



Oral History of Richard Tedlow

Interviewed by:
Rob Walker

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Robert Walker: We're here with Richard Tedlow at the Computer History Museum in Mountain View, California. Richard, welcome to Silicon Valley.

Richard Tedlow: Thank you very much. Nice to be here.

Walker: You're here pretty often?

Tedlow: I come quite a bit and there's always something new and exciting going on.

Walker: You're in Massachusetts, right?

Tedlow: Yes.

Walker: High-tech is the same there, right?

Tedlow: Certainly, tech is very, very important. I think that silicon technology is more centered in this part of the world now, but because of the presence of MIT [Massachusetts Institute of Technology] and of Harvard in the Boston area, technology will always be important. Right now, biotech is probably, in my neck of the woods, quite a center of attention.

Walker: Tell us about your family.

Tedlow: I was brought up both in Jersey and Florida. My father was an executive of a pharmaceutical and toiletry company. I have a brother and sister; my brother lives in San Diego as a matter of fact, and my sister lives on the east coast. I was married for awhile—my wife passed away and I don't have any children. But I have good relations with my siblings and that's pretty much the story, short and sweet.

Walker: What led you into a career of history?

Tedlow: I became interested in becoming a historian when I was five years old and my mother bought a book called *History Can Be Fun*. Now, at this stage, I was really too young to read but she read it to me. The book just had little stick figures and it was all about the Greeks and the Romans and I was utterly taken by it and became interested in becoming a historian when I came of age. I graduated from Yale in 1969, worked for a year for Prentice Hall, which was a publisher that's been bought by somebody else, and then went to Columbia for my graduate training. By the time I got my PhD, which was 1976, it was

hard to find a job as a historian. But I was fortunate in getting a couple of one-year contracts at Brandeis. Then I went to Harvard and I've been there ever since 1978 teaching Business History.

Walker: Has Harvard been the leader in Business History?

Tedlow: Harvard has been the leader in that field. The reason is that many, many years ago, the Strauss family of Macy's established the Strauss Professorship of Business History so there was always funding for this field. We were extraordinarily fortunate at the beginning of the 1970s in that a man named Alfred D. Chandler, Jr. became the Strauss Professor of Business History and he's the man who really brought business history into a new age, into an age where it was not bounded strictly by its own rules, but reached out to sociology, to economics, to business academics. His successor as the Strauss Professor is Thomas K. McGraw. Both Tom McGraw and Al Chandler are Pulitzer Prize-winning historians. Both of them brought business history into the mainstream not only in history but of business academics and enabled people who are trained as historians to speak to managers today, which is not the kind of training you get in graduate school.

Walker: Was Harvard the first to do the case histories?

Tedlow: To the best of my knowledge, yes. Harvard has taught by the case method for many, many years and we teach history by the case method. It was actually a casebook published way back in 1939 of business history cases. Al Chandler and I co-authored a casebook in 1985 called *The Coming of Managerial Capitalism* and there was another casebook published in 1995 by Tom McGraw, Al Chandler and by me as well.

Walker: You're speaking here tomorrow at the Computer History Museum about IBM [International Business Machines, Inc.] and the 360.

Tedlow: That's correct.

Walker: What will be the high points of your presentation?

Tedlow: I think IBM and the 360 surface a lot of questions that are not solely relevant to the time but are relevant to today. Here is a company making basically a bet-the-company decision. The 360—I don't know if anybody thought this was going to be true when they started planning it, but it wound up costing IBM \$5 billion in manufacturing costs and in development costs. IBM's revenue in 1962, which was when the project was approved, was well below that. As a matter of fact, \$5 billion is 1.9 times what IBM's revenue was in 1962, so it would be as if Google today were to say we're going to spend \$32 billion on a new, untried technology over the next four years; or Walmart, with its gigantic sales, multiplied those times 1.9

and you get something over \$700 billion on some new, untried technology that may fail. So it was a leap into the unknown and it was at a time when the CEO [Chief Executive Officer] of the company, Thomas J. Watson, Jr. was not a technologist. So he was giving orders and making requests and providing direction over a technologically, leading-edge project and that raises questions for today. So, for example, here at Silicon Valley, is it okay to have a non-tech CEO of a tech company? That's a tough question to answer and the 360 brings lots of those questions. But the 360 also changed the world. The whole world of independent software vendors comes out of the 360. The compatibility, all these things, changed the world of data processing.

Walker: Looking back, it seemed very doable.

