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David A. Bossen

EARLY BAY AREA VENTURE CAPITALISTS:  
SHAPING THE ECONOMIC AND BUSINESS LANDSCAPE

Interviews conducted by  
Sally Smith Hughes  
in 2010

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David A. Bossen

## Project Overview

*Early Bay Area Venture Capitalists: Shaping the Business and Industrial Landscape* documents through videotaped interview with the first generation of venture capitalists the origins and evolution of venture capital in California. The project explores and explains through the words of participants how venture capital in the state originated in the 1960s and 1970s, its intersection with national legislation and policy, the significance of its location, and its role in creating new companies, new technologies, and new individual and institutional wealth.

## The Project

Venture capital was not a term when these narrators began to practice “risk investment” in the late 1960s and early 1970s. The oral histories describe the evolution of the field into the industry of today, focusing on its earliest emergence in Northern California. The narrators describe their circuitous routes into venture capital, their individual approaches to its practice, illustrative investments in key companies, the significance of its location in the Golden State, and its contributions to creating, financing, and building new companies, nationally and, increasingly, internationally.

Conceived and generously funded by Paul “Pete” Bancroft III, the project in its second year has interviewed twelve individuals. In the third and final year, the project scope expands to include interviews with representative investment bankers, attorneys, and early venture-backed entrepreneurs, as well as with additional venture capitalists. Completed oral histories, including those donated by related projects, are available at:

<http://bancroft.berkeley.edu/ROHO/projects/vc/>

An advisory board meets periodically to select individuals for interviews and advise on general direction.

Members: Paul Bancroft III, William Bowes Jr., William Draper III, Jerome Engel, Charles Faulhaber, Franklin Pitcher Johnson, and Alan Mendelson.

Project Director and Interviewer: Sally Smith Hughes

Videographers: Julie Allen, Caroline Crawford, and Linda Norton

Transcriber: Katherine Zvanovec

**David A. Bossen****BIOGRAPHICAL SKETCH**

David A. Bossen is Chairman Emeritus of Honeywell-Measurex Corporation. He was founder of the Cupertino, California based firm in 1968 and served as its Chief Executive Officer until its sale to Honeywell in 1997. Measurex had a successful IPO in February, 1972. The stock was offered at \$20 per share and closed at \$40 the same day, giving it a market cap of \$100 million on revenues of \$8.6 million. Measurex grew its revenues at a CAGR of 17% a year from its IPO until its sale to Honeywell 25 years later in 1997.

Mr. Bossen graduated from the Massachusetts Institute of Technology (M.I.T.) in 1951, earning a Bachelor of Science degree in Industrial Management. He attended the United States Naval Academy at Annapolis from 1946 to 1949. Mr. Bossen served in the U.S. Marine Corps in 1945-1946. A native of Clinton, Iowa, he was born on January 9, 1927.

Before founding Measurex, Mr. Bossen was Vice President, General Manager of Industrial Nucleonics Corporation. He was with Industrial Nucleonics from 1951 until 1967. Prior to that, he was an industrial engineer at Alcoa.

Mr. Bossen has served as Chairman of the Board of Directors for the Santa Clara County Manufacturing Group, and was a member of the Board of the Bay Area Council of the M.I.T. Corporation Development Committee. He has been an active member of the American Electronics Association for many years, having served as an Executive Committee Member of the Board of Directors and as Chairman of the Capital Formation Task Force.

Mr. Bossen has made significant contributions to education. Under his leadership, Measurex has donated state-of-the-art process control systems to the University of Maine, North Carolina State University, Western Michigan University, and Miami University of Ohio. Through scholarship endowments, he has helped aspiring papermakers at the University of Maine, Western Michigan University, and North Carolina State University.

In addition, Mr. Bossen is a Fellow of the Technical Association of the Pulp and Paper Industry and a member of the Paper Industry Management Association. He holds several patents in process control.

Mr. Bossen and his wife, Darlene, reside in Menlo Park, California.

March 1999

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Interview #1: July 8, 2010

Begin Audio File Bossen 1 07-08-2010.mp3

01-00:00:55

Hughes: We're in Mr. Bossen's home, and it is July 8, 2010. Mr. Bossen is so far our one and only entrepreneur in the venture capital series. Let's start at the beginning, namely where you were born and a little about the family that you grew up in.

01-00:02:51

Bossen: I grew up in Clinton, Iowa, where I was born January 9, 1927. My mother, Rose, and father August were a bit older than normal. My father was sixty when I was born, and my mother was thirty-seven, which was quite unusual for those days. He had been and she had been something of entrepreneurs themselves. He had started a small chain of movie theaters in downstate Illinois. He founded them during the 1920s and sold them off in the early 1930s.

01-00:03:46

Hughes: Before the Depression.

01-00:03:48

Bossen: Well, the Depression had started in 1930, (and he got out) but it was not harming the movies, strangely enough. It was a great escape place, and it cost ten cents to get a ticket in those days. But then my dad died when I was twelve years old.

01-00:04:13

Hughes: Do you know how they came to be in the theater business?

01-00:04:22

Bossen: A little bit. Dad had owned a jewelry store and was a watchmaker prior to that, and my mother was a professional musician. She was an organist. She played the largest pipe organ in the world, which is still in existence at the Chicago theater. Before talkies came in, they had the organ playing along with the film, and she played that big pipe organ. I don't know how they met, but they were together in the 1920s in Chicago, and they were married, I think, in the early twenties.

01-00:05:20

Hughes: So you are an only child?

01-00:05:23

Bossen: I am an only child.

01-00:05:24

Hughes: What was it like growing up in that family?

01-00:05:32

Bossen:

Well, after my dad died, my mother and I moved in with her mother, my grandmother. And her sister, my aunt, was also there. So I was raised in a matriarchal society from age [chuckling] eleven or twelve and thereafter. Clinton, Iowa was a great place, as I look back on it, to have a childhood and grow up. It was on the Mississippi River. It was a mile wide at that point, and we would go out fishing. We weren't supposed to, but we went swimming in the Mississippi.

01-00:06:24

Hughes:

Weren't supposed to because it was dangerous?

01-00:06:28

Bossen:

Yes, well, that was the theory. And in fact, I had a cousin who drowned in it, a second cousin. But it was a good place to grow up. We lived in the northern end of Clinton, in what originally was a separate town called Lyons, Iowa, and then it merged into Clinton sometime in there. We had small schools because we were in that end of town. I think we had about sixty in my graduating class.

01-00:07:17

Hughes:

And this was a public school?

01-00:07:20

Bossen:

Oh yes. I graduated in June of 1945, and of course World War II was still hot and heavy, so all of the young men, boys, went in the service right away. I went in the Marine Corps and stayed there for one year, and from the marines I got a fleet appointment to the Naval Academy.

01-00:07:56

Hughes:

Well, step back a minute, please, because I'm interested in what this entrepreneurial streak in the family might have meant to you?

01-00:08:15

Bossen:

I never really thought about it. [chuckling] But I think it gave me the ambition to strike out on my own.

01-00:08:37

Hughes:

Did your mother continue to work after your father died?

01-00:08:40

Bossen:

Oh yes. Yes, she just became a clerk in the store. They ultimately lost most of their money.

01-00:08:57

Hughes:

Because of the Depression? Or was it more complicated?

01-00:09:02

Bossen:

It was more complicated. They were swindled, but they had managed to keep it through the crash. One of my mother's sisters was going with a guy in Washington. She was living there. He had this idea that he knew where they

were going to build the George Washington Bridge, and if you knew where it was going to be built, you could buy the land on the approaches, and it would greatly increase in value. So this fellow got a lot of people to give him money to buy up the options on the land where he “knew” it was going to be built. It turned out he was right. The problem was, he hadn’t invested the money in that. He’d spent it on fast women and slow horses. [Hughes chuckles] So my parents and a lot of other people lost a lot of money with Uncle Charlie.

