Oral History of Peter Wolken

Interviewed by:
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Craig Addison: Peter, could you just start with telling me about your early days, where you grew up and what sort of education you had?

Peter Wolken: Sure. Well, actually I was born in Chicago. My parents moved out here when I was very young and I grew up in Palo Alto and went to the local schools in Palo Alto -- Palo Alto High School and then enrolled at U.C. Berkeley back in ’51 and majored in Mechanical Engineering. After three years there, I went in the Army for a couple of years and was fortunate that I got trained in electronics while I was in the Army. So when I came back after two years in the Army, one year of which I served in Europe, I finished up my engineering degree and then went to graduate school in Arizona at Thunderbird. Thunderbird is a specialized school for global management and I majored in international marketing. I was always quite enthusiastic about the opportunity to see technology companies in Silicon Valley be able to become world-class and sell their products all over the world. So that was the direction my career took.

Addison: So, Peter, what was your very first job?

Wolken: My very first job after graduate school was with RCA International Division which was headquartered in New York City and we had offices in New Jersey and I was fortunate to be on a training program spending five weeks at each of five different divisions so I learned a fair amount of the world of electronics industry and one of those five-week stints was in semiconductors in Somerville, New Jersey, [and] one was in computers. At that time RCA was in the computer business and I was in Cherry Hill, New Jersey but I came back from that assignment on the East Coast and joined Beckman Instruments in Southern California in a systems division that did wind tunnel data acquisition and got into the sales and marketing side of the business. From there I had a hankering to get back to Europe and joined General Electric Company as a field engineer and went to Germany for a couple of years where we installed command and control systems for the U.S. and German Air Forces and that was a very interesting job.

Addison: Could I just get some timeline on this? Roughly when did you join RCA and Beckman and GE?

Wolken: I joined RCA in ’60 and Beckman around ’62 and then around ’64 went to Europe with General Electric.

Addison: After your stint with GE in Europe, what did you do?

Wolken: Then I came back and was settling back down here in Silicon Valley and looking for a new opportunity and I had a friend that introduced me to three fellows that had started this company called Cobilt and two of them were from Germany originally and one from England, and they had all worked together at Kasper Instruments and had developed some semiconductor production equipment there. They had an idea for new equipment that they thought was very much in need by the industry and they needed someone that understood sales and marketing and also had an international bent because the semiconductor industry by that time was spreading pretty widely in Europe and Asia and so I joined them. The company was called Cobilt and they got the name as “built by cooperation” amongst these three guys, and it was about 1970.

We had a machine that would be today comparable to what are called wafer steppers or lithography machines, although at that time it was called a mask aligner and it did one wafer at a time, the whole wafer, and at that time they were all of about 2 inches in diameter. And it actually had a throughput kind of comparable to some of the machines today but albeit with lower resolution. At that time 2.5 micron resolution was considered leading edge, and with Moore's Law they've gotten smaller and smaller and smaller over the last 30 years.

