An Evening with Morris Chang in conversation with Jen-Hsun Huang

Recorded: October 17, 2007
Mountain View, California

CHM Reference number: X4614.2008

John Toole: Jen-Hsun is co-founder, CEO and President of Nvidia, who is also a very close friend of Dr. Chang personally and professionally and you'll see that this evening. He was born in Taipei, Taiwan. He spent several years living in Thailand until he was accidentally sent to a Christian boarding school in Kentucky. He went on the move to Oregon with his parents and, from there he received his undergraduate degree in electrical engineering from Oregon State University in 1984 and his master's degree in electrical engineering from Stanford. While at Oregon State, he met his future wife, Lori, who is with us this evening, his engineering lab partner at the time. So technology does help spur some of these relationships, I think. <laughter> They have two wonderful children, who I think are with us tonight, as well. And, prior to founding Nvidia, Jen-Hsun was director of Coreware at LSI Logic and a microprocessor designer at Advanced Micro Devices in Sunnyvale. The museum would, again, like to thank Jen-Hsun and Nvidia and all those people here in attendance for taking a leadership role early and as a champion for the Computer History Museum and, more specifically, the follows even last night. It tells the stories of the people, a very important part of our whole enterprise here at the museum. They are outstanding leaders, Morris and Jen-Hsun together, and individually and have changed our industry in many different ways. The Computer Museum is really fortunate to have their time and their friendship. It is now my very great pleasure to introduce one of tonight's two speakers, Jen-Hsun Huang, who will introduce Dr. Chang. Jen-Hsun. Thank you very much.

<applause>

Jen-Hsun Huang: Thank you. Well, first of all, welcome, everyone. You know, when Morris asked me to be the person to interview him, I was thinking about the format and the nature of our conversation and I thought that it would be particularly special if we just turned it into a conversation. I've had over the last 10 years, I have had many conversations with Morris and all of them are insightful and invaluable to me and I thought that it would be quite remarkable for all of us to be able to talk to Morris as if it's just one of the conversations I've had with Morris over the years. You know, we've, through the course of the last several years, and also certainly last night, have learned a lot about Morris' history and his childhood and his journey in his career. I thought that what we should do tonight is to spend the time talking about his taking the story past his life but be now focused on the work of his life. So, to frame it, let me first, instead of introducing Morris, I'm going to introduce his work. You know, notice how quickly, when John told my life story, and he was comprehensive. Notice how short and concise it was. <laughter> I don't think he left out any details. There's nothing left. And so, to describe Morris' life work is an extraordinary endeavor but let me first read a few things to you guys just to frame Morris' life work. Morris, of course, as we know, is recognized around the world as the father of the dedicated semiconductor founder. He founded TSMC in 1987 at the young age of 55. He created the world's first peer play foundry. With $220 million of investment from the Taiwanese government and Phillips, he spun TSMC out of a tree and formed TSMC. Ten years later, he took the company public to get public on the New York Stock Exchange in 1997 with a market cap of $6 billion. Now, just $220 million in 1987, $6 billion in 1997. He grew the company 43% compounded annual growth rate over the course of that 20 years today. And, today, TSMC has revenues of about $10 billion, a market cap of nearly $60 billion, the second most valuable semiconductor company in the world, second to only Intel. The most valuable company in Taiwan. The most valuable company in all of Taiwan. That really only begins to describe the impact or the value or the strategic importance that TSMC really serves. TSMC has also enabled, was far, far more important and what he was recognized for yesterday, enabled an industry of $50 billion large on top of it. Morris describes TSMC as having created a sub-industry, a sub-industry enabling an industry called the Fabless Semiconductor Industry, which today has revenues of $50 billion. So if you think about the overall value that has been created as a result of the founding of TSMC in the last 20 years, and if we

