



## **Oral History of Hector Ruiz**

Interviewed by:  
Douglas Fairbairn  
Marc Weber

Recorded January 18, 2023

CHM Reference number: 2023.0007

© 2023 Computer History Museum

**Weber:** So I'm Marc Weber of the Computer History Museum and I am here on January 18<sup>th</sup>, 2023, with Doug Fairbairn, and we are interviewing Hector Ruiz, who is former CEO of AMD and major force in the semiconductor industry. So thank you so much for doing this.

**Ruiz:** Glad to do it.

**Weber:** So if we can just start with what's your full name and when and where were you born?

**Ruiz:** That's going to take more than just 30 seconds.

<laughter>

**Ruiz:** Because a name change when I became a U.S. citizen a little bit. Not a lot, just a-- but I WOULD like TO tell you why. My full name is Hector de Jesus Ruiz Cardenas, okay. Now you say, "Why is that-- why is it that long?" Well, kind of complicated. I was born on Christmas day. My father-- I was born at home. My father couldn't find a doctor. He finally found a doctor that was willing to come to the house and his name was Hector, so there's that piece.

<laughter>

**Ruiz:** And being Hector being a pagan name in a very Catholic family, that was frowned upon. You have to have a Christian name too, so that's the Hector de Jesus. I mean, that's where Jesus comes in, being born on Christmas Day, and Ruiz is my father's last name and Cardenas is my mother's last name, which is very common in Mexico and other countries, where you take father and mother's last name. But when I came to the U.S. and then eventually became a citizen, it was a nightmare trying to get my name straight, because for some reason the U.S. systems could not accommodate where the names went, so I had quite a variety of names and it began to cause me some problems in things like applying for a driver's license, you know, and things like that. So finally, I decided to drop my mother's name and drop the name Jesus and now I AM just Hector de J. So I still keep the J. because so many legal documents have that, and so that's kind of a long story ABOUT the name, and, AS you know, I was born in a small town in Mexico called Piedras Negras, which means Black Rocks, which is a coal mining town, so it's-- that was the main reason for that and--

**Fairbairn:** What part of Mexico is that?

**Ruiz:** It's in the northern part of Mexico, it's practically right on the border in the-- across from the border is a small town called Eagle Pass, Texas. Nobody ever knows either one of those two towns, but they were called sister cities because they were right across from each other. And believe it or not, back in those days they were very friendly cities with each other, which got changed dramatically when immigration became such a hot issue, but so that's a little bit of the--

**Weber:** And you were born on Christmas Day, which must've been quite an event.

**Fairbairn:** What year were you born?

**Ruiz:** 1945.

**Weber:** And Piedras Negras today is good size town. Was it smaller then or...?

**Ruiz:** Oh, yeah. When I was there growing up, let's say teenage years, Piedras Negras had about 25,000 people and Eagle Pass had about 10,000 people, and so they were two very small towns. But now Piedras Negras is a very large town and, I mean, it's, in my view it's large. It's got about 400,000 people, so--

**Fairbairn:** It's very large.

**Ruiz:** But Eagle Pass never grew. Eagle Pass today only has about 25,000, so one side grew a lot and the other one didn't.

**Weber:** And tell me about your family, your parents, siblings. What were their backgrounds?

**Ruiz:** Sure. In Mexico there's an educational system that you go through primary school, which is six years, and secondary school, which is three years. Both of my parents went through secondary school and that was-- and they didn't go to college or anything like that, and they frankly, with that level of education, you just took the job whatever you could do. So both my father and mother did all kinds of things. They have a very broad experience in jobs. In the last probably I'm going to say maybe 30 years of their lives they owned a bookstore. So they, while they were working, they saved enough money to actually open a bookstore and that was their dream, and they enjoyed that. They did that for 30 years or so.

**Weber:** But that was after you had left.

**Ruiz:** Yes. Yeah.

**Weber:** And so describe your childhood. What was your neighborhood like? I read in your book that you were shining shoes.

**Ruiz:** I was born at home and I don't have any pictures of that home, but my mother and father used to describe it and my grandfather would describe it, but they didn't like where they lived because it was just a little one-room cabin in the middle of a desert. The town is in a desert type of environment. Kind of like the Sonoran Desert, that type of thing. So it was by any standards, you know, pretty low in the socioeconomic scale. So as soon as I could I wanted to help in the house. I found out that some of my friends were pretty good at shoe shining and I wanted to do that. I wasn't as good as they were but that was enough that I could get around. But that was something that I learned from my parents is to be polite and courteous, and I remember a lot of the American tourists that would come into Piedras Negras, enjoyed getting a shoe shine because it was pretty cheap. It was a nickel or something like that, and they

always wanted me to do it because they thought I was a good kid, you know, polite and courteous. My other friends were kind of grumpy and <laughs> they didn't like doing it, so I did that for a while. Obviously I didn't bring a lot of money to the house but it made my mother feel quite good that I was willing to do something to help, you know, and--

**Weber:** And you were quite young when you did that.

**Ruiz:** Yeah. I was about six years old roughly, yeah. This is hard to describe. You know, sometimes-- I'm going to use the analogy you see on TV sometimes. You see a child has gone through some difficult health issues at the age of six or eight, cancer or something like that, and I'm always amazed, I'm sure you are too, how mature they are. I mean, the level of maturity these kids have due to that experience. Well, growing up in this very poor little town, I think I was a much more mature six-year-old than you would find in an American school, for example.

**Weber:** Yeah. My son is eight and I'm going to tell him what you were doing at that age.

<laughter>

**Fairbairn:** So, did you have siblings?

**Ruiz:** I had four sisters. Three of them are still alive. One of them, unfortunately, passed away with COVID, as a matter of fact, yeah. She had some issues that made her immune system compromised, but at the end of the day it was COVID that got her, but--

**Fairbairn:** And are they in the U.S. now or are they...?

**Ruiz:** Let's see. Two are in the U.S. One lives in Mexico, Mexico City, as a matter of fact. The one that passed away lived in Mexico as well.

**Fairbairn:** What was--

**Weber:** And where are you? Are you oldest, middle, youngest?

**Ruiz:** I'm the oldest, and, you know, I never thought about this until I was older, later in life, that my father probably wanted to have another son. So he kept having kids, but after the fourth one I think he stopped. So, I have four sisters and I'm the oldest.

**Fairbairn:** So, it sounds like given your parents were interested in a bookstore, that they were-- education was important to them. Reading and so forth, sounds like. I'm guessing that that was an important thing. Was that something that they emphasized for you to make sure that you got a good education?

**Ruiz:** Yeah, they might not have used the word education, per se, but I know they were both very insistent that we learn things, you know, and I used to tell people that my father never traveled anywhere

because he couldn't. I mean, that was just not something you did at that level of economics. But if you talked to him about the world he could almost tell you in a way that you thought he was there, because he read a lot about the pyramids in Egypt. He could tell you how they were, and things that-- I always was amazed how I thought both my mother and father could almost appeared to have been in those places because of the reading they did. So they did a lot of reading. They-- I wouldn't say they were very religious, but they really believed that religion was not a separate part of life but incorporated in people's lives, so they read a lot about religious history. They knew a lot about that too, and so the name of the bookstore was El Camino Real, which means The Royal Road, and it's really in reference to biblical passages.

**Fairbairn:** So tell me about your education and what you-- how you progressed, what interests you developed, and I understand you also went to school in the U.S. You went back and forth across the border.

**Ruiz:** Yeah.

**Fairbairn:** So tell me about sort of that arc of education and how ONE got steered in a technical direction eventually.

**Ruiz:** Well, starting with the fact that both my father and mother had to work all the time since I was born, but when I was about five years old my mother got an offer to do something that was much higher paying than she had ever had, and she really wanted to do it but it meant that she had to figure out what to do with me. And I was five years old, and as the story goes, I don't remember it well, but there was a teacher that was a friend of my mother's that taught first grade, and she said, "Why don't I just take him with me?" You know, "He doesn't have to do anything but he can sit in the class and I'll baby-sit and then you can work," and so ended up doing that.

Well, it turned out to be that I really enjoyed being in the class and the teacher told my mother that I was more ready to do first grade than a lot of the kids that were seven, which was the required age back then. So, I ended up staying in school as a result of that, so I was very young in school. So I went through what's called the elementary school, which is six years. It was a school called Modelo in Piedras Negras, which means a model school, and it was a public school. When I graduated from that, again, the same challenge again, trying to figure out what to do. Financially, it was difficult. Well, it turned out that the church that my parents were going to was a Methodist church, and there was a Methodist school in the town that was private and they offered a scholarship. So I went for what's called secondary school, and it was called Instituto Del Pueblo. It means the Institute of the People. That was the name. But it was attached to the Methodist Church. So I went to that school, graduated from there, and since you read the book, so probably all this is kind of an old story for you.

<laughter>

**Ruiz:** But--

**Fairbairn:** We're recording it for posterity. <laughs>

**Ruiz:** But in trying to attend the school and the connection to the church I ended up meeting a Methodist missionary whose name was Olive Givin, and she was from a small town in Cadiz, Ohio. Somehow she develop a relationship with me that was-- I was her protégé, you know. She liked what I was doing in school. She started coaching me about education and all that, and she knew that I wanted to be an auto mechanic, that I really enjoy working with cars, which I did. She convinced me that if I really wanted to be a good mechanic <laughs> I would have to learn English, because almost everything that was published about cars was in English. I thought that made sense to me, so she actually tutored me privately to learn English. So, I learned enough that I could get by and so when I graduated from the ninth grade school she asked me what I was going to do and I said, "Well, as I've always told you, I'm going to be an auto mechanic." <laughs> And she said, "Well, but you don't know enough yet."

<laughter>

**Ruiz:** She said, "You should go out to the high school in Eagle Pass," which was across the town, and said, "And that way you'll be better at English and be able to even learn more." And I thought that was kind of difficult thing for me to consider because that meant leaving my friends and everybody, so it was kind of like-- may not sound like it going just across the river but to me it's going to another country. I mean, really, and so she convinced me of that. So, I went and figured out that the school was willing to take a number of students from Mexico and allow them to attend school so long as you pay \$25 a month.

**Weber:** Oh, a month?

**Ruiz:** A month.

**Weber:** Oh, I thought it was a year. Wow. Okay. That's a lot.

**Ruiz:** And it wasn't a, you know, it doesn't sound like a lot, a big deal, but for us back then that was--

**Fairbairn:** Yeah, that was a lot.

**Ruiz:** But Miss Givin paid for that. You know, she paid for that, so I went to the high school, and there were about 10 of us from that town that went there. Probably half girls, half boys, and I began to develop a real liking for education at that time. So that was to me a pivotal point in my life is that I met professors who, again, took an interest and started helping me. Probably the first year was the most challenging, trying to adapt to a school where everything was taught in English, <laughs> and I had to hear English all the time, and it was a little challenging. I made a point in the book that the first time they asked me to write an essay... Nobody wrote essays in Mexico. I mean, that was not something you did, so I didn't know how to do it, so I took my best shot at it and it was terrible. The professor told me that was the worst thing he ever read.

<laughter>

**Ruiz:** But I began to really enjoy the classes, so I started-- exposed to physics and chemistry and math and really liked it. I ended up being valedictorian of the high school, and once again Miss Givin said, "Now what are you going to do?"

<laughter>

**Weber:** So you wrote in the book though that in terms of the actual curriculum when you arrived, you were quite a bit ahead of the other students in terms of--

**Ruiz:** Especially in science and math, you know, because the educational system in Mexico, even though it doesn't serve the masses as much as the one here does, it moves faster. And the school year is 10 months versus 9, and it's a little more intense. So, when I took my first chemistry and physics classes things were pretty familiar because I had done all that, and the same thing with math. So I found out that that gave me, of course, a little bit of an advantage with other kids.

**Weber:** But had you stayed in Mexico and gone to high school there, what was the alternative? What were you choosing by going to Eagle Pass?

**Ruiz:** After secondary school there's another school called preparatory school, which is two years. And what normally is done is if you go to preparatory school and actually pass and graduate, then you have to go to university. The reason it's called a preparatory school is it's to prepare people to go to college. I didn't do that. That, you know, I went straight to the high school.

**Weber:** But that would've been academically more rigorous in some ways, but--

**Ruiz:** Actually, that would've been, I would probably say, similar to junior college, something like that.

**Weber:** So, I mean, I guess what I'm asking, obviously your life, that's a real turning point in your life, because your career ended up being in the States. But, what was the-- what was your thinking or what was the importance of going in Eagle Pass? If it was not for better academics, what was it for?

**Ruiz:** Well, the hook that got me interested was still my interest in auto mechanics, and that I would be much better at understanding the books on auto mechanics if I actually went to the high school and got a-

**Fairbairn:** Learned English thoroughly and--

**Ruiz:** Learned better.

**Fairbairn:** Right.

**Ruiz:** You know, and, I mean, there was an element of truth in that, because definitely when I graduated from high school I was much better in English than I was when I started. But then things had begun to change in my mind, begun not so much about the mechanics part <laughs> but about education in

general. And back in those days-- I don't know if it still exist, everybody-- every valedictorian of a high school in Texas got offered a scholarship at University of Texas. I don't know if it's still the case or not but that was the case back then, and the only conundrum we got into is the fact that I was not a U.S. resident or citizen. I was a foreigner that happened to be graduating from high school, and so it became a little bit of an interesting dilemma that we had to sort through, with help from people, so that the law would apply to me because there was nothing in the way this was written that implied that you had to be a citizen or a resident. It's a loophole, you know. So I was able to convince the university that I should get the scholarship, which I did. It was called A Good Neighbor scholarship. Yeah.

**Fairbairn:** So, when you went to the U.S. high school, were you welcomed by the other students? Did they-- was there any discrimination or did the 5 or 10 of you who were from Mexico sort of have your own little group or did you mix easily with the American children?

**Ruiz:** Well, that's a good question because at the time I didn't think of it, but looking back, my wife always asks me, you know, "How come I have a lot of friends I went to high school with and you don't have anybody?"

<laughter>

**Ruiz:** And I never thought of it until later in life, that by coming to high school across the border every day and then going home at the end of the day and spending the weekends at home, kept me from developing relationships with other students and other things. So in a way I lost that social aspect of being in high school. It wasn't obvious to me until later in life that that's why I, you know, my wife is right. I don't have high school fr--

<laughter>

**Ruiz:** But it was because I was doing that. Now, the positive side of that is it forced me to really pay attention to school because I had nothing else to do. I'll go home and there was no friends to go out with or things, you know, so I studied. Then at that point that's when Miss Givin started challenging me again. So, "Why don't you go to university? Take advantage of the fact that they're going to give you a scholarship," Again, as you know, the scholarship is only part of the cost -- the tuition and the books and all that, it's just part of the cost. You had the room and board and all the other things that are more expensive. Once again Miss Givin agreed to pay for all that for another-- for one year. She said, "I'll do it for one year," and--

**Fairbairn:** What year did you graduate from Eagle Pass High School?

**Ruiz:** '64. 1964.

**Weber:** Did you feel any sense of discrimination at-- in Eagle Pass? You say things were much more open and friendly back then, but were you fully accepted? Did you feel accepted?



**Ruiz:** Well, I'll divide it into two parts. The professors and the teachers were almost happy to see somebody like me there. I was embarrassingly continuously told -- they would tell other students, "If these kids from Mexico can walk across the border and <laughs> make a hundred on a test, you should be able to do that too."

