An interview with

CHARLES W. JOHNSON

Conducted by Thomas Haigh

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ABSTRACT

Charles W. Johnson discusses his career in computing and mathematics with particular attention to his role as cofounder and chairman of IMSL, one of the leading commercial suppliers of mathematical software libraries. Johnson received an undergraduate degree in engineering from the University of Wisconsin, Madison and a masters degree from MIT, graduating in 1955, where he was exposed to the Whirlwind computer. After a two year spell working as a computer center manager for the Army Corps of Engineers, and a brief interregnum with his father's construction company, he went to work for IBM in Milwaukee as a representative of its Applied Science department. In 1970 he became co-founder of IMSL (along with his IBM colleague Ed Battiste, and its main investor). Although Johnson's role with IMSL was that of chairman and financial backer rather than employee, for most of the next thirty five years IMSL was his main preoccupation. He discusses its founding, development and growth, sales strategies, and its key staff members. Johnson also discusses the firm's change of direction in the 1990s, as it merged with Precision Visuals Incorporated, changed its senior management team and eventually relocated to California. Johnson concludes the interview with a review of his activities as an investor and philanthropist, including involvement with MIT and the Mayo Clinic.

HAIGH: Thank you very much for agreeing to take part in the interview.

JOHNSON: Okay. I think when we were talking before that I'm a member of SIAM since 1956, I think, or something like that—a long time.

HAIGH: I wonder if I could begin by asking you to describe your background and early upbringing particularly as it relates to your developing interest in engineering and applied science?

JOHNSON: I think probably I was always real interested in mathematics back in high school. Probably in engineering, my dad being in the heavy construction industry. My brother's a PhD in mathematics. There are just two of us in the family. We both seem to have interests in mathematics and engineering from the time we were quite young. Then I graduated high school in 1948 and went over to the University of Wisconsin, Madison to study engineering. And at that time my thinking was to go into the construction business with my father later on, but my brother went right into math. I caught up with him. He'd been in the service a couple of years. He's a couple of years older than I am.

HAIGH: So as you were a teenager and you were growing up, your brother was already interested in mathematics.

JOHNSON: Yes.

HAIGH: Do you think that influenced you to be interested in that area?

JOHNSON: Yes it did.

HAIGH: So during high school did you focus particularly on science and mathematics?

JOHNSON: Yes. At that time we didn't have the contests they have today, but I remember taking part in some national mathematics contests. I can't think of who the sponsoring agencies were, but I was always very interested in that. Then I was in a lot of athletics: football, basketball, and track and so on. But studies were very important to me.

HAIGH: Did you have any technological hobbies such as ham radio or chemistry?

JOHNSON: No. My brother had a lot of those. I guess I was kind of a hanger on. No, I didn't have a lot of those hobbies. Athletics were a big second to the mathematics in school, but none of those.

HAIGH: How did you come to study at the University of Wisconsin?

JOHNSON: Well originally I was playing football at the University of Wisconsin. I was recruited by a few schools. And one of my best friends was a year old than I am, and he was playing on the football team there. So I went over, and I was rooming with him. I was playing football but studying engineering at the time. I gave up football a couple of years later and continued on with the engineering with always mathematics as a kind of minor.

HAIGH: So what drew you towards engineering?

JOHNSON: I guess because of way back the fact that my dad was building these big buildings and churches and big structures. My grandfather had been in the construction business too, so I guess that's where it came from, even though my dad was not an engineer. I'm not sure if you're born with interests in mathematics, because that's a hobby of mine right now. I read a lot of

particularly history of mathematics type stuff. I've been reading all of these books on e and pi and phi and gamma. So I guess that's been an interest to me way back, and I suppose my brother had some contributing factor there.

HAIGH: Did you focus on one particular branch of engineering?

JOHNSON: Well I was a civil engineer, meaning in the structural area. Then after graduating from University of Wisconsin, Madison in '52, I went right to MIT. They had a program at that time in building engineering, which is now part of their Civil Engineering. I had a minor in mathematics. There was a big project going on at MIT for the Defense Department in some pretty sophisticated structural analysis type things. This was the height of the Cold War, and if you were going to bomb a dam or some of these major structures, the question was where's the optimum spot to detonate this and what's the optimum weapon size. So we did a lot of differential equation stuff on major structures. I was working at Whirlwind computer with this.

HAIGH: Had you been exposed to computing at all during your time in Wisconsin?

JOHNSON: As I mentioned to you, we probably had a little bit of contact. Gene Amdahl was at Madison working with the WISC computer, and then there was a group up there doing work with a Card Program Calculator. They had taken some IBM punch card machines and put them together to form a computer. That was going on, and so I was aware of that both directly and somewhat through my brother.

HAIGH: While you were in Wisconsin, did the undergraduate engineering curriculum include anything related to computational methods, or numerical analysis?

JOHNSON: A little bit, not a great deal, no. We did, you know, of course you're doing like in surveying and triangulation and that kind of stuff and some differential equation stuff, but not developed very well, no.

HAIGH: And I imagine that at that point and when you were applying to MIT that you were expecting to go into a career in which you'd be practicing civil engineering?

JOHNSON: Yes, that's correct.

HAIGH: So what drew you to seek an additional degree from MIT rather than seek work immediately?

JOHNSON: I don't know the answer to that. When I got out of high school I really didn't know anything about MIT, and somewhere along the line of studying at Madison, I must've become more and more aware of MIT. And I think my brother probably had something to do with that too, because I caught up with him so we actually both received our bachelor's degrees together. And then he stayed at Madison to get a Master's in mathematics. So I guess the idea of going to MIT was my idea, but the idea of going to graduate school was probably influenced by my brother, too.

HAIGH: So when you arrived at MIT, you mentioned that you were involved with this project to calculate the resilience of structures with respect to possible bombing.

JOHNSON: Yes.

HAIGH: How did you come to be involved with that project, and what part did you play in it?

JOHNSON: There was a group of programmers at MIT, kind of one or two programmers from each department forming collectively a programming group that was headed up by a physicist, a guy named Professor Philip M. Morse. I was a research assistant but as a programmer. And then I suppose representing what became the civil engineering department. This project was really a structural type project, which would've tied in with the civil engineering. The project had started before I joined the group. And so we were solving some pretty big systems compared to, you know, with the capability of the computer at that time. The Whirlwind was a $7 million computer at that point and paper tape in, typewriters out, although we did have a CRT. We had so much data coming out that we would display on a very low resolution CRT, and then with a camera take pictures then have to sit there with a magnifying glass, the digits weren't very clear. But we'd bring out a lot of matrices out of the output, and you have to read these from pictures.

HAIGH: So at that point was the Whirlwind working in some kind of campus computation center where different groups could sign up for time on it?

JOHNSON: Yes. The main ownership of the Whirlwind was the Lincoln Laboratory there, and it was a prototype of a bunch of what you call SAGE systems that they were putting across North America to intercept planes coming from the Soviet Union. That was its main function, but it was available for student work. And of course this project I was on was a government-funded project also.

HAIGH: Right. Now the Whirlwind is famous as the first interactive system. Did that change anything about the way that you used it for this project, or were you just treating it as if it were a normal batch computer?

JOHNSON: A normal batch computer, yes, no interaction. They hadn't converted, I don't think, to core memory at that time. You're right, it was the forerunner of the time sharing, but we used it as a batch processor.

HAIGH: So was it unusual at that point for someone in this advanced engineering degree to be exposed to computing, or was it something that more and more engineers were beginning to become aware of?

JOHNSON: I think somewhat unusual even then because there were no classes. I remember sort of sitting in on some seminars, kind of the late afternoon seminars on a little interpretive language that they had there, but there were no formal classes in programming. So I'd say somewhat unusual.

HAIGH: And in this graduate degree program, were you taught how to use other calculating devices such as desk calculators?

JOHNSON: Yes. We did a fair amount of work on desk calculators as well, Marchant and Freiden, I guess. I think desk calculators at that time were $700, $800, $900 for a four-function machine. And if you wanted a square root button, that was a couple hundred more. It was pretty expensive compared to today.

HAIGH: And how mathematically sophisticated would you say the MIT curriculum was in terms of its numerical analysis content?

JOHNSON: Fairly sophisticated at that time. I'm trying to think. There was a professor in numerical analysis named F. B. Hildebrand who had a couple of textbooks., I took some classes

on “Introduction to Numerical Analysis.” They were pretty sophisticated in numerical analysis at that time.

HAIGH: So were you involved with doing programming for this project?

JOHNSON: Yes. We programmed, as I mentioned, in like, they called it something like the “S Language.” I think it stood for summer session language. It was an interpreter, but it gave you some floating-point capability and so forth. The Whirlwind machine itself was a 16-bit machine, and it only had like about 2K bytes of memory or so. It was pretty restricted memory wise, and I mentioned before, it was basically a typewriter output except for this CRT with a camera, so very limited input/output and at the time fairly fast, but not fast by today’s standards.

HAIGH: So that language was analogous to the IBM Speedcoder system then?

JOHNSON: I don’t know that. I don’t know that language.

HAIGH: I believe it was interpreted, and it simulated floating point on the machine that didn’t have it in the hardware. I guess the 701.

JOHNSON: Yes I remember the 701. Yes, that was coming out about that time, early 50s, that’s right.

HAIGH: Can you describe in general the mood around the Whirlwind and MIT’s computing efforts at that time?

JOHNSON: Well, it was a very congenial group, and as I mentioned I was part of a programming group that included people from all different departments. There was not a lot of security at the computer. The computer was actually right on the edge of the campus. My wife, Jen, was going to a Junior College in Boston, and she came over with a group of her classmates one day, and I took them on a tour. There was quite a bit to see. The computer actually occupied a six-room building, each function in a different room. Everybody had a lot of fun. I know I got a real thrill out of working with maybe the fastest computer in the world at that time—it was very exciting for me to be involved with the thing, even though I was a programming applications as opposed to writing programming systems. There were a lot of pretty heavy weight people around. [Kenneth] Olsen was around, the guy that started DEC; and [Jay] Forrester, who was one of the hardware guys, and later on did a lot of work in management dynamics and went to the business school eventually.

HAIGH: Did any of the relationships that you made at that time prove important later?

JOHNSON: No. I’d say the one thing would be the common thread of the MIT relationship.

HAIGH: So once you were exposed to computing, did you feel rapidly that that was something that you would want to base your career around, or were you still thinking in terms of becoming a practicing engineer?

JOHNSON: I was thinking about going in with my dad, but when I looked back, the computing was getting more and more in my blood. I was in ROTC. This was during the Korean War, and so I had started ROTC at Madison and was finishing that up at MIT. Then I received my commission and graduated in August of ’55. I went right into the army and again did computing work for most of the two years. But then I still had the idea of engineering because I came out and worked with my dad for a while. But the computer stuff was in my blood by that time. I told

my dad I've got to get back to computing. I walked into IBM's Milwaukee office and went to work.