simply use the multiple, say, 4X multiple for that $50 billion worth of semiconductor companies of which Nvidia is part of, $250 billion of shareholder value was created in the last 20 years. $250 billion. The evidence of a great company, of course, is not just in the creation, certainly, of strategic importance and also wealth but also indication of greatness is the ability for the company to continue to flourish and be successful as the founder and the original president passes on the leadership to the next generation. In 2005, Morris passed the CEO and president and responsibilities to Rick Tsai, who is doing a fabulous job and TSMC has continued to grow. If all of that is not enough, Morris is a world-class bridge player. <laughter> I think it was in one of our conversations I noted that Warren Buffet and Bill Gates were also bridge players and Morris expressed some interest to play them and, in fact, quite a bit of confidence that he would prevail. <laughter> And so that, in a nutshell, is TSMC. Unbelievable body of work and unbelievable impact on the world. Tonight, Morris, I thought what we would do is we would talk about how did you do it? <laughter> And so, with that, I have no other questions. <laughter> First of all, welcome. So let me break it down a bit. So, Morris, both of us, we were founders of our companies and we think about building products but not only that. We think about building companies and, in the process of building companies, we go through several phases. As I think through the history of Nvidia, of which you were involved in many of the phases of my company, you know, as you think through TSMC, what were the phases, distinct phases that you can remember and how do you think through them?

Morris Chang: Yeah. The first phase, of course, was just survival phase. We started a company with a lot of money, $220 million back in 1985, 1986 was considered to be a lot of money. Well, it's a lot of money even now, I think, and particularly in Taiwan. In Taiwan, it was very difficult to raise that much money. As Jen-Hsun said, the government funded about half of it, 48% actually, of the 220 million and Phillips pitched in with another 27% and the rest, about 25%, was from a dozen Taiwan investors. But, anyway, $220 million total was a lot of money and I was really-- the first priority was to protect money, you know, shouldn't all be <inaudible> I can't afford to lose money. So the first phase was survival but I had a lot of experience, operating experience before founding TSMC so I had decided what the values of the company should be. Those values, I think, were very important to us, not only in the first phase but from there on. We have maintained them. We have actually followed them. They are our compass, really. The values are pretty simple. At first, there were just three: integrity was number one; commitment, we really wanted our employees to be totally committed to TSMC but, in return, the company is committed to the employees, too. Also, commitment applies to customers. We want the customers to be committed to TSMC but we, in return, are totally committed to customers. Integrity is pretty simple, self-explanatory. Commitment works between employees and the company and between customers and the company. And then the third one is innovation. We knew that we couldn't compete at all without constantly innovating. Those were our three values. Then we also had a vision. The vision changed. Values don't change. The three values that we had at the beginning are still values today.

Huang: And, in fact, the first time I went to visit you in Taiwan, instead of a presentation about all the capabilities of TSMC, you gave me a brochure of the core values of TSMC.

Chang: That's right. That's right. And I do the same thing with a lot of visitors, with every customer, every potential customer. In the last 10, 15 years, we, as you pointed out, we have been the most valuable company in Taiwan so we have attracted a lot of public attention, too. Political candidates usually, before they start their campaigning, would call me so the presidential candidate came and told me all his big vision about Taiwan and I handed him our values <laughter> integrity, commitment and innovation. <laughter> The presidential candidates from both parties saw that. In fact, I thought that I detected in each of them a little surprise, you know? <laughter> They don't know what to do with it.

<laughter> But, look, every company goes through phases. First is the survival phase and then is the rapid growth phase.

Huang: Now, when did you guys get traction? When did you guys get business traction and you started to feel like, you know what, somebody's going to buy this?

Chang: Well, that didn't happen because I guess we were too expensive, I think. I mean, even at the beginning-- well, at the beginning, of course, nobody...

Huang: Nothing's changed.

Chang: Huh?

Huang: <laughter> You walked into that, Morris. You walked right into that. <laughter>

Chang: Yeah.

