Computer Oral History Collection, 1969-1973, 1977

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MAPSTONE:

We were talking about logic.

PALEVSKY:

Von Neumann wrote those very important original papers at first. Then he gave a series of lectures at Cal Tech on self-repairing mechanisms. Those two things together kind of got me interested. Nobody knew anything about computers; it really was quite early. That must have been in 1952/1953, something like that.

MAPSTONE:

You were at Cal Tech.

PALEVSKY:

No. No. I was here at UCLA. At that point I'd been around universities for too long and I decided to get a job. It was probably the first time since philosophy had been invented by the Greeks, that someone trained in philosophy could get a job. A job that wasn't pedagogical, a job that was in industry, it really was one of those strange historical accidents. I went to work at Bendix, previously Northrop, a week after Bendix took over, or the same week –

MAPSTONE:

Was Bendix in the computer business before they bought Northrop?

PALEVSKY:

Well, no one was in the computer business at that point.

MAPSTONE:

They weren't making little devices or digital electronics or anything like that?

PALEVSKY:

Nobody was. Wait a minute, I think my dates are wrong. I think I went to work there in 1951, so the papers that I read must have been around 1950. You can check those at UCLA. At that point there was obviously some work going on at IBM, work was going on at Princeton with Von Neumann, there was some work on UNIVAC I guess. Of course, that was fairly well insulated because that was the Eastern school, which was really quite different. The work out here was being done at Northrop. To my knowledge there wasn't any other. The Bendix people, although at that point I was just one of the crowd of workers with no entree to management, so I had no idea what their thinking was, but obviously Bendix must have felt that computers, or its technology, meant something, so they bought part of Northrop. Northrop really wasn't set up to deal with commercial projects. I joined the week that Bendix took over.

MAPSTONE:

Was Hagen still there?

PALEVSKY:

No Hagen had left. He would come in occasionally as a consultant or pick up something, so I got to know him although he didn't work there. It is a little vague in my mind. It was a small group in a rented store on Hawthorne Boulevard. Essentially what we were doing was playing with the MADDIDA. A number of them had been developed and there were a number being built. They were very primitive machines.

MAPSTONE:

They were production line models by this point, weren't they?

PALEVSKY:

By that time they had built I would guess 12 or 15 of them. It took quite a bit of doing to keep them going. It is incredible when you think back that people ever used them.

MAPSTONE:

It isn't it. It is incredible that they worked enough so that you could even get 2 minutes of calculation.

PALEVSKY:

Yes. The state of the componentry was really incredible. There were snap-in diodes, and the drums never quite worked, but you could periodically get them to work for a period of time. I got to know a little about how they worked, to the point where I became one of the principle designers of the next machine they built.

MAPSTONE:

Which was?

PALEVSKY:

Seems to me it was called the TOTEL or the D-10. It was a digital differential analyzer only it was decimal. It had plug-in cards rather than the way MADDIDA was built, and it had more advanced technology. Obviously, it was still a vacuum tube machine, and we improved the drum quite a bit. It worked fairly reliably. We took one back to Wayne University in Detroit, and we had a summer session on computers. I taught a course on how to run it.

MAPSTONE:

Oh, did you?

PALEVSKY:

Yes.

MAPSTONE:

Was it about 1952? Would that have been right?

PALEVSKY:

Yes. I don't remember what year it was, but around that time. Harry Huskey came to the company with an idea for a general purpose computer.

MAPSTONE:

Up to now you were still into DDA's.

PALEVSKY:

DDAs and looking at the technology. With hindsight as one looks back on the technology, it is clear what should have been done and how it would have developed. At the time it was very unclear; at least it was to me. I don't think anybody had a clear picture of what was going to happen. If you look at the early tentative steps, not many of them were on the right track. There wasn't any clear product planning notion. I don't think the Bendix operation was very well managed; I would say it was very poorly managed, and the planning was relatively fortuitous. Harry Huskey showed up with the design of a machine. I guess since this is a historical document I ought to tell the truth, Harry Huskey sold Bendix the design for a small general purpose computer. Several years later

when reading the journal of the British Computer Society, I'm not sure what journal it was, it became clear that he had plagiarized totally from a machine that Turing designed, called the ACE. If you look at the ACE design and the early papers on it, it is quite clear that those ideas were the ideas that Harry Huskey sold to Bendix.* He also sold the mistakes that were in it. (laughter)

MAPSTONE:

Which were?