Well, we ramped up quite quickly with our first machine and it came to the attention of a company in the Boston area called Computervision that this was an interesting little company and they had a fellow by the name of Ken Levy who was running a division there building automated systems on another platform. They thought that our platform would be an ideal one to work with -- higher precision, better throughput, better accuracy -- and they wanted to acquire us and have us become a part of Computervision. So they did that. Ken Levy came out from New England and he became president of the Cobilt division at Computervision and we attracted a very good team of people who joined from the industry who were able to ramp up to substantial sales, more or less doubling every year for a number of years, and penetrated the major accounts. At that time Fairchild Semiconductor was still very active and National Semiconductor, Texas Instruments, Motorola, Intel, all the major companies were buying our equipment. So it was a fast growth situation and I think quite a successful company. And Ken Levy and I would brainstorm about ideas for future products. I had called on the Jet Propulsion Labs down in Pasadena who had some very interesting technology for analyzing data coming back from space and trying to make sense out of the data and we realized that there was a similar problem in the semiconductor industry in that you had huge amounts of data describing the masks and later the wafer patterns. At that time people were inspecting the photomasks and the wafers manually with girls sitting at microscopes scanning these wafers manually and the masks, which is a tooling for the wafers. It became really an impossible task as the line width kept decreasing and the density on the circuits was increasing. The ability to inspect for defects manually was pretty clearly coming to an end and so there was a need for some high resolution, accurate equipment that would do this automatically and Ken thought well, starting a company with that idea could be a really interesting opportunity so that's when KLA instruments was born and that stood for Ken Levy and Anderson. [Editor's note: Bob Anderson was co-founder of KLA]. Ken had sent me to Hong Kong the year before to run a plant that we had there that built equipment for the packaging part of the semiconductor industry and then he said, "Well, Peter, you could join us in this new start-up," and I thought, "Well, that might be kind of a risky situation and I think I'll have fun on this assignment in Hong Kong. But on the other hand, if you decide to call the company KLAW, maybe I'll join." So we negotiated a while but they just stayed with KLA, so I went to Hong Kong and came back a year later. KLA was off and running with a very successful first product, really captured the market for automatic inspection of photomasks to find the defects before they propagated to the wafers. And I had an opportunity…was actually introduced by Ken Levy to Etec…to join them in marketing electron beam exposure systems for mask making. Etec at the time was in Hayward, California, and they had licensed the technology from Bell Labs to build a machine called MEBES, Manufacturing Electron Beam Exposure System. And this is a very sophisticated machine, very expensive, would run fully automatically with high-performance computers and optics and, of course, in the electron beam arena, high vacuum. So with the sophisticated system, with Bell Labs technology behind it, Etec was successful in capturing a major part of the market for that system and it was used for mask making all over the world.

So I had been now 20 years on the operating side of the electronics industry, semiconductor equipment primarily, and Ken [Levy] again referred me to a group that was doing angel investing in the valley and so I had an opportunity to join the Page Mill Investment Company and learn the venture capital business. There were 14 partners in this group and most of them were senior managers in the industry with five of them coming from the Hewlett Packard management team, the founders of Intel and the CEO of Fairchild Semiconductor, the founders of a company called Rolm, and a couple of other people including Jack Melchor, the head of the group, and it looked to me like a tremendous opportunity to work with people that really understood the industry and the investment side of the business. So I joined them and, after a couple of years of making 14 or 15 investments, I started my own venture fund in 1982 called Associated Venture Investors, AVI.

Addison: Let me go back and fill in some of the information from the earlier period before we get too far ahead. Going right back to the formation of Cobilt, what were the names of the other people involved?

Wolken: Yes, so the three people from Kasper Instruments who were founders along with me were Alan Fleming, Gerd Schlieman and Fred Schultz. Gerd was very experienced in fine mechanics, as they call it in Germany, and really came up with some very good approaches for mechanical engineering. Fred Schultz was the manufacturing guy, and Alan Fleming was our optical specialist.

And then we had a gentleman who provided the facilities for the company and also was one of the investors who was very helpful and gave us a loft above his machine shop to start. His name was Bill Stoesser and he was a very supportive investor and provided the facilities and the encouragement of the group.

Addison: Besides Bill Stoesser, were there other investors? How did you get the money?

Wolken: Not at that time. The only real investment that came in besides Bill Stoesser's money was when Computervision acquired the company and that's when their capital backed the expansion of the company.

Addison: So all you guys put in some of your own money?

Wolken: Yes. I would say we worked for sweat equity and we all did very well in terms of converting our Cobilt stock to Computervision stock.

Martin Allen, who was the CEO of Computervision at the time of the acquisition, had put together a proposal that said we would get so much cash and so much stock and the stock depended upon how successful we were in the subsequent three years and he had three forecasts of most probable, most likely and most optimistic, something like that, and we beat the most optimistic projections by a mile so we got a very big chunk of Computervision stock. They went public a couple of years later and so it was a very good financial reward.

Addison: I'd like to ask why the mask aligner? Whose idea that was or why did you choose that as the first product?

Wolken: The group came out of Kasper Instruments that had been making mask aligners and they saw a way to improve on it and make a better machine and probably at a lower cost and it was a good machine but it wasn't until Computervision overlaid their automation technology on the Cobilt machine that made it a very unique system. It was the only fully automatic machine in the world. Texas Instruments had a program called automated front-end and they wanted to standardize on that machine and that was one of our first big accounts.

