Oral History of Gary Smith

Interviewed by:
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Recorded: July 14, 2014
Mountain View, California

CHM Reference number: X7228.2015

Doug Fairbairn: My name is Doug Fairbairn. We're here today with Gary Smith, a gentleman I've known for quite a number of years as we've shared our path through the industry for a few decades.

Gary Smith: Yes, we have.

Fairbairn: And the date is July 14, 2014. And we're going to be talking about Gary's journey through the world of electronics and electronic design automation. So welcome, Gary, glad to have you here.

Smith: Thank you.

Fairbairn: So we generally start out these interviews, oral histories, with just a discussion about where you grow up, what your family life was like, especially in the context of things that might have influenced you to follow a technical path. So take us back to I guess, 1941, is when you were born. And tell us about your family, family life, and things that steered you towards a career in electronics.

Smith: Born in Stockton, California. Raised in the Central Valley, old California family. Go back to the gold rush days, and all that kind of stuff.

Fairbairn: Certainly not much electronics then.

Smith: Not much electronics, no. In fact, what my upbringing gave me was all sorts of ideas what I didn't want to do in life. I did not want to work in an office like my Dad, et cetera, et cetera, et cetera.

My hero in those days was my grandfather. He was, number one, one the founders of North Sacramento. He was appointed judge. And he was one of the last of the civilian judges. He was actually a plumber.

And there's quite a lot of stories about Fred Carlisle. And the one I'm proudest of is that he fought putting the Japanese in the intern camp. He understood it to be a takeover.

But what happened was the land was flooded all the time, so nobody wanted it. So the Japanese took it to grow rice. And then they put the dams up, and the flooding was gone. So all the farm conglomerates wanted the land.

And it was a good chance because they not only threw them into the camp, they took away their land. But nobody touched the land below my grandfather's house. And so when the Yamigami's came back, they asked to sharecrop the land.

And he said, hell, no. Here's the land. You got the land back. They screwed you enough.

Fairbairn: Great story.

Smith: Yeah, he was that kind of a guy. My influence was interesting. I had all these ideas of what I didn't want to do.

Fairbairn: So your family was not in the farming business, which must have been the primary thing in Stockton those days.

Smith: He worked his way up to district manager of the telephone company, Pacific Telephone and Telegraph. And Stockton was the district office. So that's where he was most of the time.

So Singer Aerospace was right outside of Sacramento. And they built rockets. And during career day I think our junior year in high school, Singer sent a bunch of engineers over.

And they said, you want to be an engineer. Now, if you saw the movie American Graffiti, most people that aren't from Central Valley, California don't really understand what that movie was about.

What it was about was-- you've got to get out of the valley. So I saw this as, hey, this sounds like a good profession, number one. And it looks like a way to get out of the valley, number two, because although Singer was there, there was no other aerospace in the area. I'd have to come to the valley, or come to Southern California actually was bigger at that time. So that's why I decided to become an engineer.

But my education was interesting, in that a friend of my dad's was a West Point guy. And he said, Gary, you want to go to West Point. Now, I said, I don't know. So he said, well, just take the test.

So I took the test. And as I'm filling out my name and all that stuff, the guy next to me said, how many academies are you checking off? I said, isn't this the West Point test? He said, no, it's for all of them. So I checked Air Force Naval Academy, and West Point.

Fairbairn: This is junior year in high school?

Smith: This is senior year. West Point never even contacted me. Air Force wanted me. And I went through a whole series of tests. And ended up, they said, well, your eyesight's going to go out your sophomore year in college.

So we want pilots. So we don't need you. I said, fine.

So I enrolled in Berkeley.

Fairbairn: So this is '59, '60?

Smith: '59. So I enrolled in Berkeley, and got my housing in the engineering dorm, and all this stuff. And in May I got a telegram that said, you've been accepted in the Naval Academy.

Fairbairn: I thought you had to local congressman and all that?

Smith: Yeah, the congressman is the one that sent the telegram that I'd been accepted.

Fairbairn: So this is May of your senior year?

Smith: Yeah.

Fairbairn: So you'd enrolled in everything ready to go to UC Berkeley?

Smith: Yeah. So, again, you got to get out of the valley. Berkeley was 120 miles away. And the Naval Academy was 3,000 miles away.

So to me, no choice. I'm going to the Naval Academy, which made my parents just thrilled. I mean, they were very proud. Nobody had ever gone to the Naval Academy from my school, and all that stuff.

So I was a big hero, going back to the Naval Academy. Did not know what I was getting into. Just did not what I was getting into.

Fairbairn: Interesting, a few critical people, and meetings, and so forth, steered you in that direction.

Smith: Yeah. I got to mention Mr. Peterson. He was my math teacher. And he made math fun. And he made it really interesting.

He was the most influential teacher I had in high school. So I was straight A's in math, and science, and all that. Did not do languages well, but other than that I was OK.

So I went back to the Naval Academy. The Naval Academy was going through a big change in their education. So we were the first class to take computers.

Now, the Navy hadn't figured out whether analog computers or digital computers were going to be the major computers. You have to understand, most of their computers were all analog.

So they split it in half, and we got both sides. We got analog computers. We got digital computers.

My first computer was-- in fact, I've tried to get the Computer [History] Museum to get a hold of one, but they didn't have any interest for it. It was the Mark One Able Gunfire Support Computer. It was designed in 1911.

And it was mechanical analog. And you dialed it in, then you turn on your motor, and the guns would swing over. Very accurate, and we used the same computer in Vietnam. It worked.

Fairbairn: You were using a mechanical computer?

Smith: Oh yeah. In fact, Ford Aerospace was the one that build it. And they had to go find the old apps guy that went out to fix the computers [during World War II] to train a bunch of people go fix the computers that were obviously breaking down every once in awhile [in Vietnam].

Fairbairn: So besides computers, arriving in the Naval Academy coming from Stockton, not having any previous ROTC or any other, it must've been quite a shock.

Smith: Yes, yes, plebe year was rough. It was just flat rough. You have to understand that you were doing plebe year plus that year I think we had 21 units. It went out to 26 for your second class year and your first class year.

My degree's in, quote unquote, marine engineering. And you only got it out, I think, Naval Academy and the Coast Guard Academy called their degree. It was actually a group of minors, which really worked well for my career because it was math, obviously.

It was thermal engineering. It was mechanical engineering. It was electrical engineering. It was nuclear physics. What else did they throw in? Oh, there was leadership, which would be considered a business course today.

It was navigation and astronomy. And there's a couple that I [can't remember].

Fairbairn: Wow, really covered.

Smith: Yeah, it was a real wide education. And as I say, we were learning digital computers and we were learning analog computers.

Fairbairn: You remember what digital computers you were using?

Smith: I want to say I was 360. But I think it was too early for the 360. It was the one before the 360.

I remember one of our projects, senior year projects, was to design a rocket, and design a warhead for the rocket. And then develop the navigation program, which was all punch cards. Don't drop the punch cards, that whole routine.

And the idea was to shoot down a satellite. And so--

Fairbairn: That's pretty aggressive goal for that time.

Smith: Yeah, you take the [cards], give it to the computer guys. And then they would run the program. And then you got your grade based on whether you shot down the satellite, or it was a near miss, or whatever.

And I shot down. So I was pretty proud of that one. That was old Fortran. We all programmed in Fortran back then, which is interesting because I'm really into parallel computing right now. I have been since 2002.

And so I talk to a lot of the supercomputer guys. And probably the number one language for supercomputers right now is Fortran.

Fairbairn: I didn't know people were even using it anymore.

Smith: Oh yeah, yeah. They came out with 2006 version, or 2007 version. They made a lot of changes. And it was already a good parallel language. It's what many people consider the top parallel computing language right now.

Fairbairn: I had no idea. I thought it had long since gotten buried.

Smith: Good old Fortran.

Fairbairn: That's pretty amazing.

So you made it through the-- did things settle down after your plebe year. You sort of got the hang of things?

