Oral History of Sheldon (Shelly) Weinig

Interviewed by:
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Craig Addison: Could I start off with asking you about your early days, where you grew up, what sort of education you had, your family background.

Shelly Weinig: I was born in the city of New York. I went to what we call a magnet school here, Stuyvesant High School, which is a pre-engineering, pre-science, pre-med type of high school. And about that time World War II was going on. And I graduated from high school on Friday and I entered the United States Army on a Monday. And fortuitously three months later in August they dropped the atom bomb and the war ended. But I received the full benefits of a war veteran. What this meant was that I was then able to go to school on the GI Bill of Rights, which I did. And I ended up obtaining a doctor's degree in metallurgy from Columbia University. I then became a professor and I spent approximately five years in academia, at which point I no longer enjoyed the pleasure. Not of teaching, which I always enjoy. I couldn't stand the bureaucracy of university life and so I came up with an idea to start a company. And a keyhole of the company at that time was that all advances technologically would require some new advances in materials. In other words…the obstacle for all advances in technology was available materials. And you know what? A lot of years later you can use the same idea to start a company because it's still true.

Addison: When you left the university, was that to form MRC, or was there something in between?

Weinig: No, there was nothing in between. I began working on the concept. The concept, as I told you, was that all technological advances would require some appropriate materials know-how, development, whatever it might be. At that time there was a considerable amount of government supported research at the universities and in companies. And what would happen is that a particular government agency would give out, let's say, 10 contracts on titanium, to use one material. And they'd give one to Bell Labs. And they'd give one to IBM. And they'd give one to this school and that school. And in the end there were 10 laboratories working in titanium. Nobody ever coordinated the material they actually worked on so that IBM got their titanium from some lab at DuPont. And the chaps at Bell Labs got it from Titanium Metals Corporation of America. And the chaps at the university got it from their brother-in-law who worked for National Lead or something like that. So when you got together six months later and all these labs are now reporting, every one of them has used a different starting material. Well, we don't have to bring in scientists to understand that part of science is controlling the variables and then you study the effect of one variable on a particular property.

So my first idea was to go to Washington and see if they would support materials centers of excellence. For example, I wanted to be in the area of metals but there certainly should be one in ceramics and one in III/V compounds, etc., etc. And it took a long time. It took several years before what was then called ARPA, which is now I guess DARPA**,** [Defense] Advanced Research Projects Agency, finally appropriated about $5 million to set up a series of highly specialized laboratories that would work on these materials. And then when the government gave out, for example again, 10 research programs on titanium, all the titanium would come from one lab. All of it would be, as I like to call it, pedigreed. We know its mother, its father. We know where it came from. We knew everything we can about it. It would be pure as hell. And then we would be able to at least get together and compare apples to apples.

Well, after a number of years that program was finally initiated and I did receive one of the contracts. And that was the real push for us to go into the purification of materials. And that was a real push for us to go into the purification of materials, the pedigreeing of materials. Actually, a nicer word for it is the characterization of materials. So we'd characterize them. And then we sold them to laboratories to be used for research. So that is what I was really up to when the semiconductor industry stumbles upon me. And that's a story into itself.

In the meantime we were doing a considerable amount of consulting in the materials area. You always start a company with several possibilities. You don't want to have just one approach because if that doesn't work there's a pretty low chance of success. My other idea was that I would take consulting in materials from various companies and I would farm it out to professors that I knew. And that way I'd be a kind of agency. So if someone came to me with a particular problem and I thought Professor Jones would be best for that, well then I'd give that to Professor Jones. And of course we would obtain some piece of the monies. It didn't work. And the reason it didn't work is that since I was doing a lot of the selling of the consulting, when I said, “Well fine, this is a very interesting problem and I'd like to have Professor Jones come in and work with you on this.” They'd say, “Oh, no, no, no. We want you to work on it.” Oh boy, well, here I was then living in airports. And the only one making money were the airlines because I wasn't making any. And it just became apparent this was not a good approach. Although we learned a great deal and we work on just all sorts of consulting practices. It was fun. But it was not a way to build a corporation. So it's after playing with this consulting for a couple of years, and we had some other government research but not necessarily the one I was telling you about, it became apparent that I had to find a product to sell. And that's when I really began working very hard on this materials preparation business.

Addison: So Shelly, talking about the actual formation of the company, did you need a lot of money? Where did you go for the funds or support to actually get the thing going?

Weinig: In those days there was not a developed venture capital industry. Venture capital then was the local obstetrician, the local used car dealer and they met behind the pharmacy. And each one was willing to put up x thousands of dollars. And it was very funny because I met with a number of these groups and they would all say things like, “Oh, we have great confidence in you, you seem to know what you're doing, and we'd be happy to provide you some monies, but we'll have to lock your children in the cellar until you pay us back.” Things like that. I'm joking but what I'm saying is that they didn't have the sophistication to really set up a venture capital group. And that was good for me. Because needless to say, the longer you can go the better off you're going to be if you don't take in outside monies because it won't dilute the company as much.

So the original start of the company was based on a small amount of money that I had made playing the stock market. Knowing the metallurgy game I had been playing some metals companies and I was fortunate and made a little money. And then my father signed a loan from a local bank, which allowed me to get some additional monies. And I learned all the tricks. I learned that when I got a job I said “Would you mind giving me an advance?” And I always remember, it was very funny, somebody said to me, “An advance? Don't you trust us?” I said, “Good God, of course I trust you. I have no money though to run the business. I need the money.” And you just did everything you could in this particular manner. We had a government contract with the Navy and I found out there was some Navy machine shop equipment available in the surplus. Well, through this contract I was able to obtain that equipment. And it was a

learning experience. And it was fun. I can't say I look back with pain. I thought it was fun. You needed a desk, you went to an auction and bought one for 20 bucks. My own personal desk I had for six years, it cost $22, until my board said, “For God's sakes, it's time to upgrade a little bit.” [Laughs] It was really, I think, about three years before outside money came in. And then we sold 30 percent of the company to the General Instrument Corporation. We had got to know them because we had been working on tantalum for them for solid state tantalum capacitors. So I got to know them and they offered to put some money in. And that was the first major amount of money that came into the company.

Addison: Did you have any kind of business acumen? You obviously had a technical degree, but starting a company and asking people for money, did that come easily to you?

Weinig: That's always an interesting one because sometimes I think either you're born with it or you're not. And I sometimes wonder whether you can really teach business. God knows there's a big industry known as the MBA schools, so I shouldn't really say that. But I learned as I went. I just seemed to have an instinct. My father had always been in business and so I had learned some things from him. There was a time when I used to keep his books so I learned a little bit about accounting that way. But basically it was survival; I think that’s the right word. And I learned one thing and that was that you had to just be up front with people. Like the story of asking for an advance. Would you make up a big story about how you don't trust them? The name of the company was U.S. Steel, IBM, I mean…no, I just played it straight out.