Tedlow: My understanding is the software caused them a lot more trouble than they had anticipated when the project began and also, simply the manufacturing. IBM became a major manufacturer of microelectronics which they, to the best of my knowledge, really had not been prior. So there are some intra-company issues. I agree with you. Some of this is not cutting-edge science but if you look at the company itself, there were some tough—IBM was built on sales—sales and service—and now, all of a sudden, it's cutting-edge technology, cutting-edge science, cutting-edge engineering and hiring well over 100,000 people to make this thing possible; and then discovering somewhat to their shock that the demand for it was so much higher than they expected. Having the software come in behind the hardware, this from a company that had always said service, service, service. You know the old saying—I'm sure you've heard, “Nobody ever got fired for buying IBM.” So I think that there are two separate issues in a sense. One is what was known in a university or what was known in the world and the second issue is how do you put this all together at not just a company but a specific company with strengths and weaknesses. Also, there is the issue of upward and downward compatibility of these machines. IBM's product line—the 7090 series, the 1401, what have you—didn't talk to each other and the idea of having a modularized computer system that could grow, where big machines could talk to small machines, small machines could talk to big machines and if you needed a bigger machine, you didn't have to re-write all your software for it. The very selection of the name 360 was not an accident. It was “we solve your data desires 360 degrees.” Also, the 360 did something which, to the best of my knowledge, hadn't been done prior to that in the computer world; it locked-in the computer. So, say you're a customer with a certain level of data needs and say those data needs for various reasons— your business is growing—escalate dramatically. All of a sudden, you need a new computer and because you have to rewrite so much software, you might as well look at RCA [Radio Corporation of America], you might as well look at Honeywell, you might as well look around. But if you've got an upwardly-compatible machine that's already IBM for which you don't have to make all that alteration, that's a big deal. And if you look at IBM stock after the 360, the world recognized it.

Walker: They almost bet the company again after 360 with Future System, which failed miserably.

Tedlow: Risks are risks and not every one is going to work out. My understanding of Future System, which is limited, is that they may have learned the lesson of risk aversion too well. A certain number of risks are going to result in failure but if a company doesn't take those risks, it's guaranteed to fail. The idea obviously is to hedge the risk as well as you can and I hear you, I understand about Future System. The question is—and I think it's a question worth asking—did the company become too risk averse after that? I don't know.

Walker: But also, they were a much bigger company when they took that. The technology was CMOS [Complementary metal-oxide-semiconductor] technology, not embedded but immersed in this liquid and so the heat would be carried off by boiling in this liquid. The problem was that it would scale. You'd get scale on it, which would cause it to short out. That was inherent in the process and they couldn't really fix it. So that utterly failed, took some careers with it and then in 1981, at LSI Logic, we started calling on IBM with our new CMOS ASICs [Application Specific Integrated Circuit] and we would just mention this word and people would shudder. They were committed to bipolar technology after that, even when it became apparent that CMOS was really good. It took 'til '83 or so before they would even allow you to mention the word.

Tedlow: Well, I think the phrase that you used, “the failure took some careers with it,” that makes an impression.

Walker: Especially then, when careers meant something at a big company. It was really kind of a lifetime. IBM obviously leads into another big company right from your neck of the woods, Digital Equipment. They were very successful and what happened there?

Tedlow: My recollection is that Digital, in 1987, was the largest employer in the Commonwealth of Massachusetts and hired the Queen Mary to come into Boston Harbor and had a big party to celebrate their remarkable success and they had some remarkable success. This is a company worthy of respect that had many very talented people working for it. But for some reason—and I don't know what it is—they were not able to extrapolate what they had done with regard to the mainframe, which is come out with the minicomputer down one more level. Some of it may have been the CEO himself, Ken Olson, who is famously quoted—I don't know how true this quote is—as saying “Who would need a computer on his desk?” I think the problem with that is that the mental model that people had of computers in the 1970s would obviously not be something you would have on your desk. I also think—and you would know more about this than I so I defer—but I also think that in the 1970s and the 1980s, when people thought of computers, they thought more of analysis than they did of communication. Whereas I think today in the age of the internet, when people think of computers, they think of communication first and that was a transition that hadn't been made. But I can remember being at Intel in 1993 just talking to some executives, and they said we envision a world where you're going to go to your computer before you go to your car keys. This was in 1993 and I thought, “These people are crazy”. Of course, now it's 2008 and that's exactly what I do. The first thing I do when I get up is I go to my computer. I don't go to my—

Walker: And you look at email.

Tedlow: Absolutely. I look at Google News to see what happened over night.

Walker: It really has changed. You've written a number of books. One is *The Giants of Enterprise*. What lessons did you learn there?