Smith: Yeah, pretty much, pretty much. Started playing in bands again. I had been playing in bands in high school. And so started playing in bands again at the academy.

Fairbairn: I know that's something that you're still involved in. How did that arise? And how did you get started? Let's take a little detour on your musical adventures.

Smith: OK. So my mother was one of four girls. And basically three of those girls married the band. And my mother married the trumpet player.

And one uncle was the saxophone player. And one uncle was the drummer.

Fairbairn: These were people that had originally formed a band after they got married?

Smith: Oh, no, they were in the band.

Fairbairn: This is a band that just played locally, or whatever?

Smith: Played on the riverboats out of Sacramento. And that was a big gig. And it ended up, I played on The Delta Queen when it was tied up to the dock at Stockton. And was a restaurant.

So I played in the same riverboat that my Dad played in back in the '30s.

Fairbairn: So you took up the saxophone?

Smith: No, no,. I liked the drums. So my other uncle was the one that I wanted to be like. My father tried to get my brother, oldest brother, to play trumpet. And it never took off. So he sort of gave up on it.

And so he wasn't that active in my musical career. What happened was, I went out for drums. And one day Mr. Fairchild, our music teacher, he came in to my drum lesson. He said, hey, Gary, why don't you play bass?

I said, bass? He said, meet me after school. I want to show you something.

What had happened was the bass player had broken the e string. And it snapped up and hit him in the face. If anybody knows the size of an e string on a bass, I don't have a clue how that guy ever broke the e string. It is the biggest string on the bass.

So Mr. Fairchild showed me how to restring it. And he said, OK, I want you to play these three notes. And so he showed me how to finger them.

And he said, OK, I want you to keep practicing that because on-- and this was probably Tuesday, maybe Wednesday-- and he says, because you're playing a solo on Friday.

Fairbairn: Just those three notes.

Smith: Yeah, just those three notes. And he says, so what I want you to do is get those three notes. The rest of the time, you take the bow. And you turn around so of the wood's on the strings rather than the-- and that way you won't make any noise.

You just go back and forth and people will think you're playing. And then when I point, you go, boom, boom, boom. And that's how I got into the bass.

So I've been playing bass ever since. Played drums through high school. Went to the Naval Academy, and figured I didn't have time for both. So I just stuck with bass and joined the NA10, which was their jazz band.

And the National Marching Band is actually the Naval Academy. That's what Washington uses for all their stuff. And these guys were great musicians, the chiefs.

And so we ended up getting gigs. And sometimes we'd be playing with some of the chiefs. And sometimes we'd be playing by ourselves. I started a band when I was the last cruise off of Vietnam.

I was really bored with Vietnam by that time. So I started a band. And we played in Olongapo. We got to be the top band in Olongapo because my wife dressed us up like the Sergeant Pepper cover.

And we were playing the psychedelic stuff, the San Francisco stuff. And in the Philippines, they never heard of it. They were still doing soul. And so we became the top band in Olongapo.

Fairbairn: All right, so you graduated with a marine engineering degree from the Academy. And what year was that?

Smith: That was in '63.

Fairbairn: '63, so things were just heating up in Vietnam.

Smith: Oh yeah, I was off the coast of Vietnam the year prior in '63. And in '64 was when the war officially broke out.

Fairbairn: Tell me, where were you stationed? What kind of ship were you put on?

Smith: Put on a Destroyer. So we went over and chased carrier in the Tonkin Gulf, and showed the flag, and spied on Chinese islands-- or the islands the Chinese have been trying to take over forever. And did things like that.

The ship that relieved us is the one that supposedly got shot at by the North Vietnamese. That's another long story that I won't get into at all. And then I had three other cruises over there.

This is a good technology story. So they sent over all of the newest Destroyers we had, which were designed for the Korean War. And the big, five inch guns were designed to shoot down subsonic planes. And, of course, there weren't any subsonic planes around too much.

So they sent them over for shore bombardment. Had a minor PR problem in that since they weren't built for gunfire support, they would blow up and kill everybody in the mount. And so they pulled all those back, and sent over all the World War II Destroyers, which is the ones that I was on.

And we had to get those-- my expertise was getting those 20 to 25-year-old Destroyers across the Pacific Ocean and back to Vietnam. And did a job. I was chief engineer of two ships. And I got deep selected twice, and was considered the best engineer on Long Beach for my last tour.

Fairbairn: So did you actually engage in some shore bombardment?

Smith: Oh yeah, that's what we're doing. We were supporting the Marines in the DMZ. And so on my third trip back-- second trip back? Third trip back?-- my youngest daughter didn't know who I was. And I started rethinking my career.

Fairbairn: So you made three tours of duty in Vietnam?

Smith: Four.

Fairbairn: Four, and how long were you deployed each time?

Smith: Four to six months.

Fairbairn: Then you'd come back for?

Smith: Six months-- well, it got even closer. I mean, my last two were pretty much back-to-back.

Fairbairn: So you were in for how long before you decided to rethink your career choice?

Smith: I put in my papers and got out after six years.

Fairbairn: So you got out in '69?

Fairbairn: Yeah. So then went looking for a job. And, of course, the education is a classic aerospace education. So the aerospace guys were very interesting. And, of course, Naval Academy guys got almost a default job at IBM if they wanted it. And at that Perot's EDS.

But I didn't want to move. I had just bought a new house in Orange County. So I didn't want to move. So Lockheed wanted me. And they took me up after everything was pretty much over.

They took me up and said, OK, Gary, you're going to be-- they took me up to the top of this hangar-- you're going to be the 15th row down, and the fourth desk over. And so I went home, and said, oh, we got problem, honey.

Fairbairn: This is some engineering job, or design job?

Smith: Oh, yeah, I mean they use to sit there with slide rules and do numbers.

Fairbairn: Designing airplanes?

Smith: Designing airplanes, yeah.

Fairbairn: So you decided that wasn't the best job opportunity?

Smith: Since I didn't want an office, that looked an awful lot like an office. I said, OK, what are you going to do now? What do you want to do now?

I don't have a clue what I want to do. So I contacted some head hunters. And the second head hunter, Joe Daniels was a vice president there. I didn't know most head hunters were vice presidents. So that impressed the hell out of me.

Fairbairn: Right, sort of like bank VPs, right?

Smith: He was Naval Academy, too. And he said, OK, Gary, you want to be a salesman. I said, no, I don't want to be a salesman. He said, this is different. This is electronics.

And it was, obviously, different, because the job was not only-- in those days, it was as much field applications engineering as it was sales engineering because nobody knew what to do with these damn things. And so you would go into an account, and design yourself in.

Fairbairn: How long were at Lockheed then?

Smith: I wasn't. Oh, I never went. So I decided, OK, I'll try it, Joe.

And, he said, great. TI wants you. Motorola wants you. But TI wanted me to move to Dallas. And Motorola wanted me to move to Phoenix.

And at that time, Phoenix was really challenging the Valley as the center of semiconductors. So I picked a small company called National Electronics, which nobody's ever really heard of that did tubes and power semiconductors.

Fairbairn: What were the products they were making?

Smith: SCRs, and as far as tubes are concerned, thyratrons.

Fairbairn: Those were the actual products. They weren't building stuff out of those?

Smith: Oh, no they made the actual products.

Fairbairn: I see, OK

Smith: So, OK, I'm a sales guy, I guess. And it ended up that one of the things that helped me a lot was I could design heat sinks. And most of the design engineers, they could do the circuit. But they didn't have a clue how to build heat sink stuff, and how to mount these things.

So I would go in and do that part of the design form. So this is in 1970 or something by this time?

Fairbairn: Yeah, well '69 is when I started with National. I only lasted a year. I sold too much. So I sold out their line of 35 amp, 450 volts SCRs, which meant their main customer was Reliance Electric back in Cleveland. And so Reliance got shorted on their SCRs.

And it was a big political mess, especially since my boss, who was really semi-retired. He had been the vice president of sales. He moved out to Newport Beach to run the west coast.