01-00:10:24

Hughes:

So that was the reason for your mother getting the sales position.

01-00:10:31

Bossen:

Yes, right.

01-00:10:35

Hughes:

Were you becoming interested in any particular field as you went through school?

01-00:10:46

Bossen:

Well, besides my mother, a woman who had a very large influence on me was her sister, whose name before she was married was Carolyn Nichols, and after she was married, Carolyn Eberhart. She married a guy named Bill Eberhart who was a marvelous guy. He was a finance guy, and he did quite well in managing the financial operations of some corporations. She got me interested in management, because she ultimately became one of the first successful women executives in manufacturing. In fact, there was a big article on her in the *Chicago Tribune* in the early forties—about her accomplishments as a woman executive. She became vice president of manufacturing in a company called Climax Engineering, in Clinton, Iowa. And Climax Engineering made big V-12 oilfield diesel engines. It was big, heavy equipment stuff, and they had a big foundry and machine shop and the rest of it there, and she managed this.

01-00:12:36

Hughes:

Very unusual for a woman.

01-00:12:38

Bossen:

Well, she started out as a secretary and worked for the guy who was CEO. Then World War II came along, and a lot of the men went in the service, and she was left there, and she was doing it, so she ultimately, as I said, became vice president of manufacturing. Bill Eberhart, her husband, was the VP of finance for the company, and that’s how they got together. She pushed me and incited me to get into management training.

01-00:13:20

Hughes:

And?

01-00:13:23

Bossen:

Well, I left the Naval Academy after three years. I didn’t finish. I banged my knee up plebe year playing football, and by second-class year I was not

getting around in the obstacle course too well. So they called me in and said, “Bossen, we’re going to have to operate on that knee, but we have to tell you regardless whether we do or not that you can go ahead and graduate, but you won’t get a line commission. You’ll have to serve in the supply corps.”

01-00:14:00

Hughes: Because of the injury?

01-00:14:01

Bossen: Yes. Well, line officers in the marine corps have to be able to charge up hills and stuff like that. They told me that, so I said, “Thanks. I’m out of here.”

01-00:14:20

Hughes: Why had you entered Annapolis in the first place?

01-00:14:26

Bossen: I got a fleet appointment from the marines.

01-00:14:28

Hughes: What does that mean?

01-00:14:31

Bossen: Well, you get into the academy in a couple of different ways. First of all, every senator and representative can appoint one person a year into the academy, I think. I don’t know how it works exactly. And the second way is, the navy and the marine corps can appoint a certain number, and these are called fleet appointments. At that point I was stationed at Philadelphia Navy Yard and going to radio op[eration]s school for the marines. And Saturday night we were doing a big cleanup for the colonel’s inspection the next day, and they had posted a notice that anyone who wanted to be considered to go to the Naval Academy prep school should, as they say, lay below and see the captain. So I did that. It was better than washing windows, I thought. And he basically said, “Well, you look like you’ve got the right stuff.” I had scored very well on the basic test that they give everyone who goes in the service. It used to be called the AGCT [Army General Classification Test], and I don’t remember what those initials stand for.

01-00:16:30

Hughes: Was it like the current SAT?

01-00:16:36

Bossen: Yes, it was. Well, they were not trying to look at knowledge; they were trying to look at intelligence. So I got sent down to the Naval Academy prep school, where the service sent their enlisted people so that they could take the test, which was very much like the SAT—an entrance exam for the academy. I had never had chemistry in high school. They didn’t offer it in Lyons, Iowa. They were teaching us basic chemistry in this class, but I was only in it for about a month so I didn’t pick up much, and then the exam came along. Some of the answers were perfectly obvious, so I answered the ones that I could. The rest

of them I marked the C column all the way down, and it passed! [laughter] So when in doubt, say C!

01-00:18:05

Hughes: A lesson early learned.

01-00:18:08

Bossen: Yes, so that's how I got in the academy. And when I left the academy, I went to MIT.

01-00:18:20

Hughes: It was an honor, of course, to be at Annapolis.

01-00:18:28

Bossen: Yes.

01-00:18:30

Hughes: Did you just take it in stride that you weren't going to graduate?

01-00:18:35

Bossen: Oh yes. Sure. No question.

01-00:18:49

Hughes: Why MIT? How did that come about?

01-00:18:55

Bossen: Well, I applied to two schools, Yale and MIT. I was admitted to both, and I wanted to go to Yale because my girlfriend was at Vassar, and that was very convenient to New Haven. [chuckling] But dear Aunt Carrie, who I mentioned earlier said, "Well, you of course can go where you want to go, but if you want any help from me, you'd better go to MIT because you're a poor boy, and you have to make a living afterward, and those Yale kids are all pretty well off." That's why I went to MIT.

01-00:19:41

Hughes: MIT in those days pulled from a diverse social system?

01-00:19:57

Bossen: Oh yes.

The course I went into was initially called business and engineering administration—a horrible name. And while I was there, they changed the name to the School of Industrial Management. And a couple of years later, they changed it again to the Sloan School of Management because Mr. Sloan had by that time given them the money, so he had a school named for him. [laughter]

01-00:20:31

Hughes: [chuckling] Were you thinking at this point more about a business career as opposed to an engineering career?

01-00:20:43

Bossen: Yes.

01-00:20:50

Hughes: And why was that?

01-00:20:55

Bossen: I just thought I would enjoy management more than I would enjoy designing valves, for example.

01-00:21:11

Hughes: But the fact that you were in that business course didn't preclude taking technical courses?

01-00:21:20

Bossen: Well, of course I had three years at the Naval Academy, which was largely engineering.

01-00:21:28

Hughes: And that was your choice? Or that's just what happened when you went to Annapolis?

01-00:21:34

Bossen: The only elective that you had then was language.

01-00:21:39

Hughes: Really!

01-00:21:44

Bossen: And I took Russian. The reason I chose Russian was that about half of my class had already had two years of college before they entered the Naval Academy, and they had all taken a couple of years of German or French or Spanish or something. I thought, I will be smart; I will take Russian because no one will have had that, and I'll start out even. Big mistake. I walked in the first day in class, and there were a whole bunch of White Russian descendants there, jabbering away! [chuckling] But I've always been glad that I've taken it because it was interesting.

01-00:22:35

Hughes: I didn't realize that there was such a strong emphasis on engineering at Annapolis.

01-00:22:40

Bossen: Oh yes. Both that and West Point. They're basically engineering schools. Now, subsequently, ten maybe fifteen years ago, I don't know when they did it, but they broadened it out so that now you could get liberal arts degrees there as well as engineering, and you could major in fine arts and things like that. I don't understand why they did it. A naval officer aboard ship needs to know engineering a lot more than he needs to know about Plato. [chuckling]

01-00:23:26  
Hughes: What happened at MIT? You took basically business courses, right?

01-00:23:35  
Bossen: Yes.

01-00:23:36  
Hughes: People speak of Harvard's case method way of teaching.

01-00:23:49  
Bossen: Yes.

01-00:23:52  
Hughes: Is there something characteristic about what became the Sloan School?

01-00:23:56  
Bossen: Yes, they use cases, but it's not like Harvard.

01-00:24:04  
Hughes: And did it serve you in good stead?

01-00:24:06  
Bossen: Yes, very good.

01-00:24:11  
Hughes: In what sorts of ways?

01-00:24:16  
Bossen: I learned about marketing. Before I went there, I thought marketing was the farmer is taking his eggs to market. [laughter] And so I had marketing, and the finance courses were very good, and I even took a cost accounting course, which was very helpful.

