selected the best. He was one of them. He liked to write the classic Chinese style. But when I read one of his composition. I said, "Not that good." So from then on he studied the classic essay. When he waiting, he studied the book every day. He studied probably a half hour, wait until I come out, pretended he just accidentally meet me. I didn't know he is waiting for me through, I think maybe two years, I didn't know he was waiting for me.

When we were together, I kind of implied his academics not good enough yet. I have a lot of friends that are very good.

45-00:24:42

Li: How did you kind of imply that?

45-00:24:45

Lin: I don't know.

45-00:24:48

Li: But he knew? Like he got the message?

45-00:24:52

Lin: I think he got the message. He got the message that I respect the very good academic students, so he got the message. And he tried to do his homework in advance so when I go to the library and study with my friends, he can impress me. He tried that very hard. So he actually increased his score tremendously. When we were together, we studied most of the time.

45-00:25:31

Li: So he was a good colleague, then? You were good colleagues for each other?

45-00:25:36

Lin: Yes. We are not wasting our time because we became friends. Even in Columbia also. That's a funny story at this part. So he came in the Christmas time. I was very busy but I pick him up at the train station. He get out of ship. He took the train all the way from Chicago so I pick him at Grand Central. I bring him to the subway. You can imagine how little luggage he has. But he has only one suitcase. I teach him how to go through the gate with a token. So he put in the token. His suitcase went through but not him, so he is very much a countryboy, know nothing about modern big city

45-00:26:41

Li: Right, meanwhile you were a New York woman!

45-00:26:43

Lin: Right. So I send him to Yorkshire Hotel. I got this information from my friends. The Yorkshire Hotel is a weekly hotel, so it's much cheaper. It's right there in

Broadway near Columbia. Actually, there are a lot of students. They live there. It's fairly cheap and you can pay weekly and use their kitchen. That's very nice, so I put him there. He thought it was such a big room, very good. Actually, it's very poor but compared to Taiwan, even a slum is pretty good, right? You have water, you have sink, you have bathroom. It's not private, you share, but you have your own room. You share with other resident to use the kitchen, so I put him there and went to Woolworth's to buy two pots. I cooked for him. Open a can of chicken noodle soup and buy the two sausages, put it in. Oh, he thought that that's very good.

But I live in dormitory. It's very fancy, very luxurious. It's like one of the movies you see. The dining room with chandeliers, you have waiter service. I invite him to my dormitory for dinner. You have to be dressed up with jacket and tie. he was impressed to eat like that, living there. He came to New York, but I was very busy. I need to prepare for my final and afraid to death because, as you know, I was not that good. I had to go to study with my other classmate in order to prepare together. So He said, "Okay, you go." I said, "I don't have time to finish all the other studies." He said, "That's okay. You just go to prepare that one course. I'll study this portion, when you come home I will tell you what they are so you will know. You don't have to study all this." Because I read slow to finish all the reading is hard for me,. But to understand the contain is not that bad. It is only chemistry. If I understand, I can go to the exam. I think, "Okay, so I will let you study this part for me!" So I give him the book and I went to study the other course.

At the evening, I come home. I ask. I say, "Okay, Otto. Now, teach me. Tell me what is this section talk about." He said, "I couldn't understand a word." "My goodness, what I'm going to do?" He couldn't understand a single word of it he said. It doesn't make sense to him, it's a shock to him. He didn't study it before and then it's not that easy and straightforward. So that's the beginning.

45-00:30:16

Li: So who are your mentors at Columbia? Were there any professors in particular that you remember?

45-00:30:21

Lin: Yes. Professor Dawson. He really change my life. When I came to Columbia, my biggest shock and what really shaped my life is that we have seminars and we invite all these prominent chemists all over the world come to speak. But first time, I already forgot who is the Nobel Prize Laureate. But he is an old professor. He got his Nobel Prize long time ago. I read his paper and book before but I thought he is an ancient people, I thought he is not in this world. And I always thought Nobel Prize is not something a human being can get. It's something I think only a genius will get, like Einstein. And now he is giving the speech up there. I'm sitting down hereto listen. Although he lectures and the things he talk I can't understand very much. But just sitting there in his classroom I was overwhelmed. That day I felt Nobel Prize is not that far away. To study chemistry

is not that far away. My life, my scope is all changed. The inspiration is so different. Now I always think that if a student gets the opportunity to see someone and to listen to someone, it's [an] exceptional [opportunity]. For example, like Gates, Bill Gates, I think he's exceptional. He's probably born genius. He's another kind of animal. If you talk to him face to face and know what he's thinking, you will find that he is a human being, too. So your [sense of your own] limitations is suddenly released. Not to say that you could do the same thing, but if you want to do the same thing, it's not something impossible or nonjustified. If you think you are a god, you are unjustified. You are crazy, right. But it's not god-like.