Huang: I didn't push you. You walked right into it. <laughter>

Chang: Nobody even wanted to invest in us. We were really considered to be not very hopeful. That was the first two or three years, I think. At least, I would say, from 1987, we started in February of 1987 and '87, '88, '89, '90, I would say four years, four years it was touch and go, you know? But what really gave us a big start was this rapid emergence of the fabless industry, companies like yours. Of course, yours came up...

Huang: I'm practically the last fabless company.

Chang: Nvidia, yeah, Nvidia, of course, rose pretty late in the game. You rose in the middle '90s but there were several that started to rise in the early '90s and so those fabless companies really accelerated our growth. Now, of course, we helped them-- actually, they wouldn't even have started if we weren't around, if we hadn't been around. They knew...

Huang: In fact, when Nvidia started in 1993, there was no available foundry in the world.

Chang: No.

Huang: In fact...

Chang: Well, we were there but you didn't consider us to be...

Huang: I did consider you. You just didn't call me back. <laughter> Let it go on record that I tried to call Morris. I just didn't get a phone call back. <laughter>

Chang: Really? In 1993?

Huang: No. <laughter> I called somebody in the local office. I don't want to throw anybody under the bridge here but I didn't get a call back. Maybe I called the wrong number but... <laughter>

Chang: But, in 1996, was different, right?

Huang: Oh, in 1996, yeah, 1996 was completely different. Don't try to change the topic but... <laughter> So, by 1996, 1997, TSMC was about a billion dollars already.

Chang: Yes.

Huang: And you clearly-- I would guess, in looking at the market cap, you were probably a one and a half billion dollar company when you took the company public.

Chang: Well, actually, when we went IPO in Taiwan, which was '94, we had a market cap of $4 billion. And then you pointed out that, in 1997, when we went public in New York, we had a market cap of about $6 billion.

Huang: No, at the time, in 1997, when you and I met, Nvidia was completed that year with $27 million in revenues. We had 100 people and then we met and you guys probably don't believe this but Morris used to make sales calls. You used to make house calls, right? And you would come in and visit customers and I would explain to Morris what it is that Nvidia did and, you know, I would explain how big our die size needed to be and that, every year, it was going to get bigger and bigger and bigger. You would come back to Nvidia periodically to make me tell the story over again just to make sure that I'm going to need that many wafers and, next year, we started working with TSMC. Nvidia did, I think it was 127 and then, from that point forward, we grew nearly 100% per year until now. I mean, our compounded annual growth rate over the last 10 years was 70-some odd percent.

Chang: Yeah.

Huang: So not once, not once-- okay, maybe five times did capacity get in the way of my growth. <laughter> Four times last week. <laughter>

Chang: Honestly...

Huang: But... <laughter>

Chang: All through the 1990s, and even now, really, the biggest joy I get out of this job, CEO or chairman of TSMC, the biggest pleasure I got out of it was to see my customers grow and make money and succeed.

Huang: You know, I really believe that. I honestly feel that every time we get together. You know, I could tell that you feel so strongly about your customers and this is a story that I'm sure he doesn't appreciate me telling. This must have been six, seven years ago and it was on a Friday afternoon and you called and you asked if you could drop by to see me. And so I thought, okay, well, yeah, sure, you could drop by any time and I was expecting, you know, all of the TSMC sales guys that I usually see, Pam Way and Ron Norris and all those guys to show up and no, you were all by yourself on a Friday afternoon. You just wanted to talk about business and see how things were going and how many wafers you needed. You would always write that down in that black book and it would always make me nervous and I would check my _____ math and make sure that I gave you the right number.

Chang: Still do. <laughter> <applause> <laughter>

Huang: And so you would write it all down and, Morris, you know, credit where credit is due, I was right 100% of the time <laughter> and it turns out I found out, several years later, it was his honeymoon. Yeah. Yeah. Sophie, I don't know what it says that he wanted to see me more. <laughter> We've always been close, Morris <laughter> and so-- but that's-- he honestly loved working with his customers. Let's come back to so, starting about 1994, 1995 timeframe, clearly TSMC gained traction and it was about that time that other companies started to notice TSMC's growth and other foundries were starting to emerge...