HAIGH: So to talk a little bit about your time in the army, you were with the Corps of Engineers Research and Development Center?

JOHNSON: Yes.

HAIGH: What was that group responsible for, and how did that fit in with the broader mission of the army?

JOHNSON: Yes. This was a laboratory at Fort Belvoir, just south of Washington, D.C. Kind of the focal point of the research work going on in the Corp of Engineers, and I had really a dual role. One was to manage the computing center, and then the second role was to travel around, keeping abreast of what was going on in computing and advise other laboratories within the Corp of Engineers about what computer to select and so forth.

HAIGH: So were there a large number of computers in use within the Corp of Engineers by that point?

JOHNSON: Some, but not a great deal no. The one that we put in at Belvoir was the first one, Hogan Laboratories' Circle Computer, which was kind of homemade. I think it was a couple of guys at Columbia University in New York that built a couple of these, and that wasn't very successful, so we went to the [IBM] 650. So being the center of Corps of Engineers, they were a little bit ahead of most of the rest of the Corp as far as computing goes.

HAIGH: Was the idea that they would be using computers to do these same kinds of structural simulations that you had worked on at MIT?

JOHNSON: Yes, but in a broad sense, any engineering applications that they might be interested in, not necessarily just structural. But of course the Corps of Engineers does a lot of structural things. So we always had a pretty broad spectrum of applications.

HAIGH: And what was your personal responsibility?

JOHNSON: Shortly after arriving I was the manager of the group, so I had programmers and operators working for me. Most of them were civilians, but of course I was an officer in the army. So I was manager or director of the center.

HAIGH: Do you know why it was that you were placed in that position?

JOHNSON: I suppose because I had say two years of computer experience as a programmer at MIT. This was 1955-56. There weren't a lot of computer people floating around. It was fairly rare at that point.

HAIGH: So with the purchase of the IBM 650, that must've brought you into IBM initially as a customer.

JOHNSON: Yes.

HAIGH: What was your impression of IBM's computing operation at this time?

JOHNSON: Our salesman, and I do remember his name, was Theodore Stein. Ted was a very bright guy. He was a salesman for IBM from the Chicago area by way of Illinois Institute of Technology. So through him I got to know quite a few people in IBM, and I remember particularly IBM was working with people at Bell Laboratories, some of the laboratories in New

Jersey. Visiting some of those sites, I was quite impressed with some of the things going on within IBM. Then as I mentioned, I got an opportunity as an advisor on other installations to spend time with Univac people and CDC people and so forth. I thought very highly of IBM, in fact I influenced one of my main employees that wanted to get into industry to go to work for IBM. So when I decided, after leaving the Army and working with my dad for a little while and decided to get back into computing, IBM was my only choice.

HAIGH: So you left the Corp of Engineers in 1957, and then in 1959 you returned to computing this time working at IBM.

JOHNSON: Yes.

HAIGH: What were your initial duties and responsibilities within IBM?

JOHNSON: I was an applied science representative in the Milwaukee office. I was working with customers in the Milwaukee area that were just getting started on using computers for primarily engineering applications, whether it be gear design and various things that they were doing by hand. So I'd actually go out and call on these companies. Quite often the computer maybe was justified in the commercial side, but the engineers were starting to think about how they could use it, and I was helping them. Of course Fortran had come along in 1956, so it was available. We had one 704 at Allis Chalmers [Corp.], but a lot of the other people were using 650s, and we had Fortran on the 650. When 1401 came along, somebody had oversold one to a company saying that they could do engineering work on it as well. I think the one we installed was 16K. So we wrote a Fortran compiler for a 16K computer just so that the engineers in that company could use it. I didn't do a lot of the programming, but I worked with a couple of guys that did. So that's the kind of thing we were working with, primarily engineering people around in the Milwaukee area.

HAIGH: How big was the applied science operation at that point within IBM?

JOHNSON: I have no idea how many, I'm trying to think. We had probably about five guys in Milwaukee. There would've been several hundred, not thousands I don't think. A few hundred, I would say, nationwide.

HAIGH: And you were spread out at the regular IBM offices working alongside the ordinary sales people.

JOHNSON: Right. At one point later on, they actually had us report directly to a guy in White Plains even though we physically resided in these offices. Then gradually, when IBM started getting beat up a little bit in kind of what's now the supercomputer business, particularly by CDC, I became kind of an expert in supercomputing. I would make a lot of calls around the country to companies that were considering getting a CDC. Even making calls in Europe. I remember giving presentations at CERN in Geneva and a bunch of pharmaceutical companies in Bern or Basel, Switzerland. Most of these were troubleshooting. I got into a position for quite a while where I would get called in as kind of the last gesture when IBM thought they were going to lose the account, particularly to CDC. I traveled a lot at that time.

HAIGH: Did you remain based in Milwaukee through the whole of your time with IBM?

JOHNSON: I always stayed in this house, but technically for a while my office was in Minneapolis and then Chicago, and my boss, at one time, was in White Plains. It was a pretty

fluid deal. When I was working for the guy in White Plains I was living here, but I was spending most of the week on the road, typically a different city everyday, trying to put out fires primarily.

HAIGH: So in the early ‘60s, what was your impression of how well these engineering firms were using their new computers and whether they were working smoothly and getting value out of them? Were they finding programming and choosing applications to be a real problem?

JOHNSON: I think they were doing fairly well. It took a lot of hand holding because most of these people had no experience. So I would typically do a lot of programming myself, for their application. I remember a lot of Sundays I would jump on the North Shore train here and go into Chicago to run a bunch of programs, because we didn’t have any remote computing, and everything was done with punch cards with IBM basically. So I’d take a bunch of cards and take the train into Chicago and debug for a few hours and then back home and then deliver it to the customer Monday morning or so. So I did a lot of trying to show them how to do this and then following on to help them actually get the production applications going. There was a lot of handholding.

HAIGH: Had many of the technical computing users previously been working with punch card machines?

JOHNSON: Not too many; very few. There were a few, as I mentioned this card program calculator. There were a couple of companies around here, but that was very unusual. It took a lot of imagination to do things on those machines.

HAIGH: So most of the technical computing customers were coming to IBM for the first time?

JOHNSON: Yes. They were typically companies that had been dealing with IBM on a commercial side maybe for many years with punch card equipment and then had gone to computing, but the engineering people had not done anything on those early punch card machines.

HAIGH: Would they usually try to share a computer, or would the engineering people get their own system and a separate instillation?

JOHNSON: Initially it was shared. Later on IBM and others started bringing out relatively small units like the 1620 and some of these were used in the engineering shop. The problem with the shared situation was typically on Thursday night when the payroll had to be done, the commercial or the payroll people had priority over the engineering people. So when these 1620s and some of these machines came along, it had a lot of appeal to the engineers, so they could have control of the thing.

HAIGH: Did the arrival of the System /360 series in the mid 60s make it more realistic to run combined operations?

JOHNSON: Yes it did, although they did make a few models of the 360, which were geared more to the engineering. They were a little faster. The 360 idea was a tremendous idea, because prior to that IBM had drifted off into a large scientific, the 701, 704s, and a large commercial, the 702s, 705s. The 650 was more of a commercial system, even though it was used for some engineering. Then the 360 came along, and it looked like here’s a family from small to large, and it was completely compatible (though that it actually a couple different operating systems, one on the small ones and a different one on the large ones). It was a continual battle there because sometimes the financial people at a company would calculate that it was more cost effective to

share the machine. We saw that a lot at universities too though. The academic people would try to get their own. In some cases the administration would say "everything's got to go through us." So sometimes the academic or engineering people wouldn't call it a computer they'd have some other name to sneak it in. But that was a continual problem of the shared versus the independent.

HAIGH: I believe at some point your title changed to "systems engineering manager."

JOHNSON: Yes.

HAIGH: Did that reflect any actual change in the work that you were doing?

JOHNSON: I'm trying to think how many systems engineers we had in Milwaukee, but it was a much bigger group than the applied science group, but it included people of kind of applied sciences. So then it became more of an administrator of payroll and interviews and a lot less programming.

HAIGH: So "systems engineering manager" was a job title that indicated that you were in charge of working with customers and applications, and it could be business or scientific. Is that correct?

JOHNSON: That's correct. But again it was more managing people and doing salary administration and interviewing the employees, less customer calls at that point, except for panic situations and so forth.

HAIGH: Now presumably, during your time at IBM you had experiences which led you towards an awareness of the market for scientific software libraries.

JOHNSON: Yes.

HAIGH: Did IBM, when you began there in the early 60s, have any kind of standard library that it made available to its customers?

JOHNSON: No they didn't. At some point they brought out several libraries. You have a math and a stat library on their larger systems, and then later on they brought out a stat and a math package on some of their smaller machines, like the 1620. So they did bring out a reasonable library. Most likely these would be a couple-hundred-element type libraries.

HAIGH: Did you find these to be useful and high quality in terms of assisting your customers in solving their problems?

JOHNSON: Yes, very much so. As I indicated to you earlier, we felt that was a great idea. It allowed us to really amplify the amount of work we could do with the customers, instead of having to write all of these basic functions. To provide a lot of these standard solutions with a library like that certainly amplified the amount of work we could get done. They were fairly well done, although we found out later they weren't perfect by any means, but it was a pretty good first shot.

HAIGH: When did you meet Ed Battiste?

JOHNSON: I met him December of '59 at the Milwaukee office. He was working at IBM Milwaukee.

HAIGH: So that would've been immediately after you were hired.

JOHNSON: He hired me. He was sitting in the office, and they had a campaign on to hire people, and he got a reward for each or a commission for anybody they hired. And one day in

December, November/December of ’59, I walk in the door looking for a job, and so he was more than happy to talk to me. When he found out that I had four years of experience that was even quite unusual. So we always kidded about that later on that he got a commission for hiring me, and he just happened to be sitting at his desk when I walked in the door.

HAIGH: What was he like?

JOHNSON: Well, Ed was an extremely bright guy and a workaholic. See, at that time he didn’t have his PhD in statistics, but he had a technical background. He was sometimes, even as a young guy, a little absent-minded. I remember stories he would tell about coming into work where he’d be thinking about a speech he had to give or something and run a few red lights or have little traffic problems. But he was kind of a little bit absent minded, but very bright, a very hard worker, and quite a bit of fun.

HAIGH: And how did your relationship with him develop over your time at IBM?

JOHNSON: Well, I was working for him initially. Then later on he went back to North Carolina State to get a PhD in statistics funded by IBM, but we kept in touch. Then I became the systems engineering manager. We stayed in touch, but we kind of drifted apart for a few years there I’d say until the spring of 1970 when, I believe, he contacted me. He was thinking about leaving IBM, and he mentioned this library idea. Of course I was familiar with the IBM libraries and so on, but I give him credit for the idea of starting a company built around a library.