01-00:24:43  
Hughes: So you did have some leeway in your course selection?

01-00:24:49  
Bossen: Oh yes, at MIT you did have selection.

01-00:24:54  
Hughes: Was there some competition with Harvard?

01-00:25:02  
Bossen: Probably.

01-00:25:06  
Hughes: But you weren't worried about that.

01-00:25:07  
Bossen: No.

01-00:25:09  
Hughes: Did you make connections there that later served you well?

01-00:25:17  
Bossen: Yes, with a couple of the professors. And of course I had friends in the student body, but I don't recall anything coming about with former students.

01-00:25:49  
Hughes: Were you taking all this in your stride? MIT is a rigorous place.

01-00:25:57  
Bossen: Yes.

01-00:26:01  
Hughes: You didn't have any difficulty fitting in and doing the work?

01-00:26:05  
Bossen: No. I made dean's list right away. In fact, in many ways, I found the Naval Academy more difficult academically than MIT. But I think it was because of the courses I was taking and my background when I got there.

01-00:26:32  
Hughes: Because you'd come straight from high school.

01-00:26:34  
Bossen: Yes.

01-00:26:35  
Hughes: And you were probably the real exception there.

01-00:26:39  
Bossen: Well, straight from high school and from a small Iowa high school.

01-00:26:49  
Hughes: None of this was intimidating?

01-00:26:54  
Bossen: I was concerned about doing the work, but I felt I could do it, and I did it.

01-00:27:05  
Hughes: And you obviously could. You made dean's list.

Can you summarize the approach that the predecessor of the Sloan School took? Was it a very hands-on kind of education?

01-00:27:24  
Bossen: Well, I would contrast it with the Naval Academy. At the Naval Academy, most courses you recited every day. You had a reading assignment for that day, lecture, and then they would say, "Man the boards." You would go to the blackboard, and there'd be a slip there with four questions on it, and you had to write the answers to those four questions on the blackboard. And if you got three of them right you passed, and if you got less than three right, you failed! [laughter] Very simple. So you *had* to keep up. You were doing it daily. At MIT, it was, we don't care if you ever come to class. You just have to pass the

exams. And it was totally a different situation. But I think, because I had the Naval Academy background, I did the work day by day, didn't get behind.

01-00:28:40

Hughes: Well, tell me what happens after you graduated from MIT.

01-00:28:44

Bossen: I got a job with Alcoa at their new rolling mill in Davenport, Iowa. And the reason I took that job was that my mother was getting on, and she was in Clinton, Iowa, which was nineteen miles away. So I could live at home with her and drive back and forth to Davenport Works. So I was with Alcoa for six months, and I was terminally bored. [chuckling]

01-00:29:34

Hughes: What were you doing?

01-00:29:34

Bossen: Industrial engineering.

01-00:29:38

Hughes: What was boring about it?

01-00:29:43

Bossen: Well, Alcoa was a fine company but very bureaucratic, and if I'd stayed with them thirty years, I might have made a plant manager someplace, or industrial engineering director, but it was just too bureaucratic. And about this time, after I was there six months, I got a call from a good friend from MIT, who *did* help me. In fact, he got me out of Alcoa and into a small startup in Columbus, Ohio that was called Industrial Nucleonics, doing the peacetime atom and all that stuff. His name was Karl Cooperrider, and he got me out there, and I interviewed with him, and they offered me a job, and I took a job as their first manager of market research.

01-00:30:57

Hughes: Wow. At what age?

01-00:31:00

Bossen: Well, it was a very small company, you understand. It was a startup. I graduated in '51—that would have been '52—twenty-five.

01-00:31:21

Hughes: Now, did he know that you were dissatisfied at Alcoa?

01-00:31:27

Bossen: No. He just called me up one day and said, "Hey, we've got this opportunity out here, and I thought about you. Why don't you come out and meet us?" So I got in the car and drove out and saw him. I was married at this point, and my wife thought this was the most marvelous thing that had ever happened—got her out of Clinton, Iowa! [chuckling] Columbus, Ohio sounded like a real city. She was from LA originally.

01-00:32:08  
Hughes: Yes, she knew there was another world.

01-00:32:10  
Bossen: Yes, a different world. So that's how I got with Industrial Nucleonics.

01-00:32:18  
Hughes: What were you seeing at Industrial Nucleonics other than a way of getting away from Alcoa?

01-00:32:32  
Bossen: I thought it was a great opportunity because they were developing sensor-based control systems, analog. They developed systems to measure, for example, the thickness of— Well, I came from Alcoa, so aluminum while it's being rolled, without touching it. You shot beta rays through it from a nuclear isotope, and you could measure the thickness directly without touching it.

01-00:33:13  
Hughes: Was that new? Had Alcoa been using—

01-00:33:18  
Bossen: No, they had not been. This was new. This all came out after World War II, and isotopes became available. Radioisotopes were not available before that time.

01-00:33:38  
Hughes: That's interesting because the AEC [Atomic Energy Commission] was pretty much controlling the distribution of radioisotopes at that time.

01-00:33:53  
Bossen: They were, yes.

01-00:33:54  
Hughes: So was Industrial Nucleonics buying its radioisotopes from the AEC?

01-00:34:00  
Bossen: Yes. But then we had other companies that would take the radioisotope itself and encapsulate it. Very dangerous stuff. If you ingested any strontium-90, for example, it's a bone seeker and causes bone cancer in you ultimately.

01-00:34:25  
Hughes: And did you know all that? Was the hazard of radioisotopes known at the time?

01-00:34:30  
Bossen: Yes—oh, that was well known, well known. But we never handled the raw isotopes there. Nor did we later at Measurex. We bought—we acquired them from the AEC, and they shipped them to a supplier company. One was U.S. Radium. They specialized in taking the isotopes and putting them in hermetically sealed capsules. So then we only handled the capsules.

- 01-00:35:09  
Hughes: Which were impenetrable to whichever the radiation was?
- 01-00:35:15  
Bossen: No, no! You want the radiation to come out. That's how you use it!
- 01-00:35:18  
Hughes: Okay, well how are you protecting yourself then? I thought this was a safety thing.
- 01-00:35:22  
Bossen: [indicating with sheets of paper] That much paper will stop beta rays totally. They are not very penetrative. Gamma rays are a different kettle of fish. Depending on the energy of the gamma ray, they can be quite penetrating. But no, if you understand how this works, it isn't a problem. You design the equipment so that the radioactive source is just in the small source unit and well shielded, and directly above it you put the detector, and generally you fix it so people can't even put their fingers in between. And even if you did, you wouldn't get any serious effect from the beta rays unless you left your fingers there for a very long time.
- 01-00:36:44  
Hughes: How did the AEC transport its radioisotopes?
- 01-00:36:49  
Bossen: They transported them in lead-lined containers. You would do this work under hoods, glass-covered hoods, that would have a negative pressure, so that nothing comes out.
- 01-00:37:30  
Hughes: But Industrial Nucleonics wasn't doing that.
- 01-00:37:35  
Bossen: No. They were only handling sealed sources. Industrial Nucleonics was using analog computers and analog controls to make the measurements and control systems that then, when I founded Measurex, we did digitally. I stayed at Industrial Nucleonics for fifteen years.
- 01-00:38:06  
Hughes: Well, don't go too fast. [chuckling]
- 01-00:38:08  
Bossen: Sorry.
- 01-00:38:10  
Hughes: It seems to me that Industrial Nucleonics is a starting point for what you're going to spend much of your life doing.
- 01-00:38:20  
Bossen: Yes.

01-00:38:21

Hughes: So what were you doing at Industrial Nucleonics?