Chang: Competition, yes.

Huang: Right, competition were starting to emerge and one of the strategies that I recall, because you were completely peer play and Toshiba or Fujitsu or many Japanese companies would also do some foundry, even HP, I think, did some foundry with their excess capacity.

Chang: _____ did foundry, Intel did foundry...

Huang: With their excess capacity. One strategy was to use excess capacity as a foundry play and then another company emerged, some competitors emerged where they used JVs as a strategy, where they would go out to the customers and they would form JVs with the customer base and how did you respond to that? What was the dynamic in the industry at the time and here, all of a sudden, you're competing with your customers, in a way, because they were also in the foundry business. They had JVs and foundries.

Chang: Yeah. Well, I never thought the JV strategy was a good one for either us or our customers. I mean, I think your example demonstrates that very clearly. The JV concept was that a partner or several partners would co-invest in a fab. Of course, the foundry company is the main investor but several customers would also invest in the fab. Each customer would have maybe 15, 20% share of the fab and

then, theoretically, this customer, who has invested in the 15, 20%, will enjoy 15, 20% of the capacity of the fab. But look at your case. You went from almost nothing to-- you multiplied, you grew about, what, 10 times in one year? Something like that?

Huang: Well, we went from...

Chang: Five or six times, anyway.

Huang: ...27 million to, today, you know, $5 billion...

Chang: No, I'm not talking about today. I'm talking about just one year.

Huang: About five times a year, yes.

Chang: Five times. Five times a year. So if he had investing in 20% of a fab, if Nvidia had invested 20% and get only 20% of the fab's capacity and then, in a few months, you know, you have outgrown the capacity you are supposed to get. Then what would happen, you know?

Huang: Well, I would be a peaceful CEO running a $37 million company today. <laughter>

Chang: Well, of course, you don't have to be limited to that but I think it's far better for a foundry company, for TSMC, to stay very flexible. We actually, back then, we were plowing all the money, all the profits, back into capacity building, capital expenditures. So we were building, we were increasing our capacity very, very significantly every year and we were extremely flexible to all the customers. Some customers, frankly, shrank and some customers, like you, grew rapidly. We just managed, I mean, it was difficult and, even now, looking back, I wonder at our skill of managing the total capacity. The result was that we managed the total capacity in such a way that we pleased most-- we satisfied most of our customers. We not only satisfied most of our customers, we pleased all of our important customers, those that grew very fast. We satisfied most of them and we pleased all of the big growing ones.

Huang: Yeah, I think, in retrospect, you know, most of the people who looked at the foundry industry thought that technology was important, it is important, that capacity was important and that is important but they really missed what ultimately made TSMC extraordinary and I thought that it was two things: your recognition, right from the beginning, that the notion of a JV, the notion of multiple fabs competing against each other was a detriment to growth.

Chang: Yeah.

Huang: That your strategy of using copy exactly to the best of your ability so that customers could ring up simultaneously multiple fabs, you know, I don't know how many fabs we run at TSMC these days but it's got to be many. Considering the size of our company today, the course of the last 10 years, I think

we've purchased well over $6 billion in wafers. Growing as quickly as we have, you couldn't do that in one fab. You couldn't do that in two fabs.

Chang: And the next six will come faster.

Huang: Will come faster.

Chang: Evolve faster, yeah.

Huang: That's right. And maybe later I'll tell everybody what promise TSMC has made to me for my 10th billion dollar purchase. <laughter> And so the duplicate exactly was a wonderful strategy. The second thing and probably even more powerful in the end is this incredible focus on customer service. I remember, when you called me after your visit, I think it was after my visit, when I got back to the United States, you called me and you said, and it was a phrase that I remembered then and that I've heard I think several thousand times since then, was a phrase that you used, you said, "We will jump through hoops for you."

Chang: Yeah.