And he said, oh, there's no SCR business out here. And then I got this big order, and got him in trouble. And so he decided he didn't want me around anymore, which was fine with me because it was-- anyway, weird job. It was not on commission.

It was just a weird job. And I didn't know enough to know that this is really a weird job. And I should be looking. But since the order was taken away from International Rectifier, they hired me almost immediately.

So went to IR. And the thing I picked up in IR that really helped me was they were very slow on failure analysis. So I went in, and had the failure analysis group teach me how to do failure analysis.

So I did my failure analysis in the field. So we had failure analysis. A part failed, ah, we need to get this checked out. I said, great, give me a hacksaw.

And I did all the failure analysis for my territory. And so I actually was salesman plant applications guy for my territory. Then my best friend had the territory next to me. And he used me as the applications guy for him. So that worked out pretty well.

Fairbairn: So, again, you were selling like rectifiers?

Smith: Rectifiers, SCRs.

Fairbairn: Who were your customers?

Smith: Well, the biggest customer is PTI. I forgot what it stood for. But I sold to Jet Propulsion Labs, Caltech, Disney.

Fairbairn: So these were going into mechanical equipment that needed electronic control?

Smith: Motor control, motor drives, power supplies, got into the aerospace company that did the computer for the moonshot. So got design into that. So it was interesting. I mean, you got around all these different things.

The Disney thing, they were designing people movers for Disney World when they were putting Disney World together. So you got a little bit of everything. So one night I was at PTI. And the chief engineer and I got to be really good friends.

And we were working on design. And he was getting frustrated. He said, you know, if you could give me a 450 volt transistor, I could take a lot of money out of this drive. I thought, really?

So we went over the circuit, and went through what the changes would be. And it was eye opening. I said, yeah, you revolutionized that. You could really take your competition to the wall with this.

So I went into IR and said, hey, I got a business plan for doing transistors. And they said, we're not in transistors. Get out of here. Don't bother us.

So I looked in the semiconductor book that had all the semiconductors, and all the locations. And right down the road was TRW Semiconductor. And they made power transistors, military grade power transistors.

So I went over there, and said, hey, I got a business plan I want to talk to you about. Come on over. Let's see what we can do.

So I basically went down to R&D. They had one that they were working on. They were working on that. And they were working on the Schottky diode.

So I became basically the program manager and took those out of R&D, and took it to the market. That whole transistor thing was really a lot of fun. And then the Schottky diode was interesting because there was a quality problem with Schottky diodes.

Motorola had them on the market. But there was a quality problem with them. So they weren't selling very well. And we were having the same problem in R&D.

And so one day out I was leaving the office. And they were blowing up Schottky diodes on an oscilloscope to try to figure out what was going on. And I looked at it. And I walked over.

And said, I think I know what you got. So I tuned the oscilloscope, and got it set up. Now try it. And it was reverse DIDT, one of the more common failure methods on SCRs. And since I'd been doing all the SCRs, and failure analysis on the SCRs, exactly what it was.

And so we fixed-- the guys, once they knew what it was, they knew how to fix the problem. And so we went out with the Schottky diode. And we took the Shottky diode market number one place away from Motorola. And the Darlington transistor was a 450 volter. And we took that away from RCA.

So that was a lot of fun. But it was also my first heartbreak because we went back to corporate and said, hey, we need another fab because we're dealing with commercial [companies]. The volumes are much higher than the military.

And they shot down the fab, and shut down the group. So I came up to the Valley.

Fairbairn: So how long were you at TRW?

Smith: TRW was about four years.

Fairbairn: So that was a good run.

Smith: Yeah, that was a lot of fun.

Fairbairn: So then you decided, OK, time to move on. And you found the next opportunity up in Silicon Valley.

Smith: Well, I looked around. And Orange County was trying to be a main computer center, do the workstations like DEC was doing in Boston. RCA was down in Orange County. And there were a couple more that were down in Orange County, because the aerospace guys were shutting down, or cutting back.

And that was freeing up a lot of engineers. And then they were trying to do the semiconductor thing. But they just didn't have critical mass.

And it was obvious that if you wanted to be in semiconductors, you had to go to the [Silicon] Valley. That's where the critical mass was. So we came up to the Valley.

Fairbairn: And that was what year by now?

Smith: '76.

Fairbairn: And what company was that?

Smith: Well, originally it was supposed to be Fairchild. One of the things about Fairchild that made the Valley possible was it was a really flaky company.

Fairbairn: People kept leaving it?

Smith: Oh. They tried to hire me as a sales client applications guy when I was down in Southern California to a territory that couldn't support the position. So I said, there's not enough business there for a sales guy. Oh, yeah, there is.

Sure enough, the guy that took the job, they laid him off nine months later. So they had me come up to the Valley to take care of their discrete line.

And so I got here.

Fairbairn: Product manager position?

Smith: Marketing manager. I called in to see what time I was supposed to report. And the secretary answered the phone, and says, oh, he's no longer here.

So I got transferred to his boss. And his boss says, oh, you want his job? Come on in. I said, OK, Fairchild is too flaky for me. I'm not going to do the Fairchild thing.

So a headhunter--

Fairbairn: So did you ever report for work at Fairchild? Or you just didn't go in?

Smith: No, I just didn't go in. He said, hey, why don't you have lunch with Signetics. And I said, I'm sort of a discrete guy. And they don't make any discretes. He said, don't worry about it. It's just a lunch.

So I go to lunch with Howard. I can't remember his last name. And what happened, Phillips had just bought Signetics. And they had primarily bought Signetics for their manufacturing expertise.

What they found out was that they had a lot of great products but no marketing. So they were hiring people to take over the marketing slots. So Howard was responsible for putting in central marketing.

He said, you know how to put in central marketing? Well, the thing about TRW was QT Wiles was the head of components at TRW. QT had a difficult ending to his career. I want to say that.

But he probably should be in [the Hall of Fame]. I have this wall of fame for people that should be in. And you're one of the guys that should be in it, you and Bob Walker. QT put together a way of doing marketing for high tech things.

And USC picked it up. And from USC, it spread throughout the country. And he probably is responsible for almost everything that had to do with marketing in the high tech for a good 10 years.

Fairbairn: QT Wiles was the chairman of VLSI Technology when we first got started, when we first got funded.

Smith: So you know QT?

Fairbairn: I know him a little bit, mainly by reputation.

Smith: He's an interesting character.

Fairbairn: So he had been at TRW. And you had learned about marketing from him?

Smith: Yeah.

Fairbairn: So what happened at Signetics?

Smith: He said, do you know how to put together central marketing? I said, well, yeah. Got a napkin, drew it out for him. I said, here. OK.

So that was the end of lunch. And I went back to the hotel. And he gave me a call, and said, when are you coming in? So I went into Signetics.

And Phillips when they found my background-- oh, one of the things we were getting into at TRW that was driving the new fab was we were getting into the ignition systems of all the car companies.

So Phillips found out I knew about the automotive market. So I got the automotive market. Then they found out that, well, why don't you take the consumer market? Pretty soon I had the industrial market too. At one time, I did something in most everything.

My favorite was I headed up the design group for what we would call today the IOT microcontroller because they were doing a microcontroller for a home. That was a specification.

I hear IOT stuff today. And it's just the same old thing we were doing back in the late '70s. No different. The group went out and talked to various customers in various areas.

The one I remember was Black & Decker. Black & Decker had a minor PR problem in their big drills, handheld drills, that the steel guys use when they're up on the high iron. When it would grab, when the bit would grab, it had a tendency to flip the operator off the building. So they wanted something that would stop the drill when it got stuck. And, of course, a microcontroller was an easy answer for that one.

So that was pretty much the big success because we ended up getting into cars.

Fairbairn: Were you actually in competition with TRW?

Smith: No. They had dropped out of the commercial business completely. And they weren't doing anything integrated circuit-wise. They were just doing discretes.

Now, my big mistake there was I headed up a tiger team to get the 2650 to market.

Fairbairn: For the record here, what was the 2650?