Addison: Were there any other people as co-founders or people who came with you and started the company?

Weinig: There were at least four other people that I brought in. Some were from Columbia. Some were from the NYU engineering school. And they joined me and they each had a small piece of equity as well. But the bulk of the equity was mine.

Addison: So would you call them co-founders or founding employees?

Weinig: They were there. They were founding employees by all means. There were two PhD’s that I knew from Columbia. Each of them had taken a class with me when I had been teaching there. And then I'd taught for a while at NYU College of Engineering and I had two young men who had bachelor's degrees who had studied under me. So yeah, I would say there was a handful of students that I took out of the schools who came with me. And each one got some equity.

Addison: So what was your first revenue-generating product? I know you talked about the government contract, but the first thing that you actually built that brought in revenue.

Weinig: The first thing that we actually built that brought in revenue was an x-ray diffractometer. And this was a chamber that went on an x-ray machine. Now you could take a piece of metal and put it on an x-ray machine and you could do various studies, but that isn't adequate. What you really want to do is do those studies in a controlled atmosphere. So the first diffractometer chamber that we made was one in which you could put the specimen in, and the specimen could then be raised in temperature or, later on, with a second version, it could also be lowered. So it was cryogenic as well as heat. And it could be in a vacuum. Now this was very good because if you wanted to study a piece of metal that might be part of a space

shuttle, you don't want to study it at room temperature. You want to study it in an atmosphere of some design of your own. You want to see what happens to it when the temperature changes because it gets very hot and then it can get cold.

So this was an x-ray diffractometer, which was really nothing more than a hot and cold atmospheric chamber to study materials. And we made several of those. And God, they looked like a coffee can on a stick. And they fit onto, for example, a Philips x-ray machine or a GE x-ray machine or a Picker x-ray machine. And it was the first one on the market commercially. It was an awful looking little thing. I remember the pictures of them, they were just unbelievable. And then lo and behold…you need luck in business, and I'm a great believer in luck. And Philips came to see us and they liked what we were doing. They had a number of customers who had asked if they could get an x-ray diffractometer attachment that would allow temperature variation. And they said that they would like to market these for us. And they gave me an order for, I think it was 100, to be spread over a couple of years. And this of course was a godsend. This was it. This was the first commercial business. And we worked our tails off and lo and behold…I remember the first delivery.

The plant then was in Yonkers, New York. I started the plant in a loft over a yo-yo factory. Do you know what a yo-yo is? They were still making yo-yos down there. We were on the second floor of this loft. And we made these diffractometer attachments. Mount Vernon was where Philips was… maybe 40 minutes away. So we sent someone [over] with these diffractometers, nicely done in beautiful wooden boxes that we'd had made up, and really felt wonderful because it was our first shipment. And a few days later Philips called and said they had rejected them all. And I neared to faint. My God, “What's wrong?” Well, “This is just not up to our workmanship,” blah, blah, blah. And I said, “Let me please go over to your place and explain it to me.” And they did. And they are sticklers and wow. This one had a little scratch on it and this one maybe was a little abraded over there. And onward and onward and onward. I mean, they had gone into a quality control mode on these diffractometers...I took all of them back, took them back to our factory and we redid them one by one and inspected them one by one.

And you know what? I thank Philips for that. It changed us from a garage operation, I'll use that term, to someone that had to produce a product now to meet commercial standards. And they were tough boys. And they helped us. And that was our first real commercial product. After that we go into products which were very important. They're germane to the story because the next product that I made was a horizontal bench zone refiner for purifying metals. This zone refiner was under license to Bell Labs. I went over to Bell and I took a license. I can't recall what the percentage was, but it was fairly high. But over the years as we improved things they would keep lowering the license fee until finally we were at parity and we had to pay no license fee to Bell and they became fine customers. At any rate, that was my second product, which was a zone refiner to purify metals under license to Bell Labs. Again, this was the first zone refiner on the market.

Addison: Did either of these, the diffractometer or the zone refiner, have application in the semiconductor industry?

Weinig: Oh, very definitely the zone refiners. Very important because when the semiconductor industry first begins…we call it the transistor, the first material that was being used was germanium. Not silicon.

Silicon comes later. And you zone refine germanium in a horizontal mode in order to make the transistors. So yes, this was a very important piece of it.

So we're selling some zone refiners. We're started to refine some materials. We're starting to sell little bits and pieces of material. And then of course, lo and behold, again that mother luck comes along and this contract is let from ARPA. And we get…in those days it wasn't an enormous amount of money, but you didn't need an enormous amount of money…but it was in the hundreds of thousands of dollars per year, which was a considerable amount for us, to purify and characterize materials. And we of course start using zone refiners.

Since I now had a horizontal zone refiner I heard about an invention in a British Admiralty Lab which was an electron beam zone refiner. And now I was really fascinated with this possibility. So what I did in this case, since at that point there were no patents on this for some reason…I don't recall why that was, but there were none, I hired a British scientist, a young Ph.D. from Britain. I brought him over. I think the Brits then called that the “brain drain.” There were many British scientists then who were coming to the United States to work. I hired my first one and the assignment I gave him, he in conjunction to one of the young engineers who had been my student, was to build an electron zone beam refiner. And this electron beam zone refiner would refine things like tantalum, tungsten, molybdenum. In other words we were talking about higher temperature melting materials, not low melting point. These are the high temperature. For low melting point you could do horizontally in a horizontal zone refiner using an RF coil or a resistance wound coil. But to melt something like tantalum or tungsten or molybdenum, you had a little filament, you fired electrons at it, and you moved it along the rod, and you pushed all the impurities along. And an amazing thing happened. You left behind a single crystal. This became very exciting. Up until now people who were trying to study, for example, tantalum…to get a little piece of single crystal was a monumental task. All of a sudden I'm making single crystals 12 inches long, an eighth of an inch in diameter and I'm pumping them out daily. And they're high purity. Wow, now we're in a new business. We're selling single crystals.

So now you see how we were armed in terms of this ARPA contract. We now have a pretty fine array of instrumentation to purify. We can do vacuum melting, we can do horizontal zone refining, we can do vertical electron beam zone refining, and there were a few other tricks as well. And at the same time we were developing analytical capability; a whole different area, but you had to have the equipment to analyze this stuff. So now I've got a kind of a drugstore. And people are beating a path to my door and they're buying. And of course it's hysterical because when you think of metal, people buy metal in sheets, in rod, in wire. I'm selling it by the inch. Someone would call up and want to buy one inch of tantalum single crystal. And we'd sell it to them by the inch. Or they wanted to buy 50 grams of something. This was really a pharmacy. Of course we charged pharmaceutical prices as well, but that's the way it ought to be. [Laughs] And we had just zillions of these little orders going all over the world of bits and pieces of metal.