01-00:38:30

Bossen: I started, as I said, in market research, and then I went into sales, and I came out here to California and opened up the entire West Coast market. We were selling these systems to companies like Kaiser Aluminum and U.S. Steel. I sold thirty-five systems, I think, to U.S. Steel in Pittsburg, California, for measurement in steel rolling mills and classifying lines and electrolytic tinning lines. In any sheet process, we could measure the weight per unit area, and that correlates to thickness. Well, basically, paper making was a very big sheet processing industry, and we started out just measuring basis weight and then ultimately the moisture content.

01-00:39:49

Hughes: Now you're still talking about Industrial Nucleonics?

01-00:39:53

Bossen: Yes, they were doing that. I think we came out in 1958 with the online moisture-measuring device. You see, paper is basically wood fiber and water. And a sheet of paper in a reasonable environment will equilibrate to something like 6 percent water and 94 percent fiber. And when you're making the paper, before they had these systems that we developed, they had quite a bit of variation. You take a sheet of paper coming out of a machine today, and it's thirty feet wide, and it's moving at sixty miles an hour, and you can't touch it with a sensor. So we developed the systems, initially at Industrial Nucleonics, using analog methods for a control system. And this worked, but not as well as it could have. So when the minicomputer came along.

01-00:41:43

Hughes: When would that have been?

01-00:41:45

Bossen: That would have been in the mid-sixties to late sixties. The founders at Industrial Nucleonics, Bert [Wilbert E.] and Roy Chope, were analog people and developed vacuum tube circuits and this sort of thing. They weren't sure the transistor was here to stay, let alone the integrated circuit.

01-00:42:16

Hughes: Why would they think that?

01-00:42:18

Bossen: People who are brought up in a given technology, and they spend their lives learning that technology, are not *really* interested in jumping into a different technology.

01-00:42:34

Hughes: I see. But were you paying attention?

01-00:42:39  
Bossen: Yes. I said to them, “Look, we can use a digital computer, and we can eliminate all of this analog circuitry, and we can use the computer, not only to support the measurements, but for the controls and the displays and the rest of it.

01-00:43:01  
Hughes: Now how could you know that? Was your engineering education sufficient so that you could understand what was going on in the computer world?

01-00:43:12  
Bossen: Yes, sure. I kept up. [chuckling]

01-00:43:17  
Hughes: How? By reading?

01-00:43:18  
Bossen: Reading, living, looking, learning.

01-00:43:25  
Hughes: Because the development of the computer is a whole thing—

01-00:43:32  
Bossen: The computer was developed, the hardware was developed. We developed the software.

01-00:44:05  
Hughes: These were the very early days of the application of the computer, right?

01-00:44:14  
Bossen: Yes.

01-00:44:15  
Hughes: In any form. I’m certainly not an expert on computer history, but it seems to me that not that long before that, the computer was almost an experimental device.

01-00:44:34  
Bossen: No, that was well accepted in industry. In the sixties, IBM was—

01-00:44:46  
Hughes: Oh, I thought we were still in the fifties.

01-00:44:52  
Bossen: Well, it was starting in the fifties. I jumped ahead a little on you. About ’65 was when the digital minicomputer came out.

01-00:45:08  
Hughes: Yes, but when you first arrived at Industrial Nucleonics [in 1951] the computer must have been a very new application.

01-00:45:14  
Bossen: Well, it was all analog in those days.

01-00:45:16  
Hughes: But even so.

01-00:45:21  
Bossen: Well, yes, but people had been building analog controls for years and years and years before that.

01-00:45:29  
Hughes: All right. A company such as U.S. Steel would be interested in a sensor device largely to make sure that its products were consistent?

01-00:45:45  
Bossen: To make money!

01-00:45:50  
Hughes: Well, yes, but how? [chuckling]

01-00:45:51  
Bossen: Okay. Let's go to the paper industry. Back to that.

01-00:45:56  
Hughes: All right.

01-00:45:56  
Bossen: Ninety-four percent fiber/6 percent water. Now the paper, in fact, in the pre-computer-control days for the paper industry, standard newsprint weighed thirty-two pounds per ream. That meant thirty-two pounds per three thousand square feet. Today about twenty-eight pounds per three thousand square feet is standard newsprint. Did you know that had changed?

01-00:46:37  
Hughes: Of course not. And what is the significance?

01-00:46:37  
Bossen: All right. Well, do you *why* it changed? The reason is that it varied so much as it was being manufactured, that some of it was made down here at twenty-eight pounds and some of it was made up here at thirty-six pounds per ream. What we did when we had the measurement tools online, and we were able to control both the machine direction and cross direction, we narrowed that spread down to plus or minus a couple of *tenths* of a pound. So if it was okay at twenty-eight pounds before, some of it was—whoosh—we'll just shift it all down there. You couldn't do that before because it would have gone too far. So that enabled the paper companies to save—four over thirty-two is eight—12-½ percent of their fiber.

01-00:47:53  
Hughes: So it was a cost saver as well as a consistency regulator.

01-00:47:57

Bossen:

Of course, *of course!* And also, you could run the paper machine faster because you didn't have so much water to evaporate. Paper starts out as a slurry. Coming out of a headbox it may be one half of 1 percent fiber and 99-½ percent water. And then it is drained through a wire, and it gets to be about 60 percent fiber. Then it goes into a big string of dryer cans, that may be a city block long, that runs over them, and it boils out the rest of the water. So if you're running it lighter, you have less water to evaporate, so you can run it faster. And that's how it works in the paper industry. Now in the steel industry, you get the same kind of situation, and your rolling mill is limited in speed. So if I can narrow that down and produce it lighter, I can move it faster. So you're both saving raw material, and you're improving your productivity.

01-00:49:19

Hughes:

And that was your sales message.

01-00:49:22

Bossen:

Yes, sure! Well, that was the sales thing back at Industrial Nucleonics, who later changed their name, by the way, to AccuRay Corp. And at Measurex, that's how we sold our systems. We showed the user—the rolling mill operator, the paper machine operator, ceiling tile operator, what have you—that they could produce a more uniform product, which made their customers happy. And they could save money because they could produce it in the lower half of the tolerance band, and they could run it faster.

01-00:50:05

Hughes:

Now was Industrial Nucleonics selling to these various industries?

01-00:50:12

Bossen:

Yes.

01-00:50:13

Hughes:

To a wide range?

01-00:50:14

Bossen:

Not quite as wide as it became. But yes, pretty wide, yes.

01-00:50:19

Hughes:

And so you were dealing with all those different industries.

01-00:50:24

Bossen:

Customers—yes.

01-00:50:26

Hughes:

Which must have been an education in itself.

01-00:50:28

Bossen:

Oh sure!

01-00:50:31  
Hughes: And you liked that! [chuckling]

01-00:50:33  
Bossen: Yes.

01-00:50:33  
Hughes: I suspected. All right. Well, you were at Industrial Nucleonics a long time, weren't you?

01-00:50:42  
Bossen: I was there fifteen years. I ultimately became VP, general manager. And as I said, when the minicomputer came along, and I couldn't get the two founders to seriously consider it, I left, came out to California, was introduced to some of the venture capital people here.

01-00:51:09  
Hughes: Before you leave Industrial Nucleonics: the two founders of Industrial Nucleonics were happy with the analog and wouldn't switch?

01-00:51:29  
Bossen: Yes, yes. They didn't view the minicomputer either as a threat or an opportunity, and it was both, of course.

01-00:51:40  
Hughes: Yes, and that was really the reason that you left?

01-00:51:44  
Bossen: Yes. Besides, I wanted to come back to California. In 1967, when I was making that move, digital minicomputers were just really getting going. But there were more people who knew about them in Santa Clara County than there were in the whole state of Ohio.