Addison: Did Kasper give you any trouble about the possible intellectual property leakage?

Wolken: No, not at all. There was no problem there. The competition was relatively friendly. When we developed an automated machine, I think they may have tried to do one as well but I lost track of what Kasper Instruments did. They are no longer around and, of course, Cobilt became part of other companies as well.

Addison: So what were you doing immediately prior to joining Cobuilt?

Wolken: That's when I was with General Electric in Europe and had experienced working in Europe and so maybe I figured I could get along with a couple of Germans and an Englishman better than most people and, you know, in any start-up the personalities are somewhat volatile and getting people to march in the same direction and put their eye on the most important parts. I think we worked very well together as a team but with Ken Levy's leadership and the resources of Computervision behind us we were really able to grow at the rate that the market would accept new products. We had no restraints in terms of working capital and facilities and so we moved to a larger building. We were in Stoesser Industries' building in Mountain View and then we moved to a larger building on Arques in Sunnyvale and there we had all the resources we needed and, of course, we were profitable also relatively early on.

Addison: So how long was it from forming the company to when Computervision started to take an interest?

Wolken: Oh, within a year.

Addison: And was there any particular reason why they suddenly saw you on their radar screen?

Wolken: Well, yes. At that time we had been shipping a small number of machines to some of the customers that they had been talking to and they said, "Well, Computervision Technology was very promising," but the platform that they used to automate was not very accurate. At that time Computervision had used a machine made by Kulicke & Soffa which was, in terms of accuracy and tolerances, not tight enough to solve the problem. The technology was fairly simple…using an optical microscope and a micro manipulator, one would take a look at the wafer through the mask and line up the two patterns with a separation between wafer and mask. Once they were aligned, it's a contact printing process so it was required to bring the wafer in contact with the mask and then expose it and with the K&S machine there would be a shift or a misalignment and that was intolerable. With the Cobilt machine the mechanism was perfectly aligned and that made all the difference in the world.

Addison: So who was actually the key player in the acquisition discussions on the Cobilt side? Was it all the founders?

Wolken: Yes, the founders, because they had significant equity and the synergism between the two companies was quite obvious that Cobilt did not have the capability of developing an automated machine by themselves. Computervision had the automation technology figured out but they needed a good mechanical platform so it was a very good fit. I think Ken Levy also recognized the opportunity to come out and run the division, to move from the cold northeast out to sunny California and he was quite enthusiastic and did a wonderful job of leading the team and building of the company.

Addison: I know you were only going for a year before Computervision came along but was there a cultural change in Cobilt after the acquisition?

Wolken: We ramped up the company very rapidly in terms of recruiting people so, yes, the cultural change was bringing in professionals that had more experience…for instance, Sam Harrell, who came in as V.P. of Engineering, came out of Texas Instruments and was there for many years and was a real expert in lithography. We had professional sales and marketing people that were recruited. Jack Harris who came from Fairchild Systems Division, Roger Emerick, who I think also came from the Systems Division of Fairchild [and] was recruited by Jack. Roger ran the U.S. sales while I was in Europe running European sales and we had a partnership with Tokyo Electron in Japan for Japanese sales which was an important part of the market.

Addison: You just talked about being in Europe and before you talked about being in Hong Kong. Can you talk about your overseas experience at Cobilt, go into a bit more detail?

Wolken: I went to Europe to run the European operation of Cobilt and there were a number of semiconductor companies that were similar in terms of ramping up their operations needing better equipment -- Siemens and Philips and the major U.S. companies that had European operations. We operated out of Munich and we were quite successful in our market share in Europe and our counterparts in Japan [TEL] were quite successful and penetrated the Japanese market and the U.S. market was going along well. So, yes, I think we had a good group covering the major international markets, as well as the U.S.

Addison: How long were you in Europe?

Wolken: I went to Europe for a couple of years and then recruited my replacement and it was about the time that I thought it might be nice to take a summer sailing in the Mediterranean rather than coming right back to work in the U.S. So I bought a Finish-built yacht called The Swan 41 and launched it in Italy and sailed the Mediterranean from April to August and then came back in September and went back to work. That was a very nice experience which a lot of people would like to have the opportunity to do. I never regret taking time off from work to take a few months out of my life. They say you can't count on a man's age the number of hours spent sailing on the open water. That's kept me young. And I keep sailing today when I can.