HAIGH: Now I’ve heard from other people that his idea for starting a company came because IBM wasn’t willing to back an idea that he’d had to produce some kind of superior, next-generation library. Do you know if that’s true?

JOHNSON: I don’t know that for sure, but I think that’s probably true because IBM sort of had a first cut with this library. When I think back I think he was putting pressure on them to continue to invest and to carry it forward and make it much better, and they were probably resisting that.

HAIGH: This was around the time that IBM made its famous decision to begin to unbundle its hardware from software and services.

JOHNSON: Yes.

HAIGH: Can you remember if that was something that was driving these kinds of ideas to create independent software companies?

JOHNSON: Yes. I wish I could remember a date when the unbundling was happening. I would suspect that it’d happened before our spring of ‘70 discussions. Because I think if they were still bundled I don’t think we would have…. I don’t remember being that lucky that we would start, and they would unbundle at that point.

HAIGH: I believe it was announced in 1969, and it became effective for a fairly small initial sample of packages in the beginning of 1970 and then continue to roll over a number of years.

JOHNSON: That would tie in then. I’d been approached by another IBM guy, not in the library area, but a fellow that wanted to start like a service bureau type business at one time. Even though we never shared a lot financial information, I think Ed suspected that I could possibly help fund a startup. So his reason for contacting me is probably two fold: one from a technical point of view and one from a financial standpoint.

HAIGH: Do you know if he had sought any alternative sources of funding earlier?

JOHNSON: It's possible. He probably was a little naïve. I don't think he would know how to go about that very well. I know at that time he had talked with a couple of companies: Monsanto and Upjohn. He knew people there. I think that was more though "would you buy this product if I we had it?" They were not very far up in these companies, so they wouldn't represent top management. But he might have had other acquaintances or associates that he might suspect could help him funding. I think our thinking at that time was that we would take maybe $200, 000, $250,000 to get this thing started. It turned out that was not true, but as I recall that was our original thinking. But to answer your question, I think he did indicate to me that he maybe had talked around a little bit. But I'm not sure to whom.

[Tape 1, Side B]

HAIGH: So to continue with the origins of IMSL, how well developed was Battiste's idea at the point that he came to you?

JOHNSON: Not very well developed. As I mentioned to you, I think the phone call triggering this thing, as a guess would've been like April or so of '70. I flew down there, and we talked for a couple of days. Maybe a couple of visits down there, and then on the phone. Then we decided to do it, and I got a lawyer friend of mine in Racine here to set up the corporation papers. I used one of the accountants in my dad's office to handle the book keeping or the accounting. We did the payroll here. We actually set up with the bank here and even insurance here. So basically we had a small group of programmers down in Houston, I'd say four or five. When he left IBM, his secretary came with him. We went down there. We were going down a couple of times just to find an office that we rented. But then basically we did, so we did the development work there, and the selling was pretty unsophisticated, as indicated earlier. We use our technical people, and we did all of the financial and accounting and stuff up here initially, and then even did a lot of the mailing from up here for prospects and so forth.

HAIGH: So what was it that convinced you that this had the opportunity to be a viable business?

JOHNSON: I guess I thought similar to Ed. I thought that this library idea had a lot of merit. I didn't push within IBM to get them to do a lot more, but I guess it was obvious to us that that was a first cut, and that was all they were going to do or very little.

I'm not sure where I got the entrepreneur spirit, maybe because my dad was an entrepreneur. Even though my grandfather was in the business, there was a lag of a couple of years between when my grandfather died and my dad started, so he actually started from scratch. I suppose if you grow up in an entrepreneur family, there's days when you're in third grade, and you get off early because of good attendance, my father would pick me up at school and visit job sites, and you hear a lot of conversation around the house, entrepreneur type discussions and stuff. I hadn't thought about that when I was at MIT, but I suppose that was a factor.

I had left IBM. As I mentioned, I had left them a couple of years before I went back, and then I was working with them. And then I had left a month or two before we started talking about IMSL.

HAIGH: So what's your idea when you left IBM?

JOHNSON: It wasn't me that was so burned out, but my wife was really getting a little fed up with this leaving Sunday night and coming back Friday night every week. I was in basically a city every day, calling on major companies, and trying to save things from CDC. I had these

other interests going on, so it wasn't a matter of I was going to starve to death or something like that. I thought the world of IBM and still do. It wasn't any bitterness towards IBM.

It was just tough—we've got six children and a family situation. We've been fortunate. We've been married, it'll be 49 years this September. We never moved except for when I graduated from MIT in August of '55. We got married in September of '55, and I went in the Army in October. So we were around the Washington area and then came back here after my two years in the Army. So we'd never really moved.

HAIGH: So in 1970, when you were talking to Battiste about the idea, was there any successful piece of packaged software in any area that you could point to and say here's the proof that this model of some software really works?

JOHNSON: No. There might have been. I was thinking back that, I didn't know about at the time that SPSS was actually at least functioning out of Stanford. I'm not sure if it was a viable company. Now that, no I couldn't point to any big success story that we were modeling. When I look back, I was just kind of naive.

HAIGH: So in your initial business plan, what kinds of customers did you expect that you would be able to secure?

JOHNSON: We misread that somewhat. Our original thinking was that the real sophisticates, the top of the heap in the SHARE organization and so forth, these people probably had enough resource within their company so that they didn't need our package. So we were thinking one level down from that. We found out, as we started in business, that we were wrong. The market was the sophisticates. They appreciated the problem, and they realized that to develop one routine maybe would cost them thousands of dollars, and they could get a whole library for a few thousand dollars. So they were the ones that were the best customers.

HAIGH: I imagine you must have had to have made some significant decisions early on, which would not have seemed as obvious at the time as they might do now. For example, whether to sell software or to lease it.

JOHNSON: Yes. I think at that time IBM was leasing mainly. I don't remember giving a lot of thought to that. We kind of went in with the idea of the leasing thing, and when I think back in some ways that's a disadvantage because you don't get a lot of money up front. But then at this point we settled in on a situation where we were getting 90-some-percent renewals every year. So the growth was pretty spectacular percentage wise, because we kept everybody we had basically and added a bunch of new ones every year. But I don't remember a lot of conversation on that initially. Part of the deal with leasing the thing, we would automatically provide them with the new editions and so forth. I guess people were maybe in a leasing mode at that time.

These were again mainframe computers, which were fairly expensive. We kind of felt later on as things moved down to the workstation and the PC area that purchase was the way to go. Although that might have been a mistake, because I think SAS stayed with the leasing and maybe they still are, but we might have been a little expedient on that.

HAIGH: Did you give much thought about whether to sell the entire library as one product or to offer it on a la carte basis?

JOHNSON: Yes. We looked at that. Quite a few times we would have people come to us and say you have 600 or 800 routines. I only need 20 of them. And we would start subsetting it, and that

usually turned out to be an error. A lot of these routines kind of call each other and are interwoven a little bit. It turned out that subsetting it was not a good idea. Even if they were only going to use 20 of the routines, it was better to give them the 1,000 or the 600. We were pressured to do that, and we did it several times, and it never worked out real well. From maintenance standpoint, and because some of the elements shared other elements, the sub setting didn't work out very well. Later on when we would bring out libraries like the C library or the Java library, we would only map the most popular ones. So those libraries would quite often be smaller than the big Fortran one.

HAIGH: So you think the obstacles to that were more technical than business?

JOHNSON: Yes.

HAIGH: Now what was the initial scope of the library?

JOHNSON: You mean how big we thought it would be?

HAIGH: Yes, and what areas were you attempting to cover?

JOHNSON: Well we were basically trying to cover all the obvious numerical areas of quadrature and root finding and of course a lot of special functions. After we probably brought out the first edition with 200 routines or so, a lot of the additional ones were driven by a customer who would ask us to write one. So we would write another element or two for them, and then put it into the library. One of the problems that we had at that time was if you had an algorithm, and then a much better one came along, it was hard to get people to move if they were satisfied with the old one. So a lot of times, we'd end up adding instead of replacing, and that was always a problem. Another problem was that if you brought out a new edition, and the guy was happy with the old one, he would be maybe slow in moving to the new one. So years would go by and trying to maintain all of these old editions and so forth. It was always a continual problem to try to keep moving them up to the newer editions.

HAIGH: What were the initial sources of routines? Were you able to take routines from places like SHARE or the early IBM libraries like SPSS, or was it necessary to reprogram everything from scratch?

JOHNSON: Mostly from scratch. We took nothing from the IBM library. There were people that had algorithms around, professors and so forth. And at that time, some of them were willing to give them to us with no royalty because they looked at it like publishing a paper, getting a lot more people aware of their work. This was a way of getting recognition, and so we didn't have a lot of contributors asking for money.

I suppose at the time we had 600 elements in the library, and a guy comes along with another one, and now you have 601. If you prorate it or do anything there, there wasn't a lot of dollars available to that person. Though in some cases that happened, and people weren't realistic. The quality of the algorithm is important, but marketing and sales and the channels of distribution are very important too. So when we originally started the company, the library leased for $720 a year. The amount that would be available to one guy with one better algorithm was not a major deal. And most of these people were willing to go along with this idea that it was a way of distributing their algorithm. Even though they didn't get any money, they got recognition. We tried to do a real good job of recognizing them in the documentation and so forth.

HAIGH: Did you worry at all about piracy and intellectual property issues?

JOHNSON: We didn't initially, no. We had a few. I remember one case. We had a customer in Michigan, and all of a sudden we got a letter with an error from over in Japan. It turned out that the guy had made a copy and gave it to a friend in Japan. We didn't worry about that initially. We probably did a little bit more later. I guess our feeling on piracy and stuff was, at that time, keep the cost fairly low and try to get a big distribution. We felt that the customer was to give us $720 or later $840 a year with all the maintenance, and the fact that you could pick up the phone—that was one advantage we had over IBM: we made our programmers available on the phone, so if you had trouble you could call a programmer, where you couldn't call an IBM programmer if you had a problem with an element. We felt that piracy wouldn't be a major deal.

HAIGH: Do you feel that you set the price about right?

JOHNSON: I don't know. It was a real stab in the dark. It was certainly not a sophisticated pricing strategy. I don't know where we arrived at the $720. I guess I don't know how to answer that. It was just kind of a guess.

HAIGH: Now in terms of your customers, did you view the customer as being the person who actually uses the routines to solve problems, or was the customer usually the director of a computer center who would be responsible for running the computer?

JOHNSON: It was usually the user. We had very little dealings with the business office or so. At a university, of course, it would be the director of the scientific computing center, but he would normally have a professor of mathematics. And in some cases, in some industries, he might make the choice, but the paperwork might flow through a business office. But we would sell nothing to a business office as opposed to a technical person.

HAIGH: So the idea would be to interest the people with problems to solve in the benefits of the library and then hope that they demanded that it was purchased for them.

JOHNSON: That's exactly right.