Smith: 2650 was an 8-bit microprocessor. In fact, it was the best 8-bit microprocessor on the market. When I was at Dataquest, I was on a TV show with Frederico Fagan. He was the guy that did the Intel one, 8080.

And we knew each other. And tried to figure out where we knew each other. And finally I said Signetics. And he said, the 2650!

I was amazed that anybody remembered the 2650. This is not a name that went down in history. He said, yeah, best microprocessor out there, fantastic microprocessor.

Fairbairn: So even he was a fan?

Smith: Yeah. He said, you guys know what you did wrong? I said, yeah, I know what I did wrong. What did you do? I forgot about the software.

And that's what Intel did a great job. They had the blue box development system. They went out, and all the distributors did software training. When IBM came along, and didn't make up their mind what

processor they were going to use, they had something like 2000 programmers that knew how to program the 8080.

And I think Motorola at the time had 200. So it was really no question. And the 8080, for that application, was better than the 2650.

Fairbairn: So, anyway, back to the 2650. You got responsibility for that.

Smith: Yeah, so, I finally got it in a game in Korea. It was enough to keep it going. That was my big failure in life.

Fairbairn: You learned the software lesson at that time?

Smith: I learned the software lesson at that time, the hard way.

Fairbairn: So any other notable events associated with Signetics? You were there for six years?

Smith: Yeah, I was there for six years. One that interesting, that feel down. It was part of this.

We drank a lot back then. I don't know if you remember that, but we drank a lot back then. And, in fact, we'd sign out to the Signetics buildings so the secretary knew where we were.

And we used to sign out to the Homestead Building. And the Homestead Building was Victoria Station. And it's where Signetics hung out, and where AMI hung out Somebody else hung out there.

But those were the main ones. And as we were growing, and AMI was not growing, we were hiring a lot of their people. In fact, we hired the hostess as head of customer service for Signetics.

I was there one day, or night, afternoon. And there was three guys sitting at a table by me. One was Phil [from AMD]. --These are bipolar. These are bipolar days. A [Signetics] bipolar designer, and then another one was the top national bipolar designer.

And they're sitting at a table. And I was listening to the conversation. And this is where I figured out critical mass. You don't tell your competition what you did right.

But it was perfectly all right to tell your competition what you did wrong. And these guys all worked together at one time at HP. So they were telling all the mistakes they were making, and just dying laughing.

And it dawned on me that they were cutting months out of their design cycle because they were being told what paths not to go down. And so that is really what the critical mass is all about.

Fairbairn: You're talking about critical mass in Silicon Valley or whatever?

Smith: Yeah, in Silicon Valley. And, in fact, my first class paper in English was on bebop jazz. And it was the same thing. I mean, bebop jazz happened on four blocks of 52nd Street in New York City.

And these guys would play their set, then go listen to the other guys. And in jazz, copying is a no-no. I mean, if you want to ruin your reputation, you copy somebody. But what these guys were listening for was what didn't work.

So it's this whole negative feedback that was the same thing in Silicon Valley. And I sort of studied it a little bit in other areas. And it's the same thing. If you can get this negative feedback going, you're fine.

L.A. couldn't do it because they're too spread apart. I mean, we all went to the same bars.

Fairbairn: Was The Wagon Wheel still open at that time?

Smith: Wagon Wheel was still rolling for Fairchild. I had a couple meetings there. National used Lawrence Station. And we used to trade customers at Lawrence Station.

We would have one customer for the morning. And they'd have him schedule for the afternoon, and vie versa. And we'd go to Lawrence Station, and eat. And then shift. And take the other guy back. We were that close.

Gary Sommers is famous for working for three companies and not changing a parking place. So that was the Valley. Don't know if we've lost some of that, because we have gotten big. But, anyway, we seem to be doing OK.

Fairbairn: Maybe the Google, Facebook, and other people all converge on some other place.

So what brought an end to Signetics? Not the company, but in terms of your activities there. And what was the impetus to move on?

Smith: I got laid off. That was one.

Fairbairn: That will do it.

Smith: Yeah, I got laid off.

Fairbairn: Signetics was going through a hard time by this time.

Smith: Yeah. Plus the fact that I had Pete Rose? I'm not quite sure, anyway, Rose. He was the chief engineer at GETV. And he was out.

And I had always been in charge of the customer owned tooling business at Signetics because nobody else wanted it. And plus the fact I was bringing in things like we did the first Ford cruise control, the design. So got that business.

Fairbairn: So you're doing custom designs?

Smith: We were doing custom designs.

Fairbairn: Is this an MOS?

Smith: It's all bipolar. They had just switched to-- they were starting to do MOS because of Atari. And we were building the ROMs for Atari. 2650 was NMOS design.

So we were just getting into that. But we really didn't have the manufacturing down. In fact, if the 2650 had been successful, it would have been a disaster because we just couldn't produce volume.

We finally got an AMI guy in that showed us how to do ROMs. And we were number two in that business for years, and years, and years. In fact, Atari was our biggest account for awhile.

And that was all based on the fact that when they were little, the guy that have covered Atari-- or had the territory that was in-- Atari was going through distribution. And he came in, and said, hey, Gary, can we take these guys direct?

So we took them direct. And we were the first company to treat them like a grown up, or whatever. So we did a lot of business with Atari. And that was our NMOS business.

But Pete came in at lunch, and said, you know what, Gary? CMOS. If you want to do anything, CMOS. If you gotta go, CMOS.

Fairbairn: This is Pete from where?

Smith: From GE. He said, I'm going to start designing all my circuits in CMOS.

So it was that. And the gate array business was starting to get popular, starting to percolate. And it was obviously the way to go.

Fairbairn: This is early '80s?

Smith: Early '80s, yeah. So I ended up at Telmos, which was Jean Hoerni's last start up.

Fairbairn: So you worked for Jean Hoerni?

Smith: Yeah. What he really wanted to do with that company was he wanted to build the 40 volt DMOS products for the automotive guys. That was his dream, but he never could get that thing going.

But what he did do was we had a gate array that we got to 450 volt outputs. And those started getting into the printers, and some other military circuits, and then actually went into pacemakers for the defibrillator circuit.

Fairbairn: You need that high of voltage?

Smith: You really didn't. But they didn't know that. In fact, it took years, and years, and years for the medical field to figure out that they were killing people with their defibrillators. So they had to lower the jolt. It really took a long time before they figured that out.

They insisted on the 450 volts. Tremendous-- it was one of the things. I said, you've got to put on the pacemaker, do not tightrope walk while you have this, because it really knocked you down. So that was Telmos.

I lasted five quarters there. I lasted longer than any of the other guys who were involved in the sales end of it.

Fairbairn: You were selling gate array?

Smith: Yeah, we were doing gate array.

Fairbairn: And these are hand layout?

Smith: Oh, yeah, we had the light table. And they were analog digital gate arrays, too. So they were using a light table.

And that's when I figured out that, actually, the analog flow is auto-mateable, but nobody's doing it. They're going down the CPU route. And that's just the wrong way to go, in my humble opinion, which I say fairly loudly every once in a while and nobody pays any attention.

Because you had Macros in the drawer. That was your gate level library. You flop them on. And you draw them out. That's how you put together the gate arrays.

And I found out about timing problems with-- we were doing a 20 gigahertz ADD.

Fairbairn: Not 20 gigahertz? Megahertz?

Smith: Megahertz, yeah, No, not gigahertz. Or, that's what it was supposed to be. And then we got the parts out. And they were doing eight.

And so we had a picture up on the wall. And we were looking at it. And it goes to the edge. And then they would make the turn.

And so when you make turn, one of your routing lines was longer than the other routing lines. And that screwed up the timing.

Fairbairn: You learn about interconnect delays and such?

Smith: Yes, you do. So that was fun.

Fairbairn: So what happened at Telmos?

Smith: What happened was it was a bad board. It was just one of those situations. The board demanded a forecast of $12 million for whatever year it was coming up. And I said, wait a minute. Our fab will only do-- oh, they wanted $15 million.