<laughter>

**Ruiz:** Now, that was not very helpful to me to--

<laughter>

**Fairbairn:** Yeah, no. Probably wasn't.

<laughter>

**Ruiz:** So the teachers, I never felt anything from the teachers. If anything at all I thought they went out of their way to help me. But the counselor was-- ended up being a big problem. Back in those days, I don't know if they still do it, you took an IQ test when you came to school. Coming my first year from Mexico, I had no idea what I was doing, what the test was for or anything. But I remember I scored so low on the test that the counselor told me that I was in the category qualified as a moron and that I should not register for math and science and all that. I should take shop and mechanics and woodworking and all these things. I remember thinking, you know, questioning whether maybe it was possible that I wasn't capable. And all I can remember is asking my father, "What should I do?" He said, "What would you like to do?" I said, "Well, I'd like to take physics and chemistry," <laughs> because I had taken those in Mexico and it was fine, and he said, "Well, then just tell them that you don't agree and that you're going to do it," and so I did.

I went back to Mr. Witt that was his name, that I was going to do it, and I did, and of course, you know. But he was very insistent on-- and, you know, and maybe it was some sort of discrimination but I also think it was also ignorance. Being a counselor, it never dawned on him that maybe the language barrier was causing part of the issues. So that was the place. Now, the student body was different. They-- and it was kind of an odd thing. The white students, so called Anglo type students, were somewhat resentful that I was getting more attention than they thought I should get. So there was a little bit of a sore feeling on that part. Surprisingly, the Mexican kids that were there too, that lived there, were also resentful that somebody from-- that looked like them was getting all the attention too and all that, and so I got caught between those two things. Maybe a saving grace was the fact that I went home every night. I didn't have to put up with much after that. I found that interesting, that I didn't belong to either side and it wasn't-- except for the teachers, but, you know.

**Fairbairn:** So this must've been very close. You walked to school from one--

**Weber:** No.

**Ruiz:** I--

**Fairbairn:** You drove.

**Ruiz:** The last year and a half or three years or so I drove. I had a car. The first year or so, walked across where there was a place where the school bus would pick kids up.

**Fairbairn:** Oh, I see.

**Ruiz:** And so I would walk across to where that place was and I'll get picked up by the school bus.

**Fairbairn:** So when did you decide not to be a auto mechanic and decide that you were going to do <laughs> something...?

**Ruiz:** Well, you know, when I register in the University of Texas as a freshman, I thought I was going to be in a mechanical engineering school. And after a semester, either through contact with friends or teachers, I don't exactly know, I found myself drifting towards the electrical engineering piece. And Miss Givin was right in her wisdom. Once I got a year under my belt, I was hooked. There was no way I was not going to get a college degree. By then, by my sophomore year, I was pretty sure I wanted to be an electrical engineer, you know.

**Weber:** Had you been interested in electronics at all, like radios and the classic, when you were younger?

**Ruiz:** Only in the sense of taking them apart and trying to see how they were put together, but not because I thought much about electronics at the time. You know, I remember when I was in elementary school, there was still no semiconductor industry. So, the world was changing. As I spent my college years, technology was just accelerating incredibly fast during that time.

**Fairbairn:** So you entered University of Texas in Austin?

**Ruiz:** That's correct.

**Fairbairn:** In 1964?

**Ruiz:** In '64, yes.

**Fairbairn:** And so you soon switched to electrical engineering. Was there any particular professor or other people who were strong mentors that guided you or you just sort of rode the wave?

**Ruiz:** No. There were two or three professors that were-- that, you know, it's probably true today also, but back in those days there was competition among the colleges to get the best students. The electrical engineering people always took pride in saying, "We have-- the best engineering students are in electrical engineering." So there was always a competition like that, so there were two or three professors that

were key in helping me make that decision. One was the chairman of the department, a fellow named Dusterhoft, you know. He took an interest in trying to recruit me, if you can call that, to be in the electrical engineering curricula. There was a fellow named Dr. Powers who was from Stanford, actually, and had the same idea, and so-- and I started working in-- at the university labs pretty early. I think I was a sophomore when I started working in the labs and, again, became more associated with these professors that kept encouraging me to stay there.

**Fairbairn:** And so once you got your bachelor's were you-- what was your view at that time? You were going to go to work? Were you going to stay in the United States? Did you have thoughts about going back to Mexico? Tell me about the transition--

**Ruiz:** At that time--

**Fairbairn:** --after that.

**Ruiz:** At that time, you know, I ended up meeting a wonderful lady in college and ended up getting married when I was a junior, so when I graduated, got my bachelor's degree, I thought the wise thing to do would be to try to get a job.

**Fairbairn:** And she was American citizen?

**Ruiz:** Yes. And I did try. As a matter of fact, I interviewed several companies, and I remember to this day how horrified I was about the quality of the jobs they were offering me. I remember coming home and telling my wife, "I can't believe I went to college for four years and this is what they wanted me to do."

<laughter>

**Ruiz:** For example, one of the interviews was with an oil company. They wanted me to keep an eye on the instrumentation in the oil fields, okay? And while I'm sure that's needed and that's probably a job that's critical for them, I mean, you had a fellow here that was, you know, an Honors student in college in electrical engineering, and that's the kind of job that...? So I was very disappointed. So I told my wife, "You know, is there a chance you think we could pull off one more year of graduate school at least?" I thought that might help me find something better.

So I stayed at UT for one more year getting a master's degree in electrical engineering. But during that one year I got exposed to some pretty heavy-duty research at the university and got me more interested in going further, and then I began entertaining the idea that maybe what I really wanted to do was to teach, to be a college professor.

So I got a master's degree from UT a year later, and then in exploring where I should go to get the PhD I met this professor at Rice, Thomas Rabson was his name, who really wanted me to come to Rice, and it's interesting. He was an interesting professor. The way he chose students is he would interview them like a job and if he thought there was a match, he would push the school to provide the financial aid to bring

the student in. This is where my auto mechanics came back because he was a golf fanatic, that professor, and he had an old Corvette and we were driving in his Corvette to go to lunch and I noticed that it was making a funny noise. And I said, "I think your timing belt needs to be adjusted," and he looked at me and said, "How do you know?" I said, "Well, the sound it makes." I said, "I think--" long story short, he took it to his shop and sure enough it was a timing belt issue, I fixed it and his car was quiet. That just to him was like--

**Fairbairn:** That sealed the deal.

<laughter>

**Ruiz:** It's, "I want that guy."

<laughter>

**Ruiz:** So he was instrumental and, you know, I got a fairly generous scholarship to go to Rice and attend that and so my wife and I moved to Houston and--

**Weber:** But your wife had been helping support both of you in Austin?

**Ruiz:** Yeah, when I was still a senior in college. So senior-- my senior year and my first year of master's, my wife was teaching, and--

**Weber:** And what was her field?

**Ruiz:** Elementary school. Elementary education. She taught first grade and loved it, and then when we moved to Houston she didn't want to give it up. So she actually taught, while I was going to school in Houston, at the Fort Bend Independent School District, which is on the southwest part of Houston, and I went to Rice for three years. That's where I got my PhD, and in a field that I would have never thought, when I was trying to be an auto mechanic, I would've ever thought I was going to do.

<laughter>

**Ruiz:** But I got a feel in high-energy lasers and with the idea that you could create a powerful, you know, which is interesting given today's news. It was-- the idea was, "Can you create a pulse light that's powerful enough to actually induce nuclear fusion?" You know, just--

**Weber:** No, it's impossible. It's impossible.

**Fairbairn:** And the answer was, "Wait 6--"

**Ruiz:** <laughs>

**Fairbairn:** The answer was, "Wait 60 years and then, yeah, for--"

**Weber:** <laughs>

**Ruiz:** And, you know, the progress that was made at that time during my years in school trying to do that was miniscule but it was in the direction, you know, that eventually ended up where we are today, and even by today's standards is still miniscule. I mean the progress, has been-- that's one area where the progress has been steady but slow, very slow. So, then I graduated and I wanted to teach. I remember I said I wanted to teach, so I interviewed schools both in the U.S. and Mexico, and I could never get an offer. I mean, this-- fresh out of college PhDs were not exactly--

**Fairbairn:** So this is '72 or--

**Ruiz:** '72.

**Weber:** Ah. That was not a great--

**Ruiz:** I mean, PhD students were driving 18-wheelers, <laughs> because the space program had been watered down and there were people looking for jobs, and so it was pretty, pretty hard. But again, it just so happens that my PhD advisor, my professor, was close friends of the person that was running the research labs at Texas Instruments, and he called him up and said-- his name was Norman Einspruch. Called him up, said, "Norman, I have a student here that's one of the best students I've ever had. You really need to hire this guy."

<laughter>

**Ruiz:** And remember, I was working in this field of Lasers and thermonuclear fusion and all that. Even my master's was in that space, and I went to interview, gave a talk in that and they made me an offer to work in material science. <laughs> I actually started working at Texas Instruments doing material science work, which had nothing to do with anything I had ever studied.

**Fairbairn:** Right. And you had--

**Ruiz:** And so...

**Fairbairn:** This is semiconductor related--

**Ruiz:** Right.

**Fairbairn:** --activity and you didn't have any background in that.

**Ruiz:** Nothing. But it didn't take long for me to realize that Fick's law, which is one of the diffusion laws in materials, is exactly the same law as Maxwell's equations.

<laughter>

**Ruiz:** Pretty soon you realize how everything you learned really was applicable. So that's how I started my career in the semiconductor industry, at Texas Instruments, and I was very lucky because that was the decade of the '70s, where TI was the top technology company in the world at the time. So I was very, very fortunate to be part of that.

**Weber:** And before we talk more about TI, looking back at University of Texas and then Rice, were there many other Mexican students, Latinx students? Who were in your programs? Maybe who was not?

**Ruiz:** No. There were hardly any that I can remember in that field. There were students in social sciences or arts and sciences, education, but very few in-- I mean, they were rare in engineering. I was unique. The same thing at Rice. I think, I could be wrong, but at the time I think I was the only Latino in the graduate program back then. Now, all of those things have changed dramatically now, but at least in that time.

**Weber:** And I presume very few women as well?

**Ruiz:** Yes. Yeah.

**Weber:** And did you feel any-- was there any discrimination, maybe the job offers you were given, or did you have any sense of that or...?

**Ruiz:** There's always that occasional, like, you know, for example, one of the students at UT when I was getting my master's, one of the students was a black student in the same place that I lived. We lived in an apartment, with my wife, and he was a black student, and he and I decided one day to go get a haircut. And we went to get a haircut at a place that was known for doing the haircuts for all the football players, and so had football memorabilia everywhere and all that. And I just remember clearly how they wouldn't let that black person go in the barbershop, and so I was aware of things like that. Nothing overtly, that I felt towards me at the time. I experienced that a lot more when I was CEO of AMD than I did when I was going to school, you know?

**Weber:** So, we should go to the beginning of TI, the calculator was coming out, and Speak and Spell was a few years down the road. Anyway, tell--

**Fairbairn:** Yeah, tell us about how your career evolved at TI and sort of what the major turning points were.

**Ruiz:** TI had a major problem-- I think I started working in July, and by August, just a month later, there was a gigantic problem the company had. The silicon was developing, using materials science lingo, stacking faults. And the stacking faults were affecting the performance of the circuits, and the yield was terrible. And so, they couldn't figure out what was causing that. And they--

**Fairbairn:** This was during the processing of the circuits, it developed?

**Ruiz:** Yes, correct. And so, I got a call from my boss at the time, was a fellow named Francois Padovani, he's a Frenchman. And he said, "Hey, they need somebody to lead the task force to figure out what's wrong." He said, we'd like you to do it. And I remember thinking, geez, you know, I'm not even a material science guy. And so I took on that task, of trying to figure out how to--

**Fairbairn:** So you were a brand new employee--

**Ruiz:** Yeah, brand new.

**Fairbairn:** You had never managed anybody or anything.

**Ruiz:** I know. So, I had to read a lot; I had to become educated a lot as to what stacking faults were, why they happened, why they're created. And it's interesting. I have to say that either they were so brilliant in putting somebody that knew nothing, or it was just pure luck, I don't know which one of the two. Because I did not know enough about materials that I started questioning things that nobody ever questioned, you know? And pretty soon, I was able to run some experiments that the only way I could run them is in production. I couldn't run them in the lab, you couldn't simulate, in the lab, the things that I thought were causing the problem. So, I ended up-- the only people that would let me run it in production were the people at midnight, when they were shifting, from second shift to third shift. And then, they could let me have some of the equipment for a little bit and run the experiments. And I developed a relationship with the floor manager at the time. I explained to him what we were going to do, what we were trying to prove. And so, he took an interest in helping me out. He said, I'll help you. He said, I'll figure out a way to manage enough time so you can have access to the equipment. So, we did that, and, lo and behold, my assumptions were correct. I was actually able to figure out what was causing the problem. We were able to figure out how to fix it. And it took about-- maybe three to six months to do that.

**Fairbairn:** Took a while.

**Ruiz:** Yeah. And it made such an impact on people in the company and all that, that, you know-- that's where I think-- you look at inflection points in your life, you know, that was an inflection point in my career. Because the president of the company at the time said that-- you know, gave me an award ... it was a big deal he made out of it. And he said, why don't you stay in manufacturing? He said, "We need people that are educated." Back in those days, the people in manufacturing were not educated, were not trained. And I remember liking it. I really liked what I had done, and it gave me a sense of accomplishment, you know? Instead of working on fusion. That was taking forever. And so I got pretty excited--

**Fairbairn:** Sort of like being an auto mechanic of the 20th century.

**Ruiz:** That's right. So I got pretty excited about being on the manufacturing team, so I did move over, to help in manufacturing. And in a matter of time, I became known as somebody who really could fix things. And not easy, though, because I remember-- I'll give you one example that was amazingly difficult, even

though the solution was very simple, but I was able to convince people. We were running the same product in Dallas, Texas, that was being built in Japan. Same exact product. Same everything. But the yield in Japan was twice as much as the yield in Dallas. So they gave me the job, again, of saying, figure out what the problem is, you know? How can--

**Fairbairn:** What year was this?

**Ruiz:** Probably, I'm going to say '75, something like that, mid-'70s. So I went to Japan. I spent three months in Japan, observing everything the Japanese did, you know? Trying to figure it out and all that. And again, similar to the other one, I came up with a theory, an idea. I had to prove it. But I felt pretty confident that that was the answer, why the yields were twice as much as ours. So, I came back to Dallas and gave a presentation, and the people that were in the room, one of them was Al Stein, but the other one was Morris Chang, you know? Who later, of course, became famous, running TSMC.

**Fairbairn:** And what was his position at the time, do you remember?

**Ruiz:** He was in charge of the semiconductor business.

**Fairbairn:** Okay, so he was already head of the business. Okay.

**Ruiz:** And the thing that surprised me was that everybody in Texas was convinced that it had something to do with science. That it had to be the mobility of electrons in Japan for some reason was different. There had to be something that was scientific. And when I came back and presented the data that all it had to do with was cleanliness; it had nothing to do with science. But all it was is the Japanese were more careful. They were aware of how difficult it is to keep things pristine and clean, and they were fanatics about it. And it happened to fit their culture very well, so it wasn't like they were doing something difficult. To them, it was natural. They wouldn't allow people to smoke in the fab, you know, whereas we allowed--

**Fairbairn:** Is that right?

**Ruiz:** Yeah, back in those days, people could smoke in the fab. So, when I presented it, I remember the people in the room just thought it was such a bunch of crap. They couldn't believe that that was what was doing it. So I told them, let me prove it to you. I can prove it. There's no place to run a clean process in Texas, because everything is dirty. I said, but what I'll-- so just what we do is split it. Take a material, run it halfway through, and then finish it in Japan, and take a Japanese material, run it halfway through, and finish it here. And let's compare. And pretty soon, it became clear that defect density-- and that was when the whole idea of defect density began to be talked about. Prior to that, nobody even mentioned it. But then, we started looking at defect density. And, sure enough, that ended up being the problem. And then, it led to a complete restructuring of the factories. People had to wear, now, gowns, while prior to that, you came in in your street clothes. Frankly, a high school kid could have figured it out. It wasn't like it was a big thing. But again, I enjoyed doing it, even though I didn't have to solve many difficult equations or anything like that.