PALEVSKY:

Well, maybe I said it incorrectly. Turing designed the ACE machine and he had the feeling that it was immoral to have multiplication and division in the computer because obviously that could be programmed. If it could be programmed it was just a waste of energy to build it in. So those machines just added and subtracted. Now, not everybody was Turing and it was clear, even at that stage, that you had to have multiplication and division. Harry tried to design them into the Turing machine design and he couldn't make them work. He would show up with the design and we'd look it over and say, "Well the answer comes out wrong. There is a logical mistake." Finally he said, "I guess there is just no way of doing it." Then Bob Beck took a look at it. In his own brilliant way he just puzzled over it for a few days, and with one or two trivial changes made it all come out. Bob had a remarkable mind. That was the design that was built.

MAPSTONE:

Huskey got some financial benefit?

PALEVSKY:

Oh, yes, that was the G-15. By that time the LGP-30 was around, and those two machines were the start of the small machines. They weren't small machines; they were relatively large by today's standards.

MAPSTONE:

But relatively small by Whirlwind and others.

PALEVSKY:

Oh sure. Certainly small machines characterized the West Coast computer industry. There weren't really any big machines built out here except the Bureau of Standards . . .

MAPSTONE:

SWAC, and JOHNNIAC at RAND.

PALEVSKY:

That was really done in association with Princeton. The only one, I think, that was really a West Coast project was probably SWAC.

MAPSTONE:

Was the G-15 a vacuum tube machine?

PALEVSKY:

Yes, sure. It was very successful. It was a good machine, it was well designed: again Bob Beck was largely responsible for it. Bob not only did the logic, but circuits and layout. He had a brilliant, brilliant mind. In a computer there are innumerable details, there are innumerable ways in which a machine can go bad, and there are only a few ways in which it can work correctly. It was that attention to detail that made the difference. Today computers are designed in a very bureaucratic way. Large groups of people divided into small groups doing the various aspects of the machine, then groups integrating it, and other groups checking for various things.

MAPSTONE:

No one person is responsible for anything.

PALEVSKY:

That's right. Whereas at that time there was just a handful of people and those machines were small enough so that the whole machine could be in someone's head. That made an incredible difference. The difference for a logic designer for instance, between being able to have the whole machine in his head, seeing all the interrelations, and being able to understand the total structure, and designing machines the way they do today. There are orders of magnitude of difference in efficiency.

MAPSTONE:

That is really a significant difference between yesterday and today.

PALEVSKY:

Yes. Of course, some of the small machines now, some of the mini-computers, are still at that size. I taught the first course on the G-15. At that time there weren't any programming systems so you had to teach the people who bought the machine the logic of the machine, and, the logical structure of the command system, and they would program it in machine language. They really had to know a lot about the machine. It isn't like today where you don't have to know anything about the machine, you just know

how it is programmed.

MAPSTONE:

If you are lucky.

PALEVSKY:

Well, I think most machines are that way these days. At the same time, I was still kind of the DDA expert at the company. I wrote a lot of papers and gave talks and started to think of what we would do next. By that time the company was very heavily into the G-15 program, which was a very successful program. I forget how many machines were finally built, but it must have been in the order of 500. Then transistors came along. It became clear that you could do different things because of transistors. I really didn't have a broad understanding of what it was all about that one now has looking back historically.

MAPSTONE:

You didn't feel that you were sitting on the edge of a brand new revolutionary period?

PALEVSKY:

Oh, no. We knew that it was something new, but I don't think People understood the degree to which it would explode. For instance, I was still playing around with DDA's, which, looking back now, is incredible. I'm a slow learner but I don't think I'm stupid. At the time it didn't seem outrageous, the way it seems now. The next thing that came to my mind was that given transistors we could build a machine that was much faster than any of the DDAs. The old DDAs shared one set of electronics among some number of things called integrators, or operational units. I thought it would be possible to build a machine that was much more like an analog computer, where each operational unit was in fact not part of the time-shared set of electronics, but had its own set of electronics, which were very fast. You could get away from the drum and use delay lines for memory. The people who ran Bendix, rightly, I think, didn't want to build the machine.

MAPSTONE:

Did you make a proposal to build the machine?