Addison: In Europe, were there many other equipment companies competing with you at that time?

Wolken: I think the other U.S. equipment companies that had European operations were the major competitors There wasn't much in the way of European companies, although there was a company that originally represented Cobilt called Advanced Semiconductor Materials, ASM, run by a gentleman by the name of Arthur Del Prado and he was our rep in Holland and covered other parts of Europe and he also repped Applied Materials and then he decided to get into the business of building his own equipment and competing with Applied Materials. He didn't really try to compete with Cobilt but he had a joint-venture with Philips and that was in lithography and he called it ASM Lithography which today is one of the three giants in the lithography business along with Nikon and Canon. Arthur ran that for a while and then spun it off to Philips because it needed to have a lot more capital and support and then it became an independent public company, ASML. It is quite a successful company.

Addison: When Art Del Prado pushed ASM into actually making equipment, did Cobilt have any kind of response?

Wolken: Well, they were really more competing with Applied Materials so there was no need for any response. We kept good relationships and later, when I started my first venture fund in '81, Art Del Prado introduced me to my first major institutional investor in Holland, the Shell Pension Fund, and went with me to make a call there, and he invested as well in my first venture fund. So we kept amiable relationships all these years.

Addison: I noted recently that Art Del Prado has retired and handed over to his son. Is there any interesting story about him or any recollections that you have?

Wolken: I think Art did an excellent job in building ASM International. The capital requirements for ASM Lithography were such that he needed Philips' help and he let Philips buy a controlling interest, but I believe he retained some and when they went public it was quite profitable for him. His operation had significant manufacturing capabilities in Asia, as well as in Europe, and he did a lot of tooling for the packaging part of the industry and built a fairly broad line of equipment and so I think ASM International is a successful company. I met his son at one of the SEMI conferences in San Francisco here a couple of years ago and Art deserves to spend time on his yacht in the Mediterranean like I did. He has, I think, a hundred foot yacht he keeps in Majorca. We were over there last month and went to Valencia to look at the Americas Cup races and stopped in Majorca while we were there. Beautiful spot of the world.

Addison: Earlier you talked about Hong Kong. When you were in Hong Kong, what specifically were you doing?

Wolken: Our plant in Hong Kong built bonders for assembly of semiconductors and that plant was independent. I think later it was acquired by another company. It was a pretty small operation. The interesting thing about that part of the industry is that there are assembly plants all over Asia from the Philippines, Malaysia, even Indonesia and, of course, Korea and Japan… probably well over 90 percent of all semiconductors are assembled in Asia.

Addison: So the bonding operation of Cobilt was not very big.

Wolken: No, it was relatively small.

Addison: Was that a product that was built in-house?

Wolken: It was actually acquired and built through a partnership with another entrepreneur. The Cobilt engineering team really was not strong on the packaging end and they left that to this other operation which was very weak engineering wise because it was staffed by some guys in Hong Kong that had little experience in the industry.

Addison: Just roughly, what period did you stay in Hong Kong.

Wolken: I was there for a year. One of the major events was that my fiancée, now my wife, flew over. We got married in Hong Kong and had our honeymoon in Kowloon and when I tell people I got married when I was in Hong Kong, they think I have a Chinese wife but she's Caucasian from Ohio. But she was teaching school at the time and I thought it would be a good thing to do during Christmas break, come over and get married. That was in '76.

Addison: So after Hong Kong, you came back to the U.S. presumably. What happened then?

Wolken: That's when I got involved with Etec and got into the electron beam lithography business and then in '79 got started in venture capital.

Addison: I just wanted to add a little bit of information to the story you told about Ken Levy and Bob Anderson. You said if they had added your initials to the [KLA] name you would have joined them. Any regrets that you didn't join that operation?