And that's what I'm now running. I'm running a pharmacy…and then we're selling a little bit of equipment over here, we're selling the x-ray diffractometer attachments, we're selling some zone refiners. Needless to say we start to sell electron beam zone refiners. A bit piece of capital equipment, these were $25,000 at that time. They’d probably cost about $2.5 million today if you wanted to buy one. But we thought that was big time. And business was perking along. It's not growing very fast. By this time we're probably $2

million or $3 million a year [in sales]. We move the operation from Yonkers, New York, across the river to Rockland county. And we build a new building which the state of New York graciously helps us to build under their state grant, etc. And we're sort of perking along at this level. And it's not breaking out. In other words, it's not going uphill in a rapid growth pattern. And then we come to the semiconductor part of the story.

And this is where again fortune has to always be there. You can have the most wonderful thing in the world, but somehow you have to get it situated. So here we are, a modest size little technology company in the metallurgical pharmacy business and selling some peculiar equipment for purification and this diffractometer for analysis. And one day a gentleman by the name of Bob Noyce gets in touch with us. And Bob was then with Fairchild. And he tells us a story that in the original integrated circuits patents, of which there are two, one is from Texas Instruments that Jack Kilby worked on and then there's the one that Bob Noyce worked on. Now I think I've got them right. I think that Noyce wanted to use a thin film of gold to integrate them, whereas Jack at TI wanted to use little wires to integrate them, but also of gold. So what we have here are the two inventors, each integrating a bunch of semiconductors into an integrated circuit. And each one doing the physical integration with gold. Well, an amazing thing happens. Although patents are issued and they'd played around in the labs, and they'd obviously proven their concept, it really didn't work. And it didn't work because the contact resistance at the p-junction for the gold was different than the contact resistance at the n-junction. So what you had was another variable, which upset the application. And what they were looking for was a material that would have high conductivity [and] that could be applied very easily be it by deposition of thin film, or by the wires. And what could we use? And of course have equal contact resistance at the p-junction and the n-junction. That was the thing.

So the first chap that came was…I have it backwards. I'm sorry. Jack Kilby comes first. And we work for several months playing around with various materials in conjunction with TI. And we finally settle on this wonderfully complex, unbelievably rare material known as aluminum. [Laughs] I mean, it was selling for about 55 cents a pound in those days. And we zoned the living hell out of aluminum. Back and forth and back and forth in the zone refiner. And it goes on for the best part of a month and finally what comes out is super high purity aluminum, that's the best way to describe it. It's super high purity aluminum. And we make up one pound and we send it to TI.

And one of my guys comes in and says “Hey, Shelly, what should we charge them?” I said “How the hell do I know?” We didn't even understand what our costs were. We'd been working on it for months. I said “$2,000 for the pound.” So we sent them a bill for $2,000, which they paid. A few weeks goes by and TI calls one day and said that stuff worked real well and we'd like to buy 500 pounds. And I, figuring out that we could produce about a pound a month, make a quick calculation. I said, “Well, if we were going to fill that order with our present capacity it's going to take me 40 years.” And they laughed and I laughed. And that's the beginning of the story. That's the real breakthrough part of the story. In other words, we had technology waiting for the right problem, if you will. We have an answer; we're waiting for the question. And the question was what material should we use in a semiconductor? And lo and behold, the electronic materials business is born. And they used to joke with me and call me the father of electronic materials. And I said, “No, I have to find the mother first and then we'll see what's really happening.”

And that is the explosive moment when the company goes from being this sort of piddling-along pharmacy for materials to a producer now of materials for electronics for manufacture. And all of a

sudden we're dealing with tonnage of aluminum. And we're dealing with banks of zone refiners, not one. We had to use our own product. We had to build racks of these things and just pump through the aluminum and purify the living hell out of it. And of course then the game gets far more complicated because we get smart cats at IBM and other places who figure out that, well, if it's not pure aluminum…what if we put in 0.2 of a percentage of silicon or 0.2 a percentage of this you can improve the operation. And it's a whole family of materials now. And so we are now in the real business.

The only [materials] business I never went into is the silicon business. I'm not really sure why. Maybe we just didn't have the capacity then to even go in that direction, because that was a whole different business. It was a whole different way of growing the crystals and purifying the silicon and lapping them and cutting them. I never went into that business. Well, for one thing there were people like Monsanto that went into it, people who had raw material capability as well.

So we now have a booming electronic materials business. And we're really doing well and the company is now forced to go and obtain outside funding. And we get a venture capital group in now. They're a little more sophisticated. And three venture capital companies come in and pump some money into the company for the next financial phase. And then there's the second momentous occurrence. And that is when…I have to go back a little bit in time here.

We're a very small company and when orders came in…we didn't have computers in those days…when an order came in a girl would take the order and she'd give it a number. Order number 1175 and the next one was 1176. And then she'd write next to it in this log, “Bell Telephone” and then the product and the date and the price. In other words, just a log of orders coming in. I, being a very curious man… and it's one of the things I always teach when people ask me how do you become an entrepreneur, I say, a) be curious as hell, and b) you have to be highly committed because you're going to go up a lot of blind alleys. So I used to come in every Saturday morning and take this book and just look through the book. And I would ask questions. I always had a staff meeting on Monday at lunch time. And so if there was anything there that was interesting I would ask about it on the Monday. So I went in one Saturday morning and there was an order from Bell Laboratories in Murray Hill for a round piece of metal about an eighth of an inch thick. OK. Now, that's a very strange thing for a metallurgist. Who the heck buys a round piece of metal like a little saucer? I could see someone buying 100 feet of wire or 1,000 feet of wire or 10 pounds of pellet for evaporation, or sheet, which is generally done rolled. But here's a round piece of metal. I go into my staff meeting on Monday and I turn to my sales manager and I say, “What the heck is this round piece of metal used for? Why would they buy that?” And of course he, being a brilliant man, would say, “I don't know.” I'd say, “Well, get yourself in gear and let's get an answer because I'd like to find out.” I'm always curious to know what it's for. He comes back the next day and he says to me, “They're sputtering.” And I said “Oh, that's interesting.” I haven't a clue what sputtering is. So I make a beeline for a book, look up the subject of sputtering. And that's my second major break. I researched this and I found that sputtering was really a process that had been developed back in 1850 or something, rather primitively. But people had played with the concept way, way back.