PALEVSKY:

Oh yes. I had done some studies on it and had looked at it in a very preliminary way. They were involved in the G-15, and I think they saw that as the main thrust of the company. You have to realize my background is purely academic and I had no notion of business, I had never done anything, I had just learned a little about computers. I had no background in business at all, but I was very determined, as young people are, to get that machine going. In 1956, I started to look to see if I could get someone to put up the

money, some other company to build that machine. Again, given the incredible proliferation of companies that has occurred since, you have to put yourself back in the historical perspective. At that time there was just no capital around for something like this. The market hadn't reacted. The whole technological swell that made all the money on the market hadn't occurred. It was a time when ideas like this were crazy. I talked to people and their general reaction was disbelief. Of course, I didn't know anybody because I had spent my life around the university. I finally was reduced to going to the yellow pages of the phone book--you can see how determined I was--and called all the electronics companies one by one. I would get the buy who ran them, there weren't very many, and go over and talk to them. There was a guy running the electronics techno- what reason, was interested. I guess he was very ambitious and willing to take changes.

MAPSTONE:

What was his name?

PALEVSKY:

Dick Lang. On January 2, 1957, we started. I rented a small store on Pico. There was Bob Beck and myself and three other people.

MAPSTONE:

Do you remember who they were?

PALEVSKY:

I don't remember most of them.

MAPSTONE:

Maybe they will pop in as you're talking.

PALEVSKY:

Yes. We started out to build this computer.

MAPSTONE:

A transistorized GP?

PALEVSKY:

No. A transistorized, parallel, digital differential analyzer. The machine I wanted to build that Bendix wouldn't build. Looking back on it, it was just total insanity. Of course, the other thing that was insane was here I was starting a business, but I had no

notion of what business was. At one point, I remember someone started talking about P and L statements and I kept wondering what they were. (laughter) I had no notion. I had never looked at a set of books. I had no notion of accounting. But I don't know that much accounting now, but I can look at Profit and Loss Statements and Balance Sheets and understand what is happening in the company, even though I couldn't make one up if my life depended on it. I had no notion at all of anything. I had just been an engineer, a logician.

MAPSTONE:

Did Packard Bell set you up as an individual corporation?

PALEVSKY:

Yes. It was called Packard Bell Computer. Over the years, I'd gotten to know the Germans down at Redstone, Von Braun's group, and they were interested in this kind of gadget. They had some of our other DDAs. After, oh, I don't know, six months or a year, they broke some funds loose to help us with the development expenses. They eventually bought a computer. We built the machine.

MAPSTONE:

Did they buy your first one?

PALEVSKY:

Well, I think under the development contract they got some pieces of the first one, but it wasn't really a computer. I forget who bought the first one. Not many were bought I can tell you. It really wasn't a very good idea, (laughter) although it turned out that it worked. By that time, of course, the drift of the technology towards general purpose computing was quite clear. In the beginning general purpose computers were very awkward, very slow, and very expensive, and it wasn't clear that it didn't make sense to use special purpose devices. There were a number of special purpose devices at the time, not only for solving differential equations, but there were matrix inverters, and a lot of different suggestions because it just wasn't clear that the economics--in some cases it had nothing to do with economics--or the kind of speed you had to get, could be achieved from a general purpose computer. Some problems had to be done on real time. That was the case that we were trying to solve. We were trying to solve problems in aircraft simulation or missile rocket simulation where you actually take the control system and then have a computer simulate the rest of the missile. The computer would be able to feed the right signals in so that you can just work on the control system and have everything else computer and see if the control system really worked. That obviously has to be done with real time. You couldn't get anything near real time with a general purpose computer. There are matrix inversion problems of the same sort where the time scale is very important. With the kind of general purpose computers that were around, you couldn't get anywhere near real time, so it appeared that it real really made sense to

use special purpose machines. It turned out that for a lot of the problems, 1), they could use analog machines because this digital approach was much more expensive, and 2) that there weren't that many problems that required the kind of accuracy. Also there were numerical analysis problems, that is there are error problems, that are too complex to deal with analytically in that kind of a machine. It was very hard to really do aero studies, so there were a lot of problems. In other words, a need was there that the general purpose machines of the time clearly couldn't solve. We set up in the store and started to play with circuits and the kind of things you do in design. Then it became clear that if we were going to use this machine with something like a control system, we had to have some method of translating analog signals into digital signals to hook the machines together. We looked around and nobody had done that job correctly. So, we embarked with on that project. When I think about it, we must have been mad, but again, we always had Bob Beck. One of the things Bob Beck did at the time was an incredibly elegant paper

on analyzing errors in analog-digital conversion systems. Bob has this incredible brilliant way of looking at a problem, grasping the elements, and simplifying them.

MAPSTONE:

Being able to state the problem.