Wolken: I don't think so. I did quite well on the path that I took. I think I would have enjoyed working with them and being part of the start up of KLA Instruments but I was a long ways away in Hong Kong to be able to negotiate that deal and so I decided to stay independent. The path that I took after leaving the semiconductor equipment industry and going into venture capital worked out quite well. I've remained very good friends with Ken Levy and, in fact, he always seems to be looking out for me. So he put me on the advisory board for his venture fund. As a matter of fact, I started the venture fund for KLA Tencor about six years ago, an in-house corporate venture fund, and recruited a couple of guys to work in that team and probably two years ago I retired from active full-time role there. It was actually half time because I was also working with another venture group and I'm still on the advisory board for the KLA Tencor Venture Group and we have a couple of investments in lithography and most of the investments are in semiconductor equipment-related businesses. It's a $50 million fund, nominally invests in maybe three or four deals a year, so it's doing quite well and it's been an interesting activity for the corporation because they have the opportunity to have a window on technology for emerging new ventures and follow it potentially. It did acquire one of the portfolio companies and they keep track of what's going on.

In the lithography area the KLA Tencor Venture Fund has two investments. One is in Texas, a company called Molecular Imprint that's making some good progress with sub-90 nanometer lithography and another investment in the Netherlands in a company called Mapper Lithography in which, coincidentally, the largest investor is Arthur Del Prado, and they are a spin-off of the Technical University of Delft in the Netherlands and are developing a massively parallel direct write system that, if successful, would be very

revolutionary for the industry and would print sub-45 nanometer structures. They have been in development for five years and it's very difficult technology but they are making progress.

I think it was after a couple of years with Etec that Ken [Levy] had referred me to the Page Mill Investment Company opportunity. And I knew nothing about venture capital at the time but it sounded like a wonderful group of people to work with and to learn that end of the business, and that's turned out to be wildly successful. The venture capital side of the business in Silicon Valley was really wonderful in the '80s and '90s where one could invest in a variety of technologies that are all very strong here in the valley, not only semiconductors and equipment but software and systems and networking and a whole host of technologies, most of which are based on the integrated circuit and the tremendous value and performance that it provides at low cost to be designed into practically everything.

Addison: Peter, I just wanted to explore a little bit more about leaving Cobilt. If you are a founder of the company, leaving is a big deal. Did you see that the writing was on the wall after Ken Levy left? Was that a factor?

Wolken: I'm sure it was a factor. I think that the appeal of going with Etec and getting involved with this electron beam lithography system was very exciting because they were clearly a world leader in this technology and they needed someone that understood how to sell to the semiconductor industry. So that was the attraction. It was not so much leaving Cobilt as it was joining Etec and getting on to the next generation for just a plain old mechanical engineer that had some experience in the electronic industry to be part of a system that contained computers and optics and electron columns and all of this in one giant system that sold for millions of dollars and it was exciting and clearly it was a major effort to sell those systems around the world to the major semiconductor companies. We sold quite a few of them during the two years I was with Etec. It took them another two years to deliver the machines after I left. They were long lead time items. Today I think they are out of the business. The operation was acquired by Applied Materials and Applied Materials unfortunately, I think for the industry, shut it down and now those systems are exclusively provided by the Japanese -- Hitachi and one other Japanese vendor.

Addison: Did you join Etec as a shareholder or just an employee?

Wolken: Oh, no I was vice president of sales and marketing and an employee, had some [stock] options. I had some commission on sales so I did OK, but it was still working for a company that had other founders and I wasn't there at the founding time. So I didn't have enough equity to hold me there and the opportunity to go into venture capital was too exciting to me to want to stay with Etec. They were acquired, by the way, by Perkin-Elmer first before they were acquired by Applied Materials, and so the handwriting was on the wall, things were going to change there. But this venture capital opportunity back in '79 looked pretty attractive and challenging so I never regret the opportunity to get into that after 20 years on the operating side to get into the venture capital business at a time when there were not that many venture capitalists around and plenty of entrepreneurs and then plenty of opportunity.

Addison: Peter, you also worked for Electroglas at one stage. Can you talk about that?