HAIGH: So how would you go about reaching those people and convincing them?

JOHNSON: Okay, the way of doing that was to go to a lot of trade shows. At one time we were hitting as many as 35, 40 trade shows a year, and a lot of direct mail going through. With the universities, I have libraries that I had built up with essentially every university of the world, and I'd try to come up with the computer center director's name. So we did a lot of mailing. We did some advertising in some of the SIAM and ACM publications and so forth. A lot of trade shows, word of mouth, that type of thing.

HAIGH: Did your previous relationships with IBM customers provide any kind of entry with potential users?

JOHNSON: I'd say very little.

HAIGH: Why was that?

JOHNSON: I don't know. That's a good question. I don't know.

HAIGH: Did you try to approach them?

JOHNSON: Not heavily, no. I guess we went on kind of more of a shotgun approach I guess as opposed to a rifle. Again, we had this word processing system at home. We were sending out maybe more than 100 letters a day. I guess we were blanketing scientific installations around the

world and not really focusing…. That's a good question. I never really zeroed in on that. Maybe the ones that I actually worked those last few years with IBM were more hardware oriented, but there were prospects, maybe a different people in those instillations. That's a good question.

HAIGH: Would that word processing system have been one of those MT/ST systems?

JOHNSON: Yes, ours was a T-driven one I guess. It was an MT/ST. One was a card driven, and one was a tape.

HAIGH: The card was the MC/ST.

JOHNSON: Did the tape come first and then the card, or was it the other way around? Well, we had one of those in our kitchen. Jen had that setup so that I'd get the addresses, and then she'd make the envelopes and the letters. Then she'd have them all stacked up on tables, and when the kids would come home from school they'd stuff envelopes, and then I would drive down to the post office every night and mail. For a while we had a guy that had been with IBM, it was in Milwaukee, working for us, and he'd come down everyday, and we did some phoning. We operated out of our house here.

HAIGH: Did you have any kind of official contact with IBM?

JOHNSON: At that time you mean?

HAIGH: Yes, in the early '70s.

JOHNSON: No.

HAIGH: Do you have any idea of what their attitude toward independent software vendors was?

JOHNSON: No. As I mentioned before, we had never had anything negative, because we were very careful. We didn't take any algorithms from IBM, or any of the customer lists. In fact, when I think back, that may have been one of the reasons we didn't go after some of the people customers of IBM I knew. I didn't bring any mailing lists of customers with me, and we didn't take any of the algorithms at all. We started absolutely from scratch.

HAIGH: In the first couple of years, what did you see as your major competitors?

JOHNSON: Again, it would be more internal, plus IBM had a package out there, but I'd say the internal thing, the "not invented here" syndrome. You always have a problem with a big company. Like say you're going to go to General Motors to find the person that's interested in a mathematical library. You've got several hundred thousand employees. You might find them through SIAM going, "who belongs to SIAM or ACM computer group." Even if they gave you a directory of all the employees at General Motors, that would not be a very good way to start. But you find them certainly at these shows. The original shows were mainly computer-type shows, but then later on we started going to more specialized, like aircraft industry, or processing data within the aircraft industry, more industry or application specialties. We still do some of that. We still go to some shows. Not that many, but I'd say more like eight or ten a year, something like that.

HAIGH: In the early '70s, what proportion of your time were you spending with IMSL?

JOHNSON: I was spending close to all of it. I'm somewhat of a workaholic, so I had these other activities going on, but I was spending I would say a full time job with IMSL.

HAIGH: And besides you and Battiste, who were the other early hires?

JOHNSON: Well, there's Walt Gregory, who then became president later on. He came within a few months.

HAIGH: And where did he come from?

JOHNSON: Ed had met him originally at North Carolina State getting their PhDs. Then Walt went to work for Proctor and Gamble, not for very long, a year maybe. And then he came with us in Houston. And Olin Johnson was very early. There were a couple of people from Ed's IBM programming group in Houston. And as I mentioned, there was a science center there. We had a couple of guys from there and a couple from the space center. So that was kind of the nucleus.

HAIGH: So how big would the early development team have been?

JOHNSON: When we first started it was, you know, maybe five or so or, you know, shortly after we started. I'm not sure how many we had. As I mentioned the first product came out in July of '71. I suppose we're gradually adding people. I'm not sure how many people we had by then.

HAIGH: How many years was it before you had a revenue stream that could roughly match your costs?

JOHNSON: I'd say about five years, which is too long, but it was.

HAIGH: So you had to keep investing more money.

JOHNSON: Yes.

HAIGH: Did you ever lose confidence?

JOHNSON: Yes. You're asking some very good questions. You know, you get to that point where you talk to outside people, and they give you this "good money after bad" speech and all this kind of stuff. And it's a real conflict. You keep thinking, "If I throw in the towel, a week later the mailman is going to come with the 500 orders," so you keep extending the thing even though it's losing money. You get trapped a little bit because you're in now a ways, and if you close up, it's definitely lost. If you keep going, you might pull out of this thing and recover the whole deal. It's a tough deal.

I think the thing that really makes it difficult as an entrepreneur like that is when we pay every two weeks. So you've got all these expenses, some of which you can talk to people and hold off for a couple of days or a week or so. But the payroll… I mean if U.W. Milwaukee came to you and said, "We're having a little financial trouble, we can't pay you today, but we'll pay you a week later," that doesn't go over very well. So that payroll every two weeks is a day of reckoning.

I've talked to a lot of entrepreneurs, and that's not unusual. Any number of times on Wednesday noon or a day or so before the payroll's due, I get a phone call, and we're not going to make payroll. So I'm down rushing over to the bank here and wiring money. But when you've got five employees or so, especially at that time, these heroic efforts are maybe $10,000 or $15,000 or $20,000 efforts. When you get 100 or a couple of hundred employees, and you have problems it's a different magnitude. That philosophy makes life very difficult. And that's not just true of IMSL; that's true of most companies that are starting. Especially we didn't have venture capital or any outside blank checks or anything.

HAIGH: Right. Now when you started the company, had the idea been that it would be possible to raise additional capital or to make an IPO after a few years?

JOHNSON: Yes, that was our thinking.

HAIGH: And did the general turn of investor sentiment away from software companies in the early ‘70s prove a problem?

JOHNSON: We didn’t aggressively go out seeking funding. When I look back, we were kind of naïve on how to do it, and we didn’t do it very aggressively. So whatever the climate was, it was not a major factor.

HAIGH: More the internal dynamics of the business.

JOHNSON: Right. Exactly. And then as I mentioned this thing, the first four months the revenue was $150, the next year was $3500, but then it was going up pretty fast and you could kind of extrapolate ahead that if we can hang on a while, things would pick up. But it was more of a five year deal to break even.

HAIGH: And was the decision to expand to additional platforms an attempt to broaden the revenue base?

JOHNSON: Yes.

HAIGH: Did it help?

JOHNSON: Yes it did. We, as I mentioned to you earlier, we made some mistakes. The first one was an IBM product and then a Univac. It should’ve been a CDC or a DEC probably second. It did expand. We didn’t really look at other applications. There came a time later in the company where we started trying to look at other products. We did some work in the finite element area. We’re trying to find an application that would have as a wide applicability as a library. A library is pretty broad. I mean it’s not as broad as an operating system or maybe a database system, but in a scientific area a library is pretty broad. Certainly some of the things like linear programming has certainly broader market than a wing design. But it’s hard to come up with an idea like the library that is that wide. We never really thought seriously about doing some real specific application, although that would’ve been a possibility.

HAIGH: Did you think about offering consulting services?

JOHNSON: Didn’t early; we are now. I don’t know why we didn’t earlier, but we didn’t. We gave them some consulting just as a freebie as part of selling the library, but no planned. And when I think about it, it’s kind of a surprise because I’d mentioned that Olin Johnson had come from working next to Ross Perot. In fact, one of the reasons Ross Perot left IBM was that they didn’t want to really get into some of this heavy consulting and stuff. But that never was given a lot of thought.

HAIGH: I wonder if that was a difference between the technical market and the business market.

JOHNSON: Maybe, I don’t know.

HAIGH: So how did the firm develop, I guess, in the second half of the ‘70s and the early ‘80s as revenue picked up? You’ve got the library ported to a decent number of platforms. How did things progress?

JOHNSON: Well, as I mentioned, it took about five or six years to break even, so that would’ve taken us to ’75, ’76. Then we started doing quite well. We started piling up a fair amount of cash. We had no debt. I had the initial money that we’d put in. Initially, it was just almost like a panic

thing. We can get a phone call and wire some money and didn't worry about whether this was stock or loan, just we needed some money to make the payroll. Later on we kind of moved around so that basically of the money we'd put in, about half of it was stock and half of it was loan. So after we broke even, IMSL paid back the loans to us and then we built up a fair amount of cash in the company. So we had no debt at that point at all. This would've been the end of 1988. We were sitting there with no debt and a fair amount of cash.

HAIGH: So from '75 to about '88 things were going well.

JOHNSON: Yes.

HAIGH: Now during that period, were there any significant changes to that product itself?

JOHNSON: No. Of course there were a lot of mappings at that time because, you know, a lot of these machines were a little different architecturally. So we probably had 15 or 20 different libraries at one point.

HAIGH: So there were those portability issues. Did you begin to work more closely with the machine vendors?

JOHNSON: We've had some relationship with them for quite a few years, but it's never been real significant. Maybe in the supercomputer area there'll be situations where Ford or some major company will want to buy a supercomputer, and one of the requirements will be the IMSL library. They'll come to us and say we need a mapping to our machine. We did at one point have a relationship with Cray where they were going to buy us. It got quite a ways along, and then Cray started getting into trouble, and the deal didn't get done. Then Cray ended up selling to Silicon Graphics. We never really had what I would consider a major deal with a vendor.

HAIGH: Did the increased popularity of minicomputers require any changes to the business model or major technological shifts?

JOHNSON: Yes, the shift altered distribution, I think mainly because of the pricing. A person buying a PC is not going to pay $20,000 for a library or something like that. So as you get the price down towards a couple hundred dollars or down in that area, then you can't do it the normal way you can on a super computer. I mean on a super computer, with a $25,000 or $50,000 package, you can talk to the guy and demonstrate and ship it and bill them and do this. When you start talking about these low prices, it's a mass distribution. It's not a technical problem.

HAIGH: So how did minicomputers fit into that spectrum? Were they more like supercomputers, or were they more like PCs?

JOHNSON: They were much more profitable for us than a PC. I think they were a good business without changing the model too much. A little bit of change, but the PC was a major change in the model.

HAIGH: So when did the first PC versions of the library appear?

JOHNSON: I would say in the '90s. Our model was such that, you know, it was a little resistant to just do a PC, especially if you're going to sell them one at a time. That's why we had this deal with Microsoft. You could distribute through somebody that's selling the operating system, but to sell one at a time, even at $100 or $200, you might as well send the guy some money. So that definitely was a problem. And as I mentioned, the workstations seemed to be pretty good

business for quite a while, but I guess for some reason things started changing, I'd say beginning in January of '89.