PALEVSKY:

But state it very clearly. Bob was a bit like Fermi. I'm not saying he is in that league, but I knew Fermi somewhat, and he was that kind. That is, there are people around science who state a problem and then bring to bear this incredible amount of high powered mathematics and it's just razzle dazzle. Bob would always be able to get the problem down to elements where you use arithmetic. I'm exaggerating a little, but that is the kind of guy Fermi was. Fermi would always see the problem in a very simple way. It is the difference between Fermi and somebody like Dirac who always formulated everything in a very complex mathematical way, very elegantly. Fermi had a much more intuitive was of looking at a problem so that the very statement of the problem meant that you could solve it in a much simpler way.

MAPSTONE:

This was Beck's ability?

PALEVSKY:

Oh, yes. We had a lot of trouble getting one of those to work because it was really right at the edge of what was possible at the time. It was very difficult. Anyhow, we got that thing working, and we got the computer going. The computer did work but not very well and not many people wanted one. After we got this conversion device--it was a system for gathering data that was in analog form and putting it into digital form in some way--we started to get people talking to us about various kinds of systems. Then it struck

me that the thing that was needed in the field was a small computer. I started to think of designs, and the first guy that I talked to was Stan Frankel, who had designed the LGP-30. I don't know if you talked to Stan . . .

MAPSTONE:

Yes. I have. Stan is an exceedingly brilliant and very nice man. He has a brilliant technical mind and is really a first rate theoretical physicist. However, there is a kind of Paranoia around People like that about business' and Stanley has it too, that in some way they are going to be taken. I have always liked Stanley and we are still friends. I wanted him to design this machine, and I remember we spent quite a bit of time talking about it. As I remember it didn't work out. It just got so complex legally that I finally just gave up. I forget who did design the machine, probably Bob Beck. I think that was really a watershed development.

MAPSTONE:

This was the PB-250?

PALEVSKY:

Yes. Because that was really the first small machine. It was only about so big.

MAPSTONE:

Oh, really. Yes. And that was back quite a while. And had delay line memories. Was quite fast. Was very cheap.

MAPSTONE:

What was very cheap for those days?

PALEVSKY:

Oh, it was about $25-30,000. It had fairly good performance. It really meant that you could use a computer in a system. I would say that is the thing that I have been involved in that was the most important. That notion, which didn't come on as a vision, really evolved because of the strange historical path. We had gotten to the point where we had analog digital converters, building special purpose systems for a myriad of things. and the way they would build them would be to take the standard computer, program the special parts, and build the system with standard hardware. Up to that point, every system you built would start from scratch, and you would design the hardware and build a special system. That seems odd. It is hard for kids to believe now, because nobody would think of that. Today you go out and buy a mini-computer, program it,

buy a few things to connect to it and it does whatever job you have to do. That was an idea that no one had and that was the key to our group. As I said, I think PB-250 was a watershed machine. With that machine the company, which had been started by someone who knew nothing about business, and with a really false premise, got on the track. The company started to expand and become successful, and was a serious company.

MAPSTONE:

The parent company, I take it, was pouring in the funds.

PALEVSKY:

Yes. That is right.

MAPSTONE:

What was the structure? What was your position

PALEVSKY:

I was General Manager - the head of it.

MAPSTONE:

Idea guy?

PALEVSKY:

Well, yes. I think Bob and I really worked on what I think was an ideal relationship. Bob, is very shy and has difficulty working with people, except in a very matter-of-fact engineering way. He is brilliant at that. He is the kind of guy who elicits incredible loyalty and respect because he is so brilliant. He ran the technical side, the engineering part of the business; I did all the product planning, which I think was my real crucial contribution. Also, I ran the business side and the marketing side. Really the key to the success of the enterprise that Bob and I were involved in was the combination of product planning and engineering. It was seeing where the technology was going and what products were appropriate, and it was being able to build brilliant products because Bob did such brilliant engineering. The concept of structuring computers so as to be parts of a special purpose system was, I think, the crucial technical concept. That meant you had to structure them in a certain way, particularly the input-output system. Also, it meant worrying about all the pieces you had to connect, so you could do all the systems with a minimum amount of special purpose things. There are always some special purpose things and we had an engineering department who did that. Around the time things started to go well, the parent company--which was incredibly mismanaged--eventually was so badly managed that they were going to go bankrupt and they were bought out by TELEDYNE. We all had some ownership in the corporation that had been set up as

Packard Bell Computer, so I proposed that part of the company be set up as a separate entity so that it was not involved in the fortunes or misfortunes of the parent company. As was often the case with a badly managed company, management had no notion of their situation and felt offended. One of the heads of the companies said to me, "Well, Dupont doesn't do things like that." (laughter) Which was just incredible. At that point, I decided that I should really start my own company. That must have been 1961. I left, and by then the capital markets had come alive and it was a totally different picture.