45-00:33:20

Li: Did you start to see the process by which these amazing discoveries are made instead of just thinking about the discoveries that lead to a Nobel Prize?

45-00:33:34

Lin: No, I didn't do an analysis for all these [feelings] but just kind of feel, "Gee, all these road, human being can walk through. Gee, it's not something that you cannot understand." It make me feel whatever in front of you just take it. It's like if you see a mountain so high, you thought it's not possible [to climb it], right? But if you see other people just walk over [closer to it], then suddenly you don't have [the feeling of being] afraid. If you think of the way, you can just take it. If you take it, you will go through. So that totally opened my mind and [I] feel different. I wouldn't say I had the confident to get the PhD, to think I'm a successful scientist, etcetera, but I would say I don't see it's something unreachable.

45-00:34:52

Li: And was Professor Dawson, was he a mentor for you?

45-00:34:57

Lin: Okay. Then comes the professor, I mean, that seminar. In Columbia chemistry department, we have one course. It's called seminar. Literally called seminar. The seminar is like this. It's very essential. The first semester every professor will come to give one-hour lecture to tell you what is his research. If his research is interesting to you, you want to be a student of his, you can talk to him. If he is willing to accept you, you will take the time to do the paper research to present a presentation for your future dissertation. And if he doesn't accept you, of course you cannot do it. And if you do your presentation of your future dissertations, research proposal, it's accepted. That's one requirement. The first semester, you listen to him and do the study. The second semester you make the proposal. So the proposal is very important because it's one of the requirements for your further study. You have two requirements. One is you pass your placement. It's not qualified. Your placement means you will be placed to be a PhD candidate or [if you] just got a master and go. Now, if you don't qualify for your PhD, most likely you will qualify to get your master's and go. Very few people is that bad, you don't even get your master's, so no one really care [about master]. If you

study to go to get master, no professor will be interested in you. It means you fail already. Why should they spend the time to help you to fail?

So this is important, so every professor come. Professor IAN Miller come, who is my start, and Professor Cheves Walling come. He teach something I thought opened my eye. I never heard of that. But then Professor Charles Dawson come. He talk about enzymes. I never heard the name of enzyme. Then he talk about the little copper in the enzyme, which is an active center, because without this copper, that enzyme will be inactive. With this copper, the enzyme can do all specific things which nothing else can do in the whole wide world, because in the whole wide world, if we want a reaction to happen, you're usually need in high pressure, high temperature. But in our human body are thousands of chemistry reactions, all have to happen at room temperature and pressure so all the reaction needs the catalyst. This catalyst is enzyme. The enzyme is very specific, each enzyme only catalyst one reaction. Without the enzyme that reaction, will stop and this reaction will not go and you will either died or you got sick. Wow.! This is open eye. I never thought of it. It's so interesting and what is an enzyme? Enzyme is only a protein, like egg white. Wow. And a protein only have twenty-four component which is amino acid. And they just link together, this way, that way, and become a protein. And the protein becomes enzyme with that active center can do these specific things. And the enzyme he studied is called ascorbic acid oxidase and tyrosinase, which is an oxygen terminal enzyme. In other words, if we want to breathe oxygen in the air, the air cannot be used by us. It have to go through a terminal enzyme help to fix in order to have our chemistry, to react. This is fascinating. This is something I never heard. And this blue color was so blue. It's the most beautiful blue I ever see. I like it. I like it. I just cannot keep my eyes off of it.

But this is biochemistry. I never had biology besides at high school. And my biology had never been good. I don't like botany. I don't like the animal course, what is that, zoology. What I am going to do? But I like biochemistry. I like [it] very much. So I went to see Dr. Dawson. Really very frightened. And knock at his door. I think about that for several days because Ian Miller is my friend. I listen to Miller and like [his work] but after I hear Professor Dawson. I cannot put my eye on anybody else anymore. So I walk to the hall and I walk to his door. I was scared. I thought maybe he's not there. The door is very heavy. I knocked. No one answered. I'm very happy. I knock again. I'm already prepared to go. I'm very happy. I did my duty, right? I can go. "Come in," somebody said inside. I had to go. So I walk in and I see this Professor Dawson. He's very kind, about my father's age. Immediately I have very good impression.