**Weber:** And which one worked better, with starting in Japan, finishing in Texas? Or which--

**Ruiz:** Well, back in those days, they had test chips that you could do. And what we did is we were able to prove that the material that got started in Japan, the test chips were far better than the ones that were started in Texas. And then, when we flipped them, we could prove that then ones that were started in Japan got destroyed when they got finished in Texas. And-- whereas the ones that were done in Texas never changed when they went to Japan. They stayed just as good. And again, I learned, back in those days, because there was not a lot of educated-- and by educated, I don't mean that in any derogatory way. I just mean formal training, education, did not exist in manufacturing. It became pretty easy for me to really be able to help and contribute in a manner that people were surprised, you know?

**Fairbairn:** So this was in the mid to late-'70s. It wasn't until the 1980s where there was a big hoopla about Japan yields and DRAMs, that kind of thing. But it sounded like you were onto this--

**Ruiz:** That's right.

**Fairbairn:** In the mid-'70s. So just look at that sort of trend. I mean, how did that affect TI? Because the rest of the industry was sort of in the dark, it seemed like, until the '80s.

**Ruiz:** Well, I thought that made a huge impact on TI being able to-- you know, if you look at the history of the company, the '70s was the best days--

**Weber:** Boom times.

**Ruiz:** Boom times for TI. And I think a lot of that was contribution of understanding how to build things better than others at the time, you know? The reason Al Stein took me out of TI to go to Motorola was exactly because of those things. Motorola was even worse than TI was, in terms of not knowing how to run a semiconductor factory. I mean, it was really terrible, amazing.

**Weber:** Before going on, can you summarize, quickly, what was the fault that you solved the first time around at TI, the stacking?

**Ruiz:** Stacking faults?

**Weber:** Yeah.

**Ruiz:** When you look at a silicon crystal, they're all grown by different methods, but let's just take one method, the Czochralski method, which is you dip the seed in the molten silicon and then you pull it out and you grow this crystal. And normally, it's round, but not perfectly round. So, what people have to do, they have to grind it, to get it to be perfectly round. And then they cut it into slices, and you get these rounds, silicon slices that are used. My hypothesis was, well, what if, when we grind it, we're damaging the crystal? And then, when we heat it up, to process it-- stacking faults are like defects, they move. I mean, they actually move around, like a piece of dirt. And I said, what if that's causing the thing, the

stacking faults move? And so, what we ended up doing were two things, to be able to fix it. First of all, we proved that it was, and then we fixed it by-- you do an etch on the crystal before you cut it into slices. So you grind it, and then you etch it. The etching relieves the stress on the edges of the crystal. That was one piece. The other piece was, instead of keeping the wafers in the furnace, like we used to, then we started ramping the heat so that it would heat slowly. Then we had to calculate how to make that the equivalent of what we were doing before in terms of diffusion, so you don't end up with a different-- so, then-- and that's when equipment companies began to copy from TI. The electronics, to control the ramp and the ramp down and cool down. So that came from that. And the boats that wafer used to sit in-- remember, they used to sit in little boats in the furnace-- were poorly designed, so they actually create stress where the wafer was sitting. So we had to redesign those so that, as the wafer was heated, the stress was minimized. When you did all that, the thing completely disappeared. Like magic.

**Fairbairn:** So, were there other major developments during your career at TI? And what position did you move into before, then-- it sounds like you moved onto Motorola, but sort of finish off the story with TI.

**Ruiz:** During my career, I started in the research labs, the corporate research labs, and when they moved me to manufacturing, I ended up staying there. And that was what they called-- back in those days, they called it device manager. I was mostly in charge of making sure the processes and testing that was done on devices was, you know, as good as you could do. And we had-- for example, we had a famous microprocessor back in those early days called the TMS1000 at TI. And that was one we used because we had the most knowledge on how to learn from it, how to do things so that we could yield better and all this sort of thing. And so I stayed doing that for quite some time. And a lot of troubleshooting in the company. Every time there was an issue, I would help troubleshoot.

Then, TI became really involved in making calculators, you know? And that's another place where we had to figure out, how do you test these things so that they're doing-- even though it was very simple back then, it was, you know, the four basic functions of arithmetic. But we had to figure out a way to test them. So we did a lot of interesting work, in terms of figuring out what is the best way to do that. This is going to sound, nowadays, kind of ridiculous. But what we did is we just divided one by three in the calculator, and you display it. And if you get point three, three, three, three, three on the whole calculator, the probability of that chip being good was like 99.9 percent, something like that. So we did a lot of very interesting things that seem simple but made it easy for people to do the work and test it. And then, I got involved in a couple of task forces, one of them with a calculator. I was in a calculator task force where-- I don't know if you remember, it was called Datamath, the calculator, and it was about this big, and all it did is the four arithmetic functions, and sold for \$150 back in the '70s. I mean, that's-- you think about it--

**Fairbairn:** Real money, then, huh?

**Ruiz:** You kind of go, really? Back then? But it ended up being a phenomenal, successful product that the company made. Got involved, also, in the task force where-- TI was trying to get into the memory business. And TI's product was called a 4064, was a 4K RAM. But it didn't compare to the Mostek 4K RAM, which was a 4027. And I was put on the task force to figure out how to copy it. How do you copy-- how do you reverse-engineer a product, copy it? So, I learned a lot about, you know, how do you reverse-

engineer-- which, back then, was considered a sophisticated product. Six masking steps. Compare that, today-- because today, people, they-- I think they're up to 400 now, masking. So, while doing all that, that's when the opportunity came to go to Motorola.

**Fairbairn:** What about the transition from bipolar to MOS? TI was huge in bipolar with the TTL family and all, had to move into MOS with the calculator. And I don't know if that was a leading product, or whatever, but were you involved in that, in helping develop and refine the MOS processes?

**Ruiz:** I always worked in MOS. I didn't do much in bipolar, other than try to kill it. I thought that was a mistake for the company to continue. I think, when I look back, the beginning of the end of TI being the number one company in the world was their obsession with bipolar. I don't know if you remember that TI had a watch?

**Weber:** Yeah.

**Ruiz:** Okay, and the watch was a bipolar watch. And it was LED--

**Fairbairn:** LED display, you have to push the button to see the--

**Weber:** We have one.

**Ruiz:** You do? And, you know, the battery didn't last very long, it was-- it consumed too much power. And for whatever reason, at the time, it was very difficult to convince management that it was the bipolar circuitry that needed to be switched over to MOS, and it was not done.

**Fairbairn:** Well, they were making so much money in bipolar, right? That that was a hard thing to give up.

**Ruiz:** Yes. So, I played a peripheral role in that, not as directly involved. And, of course, the people-- there was a group of people that were working in MOS early, that left the company to start Mostek which was a pretty big company at the time, driving the MOS technology.

**Fairbairn:** So you were still in manufacturing, or related to manufacturing, tests and so forth, when you moved over to Motorola?

**Ruiz:** Yes.

**Weber:** And why did you move?

**Ruiz:** Well, you know, it's like things-- like Yogi Berra says, you know, you got a fork in the road, you got to take something-- you've got to go one way or the other. I had made it clear to people-- and there's a reason-- I'll interject a little to explain why. It's in the last couple of years of my time at TI when my first wife passed away, you know? And so, I ended up remarrying the person that's now my current wife, you know?

**Weber:** And you had children already, as well.

**Ruiz:** Yes. And so, one of the things she and I thought is, you know what would be great-- she had her set of friends, I had my set of friends. Her husband had passed away, so she was a widow, and I'm a widower. I said, wouldn't it be nice if we could find a job somewhere where we could develop our own friends, you know? We have our own life in a different way. So, I passed the word around TI that I really wanted to be assigned to an offshore assignment if I could. So, I passed the word around. That word got to Al Stein at Motorola. And so, because he knew that, he called me up and he said, we need to build a factory in Scotland. How would you like to go and be the guy that builds it? And I remember discussing it with my wife and thought, you know what? It's a perfect fit. It gives us a chance to start developing our own different life, and all that. And it'd be great. And so, I decided to take that. Now, in the middle of that, of course, Morris Chang, who was the boss at the time, said, no, you can't do that. Said, if you really want an assignment, I'll put you in charge of a factory in France. TI had a factory in Nice, France. And he said, beginning Monday, you can move to France, and, he kind of really rattled me for a while, because, you know, Nice, France was a lot nicer than Scotland--

**Fairbairn:** Yeah, I was about to say, Nice, Scotland--

**Ruiz:** But it made me think about it. That they knew all along that I wanted to do this, and I felt like, it just didn't seem right to not do what we originally thought. So, with some agony, I decided to leave TI, because I really enjoyed it. It gave me an awful lot of learning. I learned a lot. I think it was one of the best things I ever did in my life, my career. So, it was hard, it wasn't easy.

**Fairbairn:** What year was this that you left and went to Motorola?

**Ruiz:** '78, I think.

**Fairbairn:** I'm sorry?

**Ruiz:** '78.

**Fairbairn:** '78? Okay.

**Ruiz:** And so I left, joined Motorola, spent a little time in Motorola, moving around in the US, getting to know people. And then, in early '79, moved to Scotland. And I built an MOS facility there. And enjoyed it tremendously.

**Fairbairn:** Now was there any semiconductor infrastructure in Scotland at the time?

**Ruiz:** A little bit. Not zero, but it was not great, but they were really--

**Fairbairn:** Seems like that's very difficult, all the gasses and all the technology and how you build things. Must have been a challenge.

**Ruiz:** It was a challenge, but what made it easier to respond to the challenge was that the Scottish people are very proud. And when I went over there, I said, look, they're going to measure us like crazy. I said, they're going to compare us to everything I said. So, the only thing we can do to not be shut down is make sure we always do better. And it really motivated the people. And we were building, back then, the 68000 microprocessor. And the factory in Scotland was actually yielding better than any factory in the US. And--

**Fairbairn:** Where in Scotland was it built?

**Ruiz:** Right outside Glasgow, there's a suburb called East Kilbride.

**Weber:** East Kilbride, right?

**Ruiz:** Yes. And they were really proud of it. I mean, they felt good, and, you know, it was quite an exciting time for the whole family. To tell you what a positive impact it had on the family, my daughter was-- it was my wife's daughter, but it's our daughter now. Our daughter was 12 years old when we moved there. It's a difficult time to move. When she got married, her maid of honor was from Scotland. So she made a lot of very close friends, you know? So, if you ask my wife, what's the best time in our joint careers, she'll tell you, Scotland. The Scotland assignment.

**Weber:** And what's her career?

**Ruiz:** My wife?

**Weber:** Yeah.

**Ruiz:** She was-- she went to North Texas to study Home Economics. She never really had a paying job. She reminds me a lot that she worked just as hard as I did, but never got paid. But, you know, she spent all the time raising kids and doing community work.

**Weber:** Between the two of you, how many children did you have?

**Ruiz:** We had three. I had one and she had two, yeah.

**Weber:** And did Scotland give subsidies for.... because I know that Scotland, at various points, more in the '80s, was trying to recruit people to their industrial parks, various firms.

**Ruiz:** They were. But, you know, it's amazing how rapidly things have changed. Where the subsidies that Scotland offered back then-- back in those days, appeared to be substantial, today, they're peanuts. Compared-- subsidies being offered today, around the world, are in the billions, you know? Many billions. I mean, back in the day it was like \$200,000, \$300,000. And we thought it was a lot. But it was a great experience.

**Fairbairn:** So how long did you spend there, and, you know, once you got it up and running, did you continue? Or was that job done and you moved on?

**Ruiz:** My plan was to stay there as long as they needed me. But when we got the factory running and it was yielding well and doing a good job, I was asked to move to Phoenix, Arizona, and fix the factory that was building the 68000, because the one in Arizona could not yield. And so we moved to Phoenix, Arizona, and I ran the factory, which, back then, was called MOS-5. It's a great factory, but it just had-- again, back to the TI experience, you know? The things they were doing, I mean, I'll give you one example. Operators were being hired without knowing how to read or write English. And think about that. How can you work in a state-of-the-art factory? That was the most modern factory Motorola had back in those days, the one in Phoenix. And these people would make mistakes, like they would grab the wrong acid, you know? And it was terrible. But changing those things that are being done for some time is very difficult, more difficult than any technical issue I've ever dealt with, because what I wanted to do is I didn't want to hire anybody that did not speak or write English well. And the HR organization was up in arms, because, they said, there's nothing in the spec for the job that says it's required to be proficient in English. And I said, well, change the damn spec. And it was the biggest obstacle I had in trying to do those things was the HR organization. Nowadays, you think about it and you think, wow, how could you not--

**Fairbairn:** So, if they were not speaking English, were these Spanish-speaking people?

**Ruiz:** Yeah, they were-- people in Arizona, people that just didn't speak-- it's not that they didn't-- I mean, they could order coffee and ham and eggs at the restaurant, but they couldn't just--

**Fairbairn:** They weren't fluent.

**Ruiz:** They weren't fluent. But it took time. We were the first company in the US to actually test people to work in the factory. And we had to convince the Department of Labor that this was necessary and all that. But once we started doing that, you know, everything began to change.

**Fairbairn:** How long did it take you to get yields up to standard in that factory?

**Ruiz:** Well, I started-- I would say that it was probably about two to three years.

**Fairbairn:** That's a long process.

**Ruiz:** Yeah, it is. Well, these things are--

**Fairbairn:** Cultural change.

**Ruiz:** Cultural change is really difficult. And--

**Weber:** Sorry. How long were you in Scotland, though?

**Ruiz:** A little over two years.

**Fairbairn:** So you got that factory up and running pretty quickly.

**Ruiz:** Yeah. Well, it was small. It wasn't like the factories that you see today that are just massive. It was a small factory, probably the capacity was minuscule compared to what people do today.

**Weber:** This is the 68000 in the earliest days. Who was buying them at that point? Sun was later, and Apple was much later.

**Ruiz:** Well, the big customer was Apple.

**Weber:** Already?

**Fairbairn:** Well, the Mac was introduced in '84.

**Ruiz:** Back in those days, it's not a lot of chips. But the 68000 family was quite spread out in the networking space. And the very first, humungous customer was Apple.

**Weber:** So that-- and with the Mac. It was the first one to use that chip.

**Fairbairn:** So you went to Scotland in '79 and came back in '81-ish? Is that--

**Ruiz:** Yes, right.

**Weber:** Okay. So Arizona was right as the Mac started.

**Ruiz:** Correct.

**Fairbairn:** So, you got this-- so were you in charge of this factory in Phoenix for two or three years? For longer? How long-- tell me about your career arc at that point.

**Ruiz:** I should be able to remember those dates exactly, but I can't. I was probably in that factory, maybe for 18 months? 18 months? And then, there was a reshuffling in the company. It happens, you know, once in a while. Triggered by Al Stein departing the company, at the time.