MAPSTONE:

When was that turning point, would you say?

PALEVSKY:

Oh, it might have been in 1959-1960, I'm not sure. You would have to look it up.

MAPSTONE:

By now you had your ideas and a major operation.

PALEVSKY:

No. No. The computer part had not taken off. That didn't happen until much later. I think we must have been the first. You'd have to look it up, because DEC may have been organized by then. Yes, I think they had. Both companies/were organized about the same time, and there were no others. It was not like now. Of course, the capital markets hadn't been that the independent computer companies could make it, so generally the attitude was that IBM was going to do it all, and it makes no sense to try to compete with them. What had happened though was that other technologies--that is, people who had done radar and some other electronic technologies--had made a lot of money, so in the general technology area there was some awareness in the financial community that there was money to be made in that area. But computers, per se, hadn't become fashionable at all.

MAPSTONE:

Electronics were in, but not computers.

PALEVSKY:

That is right. Because at the time, if you remember, there was a lot of defense research development. It was companies like the Rockefeller company in the East, which I think, did the early radar work, laboratories for electronics, and there was the whole group around MIT and all that kind of thing. People who did guidance systems, but not computers. We had some difficulty raising money, needless to say. I ultimately raised a million dollars, but it was very difficult. It wasn't like later where so many computer

companies started, and people were standing on street corners looking for someone to give money to. That happened later. I think it happened Partly because of the success of ourselves and DEC which were big successes. People started to see that there was a lot of money. But in 1961 that hadn't happened at all. As I say, if there was any other company at the time, it would have been DEC, and they may have had ten people. There weren't any others. It is hard to believe now with all the companies around.

MAPSTONE:

They have all proliferated.

PALEVSKY:

That's right, and in a short 5-6 years. I went out and raised this money and we rented a building. Bob Beck came over, and by this time, we had a much wider acquaintanceship and there were more people in the field. One of the things I was assiduous about was keeping lists of people. One of the best technical people we got was Harold Marchant who I met at a company in England. I kept names of first rate people and when we started we brought him over from England. He became head of all of our electronics; a brilliant, brilliant man. We really gathered together an incredible group of talented people. Henry Herold, I don't know if you talked to him, he was there at the beginning. As a logician, Henry was probably the best on the West Coast. He is now a lawyer. We gathered together everybody that was good out here, and at one time or another practically every good person on the West Coast worked at SDS. We really had an incredible amount of talent. That is probably the other thing that I gave to the company; I really was an incredible recruiter. There was just a remarkable set of people.

MAPSTONE:

You were obviously offering these people something; the chance to work on some exciting technology.

PALEVSKY:

Well, I think that, and by that time everybody knew Bob and myself and a lot of them had worked with us at Packard-Bell. Most of the best ones came with us, and then people from other places that knew the reputation joined us. The company was set up so that every senior person that came in had a significant. I think twelve or fifteen of them ended up with more than a million dollars. That was way beyond our farthest hopes. We had no idea that it would be that successful. We set up the company, and the next step was that it now was economical to go a small computer with a core memory.

MAPSTONE:

When did you set up the company?

PALEVSKY:

1961. It was one of those things where everything was right. Exactly the right time, the product notions were exactly right, people were incredibly competent and we completely took over what market there was. We developed that whole market which is now a very big one. The 910-920, the first machine that came out, was the first time we had a really powerful machine. It was certainly much more powerful than the early Hollerith machines. These were relatively inexpensive, built with input-output systems that were much more flexible than anything that had ever been built up till then.

MAPSTONE:

You were doing all your own work? Did you use other people's stuff?

PALEVSKY:

Oh no. No. I was thinking of the input-output structure of the main frame. We didn't build printers or card punches, we couldn't do all that. I mean, the company was profitable within a year. It grew very quickly.

MAPSTONE:

That's incredible isn't it.

PALEVSKY:

Oh, Yes.

MAPSTONE:

That is an historic statement in itself.

PALEVSKY:

Oh, yes. Remarkable. It was just one of those things in the history of American industry where everything was right. I mean the company started, grew at an incredible rate, made money all along, never had any serious reversal, and was eventually sold for a billion dollars.

MAPSTONE:

It is the great American success story isn't it?