I said, look at. Our fab will only do 12 if it was all loaded for the rest of the year. So eight, maybe nine, but not 15.

Fairbairn: 15?

Smith: 15 is what they wanted. And so I was told that I needed to turn in that number. And I said, my reputation might not be that good. But I'm not going to lie to a board of directors, bad karma.

So he said, well, then, I'll have to fire you. I said, no you don't. I quit.

So I left. And I got a call in September, which was six months later, from my old boss. And he said, did you have a month when they were going to fire the president there? I said, yeah, it was September. I said, you're right. Did you have a week?

So that was sort of when the company started falling apart. And I think Jean got tired because he wasn't getting his 45 volt [logic].

Fairbairn: Was he the CEO or the chief engineer?

Smith: He wasn't even chief engineer.

Fairbairn: Chief scientist or something?

Smith: Yeah. And he saw the company was going a direction that didn't really interest him. So he wasn't paying much attention to it. So that's when it started falling apart.

And I started training new sales managers. Every time they fired one, none of them would last more than a couple of months, or six months. So I'd go in. And I'd talk to the guy. I'd train him.

But it was a fun company when it started off. It was just one that just didn't make it. And they finally got bought.

Fairbairn: So then you moved over to?

Smith: Plessey had been chasing me for actually quite a while. And they wanted me to put together their ASIC operation in the US. And so I said, OK. Plus the fact they had moved. So they're in Irvine, which was right by Laguna Beach. And I love Laguna Beach.

Fairbairn: So you got to move down south again?

Smith: So I got to move south again. Bought a new house there. And came in as their BUM, Business Unit Manager.

Fairbairn: This is '84?

Smith: In English, that's what they called their VP's. And so I put together the unit. And plus I was acting chief engineer for the US operations.

Fairbairn: So what was the strategy for that? What kind of product were they entering the market with?

Smith: It was a good gate array, not great. But it was stacked up with everybody else. They also had ECL gate arrays that the military liked. So we got those.

Fairbairn: And was there good design automation support for it?

Smith: Oh, yeah, we had our own design automation. In fact, when they shipped it-- what was it called? Megacell-- the megacell system. When they shipped it, my CAD guy said, hey they forgot the front end.

So I called them and said, no front end on this. Front end? You know, graphical entry and all that. You mean you guys don't just code?

I said, not in the United States. We don't have a front end.

Fairbairn: So this they had to place in route to do the physical design, is that right?

Smith: Yeah.

Fairbairn: So did they have a hardware description language they were coding with? Or were you just write net list?

Smith: I think they were just writing net lists, but I'm not positive.

Fairbairn: Probably at that time.

Smith: So I got a front end, and glued it on to Megacell. And actually it very successful.

Fairbairn: Did you get one of the commercial packages, like Daisy, or Mentor, or something like that?

Smith: No, we just used Megacell.

Fairbairn: But I mean for the front end part.

Smith: No, I got-- there was a company-- I can't remember the name of the company-- that did a PC board layout entry.

Fairbairn: I may know the name of it. But I can't remember right now.

Smith: And so I went up there. And I said, what's your output? And they said, we use pins. And I said, OK, I can work with that. I want to use your front end. We don't do semiconductors. You do now.

So I glued it on. And it worked fine. Actually, it was a good system. They had a simulator that went with it. So we got the simulation part done.

Fairbairn: So you took that to market?

Smith: Yep.

Fairbairn: What happened with that? What market did you target?

Smith: We were general. We went from military to-- lot of military, did a lot of disk drive work. Right then, the disk drive market was hot.

And I'd done disk drive work at Telmos because everybody was building a disk drive. And everybody needed ASIC for the disk drive. That was the biggest market back then.

So we did well. And then GEC--

Fairbairn: Did you have to fab over in England?

Smith: We fabbed in England mostly. I was trying to get GI to do some fab for us. I was almost close with that one when the GEC takeover battle began. And then Plessey just closed down their ASIC operations because it was too expensive.

So that's when I got the worst job I've had. And that was with US2, which was the US division of ES2, and where I met-- well, I actually I had met Saxby at Plessey.

Fairbairn: Yeah, Robin Saxby was running that right?

Smith: Yeah, so he originally was running that. We both commiserated one time about who lost the most money.

Fairbairn: Between US2 and ES2.

Smith: No, between us, Robin and I, because the French just screwed us to the wall. When the French took over ES2, they ended up-- well, what happened, this is an interesting story.

So what I brought to the party was the Plessey's now defunct marketing plan for the next year. And we were going with e-beam to do our prototyping.

Fairbairn: At Plessey you were? Because that was ES2's business.

Smith: Yeah, it was the same business plan. It was the Plessey business plan. Pat O'Hearn ran the UK, and rest of the world.

And he really was the one that put together that business plan on e-beam. Robin didn't want to bring him over for some reason, probably political, but you know. And so he brought over Gary Duncan who was the marketing manager to implement the business plan.

Fairbairn: In the US?

Smith: No, in the UK. So I was at US2. And Pat went to-- were building the plant in Grenoble, the fast turn plant in Grenoble.

So he, instead of going to ES2, he was hired on to run Phillips' ASIC operation. So he went down, and he looked at the plant, very interesting plant.

So he said, what process are you running? And the French sort of stuttered, and stammered, and ended up they didn't have a process to run in the plant. They were just building a plant.

And so Pat said, OK, we'll give you the Phillips process. And you can do all of our prototyping. Oh, that's great. That's wonderful. Pat, you're such a nice guy. He said, just sign this contract and we'll be fine.

So they signed the contract. And Pat got to the airport, and called me up dying laughing. Pat, what did you do?

They signed a contract that said they will never go into production in any of the designs in this plant. Pat, that's where the money is. He said, yeah, I know, stupid French.

So that's what sort of blew up ES2. That was sort of the end of it. And, of course, I wasn't very popular.

Fairbairn: So the contract was between Philips and--

Smith: ES2.

Fairbairn: ES2 plant?

Smith: No, it was for ES2, period.

Fairbairn: Which prohibited ES2 from going into production using this process that they were getting from Phillips?

Smith: Yeah, they could just do prototypes. So that was the end of ES2.

So I went over to IMI. That was fun. Nothing exciting there, IMI, they're the ones that develop the first CMOS gate array. And they came out with the net list that LSI Logic adopted, and enriched, and became the standard that Synopsys used for their synthesizer.

And the reason Synopsys won was this was the first company vendor that came out with a standard gate array netlist. Everybody else was using their own proprietary.

Fairbairn: Netlist format?

Smith: Netlist format, yeah. And all the library elements. So Synopsys won.

Fairbairn: So who was the head of IMI?

Smith: Frank Diverse.

Fairbairn: And they were still doing all manual design, right?

Smith: Oh, no, they bough the Mentor workstation. In fact, when I was there Mentor came down and bought it back so they could put it in their museum. They used that. And they used a Silver Lisco layout tool.

Fairbairn: Because they had started doing all manual stuff.

Smith: Oh, oh, sure, way back when. And then we put in the fast turn fab, following a book called America Can Compete, which was based on a study that IBM did a few years earlier. And it basically was a fast turnaround, how to get product through--

Fairbairn: It was just a metalization facility?

Smith: Right. But, basically, the basically said you could do it with anything. You could go into production in two weeks if you wanted to.

Our fab, we could turn around the prototypes, if we really wanted to, and build up for it in two days. That actually was a lot of fun putting that together. Unfortunately, Frank didn't take outside investment.

When we were moving to one micron, I took a look at the cost. And there's no way he was going to make it. I knew he wouldn't go out and get any money.

So at the time, we were doing some timers for IBM. And it looks like a good market. So I wrote a business plan, and gave it to Frank. Said here, get out of the gate array business. Go after timers.

Which he did. He thanks me today. And, of course, I left because I wasn't interested in timers.

So then I went over to LSI Logic and finally got the hell out of management and became a methodologist. And that was a lot of fun.