HAIGH: We'll return to that and talk about those issues in some more detail later then. Now through the '70s and the '80s, did you continue to price it on a per computer basis rather than a per user bases or per a processor bases?

JOHNSON: Yes. I'm not sure when the change came on with seats and so forth. I'd say in the '90s.

HAIGH: Now how about the firm itself, how did it develop in terms of its number of employees, its structure, the way that it was run.

JOHNSON: Well we, as I mentioned, we were Houston based. I'm trying to think when we started putting some of these other offices together, probably in the '80s. At one point we probably had about 230 employees. This would've been probably early '90s, about the time we acquired PVI [Precision Visuals Inc. - merged with IMSL becoming Visual Numerics)], that was '92, and that was probably the most we ever had.

HAIGH: Did anything significant change over the '70s and '80s in terms of the way that the firm was structured or the kinds of people that you were employing?

JOHNSON: No.

HAIGH: So it stayed pretty much the same thing, it just got bigger.

JOHNSON: Yes. As we got bigger, we at one point we had probably 20, 25 PhDs doing development work in Houston. And then when things starting coming apart or going down, we started scaling back quite a bit. And unfortunately you tend to scale back in that area, which is not a good idea in the long run, but sometimes you have to make short-term decisions. As I mentioned before, as the company started getting a little bigger, of that size, the heroics become much bigger than when you've got three or four people.

HAIGH: At what point did you hire the first sales or marketing person?

JOHNSON: As I mentioned, back in the '70, '71, '72, our original concept was we would kind of sell from our technical people, take an hour break and make some phone calls. So I would say in the fairly early '70s to mid '70s that we started hiring a few kind of technical sales type people.

HAIGH: Were there any particular issues with finding people who were able to sell this kind of specialized product?

JOHNSON: No. The library is a pretty easy sell. You're selling to a very high level person that understands exactly what the product does in most cases. The pre-installation/post-installation sales support is very little compared to most products. You basically just send them the library, and unless he finds a bug or something, training is almost zero. In fact that was a major change when we acquired PVI, the selling cycle on those graphics packages are much bigger, much longer cycle, and requiring demonstrations. The library, again, because of the type of people we're dealing with, almost sold itself. Well, you had to tell them about it and so forth, but as far as demonstrating and running classes, that was nothing. You didn't really have to do that.

HAIGH: Were the sales people working on commission?

JOHNSON: Yes. Initially maybe not, but certainly early. We use kind of our IBM experience, IBM had gone through cycles of commission, non-commission, commission, and we were well aware of that. Even though I was not a commission salesman with IBM, I worked right with the salesmen, so I was quite aware of what was happening.

HAIGH: Were there any important changes to the top levels of the management or technical teams in the second half of the ‘70s or through to ’88?

JOHNSON: Yes. As I mentioned, in ’77, Ed Battiste announced he wanted to step aside and move back to North Carolina in the summer of ’77.

HAIGH: Why was that?

JOHNSON: Well, I think he was kind of burned out. You know, he was a young guy. When I look back, I think he felt when we started it would be a simple deal, that in a year or so, or a couple of years, we’d be making money. As we didn’t, and the amount of money that had to go in escalated, we never had this conversation, but I suppose he felt guilty that this thing had taken four or five times as much money as we originally thought. So then we started breaking even, probably broke even for a year or so, and he was working very hard.

Ed was a very emotional guy. I’m not saying this as derogatory, but he quite often would come here to visit on the business deal, and we would have a very productive day or two, and everything would look pretty good. I would take him to the Milwaukee Airport, he’d get on the plane, and the plane would stop in St. Louis. He’d get off the plane in St. Louis, call me, “I quit.” “Ed, what happened? Up to an hour ago we thought we…” He was a very emotional guy. He quit I don’t know how many times, but then he’d come back. For a lot of our employees, he was difficult to work for because he was so emotional. You would come in the morning, some mornings everything was great, and other mornings it was a disaster. It was very difficult for some of our people. They wouldn’t know what was going to happen that day. He was a very emotional guy, and I’m very unemotional, Swede I guess. It was difficult because he would get all upset over stuff.

But the guy was very bright and worked extremely hard. He was a workaholic. I would get a phone call from Houston that they hadn’t seen Ed for a couple of days. Not that he’d take a lot of time off, but he would just sort of get so emotional and burn out that he would just stay home for a couple of days and cut grass and do stuff. I’d never complain about it.

Again, the deal was that we provided all the money, and we provided a lot of effort too, but he provided a lot of effort, but no money. And of course he had a chunk of stock. As I’d mentioned earlier, when he left we bought it back from him, but he left under very poor conditions. I always felt badly about that because IMSL was really his idea more than mine, and he worked extremely hard. And it just seemed like especially in the ‘80s we were starting to enjoy some success, and he should’ve been a part of that, but he wasn’t.

[Tape 2 of 2, Side A]

HAIGH: So Battiste left in ’77.

JOHNSON: Yes.

HAIGH: Who replaced him?

JOHNSON: Walt Gregory, who had been with us not too many months after we started, and he was sort of the second in command and was Ed's choice. When he left Houston, it was not bitter, it was just more or less "I've had it, I'm burned out." He suggested, and I agreed that Walt would be the new manager. I didn't fire Ed or send him off. It was a voluntary deal, and he wanted Walt to be the next, so we agreed on that, and he took off for North Carolina. Walt is a very stable guy, very bright, hard worker, but had no management experience.

HAIGH: Did that lead to any significant changes in the way that the company was run?

JOHNSON: No. The company was run in a kind of a technical way, what you'd expect from a bunch of technical guys running a business. Maybe that isn't a good example, but no there was no major change. Again, when he left it wasn't because we were having any particular problem. We had some personal problems, that's why I remember the date very well. Jen, as I mentioned, is from Duluth, and her mother and a nurse were murdered in June of '77, and Ed left like a month or two after that. I remember those dates because I had major problems because of this murder going on and an investigation. I was heavily involved with helping the police, and then Ed announced that he's leaving. So I had a lot of things going on in my life right at that time. That was one place I put IMSL a little bit aside because I had this catastrophe, and I had to put that kind of as a top priority. And then right in the middle of it Ed had made up his mind to leave.

HAIGH: And after that, did you ever return to spending as much time on IMSL, or were you more hands off after that?

JOHNSON: Good question. No. This murder thing lasted a while, and it got real messy because Jen's sister and her husband were arrested on the thing, and the husband was convicted. So it was quite a messy deal. I had to give that top priority, but I was still doing a lot with IMSL. And then when that got more resolved I picked up even more with IMSL, and I was pretty active. In fact I remember in 1990 when [Richard G.] Couch [former President and CEO] came in, it was the summer of 1990, I would go down there every week to work with him. So I was extremely active in the early '90s.

HAIGH: So IMSL continued to account for the majority of your time all the way through.

JOHNSON: Yes. As I mentioned I do have some other interests. This orchard deal, and I've been involved with that for 20, 25 years, and I was chairman for a short time, but basically I've just been a board member there. I spent a lot of time on MIT: I'm the interviewer for Southeastern Wisconsin. Every undergrad, it used to have to be interviewed, and now it's recommended, but not required. And I'm on four committees there. So I'm there typically if not every month, every other month. In September, I'll be there twice and once in November.

HAIGH: And you've been doing that since the '80s, have you?

JOHNSON: Yes.

HAIGH: But you'd say that you're still spending the majority of your time working on IMSL?

JOHNSON: Probably less now. I would say not a majority now. It goes in spurts. Some things come up, and I'm more involved with the kind of long range planning and stuff. I go to some of the shows. So I'd say it's less now than it was a few years ago.

HAIGH: So we've discussed the minicomputer era. Now you briefly mentioned the emergence of the workstation market in the 1980s creating some new opportunities.

JOHNSON: The mini was very good, with no problem. That was really an extension of the mainframe to us. The workstation turned out to be pretty good, some changes, but not dramatic. The PC was dramatic.

HAIGH: So before we get to the PC, the workstation market, can you remember at what point the firm went into that and what your experiences were?

JOHNSON: I'm trying to guess that, I'm thinking '88 or '90, in that area, and we were doing a lot with Sun and IBM. I remember with some of these, they would actually provide us quite a bit of hardware free in order to develop stuff for their systems.

HAIGH: So with the workstation providers, you were working somewhat closer with the vendors than you had been.

JOHNSON: Yes that's right.

HAIGH: Presumably because it was such a crowded marketplace for a while. There were many, many companies coming out with different kinds of Unix machine.

JOHNSON: I remember with Sun we'd have software available at the time of their hardware announcements, and there'd be part of the announcement package where we would describe our software. We'd be one of the few pieces of software available for the new hardware because we could get on these new systems fairly fast.

HAIGH: You mentioned that with the larger user base you had to find different ways of selling to them and different ways of pricing.

JOHNSON: Yes. That's a good way to put it. It's a larger base, but it's also a much less expensive base. I think that was more of the problem than the size, but both are problems.

HAIGH: Large and fragmented.

JOHNSON: Yes.

HAIGH: Did it also create problems with things like technical support or perhaps even documentation when you're dealing with perhaps a less sophisticated kind of user?

JOHNSON: That didn't seem to be a problem. Either the documentation, because we moved to online stuff, and then the maintenance and trouble shooting never seemed to be much of a problem at the beginning, or now, or anywhere along the line. I guess the program was always pretty well done and so with sophisticated users maintenance and support never was much of a problem. I never remember any panics in that area at all.

HAIGH: You've said that having successfully navigated the minicomputer era and done well with workstations that around about '88 you became aware that the PC was changing the dynamics of the business in unfavorable ways.

JOHNSON: Yes.

HAIGH: Can you talk more about that?

JOHNSON: Well I don't remember where our pricing was at that point, but I suppose a person would cancel or would not order on their mainframe at some price, $20,000 or $30,000 or whatever, and the work order would be moving to save PCs where they expected to pay considerably less.

HAIGH: That would be because computer centers were retiring their mainframes.

JOHNSON: Yes.

HAIGH: So it wasn't they were defecting from the package per say. It was just that they were closing the group that had previously been the IMSL customer.

JOHNSON: Right. And even though the mainframe has continued on commercially, I think the scientific workload moved off very heavily into these smaller systems.

HAIGH: Yes, because the thing that kept people on mainframes commercially was legacy code, high availability, and great I/O throughput, and none of those are really factors to the same extent in the scientific market.

JOHNSON: That's right. Around Racine, S.C. Johnson & Son, Inc., Fiat S.P.A. and CNH America, LLC, some of these big companies are still sitting with rooms full of mainframes. But the technical stuff, you're right, for those reasons, disappeared. And the pricing and the distribution was a different business.