Tedlow: This was a study of seven people who had made their own worlds, one of whom is Thomas J. Watson, Sr. of IBM, which we've just been talking about. Another was Andrew Carnegie. Others included George Eastman of Eastman-Kodak for example and a number of others. The lessons that I took away from that are that each one of these giants of enterprise—and I think this is true even for people that I didn't study in particular—but if you're going to build a big business, you have to stand for something. You have, to use the Silicon Valley phrase, to want to make a dent in the world. There's an old saying that if you don't stand for something, you'll fall for anything and to a certain degree, I think that's true in business, too. I think that money is a powerful motivator but it's not the only motivator. If you try to build a business on money alone, you're handicapping yourself. Think about this. Think about marines and mercenaries. They do the same thing but for different reasons. I think that when you're building a business, there is, to a certain extent, a marine and a mercenary in every person. There's a mercenary—if you get rid of the pejorative term, you have to make a living. But there's also a marine—you want to make a difference. So making a living and making a difference, that set of people in *Giants of Enterprise*, I saw them balance that in the businesses that they ran and in the people that they managed and to me, it was an interesting thing to watch.

Walker: Certainly in our financial world here recently, the people that were just in it to make money have not done so.

Tedlow: No, but in the financial world here in the Valley, for example, there are some people who are committed to funding only, say, green technology. So that's an example of using finance to make a difference in the world. Obviously, you have to get a return on the people whose money you're investing but you want to channel that in such a way as to make a dent in the world. That's one of the things that interested me most about Silicon Valley: the combination of those, of making a difference and making money, too. That's one of the things that makes this special. I would say in many ways too, pardon me, but Robert Noyce may capture that. Here's a man who made a great deal of money, both as Intel employee number one and also as an investor himself in various companies here, but also who made an enormous difference in the world in which we live and wanted to. He came from a family that was committed to making a difference.

Walker: I think you're right. I think that the great companies have behind them people that are more than money machines. They have a dream.

Tedlow: Hewlett-Packard is another example of that. There was an HP way that was different from other ways, a very strong culture.

Walker: I remember at Intel the saying was, in terms of parking, getting your own parking space. Unless you're a visitor, you get there early and you can get any parking space you want. There was no reserved parking except for visitors and customers.

Tedlow: I believe it was Noyce who said if you get there late, you park in the back-forty, which was kind of an agricultural metaphor. Very different from Eastern business that way.

Walker: It's actually cheaper to do the phony perk thing. It doesn't cost the company much at all to put carpet in your area, to give you a reserved parking place, a wood desk, as opposed to profit sharing and stock options, which can cost quite a bit. So there was a time when people believed this and they would really work hard and be loyal simply to get a parking place with their name on it. But that was sort of the culture in the '50s and '60s. Thankfully, that's gone. You also wrote about Andy Grove and you wrote a biography called *Andy Grove*.

Tedlow: Yes, the *Life and Times of an American*.

Walker: Tell us about that.

Tedlow: That was a project that I began for a number of reasons, some of them personal, actually. My wife and I both knew Andy and Eva because I had done some work for the company a long time ago. When my wife was dealing with cancer, she said "You're going to need a big project when I'm gone," and there was no bigger project than Andy. Andy was coming to the end of his career at Intel and it was really at her suggestion that I got in touch with him. The last trip we took together was in the spring of '03 out here to the Valley. We met with Andy and Eva and decided that this was simply one hell of a story. He is an icon of the Valley. He has exercised an enormous influence not solely on Intel; he's a center here in a certain way. People come to him for advice, they come to him for angel investing, they come to him when they're in trouble, [and] they come to him for help with their own projects. So he's made from nothing, from a standing start, a dramatic and remarkable career and it's a matter of talent. He's an extraordinarily intelligent, highly talented, very motivated man and therefore, sort of an American story or a story of America at its best—put it that way.

Walker: You talked about Bob Noyce a little bit similar.

Tedlow: Yes. Also a man who did not come from a privileged background at all.

Walker: Gordon Moore.

Tedlow: Gordon Moore, who in my recollection has earned PhDs both in chemistry and in physics at California Institute of Technology, was the first member of his family to get a college degree at all. These are remarkable stories and they need to be told because people need to understand that if they can do it, so can I. The stories stand to some degree as inspirations for the future, which I think, by the way, the Computer History Museum does as well.

Walker: Getting back to your biography. Was that an authorized biography?

Tedlow: No, it wasn't. He didn't look at it before it was completed and that was part of the arrangement. He did introduce me to a number of people to whom I needed to turn to get information. I got access to a lot of people who I wouldn't otherwise have because they knew it was okay with him that I was working on the book. I also published a piece in *Fortune* in December of 2005 about him, but the book itself he didn't look at until it came out.