So he said, "Young lady, what can I do for you?" "Well," I said, "Professor Dawson, I listened to your seminar. I'm fascinated with what you told me. This is the first time I learned in the world there is an enzyme." He feels interested. Somebody come to say [this] in this way. "Well," I said, "I'd really like to study enzymes but I don't like zoology and I don't like botany. Can I be a biochemist without zoology or biology?" He looked at me. He said, "Sure. I'm not a

biologist, I'm a chemist. We are studying molecular biology. Actually, we are studying the chemicals in the biological system." I said, "Really?" I really brightened my eyes, I think. I said, "Really? You think I could study this?" He said, "Well, of course you still need some biology knowledge but not as a biologist." I said, "I did study [biology] in my high school." "Well," he said, "if you study high school biology, I think that will be enough to study this. You can study this." Oh, I was very happy. Then I said, "Professor Dawson, you think you can take me? I know nothing but I promise I will study hard. I will study very hard." He probably thought, "Where does this kind of student come from?" [since] few students [would] say [this] in this way. So he said, "You can try. I'll give you assignment. You read it. And you can come to me every week." He's really kind because no one will spend that much time for a graduate student which is not even his student. He said, "You can come every week to me to tell me what you learned from the paper."

So he gave me the paper since 1931. It was 1961. He want me to read thirty years papers. I look at that, I go to the library. I was almost dying. I don't know where to start. I almost give up. I open up, read three papers, didn't know what they're talking about because every paper only talk of one thing, one small thing. It's very difficult to understand. So I don't know what to do with it. Luckily then Otto stopped here. "I cannot discuss them with you." But there are a few Chinese students higher up with me. The students are very cooperative to each other. We are incoming new students from Taiwan so they are all very kind to us. Actually, there are American and Chinese. So one of the students is very kind and so we all have this higher class of students helping us. So he helped me to look because I want to look at the library first of all. I don't know how to look through the archive. Then he helped me and then I was really lost in the whole literature sea. I don't know what to do. So he said, "Ada, why don't you read a review paper first?" You know, review. You just read one review paper. He finds me a review paper. And he also finds me a thesis of the previous student of Professor Dawson in the topic Professor assigned me. Professor assigned me to do tyrosinase. So he asked me to read introduction of that graduate student's thesis because introduction usually give you an overview of these particular things. And then he asked me to read that review paper. Then, of course, I start to understand. Several of my senior students, they were very kind. They kind of helped me. Luckily I still have half a year to prepare that, right.

But every week I go to talk to Professor Dawson. He was very patient. I think I'm his thirty-sixth or thirty-eighth student. I forgot. But if he is not an old professor and if he didn't have so many students, he'd seen the high, he'd seen the low, I don't think he will accept me. But because he had the patience, I really enter a new field.

45-00:47:38

Li:

Did you work in his laboratory?

45-00:47:38

Lin: Yes.

45-00:47:39

Li: What did you do at his laboratory?

45-00:47:40

Lin: Okay. So first the summer; I need a summer job. I'm already qualified to stay.

45-00:48:01

Li: Is this after the second year that you were there?

45-00:48:04

Lin: No, no. Actually, I'm not qualified the first summer. I needed one and a half year.

45-00:48:09

Li: So this is in 1962?

45-00:48:09

Lin: Yes. I need a summer job. So I went to ask him did he have a summer job for me? He say, "Okay, you can help Bill. He is another graduate student, PhD candidate. He's almost graduated. So you can work in his laboratory, help him. Help him to clean the dishes, to do the experiment, to be his technician and also to learn on this subject because all these techniques you will need for your own research." He said, "Don't look down on dishwashing because I'm dealing with microgram of copper. Microgram is ten to the minus six. Do you understand what is ten to the minus six?" I said, "I don't." He said, "Very, very little bit. If you cannot clean your dish to the ten to the minus seven, you cannot measure ten to the minus six. So it's not easy to do the cleaning so don't look down on doing the cleaning. Just do whatever Bill tells you."

So I went there. I wasn't really happy because I'm really only doing his dishwashing. But he taught me a lot of things. I wasn't really willing to take the job only doing the dishes. But he challenged me. I keep on asking him, "What's the meaning of this course, etcetera." He couldn't explain very well but later I could. I just explained to you much better terms than he did. But he told me to help him. If I can do the dishes good, I'll help him to determine the copper. We have sample, right? All samples have to determine how much copper content because how much copper content determines the activity of the enzyme. So I have to do these dishes. I wash the dishes, I do the copper determination.