And so I became intrigued by it and I could see a lot of possibilities. And I assigned a couple of my engineers to develop a small sputtering machine so I could see how the thing worked and what we could do with it. And once we got the thing up and running it became apparent to me that what was being done was truly primitive. In other words, companies didn't know much about it. They had one target material,

which was this round thing that was being bombarded and then it was being laid down in a thin film. And what you really wanted was either multiple or sequential…maybe you want to put down first metal A and then metal B and then perhaps metal C. Or you wanted to have a rotating table so you could either do it sequentially or you could keep the material in one place and you could rotate the targets. So you have different target positions. And long story short, we played with that for a while and came up with a small unit and took it to a trade show. And it's the only time in my 30 years in the industry where someone came and bought it right out of the trade show. He said, “I want that and I'll pick it up when the show closes.” The fellow was from GE Labs in Schenectady and he bought the thing right off the floor. Needless to say it was the only one we owned because we hadn't made any. [Laughs] This was our prototype. And that was the first commercial sputtering machine to ever go into industry. And that was it. Of course from there that piece of our business at one point was $100 million making sputtering equipment. And it became a major leg of the company.

So we ended up in the end with three legs. We had a ceramic leg where we were making boards for hybrid circuits. These were aluminum oxide boards for hybrid circuits. We had the equipment business [but] years later we just didn't make any more zone refiners. Nobody used them anymore. People bought their high purity materials. The diffractometer business…that continued for some years. But then it saturated and we stopped doing that. So in the end we were really doing everything for the semiconductor industry. We were making sputtering machines for the semiconductor industry. We were selling materials that were being sputtered down. And we were making these ceramic boards.

Addison: Can I just get some timeline?

Weinig: Sure.

Addison: When you first got the call from TI, for the 40 pounds of aluminum, roughly when was that?

Weinig: I'm going to have to make a guess. Early '60s I'd have to say.

Addison: And when Bell Labs ordered the sputtering target, when was that?

Weinig: Probably a short time afterwards. It would also be in that period. Because sputtering comes into its own rather quickly as this industry starts to develop. And yeah, I'd say we're talking probably between '62 and '66, in that time frame.

Addison: Let's pick up again after the big take-off of the company and the venture capital up until it was bought by Sony. I guess that's the '70s mainly, early '80s?

Weinig: Yes.

Addison: What were some of the key highlights during that period?

Weinig: Well, of course we were growing at a fierce rate. And like all companies in that situation, we had an initial public offering. And we used a very fine company by the name of Alex Brown down in Baltimore as our initial company to take us out. And then a few years later we needed money again because the

company was expanding so rapidly. We were building buildings, etc. And then we went to Goldman Sachs and they did a secondary for us. And we did another secondary with Goldman Sachs a couple of years later. So a goodly amount of time, certainly from my standpoint, was spent in this part of the business, which is essentially…negotiating funding. I spent a lot of time negotiating the Japanese situation. All those things take a lot of time. And you don't normally do this with subordinates. You really have to be part of it. There's a certain symbolism to it, but there's also a need to be part of it.

I think the Japanese one was fun. And that probably occurs around…I would have to make a guess that would be sometime in the '70s or later '70s. Up until that time if you wanted to open an operation in Japan you had to have a Japanese partner. And I don't mean a partner of 5 percent. I mean a substantive partner. And if I'm not mistaken it may have had to have been a majority partner or at least a 50/50. Well, no small American technology company wanted to do that because that's giving away your birthright. So we all worked through so-called Japanese rep organizations and it was very complicated. The Japanese system is a complicated one. You'll find a rep organization and they only sell to Mitsubishi, but they don't sell to Panasonic or to Sony or whatever. Each one has their own sort of district. Soon you're dealing with five, six, or seven rep organizations. And it's not an easy deal.

So one day I read in the papers that they're going to change the law. And that you can now have an operation in Japan without having a majority or certainly equal Japanese owner. So I get on my horse and get over there and I go to visit the U.S. embassy. And I go to the commerce part of it. And they couldn't be more useless if I designed it that way. I mean, it was a real disappointment. They were totally useless. I even go to MITI, which is the Japanese development agency to see if they would be of some help. Well, they certainly weren't thrilled at the idea of helping an American firm come in. And I was sort of up the creek without a paddle here, to use an old saying. And where do I go from here? I don't know how to get this damn thing started. And my rep…they're all very good, but they weren't exactly going to help me to put them out of business. So you're not getting what we'll call a high degree of cooperation.

So I came up with a crazy idea and it's really based on SEMI. And I had been on the board of SEMI at this point and I'd gone over to Japan. We had the first Japanese SEMICON show and so forth. We had used a PR agency in Tokyo for the SEMI show in Tokyo. And I called that agency and said “Look, I'm stuck. I need help and what I would like you to do is develop a press conference for me at the American Club in Tokyo. And invite as many newspaper people as you can in because I want to present the message here.” They did it. They were very efficient. And in Japan everybody reads at least four and a half newspapers a day on average. So there were, I don't know, 20 or 30 reporters there. I got up and my message was very simply that, what I have you need, therefore why should there be obstacles to my coming here. In fact what I should see are large signs saying welcome. And this is literally what I said. And of course as I tell this story jokingly, the next day there were headlines in Japanese papers that said, Inmate of lunatic asylum in the United States escapes and comes over here and wants to be welcomed. They practically said that, but not quite. Well, bottom line, within weeks I had four letters from four governors in four different prefectures on the island of Kyushu, which they were trying to turn into semiconductor island, the reason being Kyushu had been a mining island. That's where all the Koreans who were brought and kept as slave labor were -- but they had depleted the mines. There wasn't much coal left in them. So they needed industry. And what they were going to do was build up a semiconductor industry there. That was the idea.

So four different prefectures invited me. I went back over there and visited all four. I had sumptuous banquets. I was treated very well. I was told what they could do. And I chose Oita prefecture, which is in the northeast corner and not too far from Oita airport. And I chose that as the place to build the plant. The problem was, what are you going to use for money here? We're not kidding. We're talking about, you know, land prices that were off the wall and that's before the great collapse of Japanese real estate. So on the land the prefecture made a deal. I don't know what the deal was. They certainly didn't talk to me about it. But whereas one day I'm being offered to buy this piece of land to build the plant that cost X millions and millions of dollars, when I said that's impossible…I mean, if I put that kind of money in there I'm not going to be able to build the plant here. The next thing I know the prefecture somehow gets the land and I'm told we're going to rent it to you for 10 years and they give us an amount which is quite reasonable. So OK, I've solved the land problem.