I was pretty much the evangelist for RTL methodology in the Valley. Plus, the fact is it was my furthering education. I mean, working for Jen-Hsun Huang, and then having the Sun guys, and the SGI guys, that was two of my main accounts. I learned so much of that job. It was just unbelievable.

Fairbairn: So what were you using for the RTL language?

Smith: Verliog. Actually, at one point we were shifting to VHDL. All the semiconductor guys were shifting to VHDL.

Fairbairn: Everybody thought that was the future?

Smith: Well, they didn't want to fool with Cadence. They were just tired of Cadence after Cadence bought Gateway. They just said, OK, let's get out from under this. This is ridiculous.

In fact, Cadence was almost too late in opening up the language. VHDL is a much better language. Still to this day, I've got a VHDL bigot t-shirt somewhere in my collections.

But the thing with Verilog was that I could write code, put it away, pick it up a year later, and I couldn't remember what this was supposed to do. And VHDL was very explicit. You knew exactly what you were doing. It was a descriptive language.

And number two, was Cadence used to hate me for saying, was it wasn't timing accurate. It missed a couple of major things.

Jen-Hsun had come up with what we called VSNQ, Verilog, Synopsys Quad Designs, Motiv. And MDE was our layout tool. And that worked great. And that's what everybody in the Valley was using.

I sold more Synopsys synthesizers than the Synopsys sales guys did, which really pissed them off. But they got a lot of business.

The quad design guys were amazed. They called me up, and said, we just got an order because they said, you said they had to buy it. OK.

What do you do? I'm a design methodologist. Who do you work for? I work for LSI Logic? Well, should we pay you commission or something?

No, you don't pay me commission. So they'd come up and buy me lunch every once in a while every time they got a big order. That was a lot of fun.

Fairbairn: All right, well, let's move on then. So you learned a lot with LSI Logic about the whole methodology world. And then you left and became a design methodology consultant?

Smith: Yep, went out on my own until I got bored. And it was funny because I love the work. It's just I didn't like the sales stuff in front of it. And so I said, hell with it, and contacted Dataquest.

And, fortunately for me, Dataquest was just getting out of a bad spot where they had been bought by Nielsen. And Nielsen came in, and decided that they didn't need all these old guys with big salaries, that they'd get rid of them, and just hire a bunch of MBA's, and have them write think reports, and everybody would be happy.

And, of course, Dataquest business just tanked. So then Gartner bought-- was it Gartner? No. Who was the company? I forgot the company that bought Nielsen.

Fairbairn: Gartner Dataquest was the--

Smith: Well, Gartner came in a few years later and bought the company that bought us. Is that right? Anyway, she went back to the old Dataquest model. So they were then in the mode of hiring old farts that knew the industry. And so they hired me to head up their design group.

Fairbairn: So what was your responsibility there?

Smith: I did all the design CAD stuff, so mechanical, and architectural, and electronic.

Fairbairn: So a lot of stuff you didn't have any previous knowledge of? You knew the electronic stuff.

Smith: Yeah, well I knew some of it because of the motor drive days and all that. So it wasn't all Greek to me. And we had good analysts.

Fairbairn: So how do you find the analyst business, the market data business, versus the actual design business?

Smith: I liked the whole thing. I ran a little differently than most people did because I knew both sides. So I had most customers were EDA. But the second group, which was significant, was semiconductor companies.

So I was basically doing methodology jobs through Dataquest, and have continued to do it.

Fairbairn: So you're continuing to consult as a Dataquest position?

Smith: And now I do with Gary Smith, ED.

Fairbairn: So you had quite a run at Dataquest, became widely known throughout the industry.

Smith: I was told when I got there that I had to take the quotes away from the ex-analyst that ran the place, because he was getting all the quotes. And, of course-- the guy that had come in for a year, he did not like being an analyst.

So I said, OK, I'll see what I can do. Well, when I was at Plessey, this new reporter had joined EE Times. And he was green.

But he was really willing to learn. So I spent some time with him going through the industry, and semiconductors, and what was going on. His name was Richard Goering So I knew Rich from way back.

I had all the quotes in three months. Rich would call me and stop calling the other guy. So that was fairly easy.

Once the industry got used to me, because they had said, well, you can't do this EDA stuff. You've never worked for an EDA company. I said, no, but I've built my own tools. Does that count?

And they didn't especially want that to count, but since I blew the whistle on Dracula, told the world Dracula was broke. And Cadence didn't like that either.

Fairbairn: What was the problem with that?

Smith: Oh, they hadn't done any work on it. I and a couple of the engineers went in, and said, hey, guys, you can't do a whole design. You're running too slow. You're really missing a lot of the mistakes. You've got to rebuild Dracula if you want to keep your number one position.

Fairbairn: This was a major design rule checking tool from Cadence?

Smith: It was the market leader. It was the market leader four years after it stopped working, which always amazed me. I wondered how many designs just didn't work because of Dracula.

Fairbairn: It stopped working because the field had advanced beyond what its capabilities were?

Smith: Oh yeah, and they weren't putting any money into it.

Fairbairn: They were just milking it.

Smith: They were just milking it. So they weren't very happy. I got a call when I said Dracula was broke. Gary, we need to talk.

So I went in. And I learned something from that. So we start talking. I start telling them what's wrong with Dracula.

And I'm getting all these blank stares. And I said, so how many people in this room have run Dracula? Nobody, there was no engineers in there. All the marketing at that time at Cadence, they weren't engineers.

So they didn't have a clue. So after they said, well, none of us. I said, OK, I know the problem. And I left.

And even with Wally, they first wanted to talk to me about LSIM, their old simulator. We want to tell you what we've done with LSIM. I said, oh, you mean, Dog-sim? Because that one was slow-- they hadn't done anything with that.

Fairbairn: I'm sorry. What was the product?

Smith: The gate level simulator.

Fairbairn: It was previously another product? I didn't understand.

Smith: I said dogs. It was dog slow. That's what we called it in engineering.

One thing, Wally and I go way back. We go back to.

Fairbairn: This is Wally Rhines at Mentor.

Smith: Yeah. We go back to Speak and Spell. One of the things I did at Signetics was I-- I guess drove is a harsh word-- TI out of the ROM business because they basically were not doing well. And I got into a couple of their divisions.

And finally corporate calls me. And says, OK, Gary. Why don't we write a corporate contract with you so all the divisions that need you can use you? So one of the guys sitting in the corner was obviously the ROM guy.

So I went over to talk to him afterwards.He asked, “How do you do it?” Hey, it's volume. We got the volume. And so we get the price. It's the same curve you guys use, except you didn't start soon enough.

So Wally called. And said, could we have a meeting? So I flew out to Lubbock, Texas, where the Speak and Spell guys were. And he had bought into the GI trap with the razor blade issue, where you use the GI, they bomb the price on the GI processor. And then you're stuck with their nine bit ROM.

He said, do you support nine bit ROM's? Are you going to support them? No. I was afraid you were going to say that.

So I've known him since then. And I followed his career. It was obvious from our first meeting that Wally was going someplace, and he was going to be an important person in the industry. And it worked out.

And he joined Mentor, saved Mentor, about a year before I joined Dataquest. A lot of respect for Wally, he's done a great job. He's doing a fantastic job right now with ESL.

Fairbairn: You joined Dataquest in what year?

Smith: '94.

Fairbairn: So who was handling design automation EDA stuff before that at Dataquest?

Smith: Well, Ron Collette had been running it. And then he left to start Collette International. And then Bob-- who I can't remember his last name-- was hired from from Altera. And he lasted less than a year. And he just did not like the job. He quit. So I filled that slot.

Fairbairn: So you've really been in that kind of analyst, consulting role since then in one form or another. Is that sort of you found a home there? In terms of not Dataquest, but in terms of the kind of work you do? How would you describe that in the context of your career?

Smith: Well, you don't have to tape out. And you don't have to get a new product out the door. Engineering is a cyclical workload. Or sometimes it's not even cyclical because the cycles keep collapsing on you.