I thought I'm doing very well. He doesn't think I'm doing it correctly. So I wasn't happy. He said, "Okay, Ada, you do a standard curve for me. Not determine the enzyme. Not determine the copper content in the enzyme. Determine the copper. It's a standard curve. You use these to compare. You cannot make my curve. You make your own curve. It means you have different amount of copper, you have to have a straight line." I did that for three days, I cannot make a straight line. He say, "If you go back to wash your dishes, maybe you could." I go back to wash my dishes. I finally got that straight line. From then on, I train all my students, all

my technicians, first thing they need to do is to make that standard curve. If they cannot do their standard curve, they are not allowed in the laboratory. And that's a really, really good technique.

45-00:51:46

Li: It's Bill. Do you remember Bill's whole name?

45-00:51:54

Lin: I think it's Clinton.

45-00:51:58

Li: Okay. Where did he go after graduate school? Do you know?

45-00:52:03

Lin: Professor in a university and then later we lost contact. But they all got professorships, all go to research institutes.

45-00:52:13

Li: So for your dissertation research, did you work in Professor Dawson's laboratory for your dissertation?

45-00:52:17

Lin: Yes, yes.

45-00:52:18

Li: And do you remember what the name of your dissertation was? The title?

45-00:52:21

Lin: Reaction Mechanism for Mushroom Tyrosinase.

45-00:52:30

Li: And at this point did you get married after you got your master's? Did you decide to wait?

45-00:52:34

Lin: Yes.

45-00:52:34

Li: Okay. So you got married and Otto came to Columbia?

45-00:52:39

Lin: Actually, I spent extra half-year to get my master but I really get my PhD faster than most of the people. Three years I finish my PhD, so I didn't waste my time.

45-00:52:55

Li: So you and Otto got married in 1964?

45-00:52:59

Lin: Sixty-three.

- 45-00:53:00
Li: Sixty-three. After both of us get master's. He got his masters a half year later than me.
- 45-00:53:08
Lin: And what year was Ann born?
- 45-00:53:11
Li: Sixty-seven. So you finished your PhD before you had Ann?
- 45-00:53:17
Lin: Yes.
- 45-00:53:20
Li: And did you decide to wait to have children until after you finished your PhD?
- 45-00:53:27
Lin: Yes.
- 45-00:53:26
Li: And then from—so from that point on, when you're planning what to do after you finish your degree, did having children factor into what career choices you were going to make?
- 45-00:53:36
Lin: No.
- 45-00:53:38
Li: No.
- 45-00:53:39
Lin: Didn't think about. We didn't even think planning the children. His professor and my professor, Beckman and Dawson are very kind to us. He's really like a father. I asked him a lot of things. One day we were having dinner together. I was saying that we think maybe should wait a little while to have children, etcetera. He said to me, he said, "Ada, there is never a good time to have children but there is never a bad time to have children. They are just one of the things that happen in your life. You just handle it along your road."
- 45-00:54:37
Li: So true.
- 45-00:54:37
Lin: And I think they are so right. They are so right.
- 45-00:54:42
Li: But did you still decide to wait or did it just happen that you waited?
- 45-00:54:48
Lin: Well, I think I tell him when I already got my PhD [we could have children]. But Otto hasn't gotten his PhD yet. My father always tell me I should wait because otherwise I would never finish my PhD if I have children. So we were very

careful to not have children but my father-in-law doesn't understand, of course, my mother-in-law in the back country thought, "How come for one year we still don't have children?" And my father-in-law don't dare to say that to my parents. It's kind of embarrassing. So he send the chopsticks, because the chopsticks means *kuaizi* [快子] have child faster. *Kuai* [快] means faster, hurry. *Zi* means son so hurry to have a child. Then he send us dates because dates means *zhouzi* [早子]. Zhou [早] means early. And then he send us *lianzi* [蓮子] [Editor's Note: *lianzi* translates as "lotus seed"]. Means one after another son. So we got all these presents and I didn't know what it mean. Then he really cannot wait. He send me some *ejiao* [阿膠] which is good after you give birth. [Editor's Note: *ejiao* is an ingredient in traditional Chinese medicine made from donkey rawhide]

45-00:56:35

Li: So all these hints.