PALEVSKY:

Oh, yes. It is. It was just one 6f those incredible things. It was built and grew on the

basis of these few ideas that were developed by this group of people out here. I guess the other thing of historic interest about SDS is the work in time-sharing. Dave Evans, who had worked at Bendix, was one of the heads of the Computer Sciences Group at Berkeley. They were working on time-sharing ideas rather early. The basis of their machine was one of our computers modified extensively to do time-sharing. Then we took that system, brought it in-house--it had been done in the university and consequently the hardware and software left something to be desired; and we went through a very painful period because we thought it was much better than it was. No doubt they had some of the original important ideas. We cleaned it all up eventually and it became, I would say, one of the leaders, if not the leader, in that early phase of time-sharing.

MAPSTONE:

Which was the machine they used?

PALEVSKY:

930.

MAPSTONE:

Was that your third machine?

PALEVSKY:

Yes.

MAPSTONE:

The first machine was the 910, and it had a core memory and transistors?

PALEVSKY:

Yes. Yes. It was one of the first machines like that. That and the early PDP-1 were about the same time.

MAPSTONE:

What kind of price were they selling for?

PALEVSKY:

Something outrageous like $80-90,000. The whole basis of the growth of the company is that we could finance it, because we essentially dominated the market. The DEC people had a good machine. Coming from MIT, as they did and that experience with the first transistorized machine, their background was much more oriented towards general

purpose computing. What they didn't have was the understanding of input-output in systems, as we did. Also, I don't think they had an appreciation of the kind of programming support, but most of all what they missed was marketing. They were very able people, I don't have to tall you that, but the company was dominated by people who had something close to contempt for marketing. Of course, that's changed. At the beginning, if you wanted one of their machines, you literally had to go find it. They had very little notion that no matter how good their product was, and it was superb, you had to get a marketing force and let the people know. Since most people at that time were not very sophisticated, you had to help them. The thing that differentiated the two companies is that we were always very market oriented, in addition to the kind 6f technology being developed on the Coast and being systems oriented. They didn't have that kind of slant. Although they had a machine before us, we very quickly surpassed them. We were a bigger company, growing faster and everything else.

MAPSTONE:

It is amazing they succeeded with that early marketing philosophy.

PALEVSKY:

The reason they did is that the market was immense and there was no limit. That gets me back to what I was saying about prices. Early on, I think we got something towards $85,000 for the computer and it cost us maybe $15-20,000 to build. The profit margin was immense, but we needed that margin to finance the growth of the company because it grew at such a phenomenal rate. That was one of the things that we changed. Years later, by the time the financial community discovered that computers were here to stay and they could make money at it, the companies had proliferated to the point where the profit margins became very small and then it was very difficult to get a company started and make any money. Whereas when we did it we were really the first ones with that technology.

MAPSTONE:

You were the pioneers?

PALEVSKY:

That's right. Consequently we had very large profit margins and the company could grow. We also grew, we didn't generate quite enough money to make it all with internal funds, but pretty much. As I say, the company was sold and that was the end of the story.

MAPSTONE:

Talk about Dave Evans.

PALEVSKY:

Yes. When I was working with Bendix, Dave showed up one summer while he was working on a Ph.D. at the University of Utah. After he got his Ph.D., he came to work full-time at the company, and eventually became head of Engineering.

MAPSTONE:

We are talking now of Bendix or Packard Bell?

PALEVSKY:

Bendix. The G-15 period. Dave was there and was one of the people who helped put together the G-15. Dave stayed at Bendix, I think, until they gave up. It is incredible the number of times people in technological industries make the same mistake. The classic one, in my mind, is always the French. They brought out the CARAVELLE which was an airplane that really dominated the [?] They built a big customer base, I think they have built 7-800 CARAVELLES. They established a position of dominance in a field, where the user community looked for airplanes of that sort. Companies that do that often get a kind of megalomania. Rather than supply the next generation aircraft to the user that would be in that same class, or maybe, because of the change in the technology. what is defined as a small aircraft now becomes a slightly bigger one, but essentially fits that part of the market, they decide to build something large or more complex. The French did. They completely abdicated what took them literally hundreds of millions of dollars to get; a…the position where the users looked to them and trusted them as a supplier. When I was at Bendix, I kept screaming about that. They had reached the point where they were, I would say, the preeminent supplier of small computers--the Bendix G-15. What they should have done was to build a transistorized, small computer, because that whole segment of the market trusted them and looked to them. Instead of that, Dave, primarily, and some of the other people at Bendix, designed this huge machine. Building big machines is quite different; the problems of building a big machine go up by orders of magnitude. It took them years and years longer than they expected, and eventually it effectively bankrupted the company so that Bendix sold. The new machine never got into production.

MAPSTONE:

Who did they sell to?

PALEVSKY:

They sold to Control Data Corporation. HM: That is right. Was that the beginning of their big line?