Wolken: When I came back from Europe and having served there for a couple of years in Germany and knew a little bit about the European market, I got on to a consultant that was looking to find someone to

run the European operations for Electroglas. This was in the late ‘60s and I had no experience in the semiconductor industry nor with equipment but I knew a little bit about Europe. They introduced me to the Electroglas management team and they had already sold some equipment in Europe and they said, “We’ve got equipment at Philips and Siemens and we need somebody over there to support that equipment and do follow-on business,” and I thought yeah, that’s interesting and they had a guy by the name of Dave Glenn who had developed an automatic wafer prober. It was the first of its kind and a very sophisticated high-speed machine, and so I took that job and trained for a while here in Menlo Park [California] to learn what we actually built [which was] mask aligners as well as wafer probers and diffusion furnaces -- a broad product line for a company. Electroglas’ name came from the fact that their first products were glass bonding tips for bonders and the glass capillaries that we used, which was a very low cost product but that’s where they got started. But they really made their name with the wafer prober. We had one competitor in Europe -- Transistor Automation Corporation, TAC -- and competed quite well with them and captured the majority of the market for automatic wafer probers in Europe.

By the same token, our friends at Japan at Tokyo Electron, were also representing Electroglas in Japan and they did well with that and so Electroglas became the world leader in automatic wafer probers and they interfaced with test equipment systems from Fairchild Systems and Teradyne and were recognized as having provided a really important solution to the industry.

Prior to that, people used to package bad devices and throw them away. [It was] recognized that if they probe the wafer ahead of time, before packaging, there was a tremendous amount of savings because then you would mark the devices which didn’t pass the test and you wouldn’t package those. For some device types the package was worth more than the chip so it was obviously a good solution to do 100 percent probing and, if you could automate that, it was important to do. So that was a very good opportunity to learn to be a world leader in a particular equipment class and to develop relationships within the industry with all the major companies.

Addison: Talking about your venture capital period, the company that you formed after you left Etec, was that to specifically fund equipment companies or semiconductor device makers?

Wolken: Well, since I worked with Page Mill Investment first for two years before I formed my own company, we had a broad charter to look at any early stage entrepreneurial start-ups in technology that were not capital intensive because it was an angel investment group. There were 14 of us, we had a total fund of $3 million which was augmented with another two or three million [dollar] side-by-side fund that came from the investors and that was a pretty small amount, so we were looking for things that were not capital intensive. We weren’t going to fund another semiconductor start-up that had to build its own fabs, but we funded things like the start-up early investment in Apple, start-up of 3Com, Software Publishing Corporation, which was a fast growing early entry in the personal software business. And those companies didn’t require much start-up capital at all, so that was our model and we wanted to get into situations that had potential to be big companies but wouldn’t need a lot of capital. And we had the opportunity to put some of those people on the board of those companies that could, in fact, add value and help them. So that was a very interesting opportunity and then when I started my own fund in the ‘81/’82 timeframe, I had to recruit a couple of partners and go around and raise the money. There are many venture funds out in Silicon Valley today. Some are dropping by the wayside in their ability to raise additional funds because they haven’t made money for investors in the past and clearly it’s important to

make money for investors. It's been very good during the '80s and '90s. I think that venture capital returns were averaging over 20 to 30 percent and first quartile returns much higher than that but in the last seven years it's been very difficult since the bubble burst in 2000. Most venture capital companies have not made any money and that's been very discouraging, and it appears to be turning around. The IPO market appears to be getting better and the M&A market getting stronger and so it looks like we see a resurgence of profitability in the venture capital business.

Addison: When you started your own fund, again, I guess because of limited money you didn't want to fund the capital intensive companies.

Wolken: That's true, but we were able to raise a total of $19 million with our first family of funds. I say family because most of it was raised domestically but some raised in Europe so we had some offshore funds. It was the vehicle that Europeans preferred at the time and the $19 million was invested in, I think it was 24 companies. The returns were pretty good. We had some winners and that was the '82 fund. In '87 we raised the second fund which was $46 million and then in '94 we raised a third fund which was a $75 million SBIC. The SBIC is a program that the Small Business Administration had formed that allowed you to leverage private equity with debt from the government from the Small Business Administration and we raised $35 million in private equity for that fund and leveraged it with $40 million in debt from the SBIC and that fund returned 16 times cash-on-cash, so we were quite pleased with the performance of that fund.

Addison: Out of all that money, were there any semiconductor investments that are of significance today, or still around?