01-00:52:10  
Hughes: I'll bet. Well, who were those people and companies? Was it IBM and—

01-00:52:20  
Bossen: Yes. One of the co-founders with me of Measurex was a scientist from IBM. His name was Eric Dahlin, and he was a Swede who had come over to this country in the fifties and ultimately went to work for IBM San Jose. He was working on computer-control systems with big IBM computers.

01-00:52:56  
Hughes: That were meant to do what you have been describing?

01-00:52:58  
Bossen: Similar things, yes. But they were too big and too complicated and too expensive. So when the minicomputer came along, boy, he just dove into that with me! [chuckling] He just loved it because he could *do* what he wanted to.

01-00:53:13  
Hughes: And at that point he left?

01-00:53:15  
Bossen: He left IBM and joined me at Measurex. Another founder was a guy named Gene Anderson. He had been with a small company; I can't think of their name, doing a lot of work for Nasa Ames Lab. Eric was the software guy; Gene was the hardware guy. We got together and put together a team. I started raising the venture capital.

01-00:54:03  
Hughes: So you arrived in California essentially without a job?

01-00:54:07  
Bossen: *Exactly* without a job! [laughter] And I had a wife and four children back in Ohio.

01-00:54:18  
Hughes: So you must have been pretty fed up with the founders of Industrial Nucleonics.

01-00:54:26  
Bossen: Yes, I was, but beyond that it was more the opportunity that I saw. If they weren't going to do it, and I *knew* we could do this—

01-00:54:39  
Hughes: Now this was before Silicon Valley had a name. But you knew that this was an innovative region?

01-00:54:46  
Bossen: Oh yes, yes. This was well known at the time.

01-00:54:52  
Hughes: Yes, anybody who was doing the kind of work that you were doing.

01-00:54:55  
Bossen: Yes.

01-00:54:55  
Hughes: So that was a magnet.

01-00:54:58  
Bossen: Yes.

01-00:54:58  
Hughes: Did you end up in what is now Silicon Valley? Is that where you landed?

01-00:55:05  
Bossen: Yes, Santa Clara.

01-00:55:06  
Hughes: That's pretty good.

- 01-00:55:12  
Bossen: Well, that's where we put our first office and development center. We opened the doors on January 19, 1968.
- 01-00:55:30  
Hughes: Well, start back a little bit earlier than that. From the way you're telling it, or at least the way I'm receiving it, you didn't even have the idea for Measurex do you?
- 01-00:55:39  
Bossen: Oh yes. Yes, I did. [chuckling]
- 01-00:55:44  
Hughes: You're going to do what Industrial Nucleonics was doing using digital—
- 01-00:55:49  
Bossen: And I'm going to use the digital computer. Yes, that's exactly why I came out here!
- 01-00:55:56  
Hughes: I see, okay. Well then, how did you go about it? You get to Santa Clara, and then what do you do?
- 01-00:56:09  
Bossen: When we opened our doors; we had twelve employees—
- 01-00:56:16  
Hughes: But you have to have money first.
- 01-00:56:19  
Bossen: Yes, that's right. I had raised the venture capital. I raised \$1.3 million of venture capital.
- 01-00:56:29  
Hughes: From whom and why were they interested?
- 01-00:56:33  
Bossen: Well, the first person I talked to, and I was introduced to him by the guy from Chicago at William Blair & Company, Ed Blair, who had been all along the major investor in Industrial Nucleonics. We got along pretty well. When I left, he gave me a letter of introduction to a number of the people out here, and among them was Bill Draper, so I met Bill Draper. Their company was Sutter Hill Capital. Paul Wythes was there. Bill has gone on to other companies and other venture capital.
- 01-00:57:32  
Hughes: Did they immediately grasp the importance of what you wanted to do?
- 01-00:57:37  
Bossen: Well, the first thing that happened was we liked each other. We looked around at companies that they might invest in that I might manage, and we didn't find

any. I said, “Well, maybe we ought to look at doing this,” and I put together a business plan for them for Measurex. I remember Bill told me, “Yes, do a business plan but keep it to seven pages.” And his reasoning was, he said, “Venture capitalists get many business plans, and they’re fifty, sixty, a hundred pages long, full of projections for twenty years. None of it’s meaningful.” [chuckling] He said, “Now, if I’m going to take something home to read at night, am I going to take the one that’s seven pages long or the one that’s this thick? I’ll take the one that’s seven pages as long as it tells the story.” Well, I did the text in seven, but I did have one more page of a spreadsheet. [chuckling]

01-00:59:02

Hughes: Now was venture capital financing a familiar entity to you?

01-00:59:12

Bossen: No, but I learned about it pretty quickly. [laughter]

01-00:59:16

Hughes: Of course it was the very early days of venture capital as we know it today.

01-00:59:25

Bossen: Yes, I guess it was as we know it today. There had been a number of them before—Draper, Gaither & Anderson was one.

01-00:59:42

Hughes: Draper, Gaither & Anderson, as I remember it, was founded in 1968.

01-00:59:46

Bossen: Earlier, no earlier. [The correct date is 1959.]

[End Audio File 1]

Begin Audio File 2 07-08-2010.wav

02-00:00:14

Bossen: Well, the thing that amazes me is in those days I went out to raise \$1.3 million, and that was considered a jumbo. That was a *big* investment! They kept saying, “Can’t you do it for \$50,000?” [chuckling] But now they go out and raise \$40-\$50 million on a startup. What’s going on here?

02-00:00:41

Hughes: Yes, it’s a different world. [technical interruption]

So you needed some money, and you met Bill Draper.

02-00:01:26

Bossen: I met Bill Draper and Bill’s partner Paul Wythes, and they decided that they were gong to back me. But they didn’t have enough to do it themselves in those days, so they said, “Well, we’re going to help you raise the rest of the

venture capital.” So they went around *with* me, Paul Wythes in particular, and visited with a lot of the other venture capitalists, who ultimately came into the deal. Reid Dennis was one. His wife actually made an investment herself.

In fact, let me digress. We had a party at, I think, the twenty-fifth anniversary of the founding of Measurex. We had sold it by that time, but we included all of the original investors and the original twelve people. Pete Bancroft was sort of acting as emcee, and he went around and said, “Did any of you keep your entire Measurex investment until the company was sold?” And the answer was no, none of them had except one person, and that was Peggy Dennis. [chuckling] I asked her, “Well, why did you keep it?” “Well, it was doing well. I didn’t see any reason to change.” So she made something like fifty to one on her original investment because she just kept it and held on! The typical VC, when they get something and it’s going good, they will sell off enough to get their nut back and then go on, which probably is the professional thing to do.

But anyway, Paul Wythes took me around, and we met, as I said, Pete Bancroft, and Pete was the largest original investor. When he came in, that pretty much guaranteed that ultimately we were going to get enough of the \$1.3 million. There was a so-called group of guys—Dan McGanney, Bill Edwards, John Bryan—

02-00:04:28

Hughes: Pitch Johnson?

02-00:04:34

Bossen: Pitch was not an original investor.

02-00:04:35

Hughes: Did you—pitch him? [chuckling]

02-00:04:39

Bossen: No, we never did. I don’t know why. I think, if my memory serves me right, he was traveling or something in Europe during the time that we were raising the fund. I’ve spent a lot of time with Pitch subsequently on various things. I don’t know if I’ve left anybody out.

02-00:05:09

Hughes: Well, you can think about it.

02-00:05:13

Bossen: So we raised the money.

02-00:05:19

Hughes: You raised it easily and quickly?

02-00:05:21

Bossen: Well, in hindsight, I guess you could say that. But at the time, it didn’t seem like it. We started making the pitch in August of ’67, and we didn’t close on it

until January of '68. So we spent all of that time, and I was flying all over the country. It wasn't just here, see.

02-00:06:01

Hughes: Had you saved some money?