PALEVSKY:

Oh no. I don't know why they bought it.

MAPSTONE:

Did they just junk that machine?

PALEVSKY:

Yes. They junked the machine. The Control Data people ware always very aggressive about growth, and whenever there was something up for sale they were always there looking to buy it because Norris wanted to be as big as IHM and you could grow faster by buying something that was already there. I think at that point Dave left and went back to academics. [??] supplier of small computers-- the Bendix G-15. What they should have done was to build a transistorized, small computer, because that whole segment of the market trusted them and looked to them. Instead of that, Dave, primarily, and some of the other people at Bendix, designed this huge machine. Building big machines is quite different; the problems of building a big machine go up by orders of magnitude. It took them years and years longer than they expected, and eventually it effectively bankrupted the company so that Bendix sold. The new machine never got into production.

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MAPSTONE:

Is he still in Utah now? I have an address for him.

PALEVSKY:

Yes. The last I heard. I haven't seen him in a few years, but he had started a small company on the side to do displays. I don't know if it is still going. He was still on the staff at the University.

MAPSTONE:

Would he be worth talking to?

PALEVSKY:

Yes. Dave was around from the beginning. He was a very bright guy.

MAPSTONE:

You mentioned papers and talks that you had given and you mentioned the Beck paper. Do you have copies or can you refer me to them?

PALEVSKY:

I have a bibliography of all my papers.*

MAPSTONE:

May I have a copy of that bibliography?

PALEVSKY:

Yes. Bob's was just an internal paper. He was not the kind to publish or to give talks. He was really much too shy.

MAPSTONE:

That is too bad. One of the problems with tracking down this early history, because it always happened so fast, I guess, people didn't document very well.

PALEVSKY:

They certainly did not do anything historical, but there were technical papers. At one time I thought I would get somebody to put together the history of computers in the early days. It really was fascinating. Everybody knew everybody else. It was really a very small group. You knew everybody and it was a great time. I remember Fermi once

saying that before the second world war, he knew every physicist in the world that was of any consequence. Whenever he would go anywhere in the world, he would usually stay with one of his colleagues. If he didn't stay with them, he would spend his time with the local important physicist. He was saying that the war changed all that. Now there has been such an incredible proliferation of people. But more than that, he said you could be a physicist and do your own work and everything was fine. Now, unless you have ten million dollars or twenty million dollars, you can't do anything. The whole nature of the game had changed completely. In a way that is true in the computer field. It has gotten so big that if you are going to do anything it takes hoards of people, large bureaucracies, and incredible amounts of planning. In the beginning, it was a much more individualistic thing, particularly on the West Coast where, as I say, machines were small enough that you could keep them in your head. You could really understand the total machine. Now, no one under-stands any machine totally. Maybe Seymour Cray was the last guy who worked that way. I don't know. I met him, but I don't know him. I don't know if he really could do that with those big machines.

MAPSTONE:

It is hard to conceive, isn't it?

PALEVSKY::

Yes. Certainly if you think of programming the systems. No one understands any of the IBM systems, that is in the sense of really understanding in detail, how every part works and interacts with every other part. I don't know if you know the talk Wiener gave about the Sorcerer's Apprentice. It was a very good talk which he used to give around the universities about computers being like the story of the Sorcerer's Apprentice, and it really has become true. That is, no one understands what is happening inside, so that if you get answers out, it is very hard to evaluate what they really mean. In simple things, obviously you know. But if it is something very complex, you can't go through all those steps in your head and say, "Well, it did this and this and this and this." The answer is really within the context of understanding how the machine operates. He always talked about using machines in defense problems. If you let the machines make decisions, with the complexity of what was happening inside the machine itself, no human being could understand how the decision had been reached, Consequently, you couldn't really evaluate if the decision were totally irrelevant or irrational because some step involved a consequence that you didn't intend, but was in there. That has happened with computers. Because of the complexity of the machine and the complexity of the programming systems, you really have to operate on faith. You can't go back and in some way check the answers. You have to either say, "Well that's the answer," or "We are not going to use it." But we can't evaluate it in any way. There were times when if you were in doubt, you knew enough about the internal structure so you could trace back and pretty much verify if there were an error. Then you could go back and understand how the error occurred. Now it is almost impossible.

MAPSTONE:

When was Weiner giving this talk?

PALEVSKY:

In the forties.

MAPSTONE:

He was really into social significance and implications very early.

PALEVSKY:

Oh. Yes.

MAPSTONE:

Did you listen, did you hear? Were you conscious of the implica-tions of what he was saying?