HAIGH: So the crisis expressed itself in terms of a drop off in revenues because people weren't renewing mainframe contracts.

JOHNSON: Yes. And of course by then we'd gone to purchase, and so it wasn't a matter of renewing a lease license, it was buying. The orders started dropping off.

HAIGH: So you had converted to purchasing even for the mainframe installation.

JOHNSON: Yes.

HAIGH: Can you remember when that happened?

JOHNSON: I think around '90 or so.

HAIGH: Well, you've said that the crisis was '88.

JOHNSON: Right. The reason I put the '90 out there, that was about the time Couch came. I think it was kind of tied in with his thinking too. But you're right, I always remember vividly the end of '88 we were in beautiful shape financially. But by the spring of '90, that one year in there, things had started coming apart in there.

HAIGH: So this drop off in revenues preceded attempts to seek new kind of growth and new financing.

JOHNSON: We had made some attempts at financing. Again, when I look back, we didn't really do a major job. When Couch came in, he had a lot of contacts in the venture capital in the financial area. And we did crank up with one venture capitalist in California after Couch came on board. We never completed the deal, but it got quite a ways. But he had and still does have a lot of knowledge of that business. We are doing some things right now in that.

We cranked up what was going to be either an IPO or a private placement in the early '90s. Typically on those kind of things, you can spend a lot of money, and we did it kind of the right way. We had first class attorneys and accountants, and the printing costs are very, very high because you have to do it kind of secretly and very, very rapidly. So you can spend a tremendous amount of money, which we did.

The business had started dropping off, and we had bet heavily on Java, and it didn't materialize. And then this company we'd acquired, the PVI thing, was not functioning very well. So this combination of all of this we aborted the offering, and that gave us some real troubles for a while. I know we were shooting it with the Java thing. That was going to be a big part of the growth.

HAIGH: Well if that was after Java, then it must've been something like '97, '98 because Java only really hit the world I think about '97.

JOHNSON: So we probably right at the beginning of Java, we were too early with it. I guess a couple of years went by pretty fast there. That would've been about right.

HAIGH: So these changes were precipitated by the hiring of Couch then? So the sequence is: you realize things are going badly, you look around for a more business-oriented leader, Couch is hired.

JOHNSON: Right.

HAIGH: And then he is driving these attempts to find new financing and the merger with PVI.

JOHNSON: That's right. That's exactly right.

HAIGH: Okay. Can you talk more then about Couch's personality and background?

JOHNSON: Yes. Couch is a very interesting guy. He grew up in upstate New York with a very tough childhood, very, very poor people. He's very bright. He's quite a good athlete, wrestler, and football player. He started out at Cornell, and then moved over to SUNY Buffalo and played some football. He was a walk on with the Buffalo Bills about the time as O.J. Simpson. Then he served a couple of tours of duty over in Vietnam as a SEAL in the Navy. In between, he graduated from this SUNY. Then he went to the University of Rochester and has an MBA and has been on the board of the business school for some time. He's fairly active with the school. Then he worked for Xerox and had a rapid,move up and was a vice president at a very early age. I want to say 30 or so. Then he moved to California and started kind of a crisis management company [Diable Management Group] where he hired some other businessmen, well some of them are technically oriented. And he basically would move in on companies. When a venture capital firm saw the company was going down the tube or so they'd bring him in. So he's probably been president of maybe 60 companies, sometimes three or four at a time. I met him through Gary Hromadko, who's a venture capitalist.

Do you know BMC? It's a software company in Houston. He had taken them public and in the process was spending a lot of time in Houston and called me one day, and that's how we got acquainted. Then later on when we were having troubles with IMSL, I called him and said, "Gary, have you got any ideas?" And he said, "Well, I want you to talk to a guy named Richard Couch." So Couch stopped by Houston, and I spent some time with him. And as I mentioned to you earlier, we decided that he'd come on board for a short period and get things squared away from a business standpoint and help find a new president and so forth. This was the summer of 1990. He has maybe seven or eight guys that work for him, and he operates not just technical companies. One of his key people is a guy with a tremendous amount of computer experience. He was with a company that back in the '50s or '60s became part of Burroughs and quite a bit of experience in there. So that's kind of the background on that situation.

HAIGH: Now I understand that after his arrival that there were some quite heavy layoffs among the staff that had been working on the library.

JOHNSON: Yes, and other people too. Well, you know, the company scaled down from 230 or so to maybe 100 or so. I don't think he's anti-technical so much as that we were having some real financial troubles. It's not a good idea, but people tend to cut back on R&D and stuff when you shouldn't. But, you know, you don't like to cut back on sales people. There's a little lag between the R&D and the revenue thing. And he's a hard-nosed guy. He's, as I mentioned, he's been president of maybe 60, 65 companies, and a lot of these were disaster things where he would go in and within a week or two either make a significant impact to get it turned around or maybe decide to close it down. So he's an expert at laying off people, but he doesn't like it any more than you or I do. He doesn't give that image. He gives the image of the Navy SEAL, pro football player, a pretty tough guy, and it's not easy for him to lay off people either. I know we've had that conversation, but he's done a lot of it in his business.

HAIGH: Do you think that ultimately hurt the competitiveness of the library?

JOHNSON: Some. I'm not sure what we did wrong. I don't know exactly the market Matlab is in, but they've carved out a pretty good size business, if not directly as a competitor, certainly in a related area. Except for maybe sales and marketing, I'm not sure what they've done better than we've done. Some of the technical people in the industry from a distance are maybe are too critical of Couch because they don't know him. I'm a technical person too, and you tend to have an allegiance to your fellow technical people. But I don't know if some of them realize what it's taken to keep this thing afloat during some of these bad times. I don't think they have any idea. I don't know. What is the perception around in the industry of IMSL?

HAIGH: Well, several people have suggested that sometime in the '90s NAG overtook IMSL in terms of quality of the library itself.

JOHNSON: Yes, actually looking back, I always thought of them as being kind of almost an equal. They had a lot of major advantages over us. At the start, they had access to basically all the top people in the UK through universities and government labs at essentially no cost. They had a shared deal going where if you were a university and provided some help, you got a library free. So basically with the British government behind them and stuff, and we're trying to do that privately funded. Although I agree I think maybe the libraries were similar. I never looked at us as being superior even in the '70s.

HAIGH: So at what point did you first become aware of NAG as a competitor?

JOHNSON: I was trying to think of that before. I suppose fairly early in the '70s. I'm not quite sure why or how. They always had a strong relationship through Argonne Laboratory, and I suppose since [W. J.] Cody was at Argonne and was an advisor to us, we probably were aware of them. Certainly with Jim Pool. I'm not sure when he left Argonne or left his government job to go with NAG. It had to be in the late '70s or so. We certainly were aware of it at that time or maybe a little, probably earlier than that.

HAIGH: I think it was early to mid 1980s that Pool went to work for NAG. I know during the time he was there they really dramatically increased the size of the American office, I think from a couple of part time people to something like 10 people. Are you aware that NAG became more of a serious competitor within the U.S. during that period?

JOHNSON: Yes. Again, though really they were a serious competitor, but the real competition was still within companies. The number of situations was quite small where it was kind of a knock down drag thing between NAG and IMSL over a contract. They were getting orders, but ones that we didn't even know about. So it wasn't as direct heavy competition as you might suspect.

HAIGH: Right. And how about IMSL's international business—at what point did you begin to open offices abroad?

JOHNSON: I know we had a relationship in Japan, and we actually opened our own office in I'd say '91 or '92, early '90s. And in '92 when we bought PVI, I know we had the three offices in Europe because they had an office in Germany. We combined I guess the French offices and so forth. So we had those in place before '92. We have one in Korea, that came quite a bit later, and we have one in Taiwan, that came quite a bit later. Those were probably in the '90s. We have one in Mexico City that was not too many years ago too. So right now we have three in the Pacific, three in Europe, Mexico, and then we have three sites within the U.S.

HAIGH: And roughly what proportion of revenues would come from the overseas offices?

JOHNSON: I'd say about half.

HAIGH: And has that been fairly constant over the '80s and '90s?

JOHNSON: Yes.

HAIGH: Okay. Returning to the changes in the early 1990s. Now we've talked about Couch, who he was, how he came to be hired. You've also mentioned some of the attempts that took place during this period to find new sources of finance. What you haven't talked about yet in any detail are the two acquisitions: of the PV Wave product and of the 3D Vision product.

JOHNSON: Probably starting during '91 sometime, maybe the end of '91, we started looking at a lot of possible acquisitions. We looked at several hundred companies, primarily in graphics. I guess we talked to some Fortran compiler writers and statistical package people. But we had a guy basically doing nothing but looking. There were a couple of other ones that almost closed, but they didn't. But that was the result of that that we did the PVI thing in I'd say December of '92 and the 3D Vision six months later or so.

HAIGH: Was this push to seek acquisitions because you believed that the library market was entering a terminal decline?

JOHNSON: Yes, that's right.

HAIGH: So what finished up drawing you towards graphics as an alternative market?

JOHNSON: Well we acquired these two, and it wasn't too much long after we acquired 3D Vision with their Stanford Graphics product that the wheels came off of that. I suppose it was triggered by Microsoft. Again, I'm not critical of Microsoft at all. In fact we were contacted when that government suit was going on against Microsoft. The government contacted us, and we said forget it, we don't have any complaints. But I think that kind of tied in with kind of the death of that 3D Vision thing. People, instead of paying $600 for a pretty good package, could get Office and have enough capability.

HAIGH: So was the company called 3D Vision?

JOHNSON: Yes.

HAIGH: And the product was called Stanford Graphics?

JOHNSON: That's correct.

HAIGH: And what capabilities did it have?

JOHNSON: I can't give you very much on that. It had no computational ability at all. It was strictly displaying data. I'm not as knowledgeable of the graphics as I am of the mathematical side.

HAIGH: Right.

JOHNSON: But it was, you know, I guess a language primarily on PCs.

HAIGH: So it was for plotting and visualization things.

JOHNSON: Right, that's right. All kinds of different graphs and charts and so forth, yes.

HAIGH: And the other acquisition was of the Precision Visuals for its PV Wave product.

JOHNSON: Right.

HAIGH: So can you talk about that?

JOHNSON: Yes. PVI was located in Boulder, Colorado, and they had several products. They started off with almost like a library of graphics packages, and then they progressed along. There was a second company also in Boulder, RSI. These two companies were very big competitors, and they were both in Boulder, Colorado. This RSI, some of our people got involved with them at some trade shows and suggested we ought to get an arrangement with them to tie in some of the things they were doing with what we were doing and jointly market and so forth. So we had a relationship with them. Then when we went out looking at all of these possible acquisitions, the PVI thing came up. And PVI earlier had contracted with RSI also for the same stuff. So when we acquired PVI, we then severed the relationship with RSI, which wasn't too popular with RSI. But we had access to their code through the PVI thing.