Now it's, how do you get the building? So I said, “What do you do for the building?” And they said, “Well if you were a Japanese company you'd go to the Japan Development Bank.” And I said, “Well, I'll go there.” And they said, “Well, you're not a Japanese company.” And I said, “That's not true. I have opened a Japanese company.” I had Nihon MRC, which I had just opened legally. So we went off to the Japan development agency. And long story short, it took six months. My CFO always used to tell the story that when he went over there he had a nice head of brown hair and at the end of six months he had white hair. He still tells the story. I see him. He's with a company down in the DC area, nice guy. And at the end of six months we were going nuts. You just never got an answer. You just kept being asked for more and more and more information. And finally I sent a cable, a telegram…I don't know what you called them in those days. We weren't using email obviously. But I sent a wire, let's call it that. I sent the wire to my American employee who was in Japan trying to organize this thing. And I said, “Tell the Japan Development Bank that I'm coming over this Monday for the finalization meeting.” Immediately the wires opened up. “What is a finalization meeting?” And I said, “Don't attempt to explain it. Just keep using the same phrase. I'm coming over for a finalization meeting.”

We leave New York usually around Saturday noon, we arrive Sunday afternoon in Tokyo because of the time change. And I was met at the airport by a couple of guys from the Japan Development Bank. And the first thing out of their mouths is, “What is a finalization meeting.” I mean, they can't stand being in the dark. And I put it to them very bluntly. I said, “We've been at this for six months and I would like to know, this week, either we're getting the loan or we're not getting the loan and I'll go on with my life and you go on with your life. OK.” On Monday we're advised that there will be a meeting on Wednesday at the JDB. Wednesday morning I take a bath, clean up, look presentable, and go with my Japanese employee and my American employee. And the three of us go over to the JDB and we're taken to a room and we're sitting in three chairs. And opposite is a man over there. And he says in very good English, “I understand that you want to get a loan from the JDB.” I said, “Yes sir, that is correct.” “Do you have an application?” Do I have an application? They must have 400 tons of material that we've submitted. But my Japanese employee reaches in his pocket and he takes out a single piece of paper. This is the application. And on this application it says that Nihon MRC would respectfully submit this application to obtain umpteen million yen for the purposes of building a factory in Kunisaki-machi in Oita prefecture. And I presented it to the man and he looks at it and he says thank you. And he says excuse me, and he leaves the room. And he comes back in about 10 minutes and he says, “Will you please follow me.” We go down the hall and we go to another room, very formal. And this is the Governor of the Japan Development Bank, the head honcho now. And he greets us and then he says very politely, “I have excellent news. We have decided

to grant you a loan to build your plant in Kunisaki-machi." And I want to explain however that you are the first American company to ever receive such a loan and we want you to let people know about this. Because we want them to understand that we're welcoming a foreign investment here, etc., etc. And with that he says, "Will you come with me." And we go through a door in his office into a room and there are about 20 television cameras set up. They were all there, the reporters were there, the TV, everyone is there. This is a big surprise. They had set this up three days in advance. And needless to say I was on television and in newspapers, etc., etc., etc.

The bottom line is that people always ask me was this enough money to build the plant. No. JDB doesn't give you an enormous amount of money. What they really do is they stamp your rear, you're kosher, you're OK. And it opens all kinds of doors. Suddenly banks will do business with you. Suddenly insurance companies will do business with you. In other words, you can now move ahead. Yeah, they give you a little money, some token money. But it hardly was enough to build a factory. But once you are JDB approved, that was the whole difference. And it's a lovely story and it was very nice.

And I'm sure you've run into Jim Morgan of Applied Materials. We've always had a little friction on one point. And I'll put it in the record so everyone understands. I gave 10 percent ownership in my Japanese company to my key distributor in Japan. We were very close and I thought that was a very nice thing that I wanted to do. I asked him if he wanted some and he said yes. And again, don't hold me to the number. It could be 10, it could be 15. But I gave him a small ownership in the company. Jim Morgan came to see me after I got my JDB loan to find out what I did. Of course I helped him. We knew each other from the board of SEMI and from being in business. But later I think he and his son put out a book. And in the book they state that they're the first company, the first American company to get a JDB loan. And the differentiation was that minority position that I had given away. So therefore I wasn't 100 percent American company, I was an 85 percent. Well, he could say what he wants and you could have it on the record. I am the first one that got the JDB loan because I helped him get his! So much for that.

Anyway, we go on to build that plant and it was just a great, fascinating experience. I enjoy these things. I enjoy the challenge of it, the fun of it. How do you solve these problems? And I must say, as I look back, those were just heady, wonderful times. You could write many books on these subjects because you have these differences…the cultural difference are significant. And you can just imagine the cultural differences here. My engineers in the United States, they needed private offices to work in. In Japan you never use private offices. They have like a bull pen. And everyone is sort of sitting together and they maybe have two telephones and they're all yelling and talking to each other. And you know what? It's a very nice way to communicate. If somebody calls an American company and says, "When are we going to have those parts", you have to write it down and we'll call you back. And then you have to call somebody else at the company and maybe three days later…Not in the Japanese company. The guy holds the phone against himself and he yells out, "Hey, when are we having those parts." And a guy calls back from the other side of the room and he gives him an answer. Fantastic. Of course today we use computers, but in those days that was the way it was run.

So we'd send over American engineers to work in our plant there and they're in shell shock. They never worked like this in their lives. They all had private offices and it was quiet and you had your own telephone. All of a sudden you're sharing. Anyway, it was just a lovely time. And I remember it all with great pleasant feeling.

Addison: When you did sell the company to Sony I believe there was a bit of a hoo-ha about technology going to the Japanese.

Weinig: Well, I was very open about this. Here is the story. The company is now several of hundreds of millions of dollars in size. Yours truly is bored with it. I had spent some time in Washington working for President Reagan. I was on his private sector initiative advisory committee. I chaired the international part of it. I had taken this Australian Ph.D. that I told you about before and he became the CEO of the company. I remained as chair. And I spent most of my time either in Washington or chasing around the world. And when I came back he hadn't done that great a job. He was the world's greatest number two executive that I've ever met. But he had difficulty being number one. And there's no sense in going into the details. The point is that it just obviously wasn't going the way I thought it should be going. And we had a verbal altercation and he left the company.

So I was back in the CEO's slot and I ran the company. But in all truth I was beyond it at this point. I wanted to do other things. I didn't want to spend my entire life just in this one industry running this one company. I had done my thing and I wanted to do other things. So I was looking around to find someone who might be interested in making a major investment by either buying it or whatever. We were a public company now. And I couldn't find any investors in the United States. And the first ones that came forward was a company called Oerlikon-Buehrle who owns Bally shoes and they own hotels and insurance companies. But they also own a company known as Balzers, which was in the semiconductor equipment business as well, in Balzers, Lichtenstein. And they made an offer.