45-00:56:36

Lin: Did not understand.

45-00:56:38

Li: Did Otto understand?

45-00:56:39

Lin: No. We just put [them] there. And he send me these chopsticks. We are very happy. We have some good-looking chopsticks, so we use them. He send us some dates, we just eat it.

Begin Audiofile 46

46-00:00:00

Li: So this is Robin Li and Emily Hamilton speaking with Dr. Ada Lin, October 16, 2009 in Ann Arbor, Michigan. This is tape number forty-six of the Otto Lin Oral History Project. So you finish your PhD and did you apply for jobs while you were in graduate school?

46-00:00:18

Lin: Yes, yes.

46-00:00:19

Li: Or post-docs. What did you—

46-00:00:20

Lin: Post-docs, because Otto is still in Columbia working. So I am applying for jobs. I want to do research. At the time, I'm very ambitious. I told you I said it looked like even the Nobel Prize is not far away, right. In my life, I'm never thinking about the Nobel Prize or anything, but I do think to have some discovery, significant discovery because enzymes itself is a significant thing. And biochemistry at the time is such a new field. Really no one understands [it]. Most of the people in biology doing biochemistry, they are not really doing biochemistry, they are still doing biology in a simple system, biology system. In chemistry side, doing the chemistry itself in a living system is very new. I thought

I want to pursue these kinds of things. Of course, I knew Watson and Crick. Discovery, etcetera, that's at the time. Watson and Crick are the ones [who] discovered the DNA structure.

But at the time, to the protein, the understanding is very little. [Its importance] to the function of the life, [is] also very little [understood]. We know for genetics it's DNA but anything beyond genetics for the function is protein. And protein is such an important thing. You know a single reaction but how it is all related to other work, etcetera. It's very challenging.

But I want to stay in New York and I want to, if possible, not just stay with Professor Dawson, but have some opportunity to explore new things. So I applied for jobs and I saw the advertisement. One professor saying that he needs someone to do the research and determine terminal amino acid. What does that mean? It means one enzyme. Enzyme has a lot of amino acids. Every amino acid is like a chain. Every part connected together.

46-00:03:23

Hamilton: Could I break in and ask? You were working on proteins, so at the time of Watson and Crick's discovery, at that time did you think that this was something really important?

46-00:03:35

Lin: Oh, yes. Watson and Crick actually is before my graduate student time. Already got the Nobel Prize. So I actually become fascinated with biochemistry. A great deal is because of Watson and Crick.

46-00:03:51

Li: Okay. So you saw a connection from the beginning of graduate school?

46-00:03:56

Lin: Oh, yes. Because before that, when I was in China, I know the genetic material is chromosomes. I know the unit is gene. Gene is the unit of chromosome. But no one knows what is gene. No one knows gene is a chemical. Right? So, of course, this is fascinating. And I said we have a placement examination but placement examination is to determine you can study PhD. It's not determining you can get PhD. You get PhD, you have to pass nine qualifying examinations. It's called accumulation test. Within your residence in Columbia, before you graduate, besides you pass all the examinations, qualify, you must pass nine examinations. The nine examinations the professor gets from anywhere. Twice a year you can take it. Anything. It might be astronomy, maybe botany. It usually is something really new to see whether you are broad-sensed, you understand your interest in science in general. So you must go to all the seminars to learn the new topics and learn also the new topics which are Nobel Prize winning or new discoveries, etcetera, and you understand that.

46-00:05:46

Hamilton: Was it especially helpful for you that you were interested in biochemistry? I mean, this was exploding at the time that you were graduate school. Did that help you in the qualifying exams or no?

46-00:05:55

Lin: No. I'm in chemistry department so examination is only in chemistry. Even biochemistry is in the sense of chemistry.

46-00:06:13

Hamilton: So you were talking about applying for post-doctoral positions.

46-00:06:17

Lin: So I got this position. It's a terminal amino acid. It means if you have enzyme, you have the chain from this and this end, right. At the time, no one knows any peptide. Now we know. The first peptide analysis comes from Mainland China. But how you know it? If you chop it, you don't know which one is which end. So my professor's very smart, this one, Professor Gold, Allen Gold. He said he want to study terminal amino acid. So if you can determine the first one, then the two ends, it's easier, then you can try to keep on chopping every one. If you chopped, you know the first one, you can chop, you get the second one, right. You can try. Even if we chopped randomly, you always can determine the terminal amino acid, right. So I think that's a smart thing. That's chemistry, too, right? So I need to use a lot of new chemical technology. That's how I get to start.