**Fairbairn:** Yeah, so he left in '82, March of--

**Ruiz:** Yeah, something like that.

**Fairbairn:** Oh, well, actually, it was before that, because he went to Arrow. So it would have been in--

**Ruiz:** So, he left the company, and people got moved. And as that happened, I ended up being promoted to run all the factories for Motorola. So, then, I had to move to Austin, because that was where the center of gravity was for all the factories. So, I moved to Austin, Texas, in '81, more or less. Give or take a little bit. And then, I was now responsible for all manufacturing in the semiconductor space. I wasn't pursuing that, because, actually, my wife and I really loved the Arizona desert. So, it was really difficult for us to leave Arizona. But, again, the possibility of actually being able to contribute even at a more intense level was, to me-- the attraction was I could make a bigger impact. One factory, now we could do many factories. And it was probably one of the most challenging assignments that I had at the time.

**Fairbairn:** So, at this point, you had a much larger organization.

**Ruiz:** Yeah, and with it came the research labs, too, so I had manufacturing and research. So it was a pretty good size.

**Weber:** How many people, roughly, were you overseeing?

**Ruiz:** Probably 10,000 people, something like that. Roughly.

**Fairbairn:** So you must have been there for quite some time, at Motorola?

**Ruiz:** I was there for 22 years.

**Fairbairn:** How did things evolve? Can you sort of quickly summarize? We'd like to move onto the AMD story, but I don't want to miss anything in terms of Motorola.

**Ruiz:** No, you know, I left to do the factory in Scotland. I went to Phoenix to fix the factory in Phoenix that was building the 68000, then I was in charge of all manufacturing and R&D. We put in place-- back in those days, there was a consulting firm, I think the name was Thompson I'm not sure if I got the name right, but it became known in the semiconductor industry. We hired them, at that time, on an interesting deal that looking back, it was a brilliant thing to do. Our yields were okay but not great. Our cycle times were okay but not great. Our inventory management was okay but not great. So we said, why don't we get some help from these people and see if we can get them to do it for a portion of the cost we're going to save? For example, if we cut cycle time in half, that means we have less inventory, and there's a cost associated with that. So, let's see if we can track all these costs and then pay them a percent of that, the savings. And my finance guy at the time loved it, because we didn't have to pay anything unless we actually, you know--

**Fairbairn:** Pay for results.

**Ruiz:** It's a ten to one, you know?

**Fairbairn:** Right.



**Ruiz:** So if we save ten bucks, they get one, we keep nine, and he thought it was a great deal. I thought so too, by the way. And so they brought in a lot of people, very smart people, they helped us figure out where all the spots were that we had to fix and change. And over a period of about two or three years, we changed dramatically cycle times, inventory management, all that stuff. And the savings were so big that, all of a sudden, my CFO said, damn, we're paying too much. And we stopped it, mostly because the finance organization was opposed to paying that much. But it worked, it actually worked. I think, at that time, Motorola probably was peaking as a company as a major player in the semiconductor space, begun to peak. And I think there were a lot of great things being done, and a lot of great people.

Then, I get a call out of the air, just out of the sky and, you know, out of nowhere, from the CEO of the company at the time. It was a fellow named George Fisher. And he said, I'd like you to go to Florida and run one of our communication businesses. I know nothing about communication. Never been close to a communication device, and all that. I said, really? He said, yeah. He said, and the sooner the better, you know? And so, again, my wife and I got together, packed-- because we had only been in our house for like 18 months.

**Fairbairn:** What year was this?

**Ruiz:** This was in '90. So I moved to Florida-- we moved to Florida. And I ran what was back then known as a paging division. I don't know if you--

**Fairbairn:** Back when we had pagers.

**Ruiz:** Know what pagers are--

**Weber:** We have them in the exhibit.

**Ruiz:** But back in those days, it was a hot product. And, again, sometimes people ask me, well, why were you able to see the things you needed to do? And I think, probably the best answer I can ever give is that I was so curious, all the time. I was filled with curiosity. I know they say curiosity kills the cat, but it also helps you see things. And what I mean by that is, when I took over the paging division, they didn't want to sell products in China. And I said, I don't understand why. They said, well, you know, the Chinese don't speak English. It's Chinese characters. How can a pager work? And I remember thinking, in a brainstorming session with engineers, I said, do you know there's a huge market in China that would love to have pagers, but here's the obstacle. What do you guys think? And I'll never forget, this one engineer raised his hand and he said, well, just display Chinese characters. And I said, well, aren't they kind of complicated? He said, no, the electronics doesn't know that you're displaying a character-- they don't care. I said, really? He said, yeah. And so we mocked up a few pagers to see if it was possible, and sure enough, it was. So, we ended up making-- it was called an Advisor, that was the name of the pager. And it had a big screen so that the characters could be displayed better, because the Chinese characters are complicated. And we had to also create the machine that creates the code that goes into-- over the air, so the pager could receive the code and turn it into a Chinese character.

Long story short, that product became so hot that, one day, I got a call from a person in Miami who ended up being a bad person, but he offered me \$10 million in a Swiss account if I would let him have the pagers that we were making for China go through him. And he said, nobody will ever trace it. Of course, I immediately turned that over to our security people to figure it out. But it gives you an idea how hot the product became. I went to China, to see what was going on, and the line of people waiting to get a pager went for blocks. Just standing in line, waiting to get a pager. This is where I began to learn, at that time-- that was the first time I learned the importance of understanding the market. Because we were lucky, because what we didn't understand is that the Chinese didn't have any way of communicating, back then. And so, if somebody's delivering bread to a particular place but the person that's buying it doesn't need it but another person needs it down the road, you could page that person. And that person on the bike, with, you know, 1000 loaves of bread, would immediately know to go in a different direction-- and that was so productive to those people, that they would line up. And so, I was there for five years. Loved it. I mean, that was the best-- in terms of my best job I've ever had, that was by far the best job I've ever had, because it was hidden in Florida, nobody cared about it, the CEO of the company didn't pay attention to it, we could do anything we wanted to, and made a lot of money.

**Fairbairn:** So, why did George Fisher want you to go down there? Were there problems you had to go solve?

**Ruiz:** No, what he told me at the time, and I think he was right, I think. He said, we're going to put you on a track to be a candidate for the CEO of the company. And to do that, you need to become familiar with the communications business. And this is the easiest way to do it. Paging was not as complex as radio. And he was right. I learned an awful lot. And it was a great experience. I was supposed to be there for two years, and this was the first time that I overshot my assignment. I ended up being there for five.

**Fairbairn:** So you went there in '90?

**Ruiz:** '90.

**Fairbairn:** And then, '95.

**Ruiz:** '95.

**Fairbairn:** Were there any other major developments? I mean, obviously, things went very well, but entering the Chinese market was a major step.

**Ruiz:** Huge.

**Fairbairn:** Were there any other--

**Ruiz:** Well I feel bad, in a way, because I think this indicated to me that Motorola was beginning to lose its edge in the market. Because, back in those days, Motorola was the number one company in cell phones, the number one company in two-way radios, like for police force, security, et cetera. And definitely, we

had 90 percent of the market on the paging business. I mean, that was huge. But then, we came up with an idea in paging with the engineers. They said, you know, why don't we combine paging and cell phones? So you could text? You know? And we went and presented that to corporate. And they just couldn't-- there's no way they could even accept that we would interfere with the cell phone business, because they were doing so well. But if you think about it, quite a few people text more than you talk. But somehow, we had people that actually could see that, but we could not convince them. And, to me, that was a bad sign. That was a big, red flag that came up, that said, hm.

**Fairbairn:** We have a major exhibit downstairs about the--

**Ruiz:** Text thing.

**Fairbairn:** Rise of text and the fact that nobody saw it coming.

**Weber:** Well, but that was-- yeah, the GSM people, they had an internal battle to get texting put into GSM. Were you aware, though-- you must have been aware of texting happening in the GSM world. It was just starting.

**Ruiz:** Well, I got exposed to texting, the first time-- and most people missed out. I don't know if it's in your museum or not, but the Japanese were texting long before anyone else was. And when we saw that, we, in paging, thought, why don't we tell-- we had the technology for texting already developed pretty well, and we said, why don't we tell the cell phone people that they can incorporate that in their systems very easily? And then you could text on the cell phone. But it was-- I mean, it was dead on arrival, as they say. It could never--

**Fairbairn:** In paging, did you see the-- I mean, you must have seen the cell phone as a threat to that business.

**Ruiz:** Well, we knew-- in our view, it was since they didn't want to do it, we said, well, let's do it ourselves. And we came up with a two-way pager. I don't know if you remember that, there was a two-way pager where you actually could send a page to somebody and the person could respond. And it looked like a little shell, a clamshell that opened up like that, and it had a keyboard. And we sold a lot of those. And to me, a sign that it was beginning to take as a device people wanted was when you got on an airplane, the flight attendant would say, "please turn off your two-way pagers." To me, that was a sign--

**Fairbairn:** That was a great sign.

**Ruiz:** That was a sign that things had really worked. And to me, it was an excellent technology, excellent device. But it definitely was better to have been part of the phone because people don't want to carry two devices.

**Weber:** But when did Japan start texting? Maybe it is earlier than I knew.

**Ruiz:** We saw texting on phones in Japan-- it had to be in the early-'90s.

**Weber:** Okay, but already digital phones, not analog.

**Ruiz:** Yes.

**Weber:** And-- but not dedicated, two-way pagers in Japan.

**Ruiz:** The two-way pagers were launched in the marketplace probably in '94, '95.

**Weber:** Okay. And when you were doing the Chinese characters, were you just rolling your own? Or were there existing ways of representing the characters that you could adopt? Or were you just coming up--

**Ruiz:** There were-- well, we normally call it typewriter in China, that people would use to create Chinese characters. So we just took that technology and adapted it to digital. So you could create the characters. And, as I'm sure you know, the device doesn't-- it's just getting ones and zeros and interprets them and makes it the Chinese character.

**Weber:** But you were coming up with your own scheme for that.

**Ruiz:** Right.

**Weber:** So the typewriters are based on strokes, or no-- but, okay, Unicode didn't unify a lot of this for quite a while afterward. So you were coming up with your own method for representing--

**Ruiz:** Correct. And, you know, back in those days, in paging and in cellular phones, when Motorola was leading the way, we created a whole system. It wasn't just the handheld device. We created the infrastructure for doing the work, sending the signal over the air. And when you owned a whole system from one end to the other, then you have a lot more freedom, how to, for example, create the Chinese character pager.

**Fairbairn:** So, you were there for five years. What was the next step?

**Ruiz:** Again, another reshuffling occurred. George Fisher left the company. He went to become the CEO of Kodak. And in the reshuffling that happened, the semiconductor business opened up the general manager for semiconductors, and I was asked to go run the-- go back home. As people told me back then said, Hector, it's time for you to go back home to run the semiconductor side and run the semiconductor business. And that was in, what, '96 more or less, roughly '96. And so the person running it before me was a fellow named Tommy George. And so I ended up taking his place.

**Fairbairn:** So you went back to Austin?

**Ruiz:** I went to Austin. Since, you know, the company moved me around so many times, and my wife was getting really tired of it, I said, only if the headquarters of the semiconductor business can be in Austin, I'll make the change. I can't move to Phoenix again, said it's just too much on the family. And we did that. And shortly after taking over is when it became obvious to me that we had to sell the discreet business, which ended up creating ON Semiconductor today. Because we were getting distracted. We were trying to move down the path of-- which was very challenging, of microprocessor technology. And we had this discreet business that was healthy, making MONEY but it was a distraction. And so we ended up selling it. Divested of it, and created ON Semiconductor. And from everything I can tell, they have been very successful.

**Fairbairn:** So, you went back in '96 or so, and what was-- how did that evolve?

**Ruiz:** You know, it seemed like every time I went somewhere, I began to see a pattern that, good or bad, that's just the way I ended up growing up. That I was never happy being a transactional manager. It just never felt right. I think if they had offered me a position where it was obvious that that's what I had to be, I would have had to say, there's probably somebody better that can do that. So I was always looking for-- what could we do that could transform the company better? So, in the lingo of consultants, I'm more prone to be attracted by transformational leadership than I am by transactional. So, as soon as I got there, I saw a lot of things that could be very strong for the company, if we could do them. One of them was divesting of discreets. That was a very difficult thing to sell because every executive in the company, almost, went through being a discreet manager at one point or another. So there was a love affair with--

**Fairbairn:** Everybody had some ownership of that, huh?

**Ruiz:** Yeah, it was difficult. But I was finally able to do it, and so we were able to divest it. And then, I thought we were not serving our customers well, so I felt another thing we had to do is be more focused on customers and markets than on products. For example, I felt that we needed to understand the automotive industry better, rather than have a product we created and then try to convince the automotive industry they should use it, because there was a mismatch. And it became pretty clear to me that that wasn't working. That we had to figure out some way that we could do that.

And so, I needed a restructuring that probably was very challenging on people. Instead of being organized by microprocessors, memories, et cetera, we got organized by automotive, computing, et cetera, even though we had a platform that could go across. So, I made engineering and design be a horizontal structure, and the market, customer-driven be a vertical structure. And that was tough. And if I had to do it over again, I would do it differently, but still the same thing. And the different part was like the old saying, you can't teach an old dog new tricks? I tried to make that work with the people that were there. And there was a lot of-- not necessarily evil or mean, but sort of a subjective undermining of making it work. So, making it very, very difficult. But, despite that, I was able to bring the company to the sales level they had before we got rid of discretes. So, we made up for the loss and we actually achieved more profitability, as that got implemented, than we had before. But it was hard. It was really, really hard.

**Weber:** What kind of pushback did you get?

**Ruiz:** For example, there were three or four very key players in the semiconductor business that, as soon as I explained that I wanted to do that, they quit. I felt somewhat that I wish I had had the support of the corporation to not let them quit, you know, make them work. But they didn't. And part of it was that, by that time, you know, George Fisher had left. And I think he would have probably been a lot more supportive of helping make it work. So, I felt that that was a missed opportunity, because I think there are things we could have done differently.

And then, when it became clear to me that the company really wanted to focus on communications and really make communications the banner of the company-- which, I agree. I think that was the smart thing to do. Then it became clear that maybe the semiconductor business should be spun off. And I started a process to do it. It didn't get finished under my watch, but shortly after I left, Motorola spun off the semiconductor business into a separate company.

**Fairbairn:** Freescale.

**Ruiz:** Freescale, yes. And then, Freescale got acquired by the European company, what was the name? It escapes me.

**Fairbairn:** I lost track. I knew about Freescale--

**Ruiz:** Yeah, Freescale got acquired by a European company.

**Fairbairn:** Is it ST?

**Ruiz:** No, no, it was a German-- Dutch company. Philips.

**Fairbairn:** Oh, Philips.

**Ruiz:** Philips. Sorry. It got acquired by Philips. And they've done fine.

**Fairbairn:** Yeah, Philips acquired VLSI Technology, too.

**Ruiz:** Yeah. But in my view, if the company had the stomach to focus on the things that were doing well in semiconductors, it could have been a good company, and done a good job. I think the architecture they had was good. Could be developed further into a much futuristic architecture, but it required significant investment. I think when we sold the discreet business, we sold it for approximately \$1.7 billion, something like this, or \$1.5. And the idea was that I was going to use that to refurbish our semiconductor position and make it strong. And, at the last minute, that got changed, and the corporate took all the money. And so, I ended up not having the cash that I thought I was going to have. And so, it made it difficult.

**Weber:** So the restructuring was done without that cash you were expecting.

**Ruiz:** Right.

**Weber:** And did the fact that you were based in Austin-- did being in a separate place make a difference also? Did that make it more difficult?