Huang: And one of the things that I really admired about that was that it wasn't just what you told me that day. It was a phrase that drove through all of TSMC, every employee believed in it and lived by it. People repeated it year over year. How did you do that? How did that start and how were you able to drive that through the culture?

Chang: That is a culture that we just started with it. Well, actually, let me tell you. I was doing foundry work even back in the late '50s at Texas Instruments, although we didn't call it foundry then. Texas Instruments had a transistor, not IC, transistor design from IBM. IBM had developed the transistor, designed the transistor, developed the transistor and ran it on its pilot line, small pilot line. They didn't want to do the production, the volume production so gave it to TI to do the production. I was in charge of one of those lines when I first joined Texas Instruments and that was really very simply foundry work. And, later on, of course, we did more IBM foundry work, foundry work for IBM and, of course, at TI later on, we did a lot of commodity work, commodity production. Between the two, I enjoyed-- between the foundry work, customer work, custom work and the commodity work, I enjoyed far better the foundry, the custom work. So that was-- and I also knew what the secret was, what the key was to custom work, successful custom work. That is satisfying the customer. And so jumping through hoops was something that I learned in the late '50s when I was at TI doing foundry work for IBM.

And so, in TSMC, we actually tailored everything in the company, the organization, the compensation system, the evaluation system, we tailored everything to customer service, to jumping through hoops. Well, I told you an anecdote last night. I was visited by a big company, I mean, this was, you know, more than 10 years ago, and he was very big and we were still fairly small. We were couple billion dollars maybe and he was a lot more than that. His sales were several times that. He sort of was telling me, he and I had dinner together and this CEO of this big company, he sort of intimidated me by saying, "Well,

maybe I will go into your business and compete with you." So I let that go for the time being. Several minutes later, I asked him, innocently, "John, how do you evaluate your fab manager?" So he gave me the list. "Well," he said, "yield, cycle time, productivity, ability to make billings every month," you know, all those things he told me. After he ran through his list of 10 or 12 factors, he said, "What else?" he said. "Don't you evaluate your fab managers the same way?" I said, "No, no, no, John. I evaluate them according to how much complaints I get from customers about their fab." <laughter> And that's the honest truth. I really did that, have always done that, the evaluation of the fab managers. You know, I mean, we don't even keep PNL in each fab. We don't. But we do keep very good track of how satisfied the customers are. If a fab manager has got very unsatisfied customers, he is in big trouble. I don't care how much money he makes. He is in big trouble.

Huang: Well, Morris, don't be surprised if the number of complaints to your fab managers, you know, steps up dramatically after tomorrow, <laughter> especially the ones from me anyhow now that I got it all figured out, all dialed in. <laughter> And so, you know, certainly the customer focus and the jumping through hoops for customers is a core part of culture and it isn't just a tag line for you. It is really a way of life and I experience it every day. As I think through, you know, your creation of TSMC, you innovated at so many different levels. You started a company that has never existed before of its kind, very large investment in Taiwan, you know, by any standards, then and now and have built it into a global company. As you think back, well, even thinking about the culture of Asia, the notion of innovation as a core culture, building something that is a one of a kind and certainly the first of its kind is very counter-cultural. What was your experience in going through that?

Chang: Well, it was not easy. I agree that the culture in Asia is usually not starting something new. I mean, I'll just give you an example. They pride themselves on entrepreneurship but the entrepreneurship in Asia is usually driven not by a new idea but by the desire of being your own boss. I give you a very earthly example. I mean, I went to a barber shop in my neighborhood and there are only two barbers in that barber shop and, one day, the junior barber told me that he wasn't to stand his boss any more. He would go out and open a new shop. So he opened a new shop three doors down, three doors down on the street. <laughter> All right. And so he took customers away from, you know, like me, you know, to his new shop. Both of them had to work very, very hard. Both of them had to-- they both discount, started discounting, okay? <laughter> The market is the same size, you know? <laughter> And it's not a happy situation any more. I mean, both of them are very bitter and very resentful to each other and so I have stopped going to either one. <laughter> It's not a happy experience any more. I mean, that is entrepreneurship Asian style. <laughter>

Huang: How did you convince the venture capitalists and how did you convince the Taiwan government and how did you convince employees to, you know, I find that convincing employees to join a startup company is, in fact, harder than convincing a VC.