Walker: I read the book obviously. That's one of my hobbies: being a Silicon Valley historian and I also worked at Intel.

Tedlow: When did you work there?

Walker: I worked there from '75 to '80 so I knew personally a lot of these people. One aspect I could criticize is that you don't seem to get the other side of the story. For example, in the Bill Gates dinner situation, did you talk to Gates about that?

Tedlow: No, but not for a lack of trying. That was one interview I was not able to get and I very much agree with you, that that is a shortcoming of the book. That particular dinner is a very dramatic and interesting encounter and I would very much like to have known what it was like from his point of view. I didn't have that.

Walker: How about Jerry Sanders?

Tedlow: Once again, that's somebody that I should have spoken to. I didn't have the opportunity to. To some degree, I'm making up for that now because I'm working on a case on the 386 which was sole-sourced as I'm sure you know and resulted in the arbitration and lawsuit that came out of that. As a matter of fact, from 9 to 12 today and from 9 to 12 tomorrow, I'm working on the 386 and on the sole-sourcing

issue and literally, Tom Dunlap—who was Intel's general counsel back then—brought some documents along so I'm trying to get that piece of that puzzle in place.

Walker: That's a long standing feud, isn't it?

Tedlow: Oh, boy, it is.

Walker: And goes on to this very day.

Tedlow: I know that. I'm aware of that.

Walker: Along that, something that you didn't cover again in the Grove book: the opening for AMD [Advanced Micro Devices, Inc.] was the decision to not to extend the X86 architecture to 64 bits, but instead, go with the Itanium so the Itanium would be the 64-bit solution. The X86 Pentium at the time, that would be the up to 32-bit solution and AMD went ahead and built a 64-bit X86 that was superior to anything that Intel had that was compatible.

Tedlow: Which is quite remarkable when you think about it because it's basically a duopoly. Intel and AMD are making microprocessors. What I don't understand and would like to find out is how AMD acquired the personnel, the quality of engineers that must be necessary to build this equipment when Intel's right down the street. To me, that's an interesting part of the AMD story that I haven't—

Walker: Another thing to look into—again, a little off the subject—is the Israeli influence at Intel.

Tedlow: Through Dov Frohman?

Walker: No, later. The latest microprocessors from Intel were designed in Israel.

Tedlow: Is that right?

Walker: Yes. They're absolute winners. They've invested like 20 years of effort and now you have something that AMD has difficulty getting. Again, going back to the confrontations in the book: Federico Faggin. In there, there was talk of Federico leaving to start his own company and Andy Grove telling him that his family would never be known and things like that. You didn't seem to have Federico's—did you talk to Federico?

Tedlow: I didn't talk to him. I did get a letter from his wife, which was not a very happy letter I must tell you. Once again, it's hard to know what words were actually spoken, what was actually said.

Walker: Excuse me. But did you get Andy Grove to give you his side?

Tedlow: Of that particular confrontation, my recollection is no and the reason is that that was not a central part—I wanted to keep the book manageable as far as length was concerned and I didn't go down that road as far as I perhaps should have. There's another issue with regard to Federico, which I didn't pursue as far as I perhaps could have and maybe should have, which is the actual development of the microprocessor itself and what role he played, what role Ted Hoff played. But once again, I had to make a choice and I spent a great deal of time in the book talking about Hungary. I went to Budapest, I got into the apartment that Andy Grove escaped from in 1956 and you have a certain length and you've got to keep that book at that length. You do want all the rest of the information to be as accurate but there are a million roads that you could travel and these are roads that I didn't. Perhaps I should have, perhaps it should've been a two volume book, who knows. But the points you're making are strong points.

Walker: We've talked a lot about Silicon Valley. What makes Silicon Valley work in your estimation?