**Ruiz:** You mean a different--

**Weber:** Because only the semiconductor division was based there, right?

**Ruiz:** Correct. Only the semiconductor, yes.

**Weber:** So, I mean, you're doing this huge restructuring away from a lot of the other--

**Fairbairn:** No, but within the semiconductor business. I mean, it's not--

**Ruiz:** Everybody else in the company is somewhere else, you know? Austin was only semiconductor. In the process of doing all these things, we were trying to also do something pretty creative. This leads into your question a little bit, that MCUs, the microcontroller products that we had, were very successful. Very, very successful. But if we could figure out a way to put flash on them, it would really change the game completely. But flash technology is not quite compatible with the technology you use to build the microcontroller.

So, we approached AMD and said, you guys have flash, do you think we could do a joint effort where, you know, we can develop the technology in such a way that you benefit, we benefit? And we did. We signed a deal to join to develop flash so that we could put it on microcontrollers. And it was a combination of cash and technology agreements that led to that. And then, I got to know Jerry [Sanders]. And in that discussion, while all the rest of the stuff is going on, all the restructuring and everything is going on at the same time-- one day, he just brought up the idea of saying, hey, the board wants me to get a replacement lined up. He said, why don't you get a real job? Typical of Jerry, you know? Why don't you get a real job and come and join us? And I thought about it. And, in the midst of all that, all the stuff that was going on up at-- with where semiconductors stood in the company at the time and everything, made that decision a little bit easier, you know?

**Fairbairn:** So, from that point to when you actually joined AMD, what was that period of time?

**Ruiz:** I think I was around the semiconductor business for probably three-plus years, something like that. And that's when Jerry approached me.

**Fairbairn:** And remind me, what timeframe-- when did you join AMD?

**Ruiz:** In January of 2000.

**Fairbairn:** January of 2000. So, you were running the semiconductor business from mid-'90s to 2000.

**Ruiz:** Yeah, probably '97 to 2000, something like that.

**Fairbairn:** Okay. So, before we move to the discussion on AMD, can you just recount for us how and when the decision was made to start moving in the direction, anyway, of spinning out the semiconductors? What was the force and function-- was there a particular event or conversation or meeting, strategic meeting, where you said, we need to spin this out? And what was the driving force? What was the key thing that said, we need to make this happen?

**Ruiz:** At some point in time, it had to be around the '96, '97 timeframe, we made an analysis of the future of the semiconductor industry, and the place where we thought Motorola would have a significant strategic advantage over any competitor, where we could play a big role in all that. And when you do the math, the resource required to do that was pretty significant. And I felt the corporation would find it very difficult to support two things that were not yet in a position to accomplish the things they needed to accomplish. One was the semiconductor piece, and the future of communications.

Everybody in Motorola was becoming a little uncomfortable with the two-way radios and cell phones as we knew them were not going to be the future. Something had to change. People started talking about the convergence of computer and communications, you know, blah blah blah. And so there was definitely an effort going there. And also, if you remember, that was a time when Motorola made a huge investment in Iridium, trying to put all the satellites and all that. Again, that was an effort to see if they could create a future that was different. Then, you had the semiconductor piece, which, when you look at the resources needed to achieve what we thought was possible, it was huge. I mean, it was gigantic. And then, the question became-- and I wanted people to acknowledge that if we couldn't do that, then I didn't see the point of being a broad player in the semiconductor industry. You had to either go find a niche that you'd be good at, and as Jerry Sanders used to say, niches are for roaches. Nobody wanted to do that. And so, it became-- even though maybe people didn't say it aloud, it became clear that a divestiture of the business had to be considered. And so we began to do all the work, began to get consultants involved and investment banks and what not.

**Fairbairn:** And was this well-known within the semiconductor sector? I mean, did it make people nervous?

**Ruiz:** No. It was-- there was a number of people in corporate and the semiconductor sector that knew we were having those discussions, but there was not a broad discussion, outside-- I mean, we didn't think that would be valuable, you know, at the time.

**Fairbairn:** Alternatively, may not-- the word would leak out and people would start talking, right?

**Ruiz:** But it was a good exercise to go through. We felt like it was important to at least know, this is what we think would happen if we stayed, this is what we think is going to happen if we don't. And, from my point of view, I think it became pretty clear that Motorola couldn't support two major thrusts, at the size the company was. You know, you can do it if you're Samsung. You're so big, you can go into the automotive business, if you want to, you're so giant. But the size of the company, and then resources required. And



with the management team in place that had grown with the company from the beginning, it became clear that a divestiture of the semiconductor business had to be considered. And then, the decision was made after I left.

**Fairbairn:** All right. So, let's talk about the courting process. Had you met Jerry Sanders before this discussion about cooperation on non-volatile memory? Or--

**Ruiz:** No, I hadn't met him. We approached him-- we actually approached them, because we really needed the flash on MCUs. And we were struggling, trying to figure out how to do it. And we thought that might be a good way to-- they had good products, good flash technology. And so we started working with him, you know? Sign a deal and put teams together to work at both sides. And I think it was going well. I think we began to see some very encouraging signs. And it was some time in the late fall of '99 when Jerry challenged me, basically. I mean, he literally said, you know, you don't really have a job. He said, you work for somebody else and they tell you what to do. You know Jerry. Why don't you come here...

**Fairbairn:** The typical Jerry subtle side, right?

**Ruiz:** And I thought about it, it was a genuine desire on his part to bring me onboard.

**Fairbairn:** So, let me ask, he said the board had said I need to find someone to take my place, or whatever.

**Ruiz:** Yeah.

**Fairbairn:** Did Jerry want to do that? Or was this--

**Ruiz:** My thinking was that the board felt that Jerry was getting close to retirement, to a place in his life where maybe he wanted to do something else, and that they were uncomfortable that there was not an obvious person to step in if that happened. They would have to recruit somebody. And rather than do that, they said, why don't we recruit them now? And Jerry had a very talented HR person, a fellow named Stan Wimvick who really, truly understood the value of having someone, not necessarily come in as a CEO, but come in and work with Jerry for a year or two, and be able to step in at the right time.

So, between Stan and Jerry, they worked hard on me for a while. And I told them I would make a decision over the Christmas holidays, so that was '99. And again, this is another place where we've only been in the house 18 months, this particular house. And so, we talked about it, and this is the one time that my wife said, you need to do what you think you want to do for your career. The kids are grown, we don't have anybody home. But, she said, I don't want to move. So that was the first time that we actually-- and I was able, then, to explain it to AMD, that it would be helpful for me to stay in Austin. AMD had a huge presence in Austin anyway. As a matter of fact, their presence in Austin was quite a bit bigger than the presence in California, already. But, you know, before I came onboard. So, if I-- and then, I'll be happy to go back and forth. And we agreed to that. And so, in January, I decided to do that.

**Fairbairn:** So, your style and Jerry's style, pretty different personalities and--

**Ruiz:** I'd say.

**Fairbairn:** Did you think that would-- did that provide some misgivings, either in working for him or running the company that had been molded in his image?

**Ruiz:** Yeah, and not so much that I had any trepidation about Jerry himself. My trepidation was about the fact that history is filled with anecdotes of people taking over for a founder, and having very challenging times doing the things that he or she would like to do. And that's apparently just normal, human. The trajectory, is the founder-- especially somebody that had been as long with a company as Jerry, who was with the company for 30-plus years.

**Fairbairn:** And such a strong personality and everything. I mean, he--

**Ruiz:** To his credit, the fact that he even wanted to bring somebody in was a sign that he was willing to share. But there was trepidation. And when Motorola was trying to talk me out of leaving, they made me aware of a lot of other things that happen when somebody takes over for a founder. And so, I went into it, knowing that there was a lot of things that might not work. But I was willing to give it a shot.

**Fairbairn:** And how was the role divided up? What piece of the company-- so what responsibility did you have? He stayed as CEO, right? You were president?

**Ruiz:** Correct.

**Fairbairn:** So did he have some of the functions reporting to him, and was that an issue or not?

**Ruiz:** We had, I think, a situation that was tailored to both of us. He felt that I was probably strong in the operational side, having run a very large semiconductor operation. When I left Motorola semiconductors, it was about an \$8 billion company, had about 30,000 employees. So that-- things that had to deal with that, I think he felt pretty comfortable that I would do. The things that were probably more difficult for him to let go were sales and marketing, as an example. I think that was probably the place where he felt the most comfortable.

But I think we had an unspoken relationship where pretty much anything he or I wanted to do, we could do, and communicate it. No matter what I did, I always communicated, and he did the same thing. So, the boundaries were not tightly aligned, tightly delineated, and defined. And there was an understanding that, if you had to speak to Wall Street, for example, it's a lot easier for Jerry to speak to Wall Street than it would be for me, because they know him, they expect him. So, we had that relationship which I felt was working well.

**Fairbairn:** So what was the biggest surprise, positive or negative, or surprises, coming in? You expected to find X and you found Y. Were there any big, negative surprises? Boy, you thought you were X, and--

**Ruiz:** No, first of all, I really knew very little about AMD other than the relationship we had on the joint effort on flash. And the first thing that became apparent to me is, from a technical point of view, engineering-wise, they seemed to have a very talented engineering team. And very creative, very innovative, highly respected in the industry. When you mentioned names of people that were at AMD, people outside had a lot of regard for them, and all that. So, to me, it's not that was a surprise, that was something I didn't know. And I was glad. I saw we had a foundation from a technical point of view that was pretty strong. The one thing that I knew before I came to AMD, because of my experience of Motorola, but I confirmed after I joined AMD that I was right, is that there was a lack of appreciation of the challenge of having to build your own factories. And as you may remember, Jerry had that famous saying, that only real men own fads? And I knew how difficult that was, and how it was getting more difficult by the year. More and more difficult. So that immediately became, in my mind, something that I had to figure out. I had to figure out, what were we going to do? How were we going to deal with the challenge of-- that it's not understood well inside, and how do you do that? So that was one piece.

And probably the one that took me a year or so to come to a conclusion is... Again, go back to the idea that I really enjoy being in a position of transformational leadership. The company was doing a lot of things, and they could do less better than too many not-so-well. So, we were doing a memory business, we were in communications business, networking business, computing business. It felt immediately to me that, for the size of the company and the competition we had to deal with, that that was going to be a challenge. And again, so I had to step back and think, okay. So, we got this factory issue, and this broad product array. What should we do?

And I slowly came to the conclusion that we had to get rid of all the products except computing. And then I had an answer for the factory people, but nobody liked my answer. And so, I had to figure out, okay, how are we going to get all that going? And we developed a plan. I was very fortunate that I was able to bring in two or three people that were very critical, to get the things done that we needed to get done. I divided it into a number of pieces. But it was clear that we had to, as quickly as possible, divest ourselves of the non-computing stuff. So, we sold the flash business, basically IPO'd it... created a joint venture with Fujitsu, and then IPO'd that joint venture into the marketplace. We sold the communications business, sold the networking business. And then, we ended up just keeping the microprocessor business.

**Fairbairn:** So, the flash business that you collaborated on from the Motorola side, you divested on the--

**Ruiz:** Right, yeah.

**Fairbairn:** Did Motorola eventually adopt the flash technology?

**Ruiz:** We were never able to make it successfully integrated with the MCU. The process differences were so big that we didn't succeed. That turned out to be a failure, ultimately.

**Fairbairn:** A diversion. Okay, so you were divesting these-- yeah, how big-- well, first off, you left a \$8 billion semiconductor business at Motorola. How big was AMD, at the time when you came in?

**Ruiz:** I think it was around \$4 billion, probably half the size.

**Fairbairn:** Half the size of what you were--

**Ruiz:** And this came out in the public, so I think this is known for those people that were familiar with AMD, but-- which is counterintuitive, if you want to get rid of a business. But the business that was losing the most money was the microprocessor business, and the business that was making any money was the memory business. And that's the one I wanted to get rid of. Because I didn't see, looking into the future, that we would be able to be in the commodity business and play with the Samsungs of the world and all that. But we had to fix the computing side. And these events, working with my team, we were able to develop a restructuring plan that got cost out. We had to take some cost out. You normally do, when you find that your cost structure is out of whack. And so we did that. We started selling those pieces, and we were fortunate to be able to do it correctly. I mean, we did a pretty good job of that. Then we left the computing business, but we were lacking--

**Fairbairn:** Computing was X86?

**Ruiz:** Yes. And we were lacking-- to me, computational is not just an instruction set. It's really beyond that. It's just this whole idea of the computational space. How do you want to play in it. And one of the conclusions we came to is that we needed a graphics computing machine. And I talk about it in the book, eventually you'll get to it, if you read it. NVIDIA and I, Jen-Hsun [Huang] and I, we've been good friends for a long time, and we thought, wouldn't it be great if the two companies would combine? And we got NVIDIA, GPUs, and AMD. X86. For a number of reasons, which I don't think will be appropriate for the world to know, we couldn't pull it off. But both Jen-Hsun and I wanted to do it. But we couldn't.

**Fairbairn:** And what timeframe-- what years was that discussion started and broken off?

**Ruiz:** I want to say, somewhere in 2002, 2003, somewhere in that timeframe. But we needed to do that, even though we couldn't pull that off. So we ended up acquiring ATI. Which wasn't as ideal as I thought NVIDIA was... but it was not bad. It was actually a good thing. And I'm glad we did, because if you look at AMD today, it would-- over half of its sales are actually from the graphics side. And they got a good technology, good people, good products. And it has been an excellent complement to the X86 side of it. So we did that.

The most difficult part was figuring out what to do about the factories. Just in the time that I joined AMD to the time I was trying to figure this out, the cost of a factory went up by \$2 billion. Just like that! And I knew, by just looking at the future, I could see this thing just exponentially growing. Today, as you know, we're sitting here in 2023, the factory is \$20 billion now. And that's just not something that anybody can do. Intel may be able to do it, Samsung can do it, but not an AMD-sized company.

So, we put together a team of people to figure out, okay, what could we do? And we traveled around the world, trying to figure out the best solution. And what we came up with was the creation of Global Foundries, which was basically a sale of our factories to the United Arab Emirates, with the idea that they

would then manage it as a foundry. So they would be in a different business, not in the computing business, it would be in the foundry business. They would get the technology from IBM, and be a competitor to TSMC. That was the idea.

**Fairbairn:** When you say get technology from IBM-- because AMD didn't have advanced technology required to compete in that business?

**Ruiz:** AMD never did its own development. It always got the technology for microprocessors from IBM. And it was good technology. Pretty solid, and helped AMD get to where it was at that time. But then, the driver of the effort on the other side, I was driving this from the AMD side, but the other side was the Crown Prince of the United Arab Emirates in Abu Dhabi really liked the idea of being in the high-tech business. And his dream was to build a factory in Abu Dhabi. And I, frankly, thought he could. When you really think about the way a woman dresses in that part of the world, it looks like a clean room garment. It's kind of like why the Japanese were able to be so careful in making things, because the culture was that way. So, I thought it would be simple, to really create a workspace that would adapt to being able to do this. And so that was his dream and his desire. And to do that, he was willing to buy the factories, and then grow it and create that. Needless to say, a complex issue like that took time.

I remember, for a period of two years, I don't think I was doing anything but trying to figure out a way to make that work. Because-- I'll give you one example that made it difficult-- I don't know if you remember, there was a time when Dubai wanted to buy American ports, to manage them. And that was shot down by Chuck Schumer, who was the New York Senator, and still is. And I was afraid that he would shut it down. Because we were selling to, quote, the Arabs, and all that. So, I spent a lot of time with him, trying to convince him that this was not like the port thing. This was really a good thing, and it was going to be an independent-- and it took me a long time to just get him onboard before we could even proceed on that. But, slowly, we were able to get all those things lined up, and divested ourselves of the factories.