02-00:06:03

Bossen: Me?

02-00:06:05

Hughes: Yes. What were you living on in this period?

02-00:06:06

Bossen: I had saved \$80,000, and that's what we were living on.

I went to Boston, talked to venture capitalists up there, none of whom invested. Or maybe one of them did. But anyway, their view was, "That's *awfully* risky, developing that new digital technology," et cetera, et cetera. "Why don't you just copy what Industrial Nucleonics did, and gradually you can get into it?" I said, "No." So they said it was too risky. The San Francisco venture capitalists, on the other hand, said, "Gee, this doesn't seem very far out at all! It's not a new transistor." [chuckling] That was the difference between the San Francisco VCs and the Boston VCs.

02-00:07:24

Hughes: Do you consider yourself a good interpreter of technology?

02-00:07:37

Bossen: Maybe. [chuckling]

02-00:07:38

Hughes: Well, Bill Draper and Pete Bancroft don't have technical backgrounds. So how did you explain to them what you want to do with this digital sensor apparatus?

02-00:08:18

Bossen: I had made up a few visual aids. With Pete, I recall when we were having lunch at his club in New York, I drew on a napkin, putting the computer at the center of the network and having it support the sensors and the controls and the digital displays and all of that together. And he always refers to the famous napkin. [chuckling]

02-00:08:55

Hughes: There are so many entrepreneurs that start with a napkin. [chuckling]

02-00:09:01

Bossen: Yes. But you see, I didn't try to explain the bits and bytes to the VCs. I tried to explain the end result—what we were trying to do, and why this was important to the end user.

02-00:09:31

Hughes: Was Measurex always going to be focused on paper?

02-00:09:36

Bossen: Well, no, that was only one of the things that we were focusing on. We were focused on the entire gamut of sheet process industries—plastic film, for example. Paper was our biggest industry simply because the economics were so outstanding for the paper companies, and it was such a big market. There were, we thought, about five thousand paper machines of adequate size that could support the system. And we sold the systems for \$150,000 to begin with, and ultimately with all the bells and whistles we got up to over \$1 million per system.

02-00:10:34

Hughes: Well, maybe first we should get an actual physical building for this company. So where did you start out?

02-00:10:44

Bossen: Santa Clara. We rented the building that was a brand new little spec building people were putting up down there. It had 13,000 square feet. And we said, “Well, we don’t need that much. All we need is about half that much.” So the guy said, “Okay.” And he said, “I don’t want any of your stock. I want you to pay me in cash.” Big mistake! [chuckling] But anyway, we did, and then within nine months we knew we needed more space, so we took the other half of the building from him. And we stayed there—the address was 330 Mathew Street. And that was just a little tilt-up building then. We knew—and we wanted to—that we had to move, and we looked around for other space and found it in Cupertino.

02-00:12:13

Hughes: More space because you *needed* more space.

02-00:12:16

Bossen: Yes, more space because yes, we sure needed it.

02-00:12:18

Hughes: Within what time period?

02-00:12:21

Bossen: We bought the space in Cupertino in 1970. We found a beautiful plot. My former wife Doris Stephens, who’s now deceased, was our first HR [human resources] person. She had a doctorate in counseling psych. [chuckling] She worked for us for a while, and she found the space.

02-00:13:03

Hughes: Now this is the woman who had been in LA?

02-00:13:11

Bossen: Yes, whom I met in Poughkeepsie at Vassar. Anyway, she located the space, and it belonged to a nice little old lady, who I suppose has passed away now,

by the name of Blanche B. Woelffel. She owned thirty-five acres in Cupertino, and she had a factory there that produced tomato paste. She had an evaporator and one big building, and she was growing tomatoes and plums on this property.

02-00:14:00

Hughes: You certainly have a lot of entrepreneurial women in your life.

02-00:14:02

Bossen: [chuckling] Well, she had inherited it from her husband who had just died. She sold it to us, and we paid an exorbitant amount, I thought—\$50,000 an acre for the first— I think we had thirteen acres originally.

02-00:14:33

Hughes: And you thought you needed that much?

02-00:14:39

Bossen: Well, thought we would.

02-00:14:40

Hughes: So you were looking ahead.

02-00:14:43

Bossen: So we bought it, and then we started building. We started out, and we built a fifty-thousand square-foot office and factory, and then we added fifty-thousand, then we added a hundred thousand, then we added another hundred thousand as it went on. But anyway, that's how we came to be there in Cupertino, and then we sold the company to Honeywell in 1997.

02-00:15:17

Hughes: Oh, well, don't go that fast! [chuckling]

02-00:15:19

Bossen: Well, I was just going to mention one thing. They sold off that property for \$50 million. [chuckling]

02-00:15:33

Hughes: Oh my heavens!

02-00:15:34

Bossen: Right after they bought us. I'd have done better had I just bought the land and sat there and done nothing and then sold it! [laughter] That's why there are so many millionaire developers around.

02-00:15:56

Hughes: All right. So we've got an edifice, or we've now got two edifices—you've already outgrown one. What about people? You've mentioned the technologist/scientist from IBM. Who else came early on? And where were they coming from, and what were they supposed to do?

02-00:16:21

Bossen:

Oh, well, we hired a lot of physicists. Physicists are necessary in the sensor business. They understand how beta rays and gamma rays interact with matter. We needed non-contact sensors. We started out with one sensor, a basis-weight sensor or a thickness sensor which I described to you earlier. And then we developed a moisture sensor using infrared radiation.

02-00:16:55

Hughes:

How would that work?

02-00:16:56

Bossen:

Well, infrared radiation was generated from a little light bulb. We shone that through the paper, and infrared radiation at 1.92 microns is strongly absorbed by water, so we built a very good infrared-based moisture sensor. People had built them before. We were not unique in that, but no one had built a good one before, and we built a really good one, thanks to a key physicist that we had hired whose name is John Howarth.

We were still down in the Santa Clara office, and we decided that we needed a physics technician to help Eric Dahlin with his development. So we advertised for one. I'm sitting in my office on a Friday afternoon, late, and Eric comes in, and he said, "Dave, I think you ought to come meet this fellow." I said, "This is the physics technician?" And he said, "Well, he's a little bit more than that." And it turns out he was an English physicist. I don't know if you remember, but there was a recession in the defense industries in 1970, and he had been laid off from Lockheed, and his present job was repainting the paper machine. [chuckling] So he came in, and I talked to him for a few minutes, and Eric said, "I think we ought to hire him." I said, "Well, it's up to you. If you want to use him as a technician that's fine. And we only have a budget for one." Well, of course, we hired him. Then a month later we had to hire technicians for both of them! [chuckling] But that worked out.

John made a key invention for us—we patented it and it made all of the difference in the world, and it was called infinite random scattering. People had made, as I said, moisture gauges before by shooting infrared radiation through it paper and detecting it on the other side. And in order to get a lot of signals, say you want to measure a light piece of paper, like tissue paper. The radiation just zips right through it, and you don't get enough attenuation to get a decent signal even in that 1.9 micron range. So—his name was John Howarth, and John came up with this idea. He said, "Well, why don't we do this: we'll take two diffuse glass plates." (It looks like ivory glass in color; it's diffuse.) "We'll put one on the top sensor and one under the bottom one. Then we'll shoot the beam up here, and we'll let it bounce back and forth many times, and then we'll detect it over here. Well, that meant that the beam went through the piece of paper an infinite number of times, so we basically made a thin piece of paper look thick.

02-00:21:09

Hughes: Would that constitute amplification of the signal?

02-00:21:14

Bossen: Inherently, yes, but of course we had amplifiers on the electronics outside of that. So that was a key invention, and nobody had ever thought of that before.