So this was pretty steady. I got to travel more. I enjoy the traveling. I enjoy giving the talks.

I shoot off my mouth. And sometimes people actually believe me. And that makes me happy.

And I could make some changes. I've made changes. I've helped, I feel, that I've actually helped the industry, not only the EDA industry, but the semiconductor industry. I'll continue to try.

Fairbairn: So Dataquest eventually shut down that operation?

Smith: Shut down in 2006.

Fairbairn: Were their sort of significant milestones along the way that you want to describe? Or should we sort of move to Gary Smith, EDA at this point?

Smith: Not really, a lot of stuff I've done, but nothing sort of stands out.

Fairbairn: So let's talk about the EDA industry in general. You were a participant up until '94. You were a user. You were an engineer, and a design consultant in some respect.

And then you really became an observer and a spokesman for, if you will, the EDA industry, in one form or another since then, since '94 to 2014. Is that accurate?

Smith: That's right.

Fairbairn: So, what 24 years or something? Is it that long?

Smith: It's been a long time. The one thing that I've done that really I've enjoyed is they asked me to join the design TWG of the ITRS.

Fairbairn: So for our readers here, TWG is?

Smith: Technical Working Group.

Fairbairn: Of the?

Smith: ITRS is the semiconductor roadmap.

Fairbairn: International technology roadmap something or other.

Smith: Yeah. And I've been given the cost chart. The cost chart is mine. And the power chart is now mine also.

Fairbairn: That's projecting what's going to happen in terms of cost?

Smith: What's going to happen, what we need to do to contain the costs.

Fairbairn: In this case, the design costs?

Smith: Design costs, and what are we doing to contain the power problem, and decrease the power?

Fairbairn: Both of which are going through the roof.

Smith: Yeah, but they never get through the roof because we always figured out some-- how I got in it was somebody put up this-- and then you see them every once in a while, this up and to the right chart.

And it's going to cost us $100 billion to do a design. No it’s not. Come on. Give me a break. Because we're going to do something about it.

So I try to pick what we can do to cut the cost. Or what can we do to cut the power? And then I draw the graph. That's where you get this jagged line.

Sometimes it keeps going up too far. Like right now the software stuff is going up too far.

Fairbairn: Going up too far in terms of?

Smith: The power, or the cost too, power and cost. Right now, I've been following software really since 2002 because it's so important. You just can't separate. We're moving up to ES level, Electronic System level. And that's where you do concurrent design of hardware and software.

And what we're running into now is the reluctance by the software developer to change. They're slowly but surely changing. But it's difficult.

If I want an answer, I call up the supercomputer guys and talk to them. And they usually have found an answer to the problem.

Fairbairn: So when you say the software people are unwilling to change, what kind of change do they need to make in your mind?

Smith: Well there's a couple of things we ended up taking off of the power chart, which is why it's sort of out of control right now. And one is accepting a new language. They don't want to leave C, C++.

And the other is the use of transactional memory. And they don't seem very interested in buying workstations that have transactional memory unless they work for IBM, because all of IBM's workstations now have transactional memory.

Fairbairn: So what would be the impact of changing language? And what would be a better language? Is there a solution now in terms of what that language should be?

Smith: No, that's a big debate. Fortran is the one that's most usable now. But there's a lot of contenders.

It's a double problem because now what's going on in the semiconductor, which not a lot of people are aware of-- I mean, everybody thinks of it as an Intel arm battle that's going on right now. In essence, it's a homogeneous battle versus a heterogeneous war.

And the arm architecture is made to be heterogeneous.

Fairbairn: Heterogeneous in terms of working with multiple architectures

Smith: Multiple architectures, what we need to do to get the power down, get the efficiency so it will also lower cost, is we need to match the processor to the algorithm.

Fairbairn: OK.

Smith: And, again, the software guys don't want to get involved in that. They don't want to see any silicon at all. But that's what we've got to do. And that's where the direction that ARM has been going for quite a while.

And Intel wants one big hunking processor. Or maybe a bunch of the same processors in a heterogeneous environment. But they don't want to address the software problem of matching your hardware to your software.

Fairbairn: So can you summarize what the problem with C or C++ is in terms of generating power? Is it is just inefficient in terms of the code that it generates?

Smith: It's inefficient in the code. It doesn't write to GPU, etc.

Fairbairn: Graphics

Smith: Graphics processor. I don't see any movement to address any of the other network processors, although that is probably C based, but it could be assembly based for all I know.

And there's going to be a series of six to eight different processors that we're going to be fooling with, with different language requirements to do that. Like right now, CUDA is probably one of the best answers for a GPU just because of NVIDIA.

Fairbairn: Is that their in-house language?

Smith: That's their in-house language, yeah?

Fairbairn: Is that K-U-D-A?

Smith: C-U-D-A. So that reluctance on the software side, and then Intel sort of following the path of it's always going to be C++. and it's always going to need a big, hunking processor, and it's got to go fast.

The requirement for a phone is-- the ideal speed on a phone is about 300 megahertz. They don't want a gigahurt.

Fairbairn: That gives them enough performance and keeps the power down.

Smith: It gives you the battery life.

Fairbairn: So those are your current challenges in terms of where you see a couple of the design challenges moving forward?

Smith: Yeah.

Fairbairn: What about on the traditional EDA side? What's been your observation over the last-- you've been involve for so long. It's always been a very contentious industry between the vendors of EDA software and the users of EDA software.

Smith: Yes, it has.

Fairbairn: Yet they're required to work together to mutually solve a problem and be successful. You've been in the midst of that, consulting on both sides. Tell me your observations on that, and where things currently stand, and what the future of EDA is, the traditional EDA?

Smith: One of the things I did when I first got the Dataquest job, was that at that point academia, EDA vendors, and the EDA users, weren't talking to each other. So I've done my best to bring the three together so that they can work, because that's the environment that we need to keep this thing going.

One of the interesting things is that the way the industry is structured is that the big guys control the big sub applications. And the medium guys control the medium size applications. And the little guys have the little ones. So that's how the industry splits out.

So there's almost 90 sub applications. So it's a very scattered industry.

Fairbairn: You have three major players with the big things that everybody needs, and all the sub applications--

Smith: None of them have everything people need. So there's always--

Fairbairn: Well, the big--

Smith: The big stuff--

Fairbairn: The common things.

Smith: Well, the things that you spend a lot of money on, because there's some common things that everybody uses that come from fairly small companies. And any attempt at all in one flow is just sub optimal. I mean, even Synopsys, a few years ago when they came out with their, hey, use all Synopsys stuff and you'll be fine.

If you're using Primetime, the Primetime of that generation.

Fairbairn: That's their timing verifier.

Smith: Their timing verifier, it was sub optimal. You were adding weeks, maybe a month, to your design time because it was slow. It had a hard time eating enough gates. So nobody ever has everything.

We don't have enough actual developers to do it. I mean, there's things like synthesizers that there's only probably about six guys that are really pros at designing synthesizers. It's just a lack of talent because it's a small industry.

The other thing is that EDA's outsourcing industry, it has outsourced their tools from the semiconductor companies primarily. It isn't something that they have developed because when they outsource, the semiconductor companies —(well, did the research on it) basically outsourced the development, not the research, which is why EDA is a 25% business.

It drives Wall Street crazy because it's software. So it should be a 40% business.

Fairbairn: You're talking about profit margin.

Smith: Yeah. But what's happening today with the fab-less semiconductor vendors is they don't have the large CAD groups that the IDM's had at one time. And so they're starting to outsource the research to the EDA companies.

And it's just at the beginning. But there's certain areas. For instance Mentor does most of the research now for the industry, for design for manufacturing tools, those things.

Fairbairn: Now, do they get paid for that?

Smith: They're getting higher margins for that. So the margins are starting to creep up in certain areas where they're doing the research. Now, how far they'll creep up, who knows. I don't think they'll ever get to 40, but they sure could get to 35% profit margin.