And it's very easy math to do. If you say, what would happen if AMD had not done that? You can do the math today, and it wouldn't work. Because there's no way that you could have what we have today, you know, if we hadn't done that. So that was a major thing. But to do it, we had to get around an agreement that Jerry had done with Intel, that AMD would never use a foundry to make microprocessors. And frankly, how do you get around? I remember talking to the management at Intel at the time, saying, what would it take for you to get out of this thing? And they said, no way, you're stuck. You can't do it.

**Fairbairn:** They'd be happy if you just went away.

**Ruiz:** Yeah. So, I had to think of a clever way to do it. And so, along with our team, we decided to sue Intel. We sued them for anti-trust violations. And we lined everything up, in my view, so perfectly that there was no way they could get out of it. They had to find a way to solve it. And that's what led to us being able to get rid of that constraint. So--

**Fairbairn:** So, before you go into that, what fabs did AMD have at the time that were going to be spun out?

**Ruiz:** Well, when we spun out the memory business, we had a fab in Austin that went with it. So that was one that went with it. We had a fab in Germany, and that was it. Just one fab. So, when it spun out, it went the German fab plus the fab that was about to be built in New York became part of that deal too.

**Fairbairn:** I see, okay, all right.

**Weber:** And what was the structure? So the company that would run those, which was with the UAE, what-- that was completely independent? It was partly subsidiary? How was it structured?

**Ruiz:** No, it was created as being an independent company. And to be able to do the things we needed to do at AMD, we could not think of them as a subsidiary. And so it had to be an independent company. Now, AMD retained a portion ownership because of the financial deal, but not the only-- they're not-- the owner was Abu Dhabi. The sovereign wealth fund of the company.

**Fairbairn:** So, in the book, you go into rather extensive description of this whole process of getting up to the point of suing Intel. This was not a simple business thing, and you had to convince a lot of people and the board and so forth.

**Ruiz:** It was hard.

**Fairbairn:** And so, the driving force was this issue around manufacturing microprocessors at a foundry? Was that sort of the core thing that tipped it over the edge? There were a lot of other issues having to do with Intel, right?

**Ruiz:** Yeah. I think there were two things that we felt, for AMD to thrive in the computing space, had to be dealt with. One is get rid of the factories. But, to do that, you had to be able to use a foundry. You can't, unless you eliminate the contract that existed. It so happens that, at the same time, Intel was doing things that we felt were illegal, that were violating anti-trust law. And we did a lot of work figuring out, where are those things, and will the customers help us, if we decide to sue them, to prove that Intel was in the wrong? And so, it was a lot of work. And so, when we finally sued them, was to hopefully have an effect on their marketing practices that we felt were illegal. But also, the most important thing was to eliminate that constraint on foundry. And that ended up being that way. Now, it got settled. The suit with them got settled, shortly after I left AMD. But all the things that we were trying to get, they were able to get. So, it rid of that constraint, Intel agreed not to do the bad things they were doing anymore-- whether that really worked or not, I don't know. But, I think it positioned AMD to do the things that they wanted to do, as well as being able to resolve it in an amicable fashion.

**Fairbairn:** And so, you came in in 2000. There was a big downturn in 2001, right? The internet fiasco?

**Ruiz:** Mm-hm. The dot com bubble.

**Fairbairn:** The dot com bubble. And what were the years in which-- when did you initiate the suit? When did you drop the bomb, so to speak?

**Ruiz:** You know, it was probably-- the actual details, the actual date is in my book, but I think it was around 2005.

**Fairbairn:** And was that a surprise? Did everybody know it was coming? I mean, you'd been doing all this work beforehand.

**Ruiz:** I think it had to have been a surprise to everybody, including Intel. We can tell by their reaction to when we filed the suit, is to me, clear, a deer in the headlights. They never thought this would happen; they never thought we would do it. And I think that was helpful to us at the time, because we were able to get a lot of traction on the suit around the world. You know, Japan ruled against them, Korea ruled against them, Europeans ruled against them. The only place we couldn't get to rule against them were the United States, because we always have this crazy idea that there is no such thing as anti-trust, and that people should compete and do whatever they need to do. And then-- but, you know, like Bill Gates told me one time, he said, well, heck, it's just playing hardball. And I said, no, there's a difference. I said, hardball is perfectly okay, spitball is not.

**Fairbairn:** And tell me-- tell-- just for the record here, tell us about this process of convincing your board and so forth to undertake this. Because this was not an easy decision for AMD to pursue-- path for AMD--

**Ruiz:** Well, it was very costly, to begin with, and the board is always concerned with the fact that our earnings opportunity would diminish, because it was going to be costly. And it was. So that was a difficult part. As most boards of public companies, you know, there was a big concern about getting into a sinking hole. The more you dig, the deeper you go. And so there was a lot of skepticism about-- they didn't-- nobody doubted that we were in the right, trying to do it. They just were worried about whether we could actually do it and survive. And it was just a lot of, you know, discussions.

And one of the things I would like to give credit to that was helpful in doing it, was that we had a game theory guy that came to help us prepare, and was a big contributor to helping the board understand why we needed to do it. And he was a professor at Berkeley. His last name is Weber. Steven Weber. And his work was magnificent. I think we could not have been able to pull off what we did if it hadn't been for the help he gave us. But he's a CIA analyst type of guy, where we worked through every possible thing that would occur as a result of doing it. And as for 99 out of 100, happened exactly as the game theory had predicted. So, to me, that helped the board feel like we really had done our work, done our homework.

**Weber:** You mention, in your book, a number of people that were particularly important. Also Arnoldo Hax--

**Ruiz:** Yes.

**Weber:** And Bharath

**Ruiz:** Rangarajan.

**Weber:** Rivet, Stan Vinvick, Tom McCoy, Henri Richard - don't know, are there a few that you want to talk about, sort of--

**Ruiz:** Well, you know, the internal sale had to occur first, before we went out. I mean, really, we had to get our sales people, for example, prepared for the fact that you were not going to be talking to customers who might get pissed off because you're suing a supplier that's critical to them. And fortunately, all those people that I mentioned there, bought into the idea that we had to do it. And therefore, they, themselves-- and I learned that from my mistake at Motorola, by the way, when I tried to do the transformation. I said, you got to get these people's blood, before you turn them loose. I mean, you got to make sure that you get a vial of blood out of them.

And they all signed up. And I think that was really helpful, because any time any customer would bring it up and challenge it, they would act very much in-- well-prepared, by the way. This was-- the preparation that was done to do this was enormous. And it was done around the world, you know? We had people in every market that worked on it. And like I said, it was successful everywhere except the US was the only place we couldn't get the anti-trust organizations to take it seriously. But, all that led to Intel feeling the pressure to say, we got to find a way to settle this. Because we'll never know. But if we had gone to court and they had lost the penalties for anti-trust violations are severe. It's possible that they could have been hit with such a large amount of money that it would have impacted them severely, much worse than anything we had ever done. So, I think that was one motivation.

As they began to see that, around the world, these things fell in place, and if I were in their shoes, I think I would have said, hm, why are we taking the risk of potentially losing this in court, when we can probably settle it? And frankly, at the time, when they settled it, Intel was still the king of the hill on manufacturing. And they couldn't imagine anyone else being as good as they are. Now, the world changed in the last several years. Now we got TSMC ahead of Intel in technology, who happens to be the foundry that makes AMD's products. So.

**Weber:** And you-- the part of the book I got to was you were going around to Microsoft, Dell, various major customers, trying to convince them to come along in some ways.

**Ruiz:** Well, not so much convince to come-- to not fight us, to not be negative, you know? If possible, be positive on what we're doing, but, if not, then don't say anything. Don't be-- and that worked. That worked.

**Weber:** And that was an essential part of the preparation.

**Ruiz:** Yeah.

**Fairbairn:** So, you said things happened according to the game theory. How did-- just in terms of time, money spent, and results, how did it go, versus your expectations?

**Ruiz:** Well, you know, it's easy for me to say, because I left before it got settled. But I think they settled for such little amount of money, that I wonder if they could have settled for better, you know? That's the only



question I have. Everything else is exactly as we had planned. And the customers' reaction and the customers' willingness to support was better than I thought, better than expected.

**Fairbairn:** And the timeframe?

**Ruiz:** The timeframe was probably, as always happens, a little longer than you wanted it. But these things-- because what we'd not anticipated would screw things up a little bit on time was the 2008 recession. The Great Recession, as they called it. That really kind of slowed things down and made it also difficult to then get the board to be excited about selling the fabs. Because the value of things had dropped so dramatically that, in my opinion, the Arab Emirates got a hell of a deal, much better than they thought when they signed the deal, because the market collapsed in 2008. I think AMD stock was down to \$2 or something like that.

**Fairbairn:** So, talk a little about what was happening on the technical side, and the microprocessor side. You said the acquisition of ATI was very helpful. Where were things-- where does the acquisition of Nexgen fit in here? Was that done before you or after you?

**Ruiz:** After, yeah.

**Fairbairn:** After, okay. So how competitive was AMD during your time, and were you able to significantly change that? What were the challenges on just the technical, product side?

**Ruiz:** These are really challenging products to design and make. So, remember, one of the things I said that was so strong about AMD was very talented technical people. They came up with the Opteron technology in the 2002, 2003 timeframe, more or less, give or take. And Opteron became the standard microprocessor in X86 because it was, as you may remember, 64-bit technology, but it was compatible with 16-bit. So, if you had to design a system around 16-bit, you didn't have to redo the whole thing to incorporate 64-bit technology. And you were ready for, whenever the time came that 64-bit took over.

So, the Opteron product gave us a huge boost. Not as good as it should have been, based on the technology and how much of a leadership product it was, because we were still in the middle of these unfair practices that Intel was doing. And it was tough to penetrate some of the accounts where Intel would threaten them if we did business with them. So, even though it was a phenomenal product, and it did well-- I think we went from zero marketshare to 20, 30 percent of the server market at that time. It could have been better. It was really that good of a product.

And then, we hit the 2008 recession, and the next generation of Opteron, which was called Barcelona in the market at the time, ended up having a bug. And that really set back the effort that AMD had going. And under normal circumstances, I don't think that would have been as serious, but with a recession on, things slowed down, and we hadn't settled the legal parts too, it was really hard to not let that damage the company. So that made it a little more painful than we wanted to go-- we knew it was going to be painful to resolve the legal suit and sell the fabs. It was going to be a big challenge. But then, it got a little more

difficult to do, because of the Barcelona challenges that we had. And then, of course, the 2008 Great Recession also made it difficult.

**Weber:** So Barcelona was which years, then?

**Ruiz:** Barcelona was after Opteron, so it had to be-- I'm going to guess in the 2006, 2007 timeframe, something like that.

**Weber:** And the Opteron had integrated memory, also, and low-energy requirements?

**Ruiz:** That's correct. It was a much lower energy chip than others. And, also, it had a unique inner chip communication protocol that made it very fast. It had a clever marketing name, which I can't remember right now. I'll think. And again, you know, back to hardball/spitball thing, we were the first company with a 64-bit out. Microsoft had 64-bit software ready to go, but refused to release it because Intel didn't have a 64-bit--

**Weber:** Because the Itanium was delayed, right?

**Ruiz:** Yeah. And so, today would be different. Today, AMD is much stronger, and could exercise some power with Microsoft. But back then, point blank, the Microsoft people just said, hey, we have to wait for Intel to come out. And that was painful.

**Weber:** So, you could sell to the server market and to various people that didn't care about having some of the Microsoft stuff.

**Ruiz:** Which, that was probably one of the biggest success stories, is to be able to get it into those places, yeah.

**Weber:** Right, and it sounded like, from your book, the servers are particularly conscious of efficiency and energy. But, I mean, what percentage of the market did that cut out, the fact that Microsoft would not move faster?

**Ruiz:** Well, it's not that they cut out a percent of the market, it's that they didn't allow us to take advantage of the 64-bit migration. We could have dragged customers with us into the 64-bit world if Microsoft had been out, because we were the only ones that had the hardware to do it. But because of that, everybody that bought Opteron was actually doing it mostly for 16-bit, because there was no 64-bit software. So, again, it's one of those-- I think it's an unfair thing, but, you know, the Intel/Microsoft partnership has been incredibly good for them. They both have made a fortune out of it. I think they were-- I'm sure there was a concern that, if they release software that will help only AMD, it could have been very damaging to the partnership and would affect Microsoft in the end. So, complicated.

**Weber:** But did manufacturers not buy the Opteron chip because they didn't have as much demand as if-- I mean, if 64-bit had been really out there and people wanted software, wanted to run that stuff, then you would have sold more Optérons, right?

**Ruiz:** Yeah.

**Weber:** But there's no way to estimate the opportunity cost.

**Ruiz:** Yeah.

**Fairbairn:** Let's go back to the Jerry Sanders situation. Was the handover graceful, when he decided to leave? Or how did he decide to leave? Or whose decision was that? We talked about you coming in. What was the exit like?

**Ruiz:** Well, you know, like this thing, it doesn't matter how graceful it was, the outside world is still going to make up a story about it that most of the time is not accurate. But, Jerry got to a point where he saw that the sensible thing was to turn more power to me, that made sense. That's what he would prefer, that's what the board wanted to do. But in his DNA, he didn't see-- if that were to happen, then what role does he have, you know? The diminished role-- I think he made a decision to leave. Nobody asked him to leave, there was no-- he wasn't pushed out. He just decided that with me taking over more and more control of things, the company was growing. He would prefer to do something different. I totally understand it. I think, you know, he-- I don't know if you've met Jerry?

**Fairbairn:** I have never met him. I've met so many others in the industry, but I've never met Jerry.

**Ruiz:** He's somebody that, even if you don't know what he does, if you meet him, you realize that he's somebody that really likes being in charge. And I think he probably genuinely felt like it would be difficult for him, then, to be around an environment where he's not the decision-maker, you know? And so--

**Fairbairn:** So, there were two major decisions, I guess, after he left, the divestiture of the fabs and the suit of Intel. Was he involved, in any way, in those discussions?

**Ruiz:** He was. Even after he left, he was always involved as the consultant advisor. We would talk to him. But not as a decision-maker. When we made a decision to do the fab thing, I remember him calling and saying, I knew you were going to do this, and the only thing I was trying to figure out is whether I should learn Chinese or Arab. So that's kind of the relationship that we had. But I totally get--

**Fairbairn:** What about the Intel suit?

**Ruiz:** You know, he sued Intel before I came on another-- there was some violation of an agreement that he had with Intel, and he won it. He won that suit, but the judge gave him a dollar. So it was kind of like one of those things. So, he's very familiar, probably even more so than I am, of how difficult it was to fairly deal with a competitor like Intel. But I think he was concerned that we didn't know what-- since he did it, I

think he figured out how difficult it was. He probably was afraid we didn't understand what we were getting into. Not that we were doing the things wrong, it's just that it was such a difficult thing to do. What he wasn't aware of is how much time we spent preparing for it. I mean, he really was not involved in that. And I can tell you, that preparation alone deserves a book, because it was brilliantly done by the people that were doing it. Just every aspect was covered. In the meetings that we had, this facilitator from Berkeley would ask me, for example, to play the role of the CEO of Intel. And since I know about AMD more than Intel does, they would tell me, here's what we're going to do at eight o'clock tomorrow morning, what's going to be your reaction? And I could do and say things that would have been very difficult for an Intel person to do and say. But once we did it, it was so obvious that that's what they were going to do, that we were prepared for that. I can't say enough about the preparation that was done.