PALEVSKY:

Oh, yes. That was before I was even involved in computers. I could understand what he was talking about.

MAPSTONE:

Was it something you were aware of as you developed computers?

PALEVSKY:

No. Because what I was dealing with was really so trivial. He really saw much further ahead, much closer to where we are now.

MAPSTONE:

He was really the soothsayer. The Sorcerer's Apprentice is a good analogy. Another thing we didn't talk about was patents. Do you hold patents?

PALEVSKY:

Oh, yes. That's another guy who was crucial in this whole field. One of the really brilliant people around is a patent attorney, named Ellsworth Rosten. He is here in L.A. At the time he worked for Bendix and he was the one who was on top of the whole negotiation when Bend[x took over Northrop. He did all the patent work at the beginning, and he is the best patent attorney I have ever known. He is one of the

brightest people I have ever known.

MAPSTONE:

Did he do the patent work on your Packard-Bell too?

PALEVSKY:

He always did our patent work.

MAPSTONE:

All the way through. Can I get his address from the secretary?

PALEVSKY:

Right.

MAPSTONE:

What I should do is contact him and have him steer me to the key patents which we would like to have as a data base.

PALEVSKY:

Yes.

MAPSTONE:

I suspect there is an awful lot and I wouldn't want them all.

PALEVSKY:

There really aren't because they tended to be big system patents. By that time, the basic patents, the basic notions of the computer had already been identified. The basic notion of the computer is not a West Coast idea.

MAPSTONE:

Right. That's right. It is pretty much an east Coast . . .

PALEVSKY:

That's right.

MAPSTONE:

The ENIAC patent covered so much of it. Yet there was a lot of patenting going on here of the individual systems.

PALEVSKY:

Right. Particularly with respect to development associated with small machines. Elley was right in the middle of all that. [pause in interview]

MAPSTONE:

Floyd Steele is in Oregon.

PALEVSKY:

What does he do?

MAPSTONE:

He is starting another company.

PALEVSKY:

To do what?

MAPSTONE:

Build small DDA type things for automatic control.

PALEVSKY:

He has the mind of an autodidact; someone who is bright, but with no perspective and no critical sense. Although he had a lot of ideas, and he's certainly bright, he couldn't really sort them out. Some of his ideas were absolutely insane. At one point he got a group of generals together, I can't remember. By that time, the basic patents, the basic notions of the computer had already been identified. The basic notion of the computer is not a West Coast idea.

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the professors at MIT, and all the other brilliant people working on it, were just wrong. This nut could do it all in a shoebox. He had that kind of mind. That is, when he attacked a problem he would say, "Well you could do it this way," and he would come up with something vary simple that you could fit in a shoebox. Then you would say, "But it doesn't do this such and such." And he would say, "Well, you don't have to do that." (laughter) That's the way his mind operated. It was simplistic and obsess ional, like someone with a great deal of religious fervor, who has the answer to everything in some incantation that will take it all away. He really believed it, I think. He was very odd. The thing I remember mostly about him happened at one of the computer meetings, I don't remember which one, it was quite a while back. There was a panel on some aspect of computers. There were five of us and it was the big panel discussion of the meeting. The computer field was rather small at the time and there must have been a couple of hundred people in the audience. We'd all given a short talk, and it was the question and answer period. Somebody asked me a question and I answered it as best I could. Then I said, "What do you think about that, Floyd?" I looked over and he was asleep. (laughter) Right there in front of all these people. I didn't quite know what to do. He was always starting projects, and as you know, nothing he ever started succeeded. Not that success is the touchstone of intelligence or of a lot of things that are important. They were always very strange ideas.

MAPSTONE:

Wasn't it more that he never actually completed, rather than succeeded?

PALEVSKY:

Yes, but again, I think the reason that nothing was ever completed was that somewhere in the back of his mind, because he was not stupid, he realized that once something was completed and put on the test, it wouldn't do. Because, again, he had the kind of mind which could look at a problem and come up with an incredibly simple answer. During the development, or during the time it was done, he would start to see that it was just too simple-minded and there would have to be things added on. I always had the feeling that if he ever got to the end he would realize that he had missed the point. I believe that is one of the reasons why things never got done. I think they also never got done because he was the kind of guy who had the Floyd?" I looked over and he was asleep. (laughter) Right there in front of all these people. I didn't quite know what to do. He was always starting projects, and as you know, nothing he ever started succeeded. Not that success is the touchstone of intelligence or of a lot of things that are important. They were always very strange ideas.

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[End of Interview]