Chang: Well, back then, of course, the government, they sort of trusted me. Of course, I did have the credentials of my U.S. experience. I was the head of Texas Instruments semiconductor business and, back then, TI had the biggest semiconductor business in the world. So that was a credible credential, I guess. And the government decided that, if they were going to fund a semiconductor company, I seemed to be a perfectly reasonable candidate to start this company for them. So that part was pretty easy. Now, it took some convincing to get Phillips to invest but I did that, too. After all, you know, I knew them before I went to Taiwan and they also knew my track record. They listened to this foundry pitch and they

thought that it was something very innovative. They weren't sure that it would work but they were willing to put in some money just to let me try it out, you know? So that part was more difficult than the government's part. And then the rest of the investors, they were very difficult to convince. In fact, I didn't really convince them. I maybe convinced two or three of them. The rest of them were coerced by the government to invest. <laughter> I had a team of three ministers that helped me to get funding to get investments from them, you know? In fact, one of them was the premier himself. <laughter> So I remember that the biggest investor who was allocated-- 5%, he was told to invest 5% and he invited me to dinner three times and, each time, I went with an assistant of mine, two of us, and we were surrounded at the dinner table by 10 of his staff and they grilled me. They grilled me and my assistant on the details. The knew nothing about semiconductors, nothing, nothing at all, but they grilled us on financial issues. They grilled us on, you know, general issues like how do you think you're going to compete with American companies, Japanese companies, even Korean companies? They are way ahead of you. How do you compete with them? My answer to them was, "No, we don't compete with them. We're in the foundry business. Those other companies are not in the foundry business. They may do some foundry work just to fill their fab but they are not our competitors. We are going to start a new business. And that, of course, made them even <laughter> even worry more, you know? <laughter> So, anyway, but I did make two friends, I think. I didn't know them before I made the pitch for their investment but, after I made the pitch, they told their parties that my presentation was the best they had ever heard about an investment. I made two friends but the rest of them were coerced by the government. <laughter> The premier told me that the biggest investor, 5% investor, wanted to back down to 2% or 3% and the premier had to call him and say, "Gee, Mr. so and so, you know, it's government policy here that we want to start this semiconductor company. Aren't you going to support government policy?" <laughter> So that was what happened. <laughter>

Huang: So when I was an entrepreneur, I was 30 years old and, at the time, PowerPoint didn't exist so I used Persuasion, which was on the Macintosh. I don't think my persuasion was that good, either. If it wasn't because of Wilf Corrigan, who's sitting out in the audience making a few phone calls on my behalf, I don't know what I would be doing right now. How did you tell the TSMC story? Did you have a pitch or did you just hand them the brochure on the core values? <laughter>

Chang: Oh, no. Oh...

Huang: I mean, I'm not saying that it wasn't convincing...

Chang: I spoke eloquently for at least... <laughter> I did have a presentation. I did...

Huang: You did?

Chang: It wasn't PowerPoint at that time, it was Foils.

Huang: Foils. Yeah.

Chang: But I did have a Foil presentation and I rehearsed it myself and I prepared very carefully and, as I said, I spoke eloquently for 30 minutes. <laughter> And I answered all the questions.

Huang: And so, you know, people say that it is quite rare and I think, statistically, it is quite rare that the founders that found the company end up building the company, run it operationally, turn it into a multibillion dollar company, take it public, grow it even further than that and, in your case, even one step beyond that, having groomed a successor and the company continues to do fabulously. How do you attribute to, I guess, maybe answering the question in two different ways, why do you think there are so few people who do that? And how do you attribute to your ability to do that?