I was invited then to go to Balzers and I spent a week there. I met them and I went to Zurich and met the people. I had a very strong feeling, although I didn't want to work with the company, that my executives would last about 2.6 microseconds. I didn't like the whole attitude of these guys. They had only one thing on their mind, which was how soon will you produce a stream of profits of at least this level. That was the only thing that interested them. They weren't interested in technology. They weren't interested in where are you going with this thing. It was purely grinding it out. And you could tell from the fact that it’s a holding company. I mean, they own a shoe company, they own a hotel, they own an insurance company, they own Balzers in Lichtenstein which is making machinery. So they're not interested in the technology or the industry. They're interested in money. Period. I have nothing wrong with being interested in money. I am not averse to it. But it was not what life's all about.

So I had a look around for a white knight. I think that's the expression they use on Wall Street. Well, I already had a plant in Japan, which was relatively close to a Sony plant. This is down in the southernmost island of Kyushu in the prefecture of Oita. And it’s a whole other story which we won't bother with today, but in the process of opening that plant in Japan the governor of Oita prefecture had introduced me to Akio Morita, one of the two founders of Sony. I was also introduced to the other founder. But it was Akio Morita who was the player here. And I got to know him reasonably well and liked him. He was a very smart man and very nice. So on a long shot I called Sony. And I asked them if they would be interested. And they did something I doubt a Japanese firm has ever done before. I called them on a Thursday. And I said I was under the gun from an offer from the Lichtenstenian bunch and we had to really move on this thing. And I had a bunch of people spend the entire weekend faxing papers to Tokyo so that they could look at it. I had been given until 5:00 Monday to accept the offer of Oerlikon-Buehrle. And their point was that if I didn't accept the offer by 5:00 they could well make a tender offer, an unfriendly tender offer,

which I didn't want to happen. I think that kills a company. So I said to the chaps from Sony, if you really want to make an offer we've got to have it by the end of the day Monday. Well, that works because Monday night in New York is Tuesday morning in Tokyo.

And the executive committee of Sony met every Tuesday morning. They had a board of 35 people which of course do nothing, but they have seven people on the executive committee. They run the company. So at 7:00 o'clock I was hiding out. Nobody could reach me. I was in my lawyer's office over on Park Avenue and 40th with my entire board. We'd been closeted there. And at about a little after 7:00, which would be 9:00 the next morning more or less in Tokyo…we got a call from Tokyo. And they agreed to the price. And that price was considerably more than what Oerlikon-Buehrle was giving. So not only had we found a white knight, but we also found a better price for the stockholders, which wasn't all bad. And the deal was therefore made.

The lawyer said to me, "Go down and get yourself a drink or something and we'll have to draw up some papers. Come back in an hour and we'll have some preliminary papers to sign." So I went across the street. And to this day I have no idea whether I had four or six vodkas. It could have been eight, for all I know. The truth is the adrenaline was flowing, I felt nothing. And I came back up around 8:30. And as we're getting ready to sign the papers the lawyers for Sony and the U.S. representative said to me, "Shelly, we want a contract." I said, "What do you have in mind?" And they said "Five years." I said, "Five years, I'm not a kid anymore. It's a big hunk of my life." At this point I don't know whether it was my ego speaking or the vodka. But I had this crazy thought that gee, wouldn't it be interesting to be a corporate executive in a $60 billion corporation that is probably the best recognized name in the world. And I got carried away with my own juices here. [Laughs] And I still don't know what the deal was. I said, "All right, I'll go along with the deal on one condition." And they said, "What's your condition?" I said, "I don't want to run any of your businesses." There were 26 Sony operations in the United States. And I could just see Charlie Brown in San Antonio, one of the semiconductor plants, leave and [they say] "Shelly, go down and run that one for six months until we find someone." And the guy leaves in Colorado and I'm over there for six months. And I could just see myself traveling around. And I didn't want that anymore. I'd been there. I said, "I'll work for you for the five years. I want to be involved in technology, in strategy, in anything that you think will help the company. But I will not CEO operations." I'd done that 30 years, I had enough of it. To be a CEO is a seven day a week job. And I wasn't ready for it again. They agreed. And a deal was struck.

So now you asked a question. Where were we relative to the U.S. government and to the SEMATECH bunch in Austin [Texas]? And the answer is exactly what you know. They didn't want it to happen. So the next thing I know I'm down in Washington with my attorneys and Sony's attorneys and I'm being questioned by various congressmen. And they said, "Do we understand correctly that you have technology that is unique to your company, unique to this country, special technology needed for the semiconductor industry?" And I said, "Absolutely correct." "Well, will you be doing this country a disservice if this deal were to occur?" I said, "Absolutely." I said, however "I'm between a rock and a hard place. This company needs a major infusion now of capital. This company now needs management because I am finished managing it. I've really had it. And I have made it possible for people in this country to look at it and they don't want to put the money in it." They'd already begun the business of moving stuff out of the states. We already had enormous back-end semiconductor operations all over Southeast Asia. People

were not interested in more manufacturing in the United States. It had occurred already. It was beginning, but it was occurring.

I said, “So if you can tell me how we can accomplish that, I would be delighted to make certain that no foreign company were to acquire this company.” And there was a lot of chatter and chatter and chatter, and a lot of talk and a lot of possibilities. I was called back for more meetings and more meetings. And it went on for a fair amount of time. And SEMATECH down in Austin, of course they had their own words on it. And their words were exactly that, don't let it out. But you can't force an American company to acquire something to maintain the technology. And the U.S. government wasn't stepping up to it. So in the end it was decided that they allowed it, which surprised me, by the way. I wasn't certain it would happen. And so Sony was given permission. Oh, there were some strings attached. They couldn't move certain parts of it out of the United States. Who knows how meaningful those things are.

So that is what happened. And there was considerable turmoil. There were many articles written in many newspapers and trade journals about how the Japanese were acquiring significant technology. And the answer is yes. But anyway, the materials part of that business ultimately is sold to Praxair, which is an American company. The ceramic business went to a company in Boston. And the equipment business I think was sold to one of these enormous outfits like Flextronics or something like that, one of these [contract] manufacturing companies. So in the end, strangely enough, the company is U.S.-owned again. But this is years later.

Addison: Did Sony keep any part of it?

Weinig: Well, yes. They kept one of the equipment divisions that they used to manufacture equipment for thin film deposition, but not for semiconductors, for things like recording heads. Sony had a reason to buy. Sony is a thin film company. People don't realize, for example, at that time within the $60 billion [in sales] there were over $2 billion in semiconductor manufacture. They're a big semiconductor company. To them it's just a supply operation down there. But still, compared to most semiconductor companies, that's not a joke. They also had an enormous coating operation for things like CDs, which are all coated with aluminum and then with a plastic coat on it, all done with sputtering. God, just [about] everything they do has a thin film operation. So it could have worked. The problem is, it's a problem of the elephant and the flea. And they just didn't understand that. And I've never seen that type of acquisition work anyway.