46-00:07:28

Hamilton: Can you explain some of the chemical technology that you were using?

46-00:07:31

Lin: Well, I use all the new technology that now you take for granted. When I was a student for Professor Dawson, we have a technician, Mr. Luis. At the time he was already seventy years old. Professor Dawson's laboratory and another person in Italy, I forgot his name right now, also his laboratory in the world are the two most famous laboratories to do this enzyme, to study this enzyme. And Professor and his former student, his name you probably know, Isaac Asimov.

46-00:08:38

Li: Oh, Asimov.

46-00:08:38

Lin: Asimov. Isaac Asimov. He is a science fiction storywriter, right? Well, I have a very special relation with him. His thesis is really thesis I read before that. No, actually it's not. Sorry. But he was a student studying reaction mechanism of tyrosinase. So the reaction mechanism of tyrosinase is very difficult. A lot of people have to propose how this oxygen was fixed. A lot of the things had been debated for fifteen years, no clue.

But Isaac Asimov, he was a famous writer when he came to professor because that's after second World War. But Professor Dawson wanted to change his dissertation from the very first sentence they were joking to each other. But he did

these. We can say it's a milestone. Because Professor Dawson discovered a lot of things. Discovered the copper, etcetera, so the two laboratories become very important in the world. But they are debating the reaction mechanism. Asimov proposed one of the empirical equations to describe it but it's an empirical equation. Never had anyone explained it. I did some experiment and I propose an explanation. So that's how I suddenly got my PhD. So that's the part.

46-00:10:48

Li: Wow, that's really interesting. So I wanted to jump ahead, I know, because we don't have as much time as I'd like. But I want to talk about having two scientists in the family. Did you discuss your research at home with Otto, or when you were at home was it just busy with the children and the family?

46-00:11:06

Lin: Oh, we discuss a lot of time. We discuss. Actually, as a PhD candidate, we are still like student life. Nothing changed.

46-00:11:20

Li: Right. So you still continued to be somewhat competitive, I would assume?

46-00:11:25

Lin: We never compare to each other. I never compare with him.

46-00:11:30

Li: But when you were talking about your time—

46-00:11:36

Lin: Well, I got his help, he got my help. I'm doing my work in my laboratory. He came down. If he's ready to go, he's watching me. Vice versa. Yes.

46-00:11:49

Li: Okay. So you had this post-doc for one year? Did Otto just need an extra year after you?

46-00:11:55

Lin: Ye, yes. Half a year actually. Yes.

46-00:11:57

Li: Okay. So was he applying for post-docs at this time?

46-00:12:03

Lin: No, he got his job three years before he graduated, actually, from DuPont. So he went to DuPont and we were thrilled because the salary really beyond our imagination. I was getting 7,500 at the time per year but his opening salary is 10,000, so we were thrilled, happy to go.

46-00:12:30

Li: So you moved with him and left your post-doc?

46-00:12:33

Lin: And I'm pregnant, yes, so I decided this end of the year, I will start another one. Actually, it's still three months before that.

46-00:12:44

Li: And that's when you moved to Cherry Hill?

46-00:12:47

Lin: No, to Philadelphia.

46-00:12:48

Li: To Philadelphia, okay. So did you then take—

46-00:12:52

Lin: Actually, before that, when he already decided, one day we went to see my friends in Philadelphia, because we have some friends in Philadelphia. We are thinking about moving to Philadelphia already. So I went to University of Pennsylvania. I'm walking in a laboratory and here is Professor Rasmussen. So he's department head. I just walk in, I said that I'm looking for some opportunity for post-doctoring. So he said, "What do you study?" I didn't even know he's a hormone guy, not a protein guy. But I told him what I do, so he said, "Wow. How do you determine the terminal amino acid? How do you propose to do it?" So I told him about the study. I didn't tell him the idea is Professor Alan's. Well, he thought it's very smart to think that way. When I come home immediately, he give me a letter. He offered a research position. But at the time I go there to see him, I didn't know I pregnant already. So I think maybe I know in the very beginning or something. But then when Otto go, I'm almost ready to give birth, so I ask him for a deferral for three months to begin with.

46-00:14:41

Li: Was it common among people you knew to continue working after you had children? Did you know other women who were doing the same thing that you were doing? Having children but planning to keep their career?