Chang: Well, I think most people who found companies really haven't had experience running a big operation. I did, however. I was an operating executive before I founded a company. In fact, I had something like 30,000 employees working under me at Texas Instruments so I was an operating executive before I founded a company. Then, of course, I founded TSMC and TSMC started out with 150 employees. It took a long time before the employees I had in TSMC equaled the number of employees I had at TI, you know? And I enjoyed the operating management work. So, when I had the chance, at TSMC, to become a big operating executive again, I enjoyed it. I mean...

Huang: A lot of people-- usually, operating executives have a hard time thinking small, you know? Operating executives have-- they're wonderful at running a machine, optimizing a machine, tweaking it, getting a lot of yield out of it, getting a lot of return out of it but they have a hard time thinking small. How did you get yourself to think small again?

Chang: I don't think I had to think very small. <laughter> Well, I guess, right after we started TSMC, I hired the president of TSMC. I was the chairman and I hired the president and he immediately hired the U.S. sales manager. So it was a fairly well structured organization, even at the beginning. Then, on the operational side, of course, we had this group that was spun off from _____, as you already mentioned. They were very familiar with the details of the manufacturing line. I guess I really never had to worry about every little detail on a production line. Now, we started 150 people but most of them were pretty key people, you know? Managerial types.

Huang: Now, running a very large operation versus building a company as you know now are very, very different.

Chang: Yeah.

Huang: How would you describe how you have evolved yourself along the way from 1987 to now?

Chang: Well, I think that, mentally, you have to adjust yourself to the changing status of the company. For instance, when TSMC first started, in the first few years, of course, the growth wasn't very high because we were waiting for our customers to emerge. The customers were the fables companies. The first few companies, we were taking business, were getting business from the big IBMs, Intel, TI, Motorola were all our customers back in the first few years and they were very important to us. They taught us

how to control quality and a lot of things. Very important to us. But they were not the customers that eventually turned out to be our most important customers. Our most important customers, the ones that were ultimately important, were still being born at that time, the first few years. And then, in the '90s, we went through a rapid expansion phase. Almost the entire decade of the '90s, we were growing at, you know, I didn't keep track of the exact number but it must have been over 50% a year average all through the '90s. So you had a mental attitude for that kind of a growth and then, 2000, 2001, you know, the internet bubble burst and the semiconductor industry, as a whole, plunged 30% in one year, from 2000 to 2001.

Huang: Did you lose money that year?

Chang: Huh?

Huang: Did you lose money that year, did TSMC lose money that year?

Chang: No, we did not lose money that year but our growth slowed down and, in fact, our growth, well, we had negative growth in 2001, also. We plunged 25%, I think, not the 30% of the industry. But, since then, our growth has slowed down to average of 15, 20% now rather than the 50%. So I had to adjust my attitude, you know. If you can adjust your attitude to the different periods of a company's life, a successful company usually goes through a rapid expansion and then a period of consolidation and then maturity. If you can adjust yourself to these different periods of a company's lifecycle, and also bring different skills, bring a different skill set to cope with each period, then I think you are a happy man. I think some people, some very smart people, they can only get used to very rapid growth and, as soon as the growth slows down, "Well, they will say this is not my cup of tea any more, I want to start something new, I want to start something from zero again so I will experience rapid growth again," you know? Well, I, maybe unfortunately, am not that type of people. I'm quite happy with what I've got. I saw it growing very rapidly and I saw it now maturing but it's still a good business, you know? I consider everything higher than the world average economic GDP world as good business. The world average economic GDP growth is only about 4%. U.S. is less than 3% average...

Huang: Well, Morris, as soon as I have what you have, I'm going to be happy with what I have. <laughter> Did that come out right? <laughter> And so part of, certainly part of building TSMC, you know, now bringing it to the current era, the succession to Rick Tsai, tell me about that. Tell me about the process you went through to both groom future CEOs and ultimately what were the characteristics that you looked for to select, ultimately, Rick?