Addison: Let’s talk about SEMI. What was the organization like when you became involved?

Weinig: When I went on the board of SEMI, and I can't tell you the date, you'll have to look for that one yourself, we were a relatively small, not terribly important group of people trying to get a handle on this industry. I think the genius of that organization, and I don't know whose idea it was, was the idea of the SEMI trade shows. That's what makes the organization, initially, because that was its raison d’etre. That's why it existed at first. It was to have these trade shows. And it was a big deal to have an east coast show and a west coast show. And while I was there we started to spread out. And I remember the first European show and the first Japanese show. And I was very involved in the European show. And if I recall correctly the first one was in Switzerland. And I remember an anecdote. At that point my company was doing gallium arsenide. The original digital watches were of two varieties. One was the light emitting diode, LED. Pretty primitive, in other words in order to read it you practically had to cover it and press a

little button. You got a little red glow in there and that was it. But you had to press the button. Which led to one of the jokes, you couldn't go to the bathroom and tell time at the same time. Each was a separate function. The other one was the liquid crystal, which was very bad in those days. And you practically had to cover your watch to read it, with the liquid crystal. And the dominant player here is TI. There were others, but TI is the one that really starts to make them and they use their famous “down the learning curve”, starting to price them down.

Now the first watch that I buy…I don't buy it, I get it from one of my customers, an outfit in Texas, strangely enough. It wasn't TI, and I cannot remember the name of them. But we sold them sputtering equipment and we sold them other things to manufacture these watches. And that watch sold for about $200. That was a lot of money back then. And then TI gets in the game and, bang, the next thing you know it's $100.

So we go over to Switzerland, the home of watches. And I remember there is a television crew there. And I'm being interviewed. I don't know whether I was a chairman of SEMI Europe, I don't remember. I was something important in it so that I was being interviewed. And I said to the Swiss reporter, “You see these watches now, they cost $100. By next year, we come back here and do another SEMI show, these watches will sell for under $25.” And they guffawed and they made fun of me on the television program. They said this American makes statements like that. They're going to have a watch for under $25, an electronic watch. Nonsense, impossible. Well, it's a little bit like the American automotive industry. Because until they came out with the Swatch watch and figured out how to fight back, they were on their knees. A year later you could buy these damn watches for under 25 bucks. All you wanted. And it's a great story.

Texas Instruments calls me up and says, “Shelly, I know you've been screwing around with gallium arsenide.” We always screwed around with any material around. But I wasn't in any heavy duty production of it. “And we'd like to talk to you about it.” So I fly down to Dallas and the head honcho there in purchasing says, “We project a need for gallium arsenide of blipteen pounds per whatever. And we'd like you to get involved.” I was a very significant supplier to TI. They were my number one customer and I was a very significant supplier. And I said “Well, it's going to take me six months to tool up. We have the know-how, we're working on it, we're making pilot runs of it, but I don't have any production capability.” Well, “I'd like you to get into it. How large an order do you want?” Well, I don't understand what you're saying. He says, “Tell me what you want. Do you want a $5 million order today? I'll cut it for you today.” This is a true story. I don't remember what I came out with, but I came out with a multimillion dollar order for gallium arsenide. I came back, we took another building, had to put in all kinds of damn scrubbers because of the arsenic and security purposes. And within about six months we were starting to produce gallium arsenide. Just about when we were in production I get a call from TI, they're going out of the business.

What happened was TI had a big shock. They're not used to the consumer business. You know the store Bloomingdale's? There's one two blocks from here. Bloomingdale's was selling TI digital watches. And you buy a watch on Friday and you drop it in the bathtub Friday night. You bring it back Saturday. They have a no-fault exchange program at Bloomingdale's. So you give them back the watch and they don't put it back in the box neatly. They throw it in a carton box in the corner. Soon that box has 1,000 watches in it, scratched, etc. They sent them all back to TI. They haven't paid for them. Bloomindales's doesn't pay for

about three months. They send them all back to TI. TI is in shock. They've never been in a business like this. This is not the semiconductor business. They get the hell out of the business.

I'm sitting there with the goddamn new plant making gallium arsenide and my major and senior and most important customer is telling me they're getting out of the business. And I'm near to dying. So we made a deal... they continued buying from me for [a number of] months and I then went out to Fairchild, who was also then getting into this game. I start selling to them and they lasted a few months. And then the whole goddamn industry moved to Hong Kong. And I sold a little there. And finally one day you pull the flush and take your loss and get out of it. So you see, not all my stories are victories, right? A real loser [Laughs] But that was a crazy business because the price of those watches went like this [straight down]. They were selling them in Hong Kong then, which I think are the ones they returned at Bloomingdale's, for 10 bucks. I mean, it was an astounding business. So that's another little aside on the semiconductor industry because they were using chips in those things.

OK, it was at that time though that SEMI broke out into Japan and Europe, when I was on the board. And it was very exciting. And I think it changed the whole character of SEMI. It exploded. And we went over to Japan. We ran shows there. Europe. Had shows in different spots in the United States. It was very exciting. And then we started to think about other things. And you began to talk about publications, talk about education, and so forth and so on. And then they began the famous…do they still have an annual SEMI dinner?

Addison: Yes, they do.

Weinig: It's not still in the St. Francis hotel in San Francisco?

Addison: No, it's down in San Jose, usually at the Fairmont Hotel. But it's not with SEMICON West. It's later in the year, October.

Weinig: I was the master of ceremonies, I think for 10 years. By the way, I loved it. It was fun. OK, I'll give you one story about that…the night we had the three Nobel laureates [William Shockley, Walter Brattain and John Bardeen]. They were being presented with the SEMI award. After the banquet I'm down in the garage waiting for my car to come up. And Shockley is there with his wife. And we're chatting because I knew Shockley. And by this time he has become a pariah. He's been shooting his mouth off about his various racial ideas. And a woman, someone who'd been a guest at the SEMI banquet, comes up and says, “Dr. Shockley, I can't tell you how honored I was to be here. To see you. I know it must be very hard. You must be very busy and all. But I want to thank you for coming tonight. I just enjoyed it immensely.” And Shockley's wife, without missing a beat, says, “We're not very busy. Nobody invites us anymore.” Just like that. I didn't know whether to crack up laughing. And Shockley smiled. He knew the game. He was a nut case. I'd call him on the telephone and there'd be an announcement. He'd say, “Just a minute Shelly”, and there's like a little announcement says “this telephone call will be recorded.” And I said “What the hell is this all about.” He'd got to the point where people were accusing him of everything. So he was now recording all the telephone calls that were coming in there. Wow. And let's face it, a really bright guy who, in a sense, is the real daddy of that west coast semiconductor industry because many of those guys came out of Shockley's original semiconductor operation. But wow, interesting character. I tell you, it was fun to know these people, it really was.