Tedlow: That, to me, is the toughest question in the world. If I knew the answer and could package it—As you know, there have been many other geographical areas—Silicon Alley, Silicon Glen, Silicon this, Silicon that—that have tried to ape it. I hope I won't seem frivolous by mentioning something that sounds trivial but the weather is fantastic here. I think that a lot of people—Dave House is a very good example, who's from Northern Michigan—come here and they just don't want to leave for that reason among others. But I think that there is a culture that values, put it this way, the noble failure in a way. That was certainly 20 or 30 years ago: very, very rare in American business—that values the attempt even if it doesn't work out if the attempt was worth making. I think that that still does exist. I really do believe even now when we're in a recession and from a macroeconomic standpoint, the country is not in very good shape and our accounts are a mess, the balance of trade is dreadful, the debt is out of control, the deficit isn't well. Nevertheless, if you have a good idea right now, today, you can get it funded in Silicon Valley. I'm not sure how many other places in the whole world, not to mention the whole nation, that's true of. You can find funding and I think part of that is the perspicacity of Stanford University in creating the Stanford Industrial Park, the happy coincidence of Frederic Terman, Hewlett, and Packard. Hewlett-Packard and Intel for many years were basically the anchor tenants of this valley and they spun off endless numbers of companies. Apple's Steve Jobs was very close to Hewlett and Packard my understanding is and also to Andy. So there are these networks of extraordinarily creative, highly intelligent people—one doesn't want to say walking distance because in California, nothing is in walking distance of anything—but pretty close together in whatever it is, 60, 70 miles from San Francisco to San Jose. And if you think about the way the Valley has changed just in the past 10 years, nobody would've predicted at the top of the dot com boom. Then there's the dot com bust and the Stanford Park Hotel isn't quite as crowded as it used to be. Nevertheless, it comes back. The place keeps coming back and that, to me, is—to make a long story short, if you ask what is special

about Silicon Valley, it's the ability to renew itself through creativity. Nobody predicted that the PC [Personal Computer] was going to become what the PC became. Very few did. Steve Jobs was one of those visionaries. Very few people predicted the intranet and yet, once it comes along, Silicon Valley, if it were renamed today—The name, I think, comes from 1971. It's around then that—

Walker: A fellow by the name of Hoefler coined the term.

Tedlow: That was Don Hoefler?

Walker: Don Heffler, the late Don Hoefler, and he was a gossip columnist for Silicon Valley. In his newsletter, he would have who was dating who, who left which company and he coined the term.

Tedlow: Let me say two things about that. First of all, if it were to be renamed today, it wouldn't be called Silicon Valley, I don't think. I don't think there are that many fabs. There's one attached to Intel. Are there any operating fabs in the Valley right now?

Walker: Very few.

Tedlow: Okay. It probably would be called the Valley of the Virtual Community because what you've got is Google, Facebook, eBay and all these new firms that were unthinkable. Google's only 10 years old. It would have been impossible without Silicon technology certainly but I somehow doubt that it would've been called Silicon Valley. But let's get back to this observation you made about the gossip columnist of Silicon Valley. I actually think gossip is a good sign and Valley-wag, which exists but which nobody admits to reading. People gossip about other people because they care about them. So if you have an area where there's gossip, it's because people are interested in one another and they care about one another—not always nicely but they're interested. That's one thing that drives this community in my view. There probably is not a better definition of the Valley. My recollection is what Steve Jobs said when Bob Noyce died back in 1990, which was that Noyce in some way encapsulated everything that was good about the place and I think there's a lot of truth to that actually.

Walker: I agree with you. I knew Bob quite well. But it's interesting because in your Grove book, there's a number of quotations that Bob Noyce couldn't've run Intel by himself, he couldn't've run Fairchild, he never really told Andy "Andy, shut up". So in the book, it doesn't seem to talk much about your admiration for Bob.

Tedlow: In *Giants of Enterprise*, the admiration does come through. Perhaps it doesn't here. I think that Andy Grove had an interesting relationship with Bob Noyce. It was at times a little scratchy but I think that what Silicon Valley needed was an ambassador, certainly in the 1980s when it looked like it was going to

be overwhelmed by Japanese competition and Bob Noyce served as that Ambassador. And I think, frankly, that his willingness to go Sematek was, in my understanding, not something that he wanted to do. He was deeply in love with his wife. He had his own plane. He wanted to spend his time relaxing and that was sort of a sacrifice for the nation in my opinion and that's the Valley at its best. I do think, from what I can gather, that he was not the man to run Intel in the era of the PC; that Andy was the man to run Intel in the era of the PC. Arthur Rock—and I think this quote is in the book; I can't remember—said something to me profound about Intel and also about the early employees. He said to me Intel needed Noyce, Moore, and Grove and it needed them in that order. I think that's true. I think a problem with a lot of startups is they don't have a team. They have one key person. If something happens to that person, the company's over. But they had both technological savvy: Noyce with his experience first with Shockley, then with Fairchild and also because of his personality. I do think I have in there this quotation from someone that Noyce was the kind of man who could meet with investment analysts and say "Our company is facing problems that are very serious and I don't think we'll ever be able to overcome them" and the stock would go up five points. That's something that Noyce and Noyce alone could do.

Walker: Yes, so true. Thank you, Richard. This has been very illuminating.

Tedlow: Thank you for having me. I appreciate it.

END OF INTERVIEW