HAIGH: Right. I believe they were both based on something called IDL.

JOHNSON: Yes. IDL is the package that RSI has. Later on that company was acquired by Kodak, it's in some division of Kodak. And I just saw in the last couple of weeks that Kodak is selling that division including RSI. We bump into them some. They may have some tie in with some computational stuff. They don't do it themselves.

HAIGH: It's interesting that at the time of the acquisition this wasn't seen as a way to bring some kind of synergistic graphical expansion to the library, but actually as an independent product.

JOHNSON: No. It was made to tie in with the library so that, and as I'd mentioned, a few years earlier than that, we were doing some graphics development within our company to provide our customers with graphics tied with our computational stuff. But our idea was pretty much tying the two together to augment the computational ability. You mentioned before we kind of visualized the computational thing was getting mature and by putting this graphics with it, we would provide some growth, and it had more pizzazz to it.

HAIGH: Now to what extent were these developments driven by the competitiveness of Matlab?

JOHNSON: Not much of a factor.

HAIGH: And in this ’92 kind of time frame, Matlab wasn’t something that was playing a major part in your decision-making.

JOHNSON: Right, that’s correct.

HAIGH: As I see it one of the key differences between Matlab and these library products is that the library products still require you to understand Fortran, at least enough to write a simple program that calls the appropriate routines, whereas Matlab from the beginning worked interactively.

JOHNSON: Yes. One slight correction there. You know, we have C libraries and Java libraries as well as Fortran. Those were kind of operating separately, but we brought those all together.

HAIGH: At what point did you realize that interactivity was important, and what did you do about it?

JOHNSON: I’m not sure when we started realizing that. I had people commenting from the outside about that, and these were potential academic customers. I don’t recall that being a major problem, but maybe it was. Maybe that’s the reason that Matlab took off.

HAIGH: Well I suppose the users that you already had were very comfortable with that way of working, but I would believe that the spread of the PC created a potential, much broader user base where the people wouldn’t feel as comfortable with writing even a trivial program.

JOHNSON: That’s true, yes. And we still find even now that the real sophisticates seem to like the library better than the Matlab approach, but there’s a lot more of the less sophisticates out there. I don’t have any really feeling for how Matlab is. I don’t know those people real well. I know the chief scientist some, but I don’t know the business people there at all. I know there’s an MIT connection there. I think the head guy’s father is in the Sloan school at MIT, but I don’t know him. I believe that Cleve Moler was one of our advisors at one time. I know this was his original idea, and I don’t know how the idea came from him into the business.

HAIGH: So around about 1992 Matlab wasn’t something that you were particularly concerned about. Now over lunch you had mentioned some work with John Rice to try and produce a higher level language.

JOHNSON: Yes. I’m not sure when that was. That was back quite early. That thing never did much.

HAIGH: From your point of view, what was driving it? What made you think that would be something that was worth pursuing?

JOHNSON: I guess we felt that the natural progression to move up. It was triggered a little bit by the success of SAS and SPSS and other statistical packages that found a much bigger market. There’s always been a certain amount of resistance against learning another language. As I mentioned earlier, there’s all of these hundreds of languages that have died. So I give Matlab credit, because anytime you come out with a new language there’s a lot of resistance.

HAIGH: Now we haven’t really talked much about the statistics side. Do you have a sense of what proportion of the market for statistical things? IMSL would’ve had it in the ‘70s, and how it would’ve compared with SAS and SPSS.

JOHNSON: It was pretty minute. Within us, I think I mentioned it was probably maybe a 70/30 split or so. Of course SAS is much bigger now than they were then. And SPSS has had kind of some flat periods and then some growth periods. But then of course, SPSS, well both of the statistical parts of those two companies are relatively small. I mean like with SAS, what percent of their revenue that's coming from their statistical package is a minute part of the billion or billion and a half of the revenue they have. And SPSS two years ago was trying to sell off the original statistical package. Their big deal was data mining and a lot of other areas. I don't know what's happening within SPSS.

But I think you're right though. I think that model or their success in the statistical area probably influenced our thinking on coming out with a higher-level language in the mathematical area.

HAIGH: So do you think that IMSL's prospects in the statistical market would've been hurt then by the fact that statistical users would be less likely than numerical users to feel comfortable with the need to write a program in a standard language to get their results.

JOHNSON: Yes, for sure. I think that's a good point. People doing statistical work do not want to write Fortran programs. In fact I think at one time when fairly early there weren't a lot of mathematical or kind of a program mathematical statisticians around. It's Jim Gentle that worked with us who's now at George Mason. He was one of the top mathematical-statistician-computer people in the world.

[Tape 2, Side B]

HAIGH: So that was the statistical side of the library. Now back to the PV Wave acquisition.

JOHNSON: Well one thing I was going to mention on the statistical side, even though it was not a big deal with us, it's interesting that two of the prime guys initially, Battiste and Gregory were both PhD statisticians. So we had a lot of statistical knowledge. In our advisory board, I don't remember how that was split between mathematicians and statisticians. We had a lot of power on the statistical side. Maybe some people might even consider it a bias towards statistics even though that didn't produce the majority of the revenue.

HAIGH: So after PV Wave was acquired, on the technical level, how did this process of integrating PV Wave with the library progress, and what kinds of new capabilities did that bring to the combined product?

JOHNSON: Yes, I mentioned, of course they were a Boulder company, and we had trouble organizational wise for while. Most of the managers from PVI that came with us did not work out. Now whether they didn't size up with our management people, so we had quite an erosion of management people out of that group.

HAIGH: So initially did the group remain quite separate within the company?

JOHNSON: Yes, we tried to. There seemed to be quite a cultural difference between Boulder, Colorado and Houston, Texas. We tried for a while even combining things within a department, part of them would be in Houston with one manager. We did a lot of monkeying around with organization. It was more of a problem than I would've thought, this cultural bringing them into the system. Some of the original people are still there. In fact Margaret Journey was one of the founders, one of the original employees of PVI whose still with us. And there are some other people who have been there quite a while. Now I know that might have been coupled with the

overall business problems going on at the same time, which put a lot of heat on. But it was a very difficult acquisition.

We did quite an extensive due diligence on the thing, and whether we caught them on the way down and paid too much or whatever happened, it was just very difficult. And personality wise it was a real problem also. We found out later that several people had tried to acquire that PVI and begged off or dropped off because of potential problems. We thought we had studied it quite extensively. Gary Hromadko whom I mentioned earlier introduced me to Couch, he was well aware of PVI. I guess they approached him. They had some outside funding through some venture capitalists and so forth. We went in with our eyes open we thought, but it was just a very difficult deal. And it chewed up a tremendous amount of management time trying to work with these problems.

HAIGH: So what kinds of individuals or groups had been buying that product prior to the acquisition?

JOHNSON: That's a good question. It was not quite as technically oriented as the library business, so there were a lot of commercial people that wanted graphics capabilities and some technical, but not as heavily technical as the library. Though they did have customers like GE Medical in Milwaukee, and they did a lot of work with Caterpillar and Cummings engine test people and that kind of stuff. So there was some of that, but from a mathematical standpoint, it's a lot less technical. But then there are a lot of technicalities of doing graphics too. That's a science of its own. It was a little different market.

HAIGH: And did you have trouble hanging onto those users after the acquisition?

JOHNSON: Not too bad, that was okay. I think one of the things that surprises, it's a long selling cycle as opposed to the library being a fairly short cycle, and this requires a lot demonstrations and a lot of education. So it's an expensive product to sell. A few years ago we started thinking we're going to kind of phase out a little bit of that and concentrate more back on the computational side, and in the last couple of years the business has picked up quite a bit in the visualization area. So we weren't doing as much development work there for quite a while. We're now kind of relooking at it because it's perked up in the last year or two.

HAIGH: Did they remain separate products, or did you roll some of the capabilities into the library stuff?

JOHNSON: Both. There's one product that you get both, and some that you can get it individually.

HAIGH: And has much changed with the library itself in terms of its scope or the way that it's used?

JOHNSON: I don't think so. It's somewhat dynamic. It's not as dynamic as what some people might think, like if we're doing a lot of work in the financial area there might be a lot of special functions that are unique to financial applications, and they'll ask us "could you produce these?" And in some cases, we'll then add them to the library. So there are some things of that type that come along, but in general most of these mathematical techniques are applied to many different industries.

HAIGH: So has the financial area emerged as a larger market in recent decades?

JOHNSON: It's been fairly good for quite a few years. I would say it's one of our key industries, but I don't know if it's growing relatively over the last couple of years. It's been fairly major for a few years.

HAIGH: But you think it wasn't as big in the 1980s.

JOHNSON: That's correct. It was almost nothing at that point.

HAIGH: So that's emerged as a new market then?

JOHNSON: Yes.

HAIGH: How would you describe the state of the company at the moment?

JOHNSON: In regard to?

HAIGH: Well in different areas. For example, are revenues recovering? How big is it roughly? How large is the development team? Those kinds of things.

JOHNSON: We've been, I'd say fairly stable about the same size now for five years or so. There is some indication that it's starting to grow, but not dramatically.

HAIGH: So about how many employees are there at the moment?

JOHNSON: About 100.

HAIGH: How did the name change to Visual Numerics occur?

JOHNSON: Originally the company was called International Mathematical and Statistical Libraries, and then we shortened it the IMSL. Then after the acquisition of the PVI, the feeling was that the name should reflect the visualization as well as the computational side. It was probably kind of a hurried decision that maybe was done too rapidly. I don't think we realized how well known the IMSL name was. The PVI name wasn't as well known by any means. I'm not saying that just because I was a founder. So in creating another name with all of the problems of getting recognition and so forth, we probably didn't think that through real well. So the name change came fairly rapidly after the acquisition. I'd say mid '93 or so.

HAIGH: You'd mentioned that the Java library didn't catch on as quickly as you'd hoped?

JOHNSON: That's correct.

HAIGH: Has it now picked up to account for a large share of revenues?

JOHNSON: It's picked up. I can't give you a percentage, but it's definitely picked up quite a bit. The original thinking with Java and a lot of these software companies involved with it at the time was that it was sort of give away the product, and then later on try to come back with a product that would be charged for. Of course that's fine if you've got a lot of capital sitting behind you. About the time we were doing the possible public or private offering, we felt that the Java thing was going to be the growth engine and a big deal, and it didn't turn out to be that. We had actually carved out a chunk within the company, separate management, kind of a Java task force with marketing and sales. When we looked at the public/private offering, almost all of the growth was going to come out of that Java area, and it was quite a disappointment for a while.

There were other things that happened that fouled us up, because of this fallout from the PVI acquisition and so forth. It turned out to be a very tough acquisition. It was an acquisition that would pay over time, and we probably over paid for it, and the business dwindled down, and we

thought it'd meet all these commitments and so forth. So it was quite a few tough years, and it occupied a lot of our management time where they could've done other things much more productive.