And that also changes the relationship between the companies. So one of things you're seeing big time right now is that the nice guys are winning. We've got Wally's always been the nice guy of EDA. And now Lip-Bu has come in and is turning Cadence into a nice guy, a guy people want to deal with.

And then Synopsys has done a horrible job in raising prices. Not that the prices shouldn't be raised. Everybody understands that the magma impact on the industry was significant as far as lowering margins--

Fairbairn: Magma's competition in the place and route business specifically?

Smith: Yeah. And the pricing just got really horrible. The users are pretty generous to the EDA companies. They don't want any of them to go out of business.

You'll get some new guys on the block. And they'll play some games. In fact, one advice I had with Intel when I first started working with them was raise your prices. Go tell them you're going to pay more for the tools because nobody's paying attention to you. You're the worst guy on the block right now.

So Synopsys has done a horrible job raising prices. And it has made a lot of people dissatisfied, let's say, with their--

Fairbairn: You mean, they've kept the prices too low?

Smith: No, they came in and raised them immediately after they bought Magma, abruptly and rudely. So there's a lot of anything-- it used to be ABC, Anything But Cadence. But now it's ABS out there, where people don't like to deal with them. The sales force has just been brutal.

Fairbairn: So they need to raise their prices, but not quite so brutally, or abruptly.

Smith: Lip-Bu is showing how to be a gentleman about this whole thing. And plan it out, and make sure everybody's ready.

Fairbairn: So Cadence went through quite a terrible downturn. Are they starting to recover now?

Smith: Yeah, Lip-Bu done a very good job. I mean, what Mike did to Cadence was horrible.

Fairbairn: Mike Fister.

Smith: Yeah. And Lip-Bu has done a real good job in starting to catch up with Synopys for the first time in a lot of years.

Fairbairn: In trying to catch up with Synopsys?

Smith: Yeah, Synopsys, technically. I know of one hiccup, and only one. But other than that, they've been pretty good. I mean, they've got a good timing analyzer out there right now. They certainly are doing more in the ESL business than Synopsys has.

So both Mentor and Cadence are technically passing Synopsys in ESL. They've done a good job. He's really put it together.

And he, as you can, he's shifted around managers pretty often. He says, oh, you have to perform. Or you got another job.

Fairbairn: So do you see major changes in the EDA business over the next few years? Or things kind of incrementally change? What do you see the future as?

Smith: Every time we go through these major shifts, we've lost vendors. So there's no reason not to expect that we're going to lose somebody.

Fairbairn: Major shifts being, in this case you're talking about?

Smith: Daisy, Mentor, Valid controlled the gate level market. And then Synopsys and Cadence, and Mentor would've been gone if it hadn't been for Wally. Prior to that, all of the leaders in the last generation have disappeared from the market.

Fairbairn: So when you say the transition, though, you're talking about the move to ESL, to a system level design?

Smith: Well, this isn't true systems level yet. What's coming up is true systems level. That's going to be another one that's going to be very interesting.

Fairbairn: So what do you describe as the current transition that threatens the industry?

Smith: I think just getting the product working at the ESL. We still don't have a complete flow. We've got a flow that works. We've got tools that are starting to fit the bill. But it still needs some work on the virtual prototyping.

Software version of prototypes is in pretty good shape. We're getting the silicon virtual prototyping now. That's starting to firm up. So we're slowly, but surely, getting there. And if you miss those shifts, of course the money always shifts up to the next level.

For instance, Synopsys doesn't have an answer for the high level synthesis. And that was the key to their success in the RT level.

Fairbairn: So who is the leader in high-level synthesis?

Smith: , Well it's Calypto. But Calypto is mostly owned by Mentor. So you can say that Mentor really is the one. And then, of course, Cadence just picked up Forte. And so now they've got a strong play. So it's, again, Cadence and Mentor are sort of climbing into the lead.

Fairbairn: OK, so let's wrap things up in terms of your now have your own company, and have since 2007. So seven years or whatever, tell me how that's been, how that's evolved?

Do you see that evolving further over time? How does that look versus what you were doing at Dataquest?

Smith: It looks the same. I mean, it's the same guys. Same people, doing the same thing. We're using the Dataquest business model instead of the Gartner business model. They killed us off at Gartner.

Fairbairn: Which is what?

Smith: Gartner wanted people to spend at least $65,000 to even talk to an analyst. And, of course, we only have a couple of companies that can afford to do that. So we went back to the old Dataquest model, where you can actually become a client at the-- well, the least is $6,000.

The average is $7,000 or $8,000. So it's affordable. It gives you everything that you really need to know if you're a small, medium company. So we built up the client base again to where it was when we were at Dataquest.

We're getting a lot of interest right now from the financial industry. So that's been interesting. And then, of course, the semiconductor companies, as we move to the ES level, they need more and more help in the methodology. Even the Asian companies are starting to come in now fairly hot and heavy.

Fairbairn: So you have quarterly reports about the state of the EDA industry?

Smith: We don't do it quarterly. Quarterly, you can't get the information. So quarterly reports are always going to be incorrect. We'd rather wait. And so every year we come with a market share, and a market forecast right around this time.

And then in September, October usually, we come out with market trends, which is a book that is something we talked about at Dataquest, but never did. We split our market trend book into five different books. So a company that only does ESL tools only has to buy the ESL book. And a company that only does RTL, et cetera.

So that keeps us busy in that period. And then we write reports. I've always got one or two stuck on my wall that I should be doing now. And I get them out when I can get them out. And the women do some.

Fairbairn: Do you spend most your time doing consulting? You consult and write reports.

Smith: Yeah, consult and write reports.

Fairbairn: And all the statistics work, and so forth, is done by your staff?

Smith: Yeah, Laurie Balch and Mary Olsson. Mary Olsson does the collection. And Laurie Balch is the data analyst, and also covers some of the areas for us.

Fairbairn: So is there anything I missed? Anything you'd like to cover in terms of industry trends, your own activities, contributions, observations you wanted to?

Smith: Something I brought up at DAC this year is that we're moving into the full system level work, automotive especially is doing that. And Mentor's been doing a good job with their automotive division.

And when you approach the systems world-- and this I got all way back with QT Wiles-- you have to look at the market completely differently. You have to look at it through an industry of verticals. Dealing with automotive industry is different than dealing with the medical industry, which is different than dealing with aerospace, et cetera.

And in the system, of course, then your product is even different for each one of those. So we're going to look at this. And we're going to have to reorganize the fit this new marketplace that we're dealing with.

We need systems experts, or you don't get anywhere. Without one of the experts, you really can't put anything together.

Fairbairn: You say we, you mean in the EDA companies?

Smith: Yeah. What we did at TRW is we were going after the switching power supply market. So we brought in the switching power supply expert from TRW Aerospace, Peter Wood.

And Peter just made the whole thing work. He's the one that got the app note written that actually worked. RCA had one that you followed the app note, and for some reason the power supply never worked. And ours did.

If you call Peter, you would cut your design time by two weeks to a month on a phone call. And if he came and visited you, he might just knock out the design for you there.

But he was very nice that the way he did that, when we walked out the door they thought they had done the design. I never could figure out how he did that. His English was very smooth, very smooth, very brilliant.

So those are the kinds of guys you need because when Pete gave a presentation, everybody that was doing power supplies wanted to be at that presentation. So that's the entry into the market. You can't do that by just billing standard products and having some customers tell you what to do to make them work.

And then the other thing is, for EDA of course, is that we're going to run smack into the mechanical vendors sooner or later. I'm saying 2022. But it could be sooner than that. 2020, I'm sorry. It could be earlier than that. And who's going to buy who?

So that's a big thing, because these mechanical guys, Dassault's a big company. Siemens is a big company. So that's another thing. Are we going to buy them or are they going to buy us?

Fairbairn: Right, all right, well, Gary, thank you very much for spending a couple hours with us. And I appreciate learning the background and contributions that I wasn't aware of. And I always learn a lot in these oral histories. So thank you very much.

Smith: OK, thank you.

END OF INTERVIEW