**Fairbairn:** So, you left AMD when?

**Ruiz:** I think I left around two thousand—and nine, as soon as we did the deal, about six months after the deal. So--

**Fairbairn:** After the foundry deal?

**Ruiz:** The foundry deal. And went to help GlobalFoundries. And that's another thing that's not as commonly known, is the Emirates people would probably not have done the deal if I hadn't volunteered to help them. And so, to me, it was so critical in this transformational effort that we had, that if we didn't do the fab deal, I don't see how AMD could compete. So, when that came up-- and I'll never forget this Arab person looking me in the eye, and he said, if you think this is such a good deal, why don't you come help us? And so, it was tough for me, because I didn't get a chance to see the whole thing go through from the AMD side. So I did leave and helped them out for about a year. And then left.

And then, the only sad thing I feel about them is they changed their strategy. They got spooked by competing with TSMC, and GlobalFoundries went away from the dream that the Crown Prince in Abu Dhabi had of being a really strong competitor to TSMC, to now they're more of a niche supplier of technology that's unique-- I mean, it's very unique. They're doing Gallium arsenide, for example. They're doing RF-- silicon RF technology. So there are places where there's no question that they'll do well and compete, but they're not going to be anywhere near the size that they could have been. So, they got spooked. It's a difficult market, as I'm sure you know.

**Fairbairn:** How did they even get involved in this process? I mean, how did you sit down with the Crown Prince?

**Ruiz:** Well, that's really an interesting question, and fascinating to me. Another book I could write. AMD was a Ferrari sponsor. We sponsored Ferrari. And we got lucky. We sponsored Ferrari during the days when Schumacher won every race. So we had a big awareness by people that AMD was a very sexy technology company. Well, it just so happens that Abu Dhabi, the Arabs, were also a sponsor, from an investment point of view, of the Ferrari event. So we both had a connection to Mr. Ferrari. And one day--

**Fairbairn:** The Mr. Ferrari.

**Ruiz:** The Mr. Ferrari, you know? Can't think of-- his first name is-- it's either Esro or--

**Weber:** Enzo.

**Ruiz:** Enzo. He's the Enzo grandson, something like that. One day-- our headquarters, if you want to call it that, for AMD, was in Italy-- for Europe. And our European general manager was a very close friend of Mr. Ferrari. So, one day, we were having dinner, and I was explaining to him the challenges that we were having, trying to find some way to create this opportunity for these factories. Then he said, why don't I introduce you to the Crown Prince? I said, I've heard him talk about how he wants to divest from oil into high tech. And I said, well, that'd be great. So, he made a call. The Crown Prince agreed to see me for five minutes. So I flew to Abu Dhabi with a couple people in my company. We're sitting in this gigantic palace, in an office, waiting for the Crown Prince. So, the Crown Prince comes in, says hello, shakes his hand, and he said, I'm really serious about investing. Tell me a little bit about why you think this might be good for us.

So, I started explaining to him about the future and the factories and how semiconductors are going to be the oil of the future, and blah blah blah. And given what's going on today, it's all working out like, actually, I told him back then. And he started listening. And the five-minute meeting turned into a two-hour meeting. You could see his excitement and all that stuff. And so, when it came time to leave, we were going to walk out to the car. And I'm walking out to the car, he comes and grabs me by the arm and walks me to the car. And the guy said to me, the Crown Prince has never walked anybody to the car. So, it kind of made me think, okay, he's really interested.

**Fairbairn:** You got his attention.

**Ruiz:** He's really interested. So, the next day, he called up and said, look, I want to figure out a way to make this deal. It's not a question of if, it's how. And he asked me a favor. He said, I just want you to do something for me. I said, what is it that you want? I want you to have a board meeting here, so that the board sees what I'm talking about. So we did. I had a board meeting in Abu Dhabi. I flew everybody there. And he came into the board, gave a little talk, and talked about what he wanted to do. And that was very helpful, because so many of the board members were, I mean, about--

**Fairbairn:** Not real, it's over there, whatever.

**Ruiz:** I mean, they were scared. They were frightened. So, that's how that came about. I'd like to say I'm such a good salesman--

**Weber:** Well, I guess you were.

**Ruiz:** But, it kind of points out how important it is to know people and respect them for, you know-- I respected his desire to divest his economy. I didn't ridicule him like some people do. Because when you

think about it, it's challenging. You see, it's nothing but sand, and this country that's a city sits there. Of course, they own a lot of oil. And you know that if they set their mind to it, they can do it if they wanted to. And I really think they would have... In my opinion, what spooked them is McKinsey, as a consultant, probably told them it would be very difficult, and the likelihood of failure could be higher than he thought, perhaps. And one of the things I know that culture is very afraid of is being ridiculed, being belittled. And so, somehow, they backed off from the original idea.

**Weber:** I wonder if you saw some of the same-- it's another form of transformation, obviously, the challenge that interested you.

**Ruiz:** That's right.

**Weber:** Before moving on, a couple questions, some from David Laws -- I don't know if you know, but a colleague of Doug's with semiconductors here. How did the culture of AMD differ from that of TI and Motorola? Start with that.

**Ruiz:** Well, boy, they are three very different companies. During my time at TI, it was a period of time when TI was just at the top of the world. They were anti-bureaucracy, they eliminated... I found it so interesting, when I joined first. Everybody wore short sleeves, no tie, jeans. Even the CEO dressed like that. There was camaraderie, and you felt very close to each other, and it was a company that could not see that-- if it was important, it's something they should not be in. An example I'll give you is they invented bubble memories, but they didn't commercialize it. They invented liquid crystal displays, and they didn't commercialize it. They invented a calculator and a watch, but they couldn't capitalize on it like the Japanese were able to.

So, on one hand, there was some amazing-- so, I learned a lot about how to get bright people to do their thing and create technology. But I also learned a lot about how difficult it is to channel all that into a successful enterprise. And an example of that, TI invented this thing called the OST, I don't know if you're familiar with it, Objectives, Strategies, and Tactics. And it was-- became famous, became a Harvard business study. And I loved it. I thought it was fantastic. But it had a flaw in it, and that is people became so focused on the process of creating the objectives, strategies, and tactics, that they completely forgot the vision of what the company was trying to do. So, it got mired in bureaucracy and all that. But it was, to me, a great place.

Motorola, on the other hand, was a family company. The Galvin family owned it. It was public, but they owned pretty much all the decisions. And they were very family-oriented, in the sense that they put in place a thing-- they used to call it Participative Management Program, PMP, they called it. And what it did is that every manager needs to figure out a way to let the employees participate in the decisions made. And it was pretty brutal. It's in the sense that if you didn't agree with that, the CEO, Mr. Galvin, would ask you to leave the company. I mean, that's how hard they pushed it. And he had good things, because he made people at the very low levels feel like they were participating in the company. But like everything else, if you're not careful it can go beyond where you meant to and then you had people that really were not capable of making decisions, doing things that were not proper. And so, that's the culture.

AMD to me was a-- people were having fun at AMD. <laughs> They were a scrappy little company. Very smart people. They wouldn't take no for an answer on anything. What I saw was just an opportunity to transform it into something bigger, but not change necessarily some of those things that helped them get to where they were. And to me there were. It was a can-do attitude that was contagious and very positive that I think is still there. So, it's very different. And one of the things that I find very in a way depressing was that when one learns all these things in life, all of a sudden you find out that you're too old to benefit from all the learning you've had. <laughter> Not many people have that opportunity that I had to learn all that. But then you get to this point in life where you say, "You know, now what do I do with all that learning?" Well, all I can think of hopefully is somebody might watch your video and learn something from it. But I can no longer go run a company. I even thought about figuring-- as a matter of fact, I'm still doing a little bit of work with a consultant trying to figure out is there a way we could tap into the people that are in their 60s and 70s that could contribute? But not like a CEO or a full-time employee, but--

**Fairbairn:** Well, that's another discussion. But there are in San Francisco there's a group where people advise companies that are retired people from the same industry. But that's a--

**Ruiz:** I'm just trying to think of it at the next level up from that in the sense that. Because I've done a little bit of polling of people that I know. People would love to spend 20 hours a we-- and see, you don't have to buy them health insurance, because they're all on Medicare-- but they would love to spend 20 hours a week doing something that's really fun and exciting. Not to just advise somebody on something. And just imagine all the talent that's around and what you could do with it. I haven't figured out how to do it, but I'm working with a lady that's a business consultant. Used to work for Steve Jobs when he was running the company. She was very smart. I'm trying to figure out is there a way we could do that so that people have a chance to transfer some of that knowledge by working on a particular exciting project? The one thing nobody wants to do, people are good, they don't want to get involved in anything that requires routine stuff. They won't [be] involved in figuring out how to cut ten percent of the cost. But if you're going to work on the next generation of secure computing, they would love to spend 20 hours even if they don't get paid. So there's an opportunity that we-- nobody in the world has figured out how to tap into.

**Weber:** Oh, very interesting. I have some thoughts I'll say after the-- and in terms of culture, and this could come into that, too, but did any-- we're also researching the history of diversity programs. Did any of these three companies have formal efforts to increase diversity. Or certainly some were federally mandated, right?

**Ruiz:** I'm not aware of Texas Instruments having had anything like that. But that could have been the '70s might not have been the appropriate time for--

**Fairbairn:** It was a long time ago.

**Ruiz:** Long time ago. Motorola definitely did. And AMD had also. Personally, I'm not so sure how effective they are. A good/bad example of that is the NFL. You know, they have diversity programs and they still only have one or two black coaches. So, I'm not sure that people have found how to make that work. However, I mentioned earlier in the conversation that the biggest exposure to bigotry that got to me

when I was CEO of AMD. After two years of-- I was in the job maybe a couple years as CEO and somebody at one of the main magazines wanted to do an interview with me and my staff. And I said, "Fine." The first question he asked everyone on my staff was, "How does it feel to work for a Mexican?" Now to me, that's indicative of-- and this is the press. I mean, this is the press who supposedly is "woke", if you use that expression. It shocked my people. It shocked staff because they didn't know what to say. You know, it was not-- it was the last question they expected and it kind of bothered them a little bit. Because no matter what you say it's never going to come out right. Then on top of that, you add the editing that's done by the media. So, that's an example of the-- and that happened twice, with two of the probably the most famous magazines in business.

Then the other part is I was coming back from a trip to Brazil and there were five of us, six of us in the plane. And it was a private plane. And when you come back from out of the country on a private plane, you have to land at the nearest port of entry first and go through customs. So, the pilot chose to land in Laredo to go through customs. And I fell asleep. So, I was asleep in the back, and I didn't even know when the plane landed. I'm a sound sleeper when I go to sleep. So, the plane landed and I'm asleep in the back. The customs officer comes in and checks the passports and all that, and looks back and he sees me asleep back there. So, he looks at one of my staff and says, "Why do you choose to bring the mechanic with you on the plane?" And I thought to myself, "Gee." So, see I didn't go through that when I was in school or in college or when I was a middle level executive. But the bigotry and the bias is that there comes a level above which you're not supposed to see these people. So, you question it. And I could give you dozens of things like that that happened to me when I was CEO at AMD that never happened to me at a lower level.

**Fairbairn:** Because people didn't expect you to be at that level. At other levels, it sort of--

**Ruiz:** That's all I can think of.

**Fairbairn:** But at that level it didn't fit.

**Ruiz:** Yeah, that's all I can think of.

**Weber:** Glass ceiling. But you don't think the diversity, I mean, you don't think the diversity programs help to remedy some of that particularly?

**Ruiz:** It's not that I don't think-- it's that I haven't been able to see something that you can attribute directly to the diversity effort. I became CEO of AMD not because of a diversity program. It's a public company. Nobody's going to put you in charge and tell the shareholders, "By the way, we're filling a diversity slot." <laughs> That's just not going to work. So, I've questioned it only because I think there's something missing yet. I think that educating people about the differences in cultural biases is important, because sometimes you're not aware of it, and you can... But to have a diversity program that implies in its implementation that it's going to address the lack of representation at certain levels, I haven't seen that yet. Even Motorola there was to me ... one of the best companies sensitive to people, that that's paid off.



**Weber:** And okay, with NVIDIA, right, it went to ATI. But at ATI, you had to write down there was a loss involved? Was a--

**Ruiz:** There was what?

**Weber:** With ATI, there was a loss?

**Fairbairn:** There was some question about the write-down of ATI. Was there, you know?

**Ruiz:** I wonder who that was?

**Fairbairn:** I don't think it's important.

**Ruiz:** After my time.

**Fairbairn:** Okay.

**Ruiz:** I mean, the one thing about ATI is that the people outside AMD, particularly in the financial markets questioned the wisdom of buying ATI. They didn't think it was right. And they questioned the price we paid for it. They thought it was too high. There was a lot of criticism of me personally for having made that decision. To me, that was their right to criticize me. The result is that without ATI, AMD would not be where it is today.

**Fairbairn:** So, getting back to the transition with Jerry Sanders, how was the transition with you? When did you decide that you were going to make the transition to help GlobalFoundries and did you take a position there as President of that operation or what--

**Ruiz:** I was interim chair of the board.

**Fairbairn:** Okay, and were you completely out of responsibilities at AMD when you took that on?

**Ruiz:** Yes.

**Fairbairn:** So, how did the transition out of AMD go? What were the driving forces, was there somebody groomed to take your place? What was the--

**Ruiz:** The person that took my place was the design manager, was a fellow named Dirk Meyer. And the idea was that because I was going to be around, and the board was not changed, it was the same, that there was time to help Dirk grow into that position. Some other board members felt like he was a very smart guy that needed some time and grooming to be able to fit into the slot. But then I wasn't involved anymore. And so, at some point in time something must have occurred that made the board feel like he really wasn't the guy they wanted. And so, he left. I think he was there perhaps a year or so. Something like that. And of course, I didn't know all the other people that came after that.

**Fairbairn:** Right. So, you went off and what was your contribution with GlobalFoundries? What was the-- where did you think your most valuable contribution was and how did you decide to end that? Was that meant to be like a year-long process and have someone else take over? Or what was the--

**Ruiz:** It was supposed to be about a year. Nothing hard specific about a date, but it was supposed to be about a year. And my job was supposed to help them figure out how to set in motion the strategy that would make them a competitor to TSMC. Okay? But somewhere in that timeframe, nine months into it or something like that, it became clear that they didn't want to do that. They wanted to change that to go the direction of selectively being competitive.

**Fairbairn:** Being niche supplier, yeah.

**Ruiz:** And I didn't feel I really could contribute to that. And so, I decided to call the option that they had given me, that I could leave whenever I felt that something either had changed or that I couldn't do anymore. And so, personally, I think they missed a huge opportunity if they had stuck with it. Because I think even the scenario today where the world and our nation is concerned about security, and there's a lack of leading edge products in this country. It would have been a perfect fit.

**Fairbairn:** Yeah, having GlobalFoundries as a major supplier now would change the landscape.

**Ruiz:** So, I think they missed a big one.

**Fairbairn:** Yeah. So, what happened-- this was 2000-- when did you leave GlobalFoundries?

**Ruiz:** Probably around 2009 or '10, something like that. Somewhere in there.

**Fairbairn:** So, what was life like after that? what was--

**Ruiz:** Well, it's probably everybody goes through this. I probably overreacted to the fact that I didn't have a real job anymore. And I got involved in way too many things. I got involved in too many boards; I got involved in too many non-profits; political events. And pretty soon after two years, my wife said to me, "You're working harder than when you were running the company." <laughter> And she was right.

**Fairbairn:** We've heard this before.

**Ruiz:** I think I just-- it was the decision to fill my time that I frankly overdid it. And so, I started slowly take--

**Fairbairn:** Divesting.

**Ruiz:** Divesting. <laughter> And what I ended up, I soft-landed, if I can use that word, into a place that I'm really enjoying it. I'm helping some startups. And I have a criteria that's-- because people ask me, "Well, what's the criteria for you?" It's very simple. First of all, it has to be led by at least one of the people

that's a founder. It has to be a person that's not-- that's underrepresented. Either a person of color or a woman. The second thing it has to be something that's crazy. That's really not-- I mean, if it works, it's great, but if it doesn't work, people will say, "Well, we knew it wasn't going to work." <laughs> It's got to be not another app for reserving hotel rooms or something. So, something very different. And third, the chemistry between me and the people has to be solid, good, because we're going to sleep, eat together and try to make this work.