HAIGH: Do educational institutions still account for a large share of revenues?

JOHNSON: We did a lot in that area when we first started, and then we kind of let that fall because we used to give a big educational discount, and we really had a very big representation. I'm not sure when we started having some financial troubles and people started questioning is it worthwhile, giving away all of this to universities? I can't give you any numbers on it, but it definitely became less important as a market. More recently we have some products that are aimed specifically at the education market. We're definitely building up in that area.

HAIGH: How have your relationships with vendors developed over the last ten years or so?

JOHNSON: Nothing really dramatic going on. We don't get quite as much. As I mentioned, at one time we had a lot of hardware provided to us and so forth. Now whether we haven't worked as hard on that with the vendors, or whether they've scaled back on that, we don't have anywhere near that relationship.

HAIGH: Well there are a lot fewer platforms around than there used to be, and with the PC vendors it's all standard. So imagine that's played a role. There are still companies making supercomputers, but it's different.

JOHNSON: Yes. Well as I mentioned, we have pretty close relationships with some of the supercomputer vendors, particularly some of the Japanese ones where we've done ports or mappings, libraries too. Some of these are still unique configurations, and we do a fair amount of mapping of libraries to these big computers.

HAIGH: Now I know in the mid 1990s there was some kind of relationship with Microsoft.

JOHNSON: Yes. We had several things going with Microsoft. One of them was that they were bundling or selling a library for the PC in connection with a Fortran compiler that they developed. It was fairly large numbers, and then as I mentioned to you earlier, they decided to get out of the scientific market and sold that Fortran group to DEC, and then it went to Compaq and then to HP. We're still working in that area most recently with Intel, but it's the same thing. There are several Fortran compilers coming out, particularly for 64-bit machines. Some work with a 64-bit C library.

At one point, Microsoft had approached us. They wanted to put together kind of a company, and they were talking about getting into Fortran compilers, combining three or four companies with a new company formed where Microsoft would provide a lot of the money. They were initiating this thing, and then all of a sudden it died. I don't know if the people within Microsoft moved onto other jobs or something. It never, never flew, but they approached us on that.

HAIGH: I wonder if you would like to say anything about your involvement with other organizations, community, charitable work, that kind of thing?

JOHNSON: Okay. Yes, I indicated on that material I sent you, my wife, Jen, and I made a decision quite a few years ago that instead of trying to help large numbers of people or groups we would try to concentrate on two or three situations where we would have a bigger impact and put time in as well as money. At the time, it wasn't quite as formalized as I'm making it sound, but this is the way we're looking at it now. We had had quite a long relationship with MIT going

back probably 30 years or so. So that was one of the choices. And we wanted to do something locally with the Racine Zoological Society. And then more recently the Mayo Clinic, we're funding some research up there. That's kind of new, in the last four years or so. We're going to do more with that one.

With MIT , as I indicated, we funded a chair there at one time in the electrical engineering computer science department. A fellow named Professor Arvind, has the chair. He's more of an architectural design guy. Then we had a thesis prize in computer science that was kind of a take off from the chair. Recently we've split that off and are funding that separately. Then in the math department we have a thesis prize, and then we also are funding a graduate fellowship. Then we have a similar relationship in the Sloan Business School and a small deal in the athletic department, all of this at MIT. We did the chair a few years ago when I myself was doing a little bit better, but we've continued on a pretty aggressive program there. I put a lot of time in there, and then I'm the interviewer for students around here.

Likewise the zoo thing, I've spent quite a bit of time on that. I spend a lot of hours working as you can tell. The Mayo thing is not a lot of time, but it may become more time, but mostly some financial contributions. The oil/gas company I'm involved in, I don't spend much time with that. It's mainly a major stockholder situation. It's headquartered in Denver, and it's a New York Stock Exchange Company. We've been involved in that for a long time. As you know the gas/oil business has been pretty dramatic, and so it's been a very good business, in fact, it's been a good business for a long time. Then I'm involved a little bit in the iron ore business, but that isn't a major time thing at the present. Then I guess the Police and Fire Commission, I'm president of that now, the local commission.

HAIGH: In Racine.

JOHNSON: Right. Then the other one is some orchards out in the state of Washington, which is a board seat. I make about five visits a year and some phoning and stuff.

HAIGH: So it sounds like IMSL is the only one of the businesses that you've really got emotionally involved with--

JOHNSON: Yes.

HAIGH: And particularly committed to in terms of hands on engagement.

JOHNSON: Right. The iron thing might turn out to be more because, as I mentioned, that's because very, very dynamic in the last year, so we've got a real opportunity there. But you're right, emotionally…. When I go to bed at night the thing I read is mathematics, not iron mining stuff.

HAIGH: So in retrospect do you think that mathematical software was a particularly good business to get involved with?

JOHNSON: Well I still think so, yes, but it certainly has been a difficult experience the last few years. That early period from '70 through '88, even though it was a struggle those first few years, there was a lot of places where you could be quite optimistic that eventually good things were going to happen. And since then it's been more of a survival type thing, I guess it was survival at the beginning too. I would've thought by now that we would've….. You know, it's coming up on 34 years now. I suppose that's kind of unique in the software industry. By then you either make it big or you're gone.

HAIGH: It does appear to be an interesting difference between scientific and business software because in business mainframe software, even the successful firms were all acquired by Computer Associates in the 1980s. For some reason people believed the logic of the market was that a medium sized company with a successful product or two wasn't viable. Whereas in scientific software, it appears that these small companies with one or two main products have continued to exist for decades and people seem quite happy with them.

JOHNSON: That's a good point because there's some small statistical companies that have been around forever basically. There's one at State College with a couple of men. Some of these have been around 30 years. I guess in the pure mathematical area it was primarily NAG and us for quite a while. I'm never quite sure where to place Matlab because we don't run into them as much as you might think. Again, they have obviously a very big market, but they don't seem to be as prevalent in say these big department of energy labs and that kind of stuff. Maybe they are in certain parts, but the real heavy Fortran computing…

HAIGH: It's a different trade off because the language was interpreted. There was a significant performance hit there, so you wouldn't use it for a supercomputer application.

JOHNSON: We seem to have bumped into a more, from the PVI and the graphics area, than the real hard core numerical computing, which is always kind of surprising because Cleve Moler was a real heavy mathematical type person. But again, I'm not quite as close to the market as I used to be either.

HAIGH: Well the mathematical core that he built it on was from the LINPACK and EISPACK packages, and those were available before there was Matlab. So the advantage was you've got an interpreted version that was good for quick application development or instructional use, but with a performance hit. So the labs would've continued with the original library style packages.

JOHNSON: Sure because that was really developed at Argonne. Again, I'm not as close to the market place as I used to be.

HAIGH: And you've remained very involved with the community here in Racine. Now was it a deliberate decision that you were going to stay here rather than move during the 1970s to Texas, or to Silicon Valley or Boston or some other center of computing activity?

JOHNSON: I'm a native here. That doesn't mean you have to stay here, but my folks were both born here. Jen is from Duluth, but we've been here a long time and I don't know, we never really seriously thought about moving anywhere. I suppose the reason I didn't move to Houston was I did have some of these relationships with these other companies and not so much right here in this area. Jen's family had an office in Duluth at one time that they maintained, with this iron deal and some other activities. The oil/gas company came out of the family, but that has really mushroomed. It's become a fairly big company. Well, as I mentioned, it's on the New York Stock Exchange now, and it's capitalized at around a billion dollars, so it's been a very, very successful deal. Though I never spent a lot of time on that, I spent a lot of time studying it, and talking with the people because we have a big financial interest there, much bigger than in VNI, but I'm not actively working on it.

HAIGH: I saw that VNI had moved from Texas to California.

JOHNSON: Yes.

HAIGH: Why was that?

JOHNSON: Well Couch lives in California. That wasn't the whole reason. And quite a few of the people that we've hired in the last few years, because of the all the unemployment around Silicon Valley, we've brought some pretty good talent in. We actually wanted to do that a long time ago, but it's expensive, and it just seemed like it kind of happened naturally. Phil Fraher, and a lot of our key people coming into the company were coming into the California office, and Houston was becoming more just a development center. We really only have kind of two key guys there, and likewise in Boulder, there's only really a couple of key people there. So as we got more and more key people in California, it looked like a logical thing to do. We're over in that East Bay Area, San Ramon, so it's kind of a junior Silicon Valley along there. You've got U.C. Berkley at one end and Livermore Laboratory at the other, and then a whole string of new startup companies. It's a fairly exciting place to be, but lower cost than Silicon Valley. It was something that we kind of talked about for quite a while, and then it just sort of evolved because of people leaving and coming on board and so forth.

HAIGH: So moving to wrap up, I think I will ask you the same final questions that I asked the other interviewees. So the first one of those would be looking back on your involvement with mathematical software, what do you think the single achievement or decision would be that you're most proud of?

JOHNSON:As we looked around, IBM had a library that a lot of people had moved over to other hardware and were running and causing a lot of errors and so forth. The SHARE library was untested. The mathematical software was pretty chaotic. Basically there were people taking code that was untested and with no conventions and so forth. Our idea was to organize this thing into a real first class library, and to map it onto the different architectures at that time, and have a real high quality product that would serve this industry. And the industry we're serving is made up of a who's who of important companies, whether they be in healthcare or providing transportation to people. I think we have a lot of pride in providing software to industries that in turn are very worthwhile in providing important things to a lot of people. It was a business that's easy to be very proud of because you're not creating cigarettes or something. You're creating very worthwhile things and augmenting worthwhile companies and putting some organization to this chaotic software that was sitting there.

HAIGH: So you'd say the creation of the library itself.

JOHNSON: Yes.

HAIGH: And to reverse that, what decision or occurrence would you say you most regret?

JOHNSON: I suppose we probably should've gone out more aggressively looking for money initially. So instead of reacting to kind of panicked situations as I indicated, wiring money down the day before payroll, we should've bit the bullet, either internally or outside, and gone out and got some significant amount of money and been able to continue the R&D in a better way. And then also really do the marketing and sales in a much bigger scale.

HAIGH: So you'd say then having initially under capitalized the firm back in the '70s.

JOHNSON: Yes I think so.

HAIGH: Well those conclude the questions that I'd prepared, if there's anything else that you'd like to say then now would be the time.

JOHNSON: I think it's a business you can be very proud of because selling a worthwhile product into all of these industries that are very important is something that's very easy to be very proud of. It's a real who's who of companies out there whether it be Johnson & Johnson or M.D. Anderson medical research. And then I like technical things, and so I sm personally doing something real. Non-technical would not be particularly interesting to me. I guess it's a matter of maybe pride. If I had two businesses that were equally profitable, and one was tied in with technical things and one was not, I would without question go to the technical one.

HAIGH: Thank you very much for taking part in the interview.