46-00:14:54

Lin: Many people would wait for a year or so, but I didn't do that. I told you the other day that my mother said, "You must not save money to hire babysitter. You should have a babysitter full-time, even if it took all your money, because if you have your child take care well enough, then you will not feel guilty to go onto your work. If you continue work, at least you accumulate your experience. In a few years, the kid grow bigger, they go to school. You can continue your career. If you stop a few years, you will have difficulty to continue your career." So you really don't lose much. Just think about exchanging jobs. If you stay home to take care of the baby, you don't have the money anyway. This way at least you will have new clothes. You go out, you have some lunch and your knowledge, your experiences accumulate.

46-00:16:16

Li: Did your in-laws also support this decision? What did your mother-in-law, father-in-law, think of you—

- 46-00:16:21
Lin: We never ask him. Actually, she need my money so no one against the idea, that I work, because we were supporting the family even when we were graduate students. Otto need my salary to help him to support.
- 46-00:16:40
Li: How much did your sense of patriotism for China affect your career decisions?
- 46-00:16:44
Lin: At that point, we didn't, because at that point, actually Taiwan is very difficult. If I stay in Taiwan, I probably would be a high school teacher. And if I can get a job in a company, like PetroChina or so, the salary would be higher. I would be so thrilled. But there is not much job is available.
- 46-00:17:16
Li: Would you have been happy staying in the United States permanently at that point?
- 46-00:17:20
Lin: At that point, I plan to. We both plan to. And staying in the United States will be the only way I help my brothers, sisters, come to study. Well, later my father came, but that is not planned and that's the only way to help Otto's family.
- 46-00:17:43
Li: And at this point, neither of you had seen any of your family since—?
- 46-00:17:48
Lin: Oh, I know my family all the time. I was with my family in Taiwan.
- 46-00:17:53
Li: No, but since you'd been to the U.S. You have not been to Taiwan?
- 46-00:17:55
Lin: Oh, my father came to visit. My mother also. Actually, they got a fund from the United Nations to tour around the world. My mother actually is the selected principal.
- 46-00:18:24
Li: To visit American schools?
- 46-00:18:24
Lin: Visit American school. And my father got a fund from the State Department because he is a financial expert. Actually, they tour around the world, around all of Europe and the United States.
- 46-00:18:40
Li: Would they have done this had you not been in the United States?

46-00:18:43

Lin: I wouldn't know. They probably, if they had the opportunity, still would do it. That's 1963. Actually, because they came, we engaged. No, it's 1962. Because they came, so we engaged.

46-00:19:01

Li: Finally, I wanted to ask you about the decision to return to Taiwan and how much you and Otto talked about that in advance, how difficult of a decision was it to make, what did it mean for you career wise?

46-00:19:16

Lin: Okay. Well, actually at the time, Taiwan has this conference, they have a name, Guojianhui [國建會], that invite overseas Chinese all over the world. The prominent, young, overseas Chinese came back to Taiwan in the summer for seminars. The seminar is listen to the government, their plan, and give suggestions to what direction the country should go. So my father was invited to join the conference and when he came back, he recommended Otto to join the conference next year. So when Otto went in 1977, I went with him and I met a lot of people in the field of environmental. I also give a few seminars about the current status in the U.S. So the next year, I was invited to join the conference, because Taiwan were planning to set up the environmental bureau and occupational safety and health department and I was the expert in these fields.

46-00:20:44

Li: So there was a career opportunity for you to go back to Taiwan, as well?

46-00:20:47

Lin: Well, at the time we only go there for a meeting. Then it comes another reason, that is because Otto's mother is still in Mainland China. We're trying everything we could to get she out. Otto's uncle, i.e. His mother's brother, want to get his mother escape from Mainland China. Buy a boat and sneak in to Hong Kong. So he asked us to send him some money, \$10,000. At that time, it's more than all our savings, and it is quite a risk to take etcetera. Otto wanted to have the opportunity to go to Taiwan so that it's closer to Hong Kong. We will be able to have more first hand information. to get his mother out.

We already exhausted all possibility to apply for his mother to come to the United States to reunite with us. United States already approved. Mainland China was kicking the ball back and forth, etcetera. That's how we went to Taiwan in 1979.