02-00:21:31

Hughes: Was that the first sensor for moisture content?

02-00:21:34

Bossen: Yes. The same physicist came up with another idea, and we made a color sensor. Paper, plastics, many materials, color is a very important thing. There were laboratory color sensors, but there was nothing that was good online. So he invented a good online color sensor as well.

02-00:22:23

Hughes: Would that work under that same system?

02-00:22:26

Bossen: No. Different principle. You shot straight through for color, and you also used reflectants for color.

02-00:22:37

Hughes: It would work for any color that you wished?

02-00:22:38

Bossen: Any color that you wished. And you defined the color.

02-00:22:51

Hughes: These inventions allowed you to move into different industries, right?

02-00:22:57

Bossen: Oh yes. We did a lot in the plastics industry—any sheet-process industry. Then ultimately we got back into fluid processing by developing some gamma ray sensors to measure the liquid density of stuff in a pipe.

02-00:23:23

Hughes: Now are the radioactive materials still coming from the AEC?

02-00:23:26

Bossen: Yes. Actually, we were buying some— The most useful radioisotope for lightweight sheet materials, like paper and aluminum foil and things like that, is krypton-85. It's very useful because it emits a very low-energy beta particle. I think we were getting some through the USAEC, but I think we were getting more from England. I think they had a thing like our AEC, but they were doing more to develop some of the isotopes for industrial use. And we got some from Canada—oh yes, Chalk River in Canada.

- 02-00:24:26  
Hughes: Do you think the different agencies that were early on in the isotope making and distribution business deliberately tried to make their products distinctive?
- 02-00:24:48  
Bossen: No, I don't think so. These were a bunch of scientists and—oh, here's an isotope. Let's make it, and maybe somebody will find a use for it. [chuckling]
- 02-00:25:21  
Bossen: Where are we here?
- 02-00:25:21  
Hughes: Well, you've just developed a color sensor.
- 02-00:25:26  
Bossen: Oh, well, we developed many sensors for different purposes. We ultimately wound up with a dozen or more sensors, but this was after we were going. I showed you that annual report. Some of it's in there. I've got other annual reports. Every year they're showing more products and sensors coming through.
- 02-00:25:53  
Hughes: Your physicists came up with new products?
- 02-00:25:57  
Bossen: Basically yes. Physicists are the guys who are cranking the stuff out.
- 02-00:26:11  
Hughes: And how does that work? Are they saying, "We can make the technology to be able to sense x, y, z." Or are you or they saying, "There's an industry over here which could use a device that told you x. Can you develop something that will sense the consistency there?"
- 02-00:26:35  
Bossen: Yes, basically both. The physicists would come up and say, "Ooh! We can do this. Can you use it?" And we would be saying, the marketing people, "Look, I can sell a zillion of these if you can measure this."
- 02-00:26:56  
Hughes: So was there a lot of interaction?
- 02-00:26:58  
Bossen: Yes, and we focused that interaction. We would have quarterly meetings and get the physicists together with the sales people.
- 02-00:27:10  
Hughes: Do you think you were unusual in that?
- 02-00:27:17  
Bossen: I think we probably did it more than most companies, but other companies, I'm sure, were doing that.

02-00:27:25  
Hughes: This is certainly a far cry from what you'd experienced at Alcoa, isn't it?

02-00:27:34  
Bossen: Oh yes.

02-00:27:36  
Hughes: Where you were burdened by the bureaucracy.

02-00:27:41  
Bossen: Yes.

02-00:27:45  
Hughes: It seems to make something like this go, you have to have people from different perspectives dealing with one another.

02-00:27:59  
Bossen: Yes, right. Exactly.

02-00:28:00  
Hughes: The old system where you had a department for this and a department for that, which you see, for example, in the pharmaceutical industry, wouldn't work here.

02-00:28:13  
Bossen: Yes. Well, a lot of companies were organized that way and still are. But they didn't get very far in developing successful new applications.

02-00:28:27  
Hughes: Was it an exciting place to work?

02-00:28:29  
Bossen: Oh yes! Oh, I enjoyed every day. Getting up, driving down 280 to the office and thinking about the meetings.

02-00:28:40  
Hughes: Was there a typical day?

02-00:28:55  
Bossen: We had all of the normal business functions, like quarterly reports and finance reports and manufacturing, and then we had the developmental project reports. I don't think there was a typical day. There's a typical *month* but not a typical day.

02-00:29:25  
Hughes: Well, do a typical month.

02-00:29:28  
Bossen: I was afraid I shouldn't have said that. [laughter]

02-00:29:32

Hughes: I just want to get a flavor of what you, David Bossen, were doing on any given month.

02-00:29:47

Bossen: Well, depending on the month, I would review the sales and the sales forecast as they were coming together. I would review every development project monthly, at least.

02-00:30:05

Hughes: Does that mean you're looking at documents or you're interviewing the physicists?

02-00:30:12

Bossen: Both. And let me tell you where I got most of my information from them—in the cafeteria. We had a very good cafeteria at Measurex, a nice building and good food, and people stayed in. I'd wait until lunch hour was about a third of the way through, and then I'd walk down and see some guys that I wanted to talk to about projects and go over and sit with them. That was sort of like Hewlett-Packard's management by walking around. I did management by eating! [chuckling] I did a lot of the management by walking around too. You learn so much more that way than you do from the formalized reports.

02-00:31:18

Hughes: I suspect that you were not an intimidating boss. In some companies, if the boss sat down at the table, people would quake in their boots.

02-00:31:28

Bossen: I tried not to be because I don't think that's how you get the best out of people.

02-00:31:41

Hughes: Well, you're getting at the company's culture. Could you say a little bit more about that? Was there any conscious intent on your part to encourage the development of a certain type of culture?

02-00:32:00

Bossen: Yes, there was. I wanted an open culture where people would get around and talk to each other and work, and I wanted bright, intelligent people. I didn't want drones. Measurex culture was—I won't say it was unique, but it was darn close to it. I've had a lot of people tell me that former employees—and the rest of it.

02-00:32:34

Hughes: How would you characterize the culture?

02-00:32:46

Bossen: Open, hard-working, results-oriented. In fact, we characterized ourselves as the results company. Our objective was to get superior economic results for our

customers so that they could provide superior economic results for our employees and shareholders. That was our statement of objective.

02-00:33:24

Hughes: Was there any place for basic research?

02-00:33:33

Bossen: Why is the grass green kind of research? No.

02-00:33:36

Hughes: Well, maybe not that basic.

02-00:33:38

Bossen: Well, I don't know what you mean by basic research then.

02-00:33:41

Hughes: Well, you could say to your team of scientists and technologists that everything they were doing had to have a definite product in mind. Or you could say, "Go out and read the literature, find out what's happening, see if there's anything there that we could take and develop into a product."

02-00:34:06

Bossen: Yes, we did some of that. But it was mainly product oriented. This is something we want to do—figure out how to do it.

02-00:34:17

Hughes: Well, you more or less said that it would come from both sides.

02-00:34:24

Bossen: Yes.

02-00:34:25

Hughes: Your scientist would say, "We can do this." And then you or your sales force or whomever would say well, "There's an application." Or you could be looking at the field out there and say, "There's a need. Can we fill it?"

02-00:34:41

Bossen: That's right. And we did it industry by industry and we did it *within* the industry. Because once we had achieved a foothold in an industry, like paper for example, the easiest guy to sell to is the one you just sold to, because he believes in you. So if we can find more product for the same plants and mills— Well, the other thing that we did that ties in with the results philosophy, we developed—and this differentiated us from our competitors, particularly the old company in Ohio, who we passed in revenue in four years. From a standing start in the industries we were in, we passed them in four years. But the key—well, there were a number of keys—was this results orientation. [pause] I'm getting worn down.