Chang: Well, the short answer to your question is that you can groom somebody on some of the skills that he needs as a successful CEO but...

Huang: My staff's in the audience, just so you know.

Chang: Huh?

Huang: My staff is in the audience.

Chang: Oh, yeah. But the more important ones, he really has to acquire himself. Usually, if you groom someone inside a company, you pick someone that has executed well. That's usually how a person, a manager gets promoted within an organization. He is usually a very successful executor.

Huang: And Rick started out in the ranks of running fabs, right? He was one of the fab managers.

Chang: Yeah. He is an excellent executor. So, all right, so what did I do? He was an operations man. He was basically a technical person, engineering type and, when he came to TSMC, he was, first, a deputy fab manager and then he became fab manager then he became a group fab manager in charge of a group of fabs and so on. And then he became operational VP. At that point, I decided that he would be a candidate for my job. So I put him in sales marketing and I also put him in as the presidents of a subsidiary of ours, the subsidiary is Vanguard and it's also a foundry and put him there.

Huang: That's right. You had him run Vanguard for awhile.

Chang: Yeah. I had him run Vanguard for a couple years. He was president of Vanguard. And then he came back to TSMC and I put him in as marketing and sales executive VP so he had both operations and the marketing and sales. Those were the two major functions in TSMC anyway, operations and marketing and sales.

Huang: So that was the process that you went through to groom Rick to be CEO?

Chang: Yeah.

Huang: But, you know, you're methodical in just about everything I know that you do and you break every problem down into its fundamental pieces and so, in the case of ultimately selecting Rick to be CEO, I know that it must have been extraordinarily thoughtful and, you know, this is a company that you've built so it's also personal and, you know, what were the criteria that you ultimately went through to select Rick?

Chang: Criteria? I think, first, his adherence to the values. I still come back to values. I think those are important, very important. And then his skill set. Because of the exposure he already had to the two major functions that we have, operations and sales, I think he already acquired a very complete skill set. Then you look at a person's imagination and really, when you come right down to it, how smart he is. I mean, I certainly-- I mean, a lot of people, I think, become successful when they are not very smart maybe but I don't believe in that. I think that Rick is a very, very smart person.

Huang: Yeah. Well, I think that the selection of Rick has been fabulous and he certainly lives by the core values of the company.

Chang: Yes.

Huang: Lives and breathes by it and certainly his intellectual capacity is extraordinary. Now, as you think, going forward, TSMC is now the largest foundry in the world, second most valuable semiconductor company in the world, as you look forward for Rick, what are the challenges that you think are ahead of him?

Chang: Oh, just enormous, I think. Well, first of all, you know, just this...

Huang: Good time to pass it off. <laughter>

Chang: You can't stand still. I think this business is still like a treadmill that speeds up all the time. If you can't keep up, you'll fall off the treadmill. It's a treadmill that speeds up all the time and you will fall off the treadmill if you can't keep up. So that's Moore's Law, also, by the way. Moore's Law is just a relentless task master.

Huang: Well, one of the challenges that Rick and I both have and this applies to all the semiconductor companies in the world today, Moore's law is a enabling force but it's also the depreciating force. On the one hand, its advancement makes possible amazing new devices and new technologies but, on the other hand, because of its compression and its integration, it makes valuable products cheaper and cheaper every day. So, you know, I think there are few forces in the world that of this nature and few industries of this nature.

Chang: That's true.

Huang: How do you think this plays out?

Chang: That's why you have to keep up on the speeding treadmill. If you fall off, you have become depreciated. <laughter> Seriously, you know...

Huang: It's true.

Chang: ...people who have lived with Moore's law for a long time usually have mixed feelings about it, just as you've said. They have mixed feelings mainly because Moore's law is a relentless task master. You know, the best people, and the best people change from time to time, the best people are able to live with it and use it to advantage. Yeah, sure, the chips become cheaper and cheaper and so on but still we intend to make money no matter how cheap the chips get and you intend to make money, too.

END OF INTERVIEW