But since then, Otto was involved in a lot of planning for other things. He's spending every single holiday in Taiwan and one day he went there and the Premiere of Taiwan then said, "Otto, I already promised a project for you." So he's embarrassed and I think he kind of accept it. Really cannot say no. He came back told me about it. I was shocked. We talked to our family. We were struggling to think about whether we should go because Ann is a senior. In one year [she] will go to college. If we both work here—at the time, I also work for DuPont—we are certainly no problem to support Ann to go to the best school in

the United States financially, because we have two salaries. If we go to Taiwan, we definitely couldn't do that. It's difficult. It's really difficult. But Otto thought this is one of the opportunities he will not have in the United States. In the United States, he probably will stay at his position, maybe one grade higher for the rest of his career.

46-00:23:37

Li: And why is that? Why would he not go further, do you think? What was his thinking?

46-00:23:43

Lin: Well, you would be a research associate. You would be a fellow. That's the top. He was a research associate, that's a fairly high position in DuPont, and the highest position is a research fellow. And they would not ask him to be a manager because they're already [of the] mindset he's a scientific guy. And he thought if he go to Taiwan, he could help a lot. I thought that, too. I believed that, too. So to me, it's quite difficult because even my own father, even his father, were thinking, "How about Otto go to Taiwan and you stay in the United States?"

46-00:24:32

Li: Oh, in the U.S.?

46-00:24:32

Lin: Yes, in U.S., and my parents certainly think [if] you're going to Taiwan, you [are making a] sacrifice. And Taiwan is not stable. Communists may take [it], etcetera. Not really [stable]. My father is not that against the idea but not that encouraging. The first thing came to us very clearly is the child support, financially, because we are considered, although not well to do, but fairly good compared to most of our friends because we have two salaries. But I thought I struggled for all this education for Ann and for Gene, only to hope in the future they will have the opportunity to do something that's meaningful for society. But my husband has this opportunity right now. Why don't I give him this opportunity. Even if my children study the highest degree in the best university, he may not get this opportunity. So why don't I let my husband have this opportunity right now? But I will feel very bad if Ann cannot go to the best university she can get into. So I talk to Otto and we decided that he will take his retirement out and that will be set aside for Ann's college and I will take mine out, set aside, and that will be Gene's. We don't have any money for Dean. That will be in the future. And I talked to Ann. I said, "If I cannot support Dean, it will be you and Gene's responsibility to do that." So that's how we decided. Because he had to cut his salary to one-third and I have to cut my salary to one-half. We were not able to send our kids to American schools in Taipei, because cannot afford the tuition.

46-00:27:09

Li: So they went to Taiwanese schools in Taiwan?

46-00:27:12

Lin: Well, not, really, the Taiwan government at the time really bent backward to support the oversea Chinese experts to return to Taiwan. because they decided

they need a lot of overseas Chinese come back to help, otherwise the Hsinchu Science Park will not be a success. Otto is among the first ones willing to come back. But before that, because they want to attract people willing to quit their job to come back, the first concern of everybody will be their children's education. It's not difficult for you to sacrifice but it's difficult for you to sacrifice your children's future. So they decided they will build a bilingual school in the park just for these scientists' kids. But we are the first, the school has no experience and short of teachers so it was chaos. It's really chaos. We tried it one year. We had to send Gene back to U.S. for schooling. But for Ann, we just speed her. Luckily she can graduate one year earlier, And Princeton already accepted her, but she's too young. She's only fifteen. So we talk to her and talk to the professor. The professor advice Ann. Said, "Defer one year to learn Chinese. It's really a good idea. And by then you will be older." So, she agree and we thought that's very good so that's what we did.

46-00:28:45

Li: So she went to Princeton at sixteen?

46-00:20:47

Lin: Sixteen. And she was in Taiwan for one year.

46-00:28:52

Li: It's amazing. I was thinking about how you inspired people to leave Taida and come to the U.S. for college and apply to these harder universities and then how Otto inspired people to go back to Taiwan. He's one of the first. You and Otto are both at the forefront of these international moves.

46-00:29:13

Lin: But it is all occurred accidentally, not planned, so we take no credit for that. Just accidentally we are born at the time. But we did inspire. It's really after we went back, lot of friends come back, they come to see us. They ask how we do it and because they saw how we solve our problems, their hesitation is removed.

46-00:29:47

Li: Well, thank you so much. I know we're still in the middle of your story but it's been so helpful to better understand—

46-00:29:53

Lin: Sorry about that.

46-00:29:54

Li: Short of time. Yes. And so maybe some other time we can talk again.

46-00:29:57

Lin: Sure.

46-00:29:58

Li: But thank you so much.

46-00:29:58

Hamilton: Thank you.

[End of Interview]