02-00:36:23

Hughes: Do you need a break?

02-00:36:24

Bossen: Well, no, not a break. Just how much longer do you see us going here?

02-00:36:29

Hughes: [chuckling] Do you want to end sooner rather than later?

02-00:36:38

Bossen: Well, yes! [laughing]

02-00:36:55

Hughes: Well, we'll wind up. But I do want to find out, were there a bunch of competitors trying to enter into the same sorts of fields?

02-00:37:11

Bossen: Well, there was the company back in Ohio, and they ultimately got onto the digital computer. Oh, now I remember what I wanted to emphasize: the key difference that we built was this results orientation and that we built a big international service organization. We made more money selling the services than we did the equipment. Ultimately we had about 3,100, 3,200 employees, of which two thousand were in service around the world, from Finland to Tasmania.

02-00:38:06

Hughes: Did you have an office in each country?

02-00:38:09

Bossen: No, they would be based in our customers' plants basically. When we first sold a [sensor] system in Jyväskylä, Finland, we hired and trained a Finn or two to be there as service representatives, resident in the company. And we lost money on that with *one* [system in place]. As soon as they put in a second system, we broke even. When they'd put in a third system, we made a lot of money on the service. But in order to get that, you had to develop the service base, and you did that by putting in people with a system. We took losses in the beginning, not many because we were profitable all along.

Our big competitor back in Ohio went the opposite way. They told the customers, "Our systems are so reliable you don't *need* any service." Well, total BS! [chuckling] Any computer-based sensor system is going to require service, and we decided that we would do that at the customer's site. We would put a service man *at that site*. If there were two or three customers in a local town, he might handle that, but by and large they were devoted. We made a lot of money off service ultimately, because we got the service density. See, it feeds on each other. When you put your first guy in the site, he's losing money. Then you get a second system in, and you break even. You put a third system in, and you're making a lot of money. You put in a fourth system, you're making a *lot* of money. *And* your customer is happy.

02-00:40:22

Hughes: Had you that concept as you initiated this service aspect of the company?

02-00:40:32

Bossen: I knew that we needed to do that, and I saw that opportunity, and we started out doing that from day one.

02-00:40:43

Hughes: Oh, really—day one!

02-00:40:45

Bossen: The first three systems that went in—one went in Varkhaus, Finland. No, that's the next year. Can you slide that report over to me? [reviewing annual report] This is the 1972 annual report, and it shows the systems. The first three systems went in—one in Garden State Paper Company in New Jersey, one in Fiberboard Corp. which was in Antioch, California then, one in Simpson Lee Paper Company out here in Ripon, California. I wanted to get all three of them in California so we could service them easily. And then we started moving out. Our first European systems went into Ahlstrom and Varkhaus, Finland, Bowater in England, and Fundy Forest Industries in Canada. But this [annual report] shows the first three—1968, '69, '70, '71, '72. This was a great selling aid, showing this to our new customers.

02-00:42:36

Hughes: It seems pretty adventurous on your part to be starting a company—starting a company has its problems right there. But then to take on this service concept right at the start seems compounding the difficulties.

02-00:43:07

Bossen: It makes it much easier. We couldn't have done it without the service business. We would have *failed* had we not had the local service.

02-00:43:18

Hughes: Because you would have had disgruntled customers?

02-00:43:27

Bossen: Well, here you are, the owner/operator of a very large paper machine. And you're producing product at the rate of a million dollars a week or, on a very big machine, a million dollars a day. Once you adopt this philosophy of going down in the lower half of the tolerance band, you can't run your machine without the system. We guaranteed 99 percent up time, and that's not enough.

02-00:44:13

Hughes: Really?

02-00:44:16

Bossen: Yes. We got up to 99.7.

02-00:44:24

Hughes: Which you could only do by having the service market, right?

02-00:44:31

Bossen: Yes.

02-00:44:31  
Hughes: I know you want to stop, but I want to introduce two more subjects, all right?

02-00:44:36  
Bossen: All right.

02-00:44:37  
Hughes: You mentioned the IPO in 1972, and from the little I know it was very successful.

02-00:44:45  
Bossen: Yes, it was. The stock came at \$20 and it closed at \$40 on the same day.

02-00:44:51  
Hughes: Did that astound you?

02-00:44:56  
Bossen: It astounded me that it went up that far. I thought it'd probably get to \$25 or \$30. But the investment bankers priced it for the benefit of their customers, not for our benefit. [chuckling] It should have been priced at \$30, but it wasn't. But that's okay. We got there.

02-00:45:22  
Hughes: What was the stock market doing in the early seventies?

02-00:45:27  
Bossen: Oh! It was okay. 1970 had been terrible, but we were coming out of it in '72 when we had our IPO. The market had turned and was on the way up.

02-00:45:45  
Hughes: Is that one reason that you held the public offering at that point?

02-00:45:50  
Bossen: Yes. If it hadn't turned, we would have put it off. We could have raised more money from our original investors, because they were very happy with the way things were going.

02-00:46:13  
Hughes: You didn't worry about the bookkeeping and public presentation and all of that that goes along with an IPO?

02-00:46:25  
Bossen: We knew we had to do it. It wasn't a matter of *worrying* about it. We had to do it, and we had to get ready to do it.

02-00:46:36  
Hughes: But it can make a very different kind of company when you're beholden to your public stockholders.

02-00:46:47  
Bossen: I didn't feel different about it. I felt that we would go back to our original results objective: outstanding economic results for our customers so they will give us outstanding economic results for our employees and shareholders.

02-00:47:07  
Hughes: So that was your consistent mantra?

02-00:47:09  
Bossen: Yes. All the way.

02-00:47:12  
Hughes: Everybody in the company understood that?

02-00:47:14  
Bossen: Yes, we tried to drill that into everybody. This is the *results* company.

02-00:47:25  
Hughes: Some of your competitors were not?

02-00:47:26  
Bossen: No, they weren't! Well, most companies are not when you look at them, *really*. [chuckling]

02-00:47:34  
Hughes: Yes?

02-00:47:36  
Bossen: They pay lip service to it but—

02-00:47:48  
Hughes: Then the last topic: the purchase by Honeywell in 1997, right?

02-00:48:00  
Bossen: Yes.

02-00:48:02  
Hughes: Why was that?

02-00:48:06  
Bossen: Well, there were a number of reasons coming along at that point in time, and they basically had made an offer to us. I felt that the shareholders would accept the offer.

02-00:48:59  
Hughes: How did you feel about being bought out?

02-00:49:02  
Bossen: Well, I felt that we had had a pretty good run. But I wasn't happy the way it worked out. What had happened was that the CEO at Honeywell, Mike [Michael R.] Bonsignore, was a pretty good guy, and he basically convinced me that he wanted to use Measurex as the model for Honeywell Industrial.

And we would be made the point for all of Honeywell. Well, at the same, almost concurrent with our sale to Honeywell, Honeywell was sold to Allied [Signal] back in New Jersey. And Mike went away to become CEO of the combined companies, and then they basically had Measurex report to somebody in Phoenix who didn't know what the hell he was doing. Bonsignore was out of it because he was now running the combined big Allied, and I couldn't get any support there. So had I known that would have happened, I would not have supported the sale. But I didn't know that, and I thought it would work out, and it didn't. Too bad.

02-00:51:02

Hughes: Were you planning to stay with the company?

02-00:51:05

Bossen: I had agreed to stay with it for three years. But I did not wind up doing what I thought I would be doing, but I got paid for three more years. [chuckling]

02-00:51:37

Hughes: Well, should we stop there?

02-00:51:41

Bossen: Fine. Thank you. Well, I offered you ladies to come over to the Circus Club, and we'll have lunch.

[End of Interview]