Addison: Going back to the SEMICON exhibitions. As a company doing business, you said it was like a godsend to have this exhibition because before you had to go to the IEEE show.

Weinig: Oh yeah. The IEEE show compared to this was just “nowheresville.” The SEMI show is what made it for us. The IEEE show they put over here in the old coliseum in New York, it would be five stories. You couldn't find us to save your neck. And I can remember working one of those shows. I wasn't much of a company then and there weren't many people and I was a chief salesman here. I remember working that damn show day after day from morning until night. And you didn't get a handful of live leads. Because that wasn't what the show was all about. But once the SEMI thing started, wow, what a difference. It was just exciting as hell. From a commercial standpoint I'm talking about. We got real leads there. You got people who were interested in buying your hardware, buying your materials. Plus the fact that it brought the industry together. We got to know each other. And that's important.

I don't hate my competitors. I love them because if we're all successful then the industry is going to be a good success story. And anyone who takes the attitude, “That's my competitor, he's my enemy”…he's not your enemy. The truth is you have to work together because we're part of a single industry. And I think SEMI did it and I think it congealed this industry in a very successful manner. And I suspect that in a way it helped us grow and it made us more powerful against, for example, overseas companies. And this was one of the great discussions we always used to have. Should we let the Japanese people into the SEMI show? I don't mean spectators, I mean the exhibitors. That was one of the great arguments always. Of course you had to let them in because that's what the world's all about. If you don't let them in they're going to start their own show down the street. You might as well. If you're going to be the representative of an industry, you've got to represent the industry.

It was a very, very good operation and a very meaningful one. And I for one attribute a lot of success to the whole industry and to my own company to its existence and those shows. They were great. I have no complaints, Craig. I've worked my tail off for a lot of years. I enjoyed it immensely. I never did it for the money, because if you do it for the money you're crazy. It's the wrong industry. Go to Wall Street if you want money. This was real work. But it was real fun. And as you can tell, I hope, I enjoyed it. I had a lot of fun and there were good people in this industry and I assume there still are very good people in the industry.

Addison: So just to bring it up to date, what do you do with your time these days?

Weinig: Well, first of all I have to explain. My father lived to be 108 and a half. My father had his marbles, as we say, right up to the end. He never lost his mental capacities. He retired when he was 78 and told me it was the stupidest thing he ever did. He should have worked another 20 years. [Laughs] And I have the same kind of feeling; that I don't know what retirement means. Retirement is what I've always done in my life. You do what you want to do. Even when I was working I was retired in that sense. I did what I wanted to do. All the years I ran the company I played tennis four to five mornings a week if I was in New York. I got up at 6:00 in the morning, went to the tennis court, played from 7:00 to 8:30, took a shower and was in my office by 9:00. That's what I wanted to do. So you've got to call it what you want.

I teach in the fall at Columbia University on Wednesday. And on Thursday I teach at Stony Brook, at the university out on the island. And this allows me then Thursday after class to…rent a house way on the

end of the island and we go out there and spend a long weekend. Both my wife and I do a lot of fly fishing. We do a lot of reading out there. We play tennis. So that keeps me busy in the fall. Then we go to our home in Florida. I serve on three corporate boards and on the board of a very large foundation called Math for America. And ever since we've had some of these Enron episodes, board life has become more intense because we've had various SEC and governmental regulations that make it much more intense to be a board member. So that takes up a fair amount of my time.

And then in June I go to Rome [Italy] and teach an MBA course. Well, people always ask me, “What are you teaching?” Well, I assure you I'm not teaching metallurgy. I'm not teaching anything of high technology because, first of all, I'm 50 years away from my Ph.D. What I'm trying to do is very simply this. We have another crisis right now [in the U.S.]. Everybody knows what the crisis is. Technology is moving to India, to China, and I'm sure other places as well. Manufacturing is going over there. What happens to all these kids that are engineers, scientists, technologists? What's going to happen to them? Are they going to move to China and India? I doubt it. So how do we [the U.S.] compete?

Well, the only way we're going to compete is we have to turn out a different type of engineer or technologist. What we've been doing for too many years is teaching in a silo. Do you know what I mean by a silo? Up and down, all technology. Anecdotally, I once promoted an engineer to run one of my operations. And after a few months I met him and I said, “How do you like being a manager?” He said, “It's great.” He said, “There's only two things I don't like.” I said, “What is that?” He said, “I don't like dealing with people and I don't like all the budget information.” And I said, “Well, Christ man, that's what managers are all about. What the hell do you think you're supposed to be doing here, getting a bigger paycheck?” OK, you got the picture.

You go through an engineering school nowadays you haven't a clue as to what a financial statement is all about. They can't read it, they've never been taught to read it. They know nothing about dealing with people. They know nothing about what we were talking about before, which is culture. You send one of these idiots over to another country to work and they get in all kinds of trouble. They don't even understand that there are differences in culture. So what we have to do is instead of the silo education, we have to broaden. That's what I do. I teach a course. It's a graduate course for engineers, scientists, and I get MBAs in as well. I want to keep them from getting shocked when they go into industry. And I want to keep industry from getting shocked when they come in. I want to prepare them a little better to go in to serve in the industry in which they've chosen. And that's what I do. For example, I teach them how to read a damn financial report. I teach them how to cook the books. [Laughs] Show them what you do. How do you fool around with inventory, what do you look for. They haven't a clue. So it's a kind of a condensed course. I have all kinds of names. Sometimes I call it the manufacturing enterprise. Sometimes I call it global operations. I have a lot of names for it.

And I'll leave you with one thought. People always ask me, “Why do you use the word enterprise. The word enterprise comes from a French word, entrepreneur, and it means to undertake something that has risk. And that's the word that I have to teach them. Every business has risk. People don't understand. A dozen years ago, IBM was on the brink of disaster. Would anyone in this country have bet that General Motors would be on the brink of disaster? Or Ford Motor Company? Hell, man, everyone is at risk in the business world. This whole damn country is at risk now in terms of what is going on with this moving of all manufacturing technology, software. I call my dentist. He's four blocks from here and a girl answers me

from India. “How can I help you?” I say, “I'd like to make an appointment with the doctor.” She's got a goddamn computer in front of her. She's just as able to give me an appointment as someone sitting in his office, right? What's going to happen? The next thing you know, my dentist will be in India. I'll have to send my teeth over there, right? Are we done, sir?

Addison: Yes, we are. Thank you very much.

Weinig: Well thank you. It's been fun.

END OF INTERVIEW