So, I have three small companies that fit that category that I'm involved helping them. And I'm really enjoying it. These are people very young, probably between the ages of 25 to 35, somewhere in there. And they just don't-- no way they're going to accept that nothing can be done. <laughter> So, it's a lot of fun, and I've helped them trying to find some seed money. I helped them with sometimes with advice because there are some things that obviously can only come from experience. And so, that's one thing.

The other piece that's a third of my time, the other third of my time is I think we have a serious problem in Texas, where I live, with the Latino population not going to school. So, I'm involved with some groups of people that are trying to put in place efforts to keep people in school and help them attend college, if they can. The most successful of them is an organization called Breakthrough. It's done an amazing job of grabbing kids in the fourth grade, let's say, that's the entry point. You grab them in the fourth grade and stay with them until they graduate from college.

**Fairbairn:** Wow.

**Ruiz:** And they're really amazing people. Really committed and I'm pretty happy with that. And the third and the most difficult one that I'm doing that so far has been a grandiose failure <laughs>, is trying to get people to vote. You know, in Texas, we're number 50 in voter participation.

**Fairbairn:** Wow.

**Ruiz:** And Texas being the second largest state with 38 electoral votes, that's dangerous when you have that low level of participation. So, it's been disappointing to me how difficult it is to get people to vote. And I realize that a lot of people are trying to make it harder to vote, but I don't think that's the reason. I think it's just we haven't found the fire that can motivate the people--

**Fairbairn:** People aren't motivated, huh?

**Ruiz:** -- to come out and vote. And there was a glimmer of hope in the last election. The number of young people in that age group, 25 to 35-- 18 to 35, went up by 50 percent in Texas. And so, it gives me some hope that maybe we have to stop worrying about the fact that the older people don't vote and focus on the young people. And so, we're going through some transitions trying to see if-- and maybe that's true. The 60-year-old Latino that's never voted may never vote. And we have just to accept that and work with the 16-year-old that's going to become 18 in two years and hopefully they'll vote. And so, those are the three things.

**Fairbairn:** You're talking in terms of this younger group, talking mainly about Latino youth, or youth in general?

**Ruiz:** Youth in general. Yeah, on the voting side. You know? And so, I found my level now that I can live with. <laughs> But in the beginning it was really difficult. I was-- way overdid it. And I don't know if everybody goes through that or just, but--

**Fairbairn:** Yeah, I've heard the common thing of working harder after retirement than before.

**Ruiz:** But I've enjoyed it. I'm really having fun doing it. I'll give you an example of one of the groups. It's a group of six people, three are from Mexico and three are from the U.S. And the three from Mexico are from a school called Tecnológico de Monterrey, which is the MIT of Mexico. A really well-known school. And the three from here are from Stanford. And they came up with an idea that combines visible light with radio frequency to detect cancer, skin cancer. You don't have to do a biopsy. And so, far, they have suggested it's more accurate, than actually biopsy. And so, they're trying to figure out a way they can get enough trials done to get the attention of somebody that can put money in it, so they can scale up. So, to me that's interesting because you know?

**Fairbairn:** Breakthrough...

**Ruiz:** Breakthrough. And it's particularly important for things that are invasive, because it's not invasive.

**Fairbairn:** Is it shining light on the skin? Is that--

**Ruiz:** Yeah, and it has an RF beam that disturbs the skin and the way the light deflects is detected. And it's basically A.I., by the way. It's got an A.I. algorithm that the more you do it, the better it gets in accuracy. And the most promising result right now is in India. They're running a test of several thousand, hundreds of thousands of women on cervical cancer. Because cervical cancer is very invasive-- I mean, the procedure for doing a pap smear, they call it.

**Fairbairn:** Mm hm, yep.

**Ruiz:** It's very invasive. Women don't like it, and it's very uncomfortable, and it takes a long time and it's expensive. And this is very fast. In five minutes, you know the answer. And it costs a fraction of what it costs to do it.

**Weber:** So, it works for skin cancer, but also internal if it's visible inside to the probe.

**Ruiz:** There's a good chance it'll work in-- they're even trying to figure out if they could put it in a pill that you can swallow and it'll detect things in your colon and your digestive tract. It's kind of really-- and the person that wrote the algorithm is actually a woman from Mexico. So, it's very fascinating to me to see these young people. Now it doesn't mean it'll be successful, but it's great experience for these people to be going through.

**Weber:** So, do you have any thoughts on your successors at AMD and what they've done right or wrong? And have they been able to do significant growth?

**Ruiz:** Yeah, there were a number of CEOs that followed me that I wasn't there to observe to see what is it that transpired. But there were three or four people that they went through pretty fast. Unfortunately. So, there must have been something that the board was not happy with. I don't know what it is, and all that. But that, I am sure made it difficult for the company to figure out what to do when every year or two you changed CEOs.

But the last CEO that's there, Lisa Su, who I've known for a long time, couldn't be a more perfect fit for the company at the time that she came in. She's incredibly smart. MIT PhD in science, engineering. Just brilliant. I mean, this lady's in a class by herself in terms of being smart. And genuinely trying to do what she thinks will make the company continue to be successful and grow. And she was very, very, very quick to take advantage of the things that we did that we tried to do to position the company. The fact that by getting rid of the contractual obligation with Intel to have to go to foundries-- to not have to go to foundries, she jumped on that really quick. And as a result, you know, AMD products are at the leading edge of technology thanks to the fact that the foundries are at the leading edge of technology. So, she did that pretty well.

The other thing that she picked on to me that was incredibly important for the success AMD has had is to really focus to win in the server space. Or high-end computing, or high-power computing, or advanced computing. All those things fall in the same kind of sphere. She put a lot of effort in that, because the AMD products are actually the best in that space. And so, she's benefited from that.

The third piece is the integration with the business of graphics. She's done a fantastic job being able to get ATI and computing to jointly be able to address the needs of their customers. And I think the world of her. And I think that the future of AMD is pretty bright if she continues to be there. But she's kind of like a franchise football player. Surprised Intel hasn't poached her. <laughter> But really, I just think that unfortunate that three or four other CEOs went through before they found her, because that delayed AMD's success. But where they are right now is phenomenal and I think a lot of it is the result of her work, so I think she's very perfect fit.

**Weber:** So, how was your thinking about your field changed over the decades? What will it look like a decade from now?

**Ruiz:** The what changed?

**Weber:** How will your field look a decade from now? The future.

**Ruiz:** Field? You mean, semiconductors engineering?

**Weber:** Yeah, we'll take that. I mean, it's meant to be open-ended but that seems the most appropriate.

**Ruiz:** Well, you know, at the time that I wrote my book, at the end, I put an epilogue, and at the time I wrote it, I believed what I wrote. But I didn't realize how accurate it actually was going to be. And they're not in the order of priority or anything, but the two major things that are happening, one of them is so transformational that it's going to be the equivalent of the internet in my opinion is the artificial intelligence. I think that from things that are sort of mundane like this thing going around right now that's so popular, this chat--

**Weber:** GPT.

**Ruiz:** GPT, yeah. Which are kind of fun and people are having fun to something that's much more serious like in healthcare, for example and other places. I think the artificial intelligence is just going to-- and this has opened the door by the way for companies like AMD and NVIDIA, both of them, where the products they are doing are going to fit perfectly into the future of A.I. And so, and I even think that my expectations with A.I was going to be able to do and contribute were not even wild enough. I think that this thing appears to be developing a lot faster than I thought. And it's going to find its home everywhere. Kind of like the internet has. And so, I think that's definitely it.

But the other part and you have to say, "Well, what's going to enable that? You don't get artificial intelligence out of the air. How do you enable it?" The technology that's going to enable that is going to be sort of a hybrid approach to how you put things together. How do you create the computing, the scaler and vector graphics needed, scaler computing and vector computing needed to accomplish all these things. How do you put them together in a way that allows this to occur easily and cost effectively? It's going to be a hybrid approach to building these things so that you can mix technologies. So, you can put communications, for example, in the same space. You can put RF technology in the same space. You can put even perhaps mixed substrates, such as gallium arsenide and others in the same space. With the advent of these technologies like graphene, for example, and other things that are going to enable all these things to happen. It's entirely possible to me that we are not going to interact with machines at all other than like the machines detecting how we feel, how we sound, what we say, what our eyes do. There's no keyboards. I think we're entering a very exciting place.

And you're beginning to see the beginnings of it. That the fact that who would have thought a few years ago that you could actually tell your car, "Take me to this place," and the car knows how to take you. And if you happen to be on one of those that have self-driving, you don't even have to do anything. You just have to tell it. But the two are connected. You got the A.I. and you got the enabling technologies right behind it. And of course, the glue that gets everything together is the algorithms and software. That, to me, is going to change even the existence of our companies, dramatically. Take the example of Google. I don't know how you feel about Google search, but to me it's kind of poor. Every time I do a Google search, I get 10,000 things. Why do I want to look at 10,000 things? Why can't I just get the answer I want? And this is where A.I. properly done, frankly, could be the next Google. You know, now of course, I'm sure Google is aware of it and they're trying to figure out a way not to lose that opportunity.

**Fairbairn:** Oh, they don't want to get you to the right answer too quickly, they want to show some ads on the way.

**Ruiz:** Exactly. So, I just think we're in for a pretty exciting ride in A.I. and all these things that make it work, that enable it, you know?

**Weber:** And the graphics coprocessor being adapted to A.I. seems like the path for that.

**Ruiz:** Yeah, certainly. And by the way, there's no doubt in my mind, although I don't know this for a fact, I'm guessing, that NVIDIA and AMD are heavily involved in thinking about this and probably ahead of anybody in terms of the enabling technology.

**Weber:** And making it low-powered enough to put in at the edge and not just through a huge data center right?

**Ruiz:** Right.

**Weber:** So, then getting ready for the one word, in general-- not the one word-- but what suggestions can you offer to young people especially young Latinx people interested in technology? And I know that you said the proceeds from your book were going to a scholarship fund at University of Texas. But if you could talk about both of those.

**Ruiz:** Well, let's start with that one first. Because that one's been done. We established a fellowship at the University of Texas for capable people that... first of all you had to qualify to get in. But assuming that you get in and you're Latin or underrepresented, either way, that scholarship is established. It's at perpetuity. It'll last until someday it runs out of money or whatever, but it's being fed continuously. And that exists right now. And so, that part is done.

The thing-- this is a real difficult thing to-- why do you tell, you know, Latinx people about what advice would you give them? I always struggle with that. I mean, I gave a talk one time to a group of students, they were about 200 or 300 students in the audience, and there were two of us speaking, and all of them, 100 percent of them were Latino students. This speaker that went before me, talked to them about working hard and all these things that you normally think of. And it was really hard for me to follow-up and not say something. Because I knew more about the students than he did. He was just a speaker that they didn't really know who he was talking to.

And so, I said, "You know, you're already working hard. I know some of you have two or three jobs in addition to going to school. And that your parents are working hard to help you." And so, I said, "So, you've done all that. You've passed that test. The only thing I encourage you to do now is to be curious. Be curious in everything you do. Don't ever stop being curious. And when the curiosity opens up the door that says, you know, maybe this might look like a great thing, then don't be afraid to walk through the door. Now it may not work. You may get to the other side and go, "Aw, geez," and start all over, but be curious," I said, "and you'll be amazed at the things that you personally are going to observe and open up. And then you'll decide which ones you want to take on, but don't be afraid to do it, just because of fear. If you choose not to do it, do it because it's just something you didn't want to do. But do it. But whatever it is be curious."

And that's the only thing I could think of that made sense to me, because when I look back at since I was a young kid, I was curious about everything. You know, not just science. I mean, I was curious about every single thing. I was curious about why every small town has a square. They call it plaza in Spanish. And women walk counterclockwise, and men walk clockwise. And I said, I was a little kid and I was curious, "Why do they do that?" <laughs> You know? Then my mother had to explain to me and said, "Well, they're flirting with each other. And you can't flirt if you're behind somebody." <laughter> And I thought, "Wow, that makes sense." So, you have to be curious and ask questions.

I learned from Bob Galvin, who was one of my mentors that I respect the most at Motorola. He was the son of the founder of the company, Motorola. And one of the things he'd always say that, "You have to ask the question why until you get tired of the answers that they are giving to you." He said, "Don't stop at one "Why?" when you ask somebody, "Why is this happening?" and they give you an answer. They're probably not giving you the answer you want. So, you got to say "Why?" again. "Why?" And it's so true. You know, it's absolutely true.

And the other thing that I learned from Bob Galvin, too, is one day when I got promoted to be in charge of the semiconductor sector at Motorola, that was a big job. It's an eight billion dollar business, 30,000 people around the world. And I had one person that I inherited, whose division was the most profitable, the fastest growing, but he was not a good person. And I struggled, because if you look at the metrics, I should be promoting him because he makes the most profit, his division grows the fastest, I said, "But here are the things I don't like," and I can tell you briefly is, he came to work drunk. He had affairs with probably every woman around him. And he treated people like dirt. Okay. But because he was very profitable and growing, he was able to give big bonuses to his people, and so they put up with it. So, I didn't know what to do. So, I went to Bob Galvin and I said, "Bob, I have this problem." <laughs> "I need your help," I said, "You've been around a long time and what can you help me with?" And he looked at me and typical Bob, you know, he leans back, puts his feet on the desk and says, "Are you married?" And I said, "Yeah." He said, "You have children?" I said, "Yeah." Said, "Would you like your children to grow up to be like him?" And I said, "No." Then he said, "Then you have the answer." <laughs> And I thought to myself, "Well, that was simple. That didn't take long and that was simple." I think we complicate things too much, and that's why I think this curiosity's great at uncomplicating things. And to ask, you don't have to know everything. You just have to ask and ask and ask and ask. Yeah.

**Weber:** So, then drawing on your wealth of life experiences what one word of advice would you give to a young innovator or entrepreneur. And can you tell a story that illustrates why you chose this word? Which maybe you already have.

**Ruiz:** Well, like that beer commercial said, you know, "Stay curious, my friend." <laughter> Instead of "Stay thirsty," it's "Stay curious, my friend." You know, it's--

**Weber:** So, the one word would be--

**Ruiz:** Curiosity. And sometimes you're going to be embarrassed by being curious. I mean, that's telling you. Curiosity doesn't always lead to something that's great or succeed. It embarrasses. When I first got



put in charge of figuring out why a particular product wasn't yielding, I found out that the product seemed to always have a scratch. And I thought, "Well, that's obvious to me. The scratch is causing the problem." Because every single product that didn't work had a scratch. So, I went to my boss and I said, "I found the answer. The products are all scratched and that's causing them to fail." And he said, "Nah, when they fail, we scratch them, so nobody uses them." <laughter> And I thought, "Oh, crap." <laughter> So, you have to chalk that up to experience and say, "Okay, next time I'm going to be more careful how I ask," but don't stop asking though.

**Weber:** That's great. Anything else you'd like to add.

**Ruiz:** No, I appreciate the opportunity to hopefully influence somebody.

**Fairbairn:** That's great. We really appreciate it, and many words and comments of wisdom and a great addition to our Oral History Program. So, thank you very much.

**Ruiz:** Well, I'm glad to do it. I'm glad we were able to do it.

END OF THE INTERVIEW