Wolken: There were device companies, fabless semiconductor companies but not equipment companies that I can recall. The reason is that there were so many other opportunities out there in software and networking and systems and so on that it seemed that semiconductor equipment companies were not as attractive at the time and [we] just didn't do any. We might have done one that didn't pan out. But it was actually more of a printed circuit board automation process.

The network sector was the one that treated me the best. I was fortunate to invest in four networking companies, each one with a next generation system. The first one was 3Com that invented the Ethernet, and then Network Peripherals that did fast Ethernet, and then Grand Junction Networks, also in the fast Ethernet area, and then Extreme Networks that did gigabit Ethernet. So I looked at the data somewhat like Gordon Moore looking at the fact that the number of transistors on a device would double every 18 months and so that was Moore's observation. Wolken's observation was that the increase in the bandwidth of Ethernet would go up an order of magnitude every 7 or 8 years and that's proven true, going from 10 to 100 to 1,000 to 10,000 and 100,000 will be the next, so there's an insatiable demand for bandwidth processing power and memory and it continues to grow the industry. But I was very fortunate in the networking space to have four major winners.

Addison: You had mentioned before there were 14 of you in that Page Mill Fund, including the founders of Intel. Was Gordon Moore one of those?

Wolken: No, just Bob Noyce. Gordon wasn't one of the investors there. It was Bob Noyce and Les Hogan from Fairchild Semiconductor and Bob Maxfield and Ken Oshman from Rolm and the management team at Hewlett-Packard which at that time included John Young and Paul Ely.

Addison: Do you have a Bob Noyce story to tell?

Wolken: Well, Bob Noyce was such a positive individual in terms of his enthusiasm towards any entrepreneurial venture that would use his microprocessors. He was ready to write a check and could for all these start-ups. Of course, when we invested in Apple, he wrote a big check and we, in fact, were offered quite a large chunk of Apple stock early on by Mike Markkula and we gave half of it to the HP pension fund. Let them pick it up. And we picked up half of it. It was a very good investment at the time. Bob was a natural supporter…if somebody was starting a new company using Intel processors, he was very supportive so he funded many of them.

Addison: I presume that wasn't because he thought he'd get X dollars from the microprocessor but because he was thinking ahead that future products could really grow the market.

Wolken: Absolutely, because the microprocessor as a core element in many, many products gave it the power and performance and low cost to capture big shares of the market. Any sector you think about -- industrial automation, automotive, everything in consumer electronics, of course. So he was just very positive. Also, we made some investments in some companies at that time -- it was kind of an early Internet type approach, and an email company called Infoseek was another company as well. I remember Bob saying that they thought it was an interesting idea but he didn't know if the entrepreneurs' ideas were big enough, and I think he was always looking for people who had big ideas, who had the vision that they could really build something world class and that's what everyone looks for. You don't find that every day but he clearly had the right focus on trying to help people to be all they can be. He helped Steve Jobs a lot in the early days and he was a wonderful guy, and very supportive in the industry.

To some extent it's all about attitude and the ability for people to believe that they can do great things, and if they believe, they can do it. We've seen from the early days at Cobilt until today some amazing achievements in our neighborhood. I'm very much a Silicon Valley fan. It's clearly not the only innovative place in the world and there are plenty of other achievements going on in other places.

I have a neighbor who is a founder of Yahoo and I heard one of the Google founders just got married. There's a lot of excitement in what these guys have achieved. Google, I think, clearly has to go down in history as the most successful company ever. It has made amazing achievements and they continue to come up with new products and services all the time.

So there's still plenty to be done. We have today to face the fact that our competitors in India and China are getting stronger all the time. They have some unfair advantages, China in particular. The protection of intellectual property has been a big issue. We think over time it's going to be solved and that they'll be competing with themselves and protect their own company's intellectual property and they'll become more respected members of the international community. But they do have a major unfair advantage in their low cost of labor and skilled labor and a number of science and engineering graduates that they put out every year is mind-boggling compared with what we generate. So I think the future there is partnering

and most of our companies are doing that, having a strategy that allows them to partner in China and hopefully that's going to work out well.

Addison: That's a good time to end it. Thank you very much, Peter.

END OF INTERVIEW

