# John Gardner Oral History Interview, August 13, 2014

### Title
“Improving Science Accessibility for the Blind”

### Date
August 13, 2014

### Location
ViewPlus Technologies, Corvallis, Oregon.

### Summary
In the interview, Gardner discusses his upbringing in Mississippi and Texas, his struggles with poor eyesight as a child, and the techniques that he used to overcome his disability and succeed as a young student. From there Gardner describes his mostly unhappy experiences as an undergraduate at Rice University and his more fulfilling years as a graduate student in Physics at the University of Illinois. He also notes his year of post-doctoral work in Munich and his first academic post at the University of Pennsylvania.

Gardner next discusses his tenure at Oregon State University, including his initial impressions of the area, the status and development of the department, and the role that German international exchange students played in bolstering the rigor and reputation of Physics at OSU. Gardner also speaks of important OSU colleagues and the development of his research agenda during the first fifteen years of his career in Corvallis.

The remainder of the session is devoted to Gardner's complete loss of sight and the changes that this event compelled him to make, both personally and professionally. Gardner describes the surgical procedure that led to his blindness, the immediate impact that this made on his research and teaching, and the methods that he employed to try and remain productive. He also comments on the transitions in day-to-day life that were ushered in when he could no longer see, and his professional movement in the direction of accessibility technologies for the blind.

Gardner's founding of the Science Access Project and its eventual transition into ViewPlus Technologies is a major point of emphasis, as is the development and growth of the company to its current status as a world leader in assistive technologies. In commenting on ViewPlus, Gardner specifically remarks on benchmarks in the advancement of the company; its flagship products; the role that his wife, Carol, has played in its success; and his future vision for what the company might achieve.

### Interviewee
John Gardner

### Interviewer
Chris Petersen

### Website
http://scarc.library.oregonstate.edu/oh150/gardner/

## Transcript

**John Gardner:** Today is August, I don't know what, 13th? We're in the main conference room of ViewPlus Technologies.

**Chris Petersen:** Right. I think I may have started this just a second late. If you could say your name again?

**JG:** John Gardner.

**CP:** Yeah, okay, terrific. So we will be talking primarily about your association with OSU, and the loss of your sight, and the founding and flourishing of your company, but I wanted to touch on some of your earlier background first, and we'll start from the beginning. Where were you born?

**JG:** [Laughs] I was born in a small town in northern Mississippi.

**CP:** Were you raised there?

**JG:** I was raised sort of all over Mississippi. My father was a teacher, and we moved every year for a few years so he could get a raise.

**CP:** So he could get a raise?

**JG:** So he could get a raise, yeah.

**CP:** Huh. How would you characterize your upbringing in Mississippi?

**JG:** Mississippi was an interesting place to grow up in the forties and fifties. Not an ideal place to grow up, but certainly interesting.

**CP:** Do you want to expand on that at all?

**JG:** Well, it was not a liberal atmosphere. My parents were not nearly as conservative as most Mississippians, and we left and went to the relatively liberal atmosphere of north central Texas when I was a senior in high school.

**CP:** Okay. Did you have any siblings?

**JG:** I had two sisters.

**CP:** So you lost sight in one eye at the age of two, is that correct?

**JG:** Well, I was actually born with no sight in one eye.

**CP:** In one eye?

**JG:** Yeah.

**CP:** And what was the explanation of that?

**JG:** I think now, it's certainly clear that I just had a congenitally malformed eye.

**CP:** Uh-huh. So, how did that impact you growing up?

**JG:** Well, having one eye didn't seem to make that much difference. The problem was that I couldn't see that well out of the other eye, either. And that had more of an impact. I had a fairly restrictive field of vision. Had probably 20-30 to 20-40 vision, corrected, but I could not see the black board, even when I was sitting in the front row. So I was effectively blind in many ways growing up; I just didn't know it.

**CP:** You were a good student though?

**JG:** I was a good student, yeah.

**CP:** How did you compensate for these sorts of things?

**JG:** Oh, I listened a lot. And if necessary, I would ask the teacher afterward what was on the board. Some of the time—when I was in grade school the way the test were given is the teacher would write the test on the board, and the students would then work it out and turn it in. And I asked the teacher if she would let me write it on the board, and then I would have the piece of paper, and I could write it on the board fast enough that I could sit down with the piece of paper and still get the test done in time. That worked out okay.

**CP:** What kinds of things interested you as a boy?

**JG:** I was a photographer, actually a pretty good photographer. Even was a professional photographer for a while. I liked to read. I was a good student. I was not very athletic, because [laughs] it was a little hard to play ball when I couldn't see the ball. They'd always put me in the outfield when we had to play baseball or softball. If I saw the ball coming, I usually didn't catch it. And most people thought I was just clumsy, but in fact it was hard to do things when you couldn't see the ball. But I played tennis a little bit. I bowled a little bit. I could play pool, and that was reasonably good. And later on I learned to ski, and I was a decent skier. I wasn't really good at anything, but I enjoyed those things.

**CP:** What were your first interests in science? How did that come about?

**JG:** My father was a mathematician, so I guess I was naturally interested in science. It just never occurred to me not to be interested in science. I like math. I liked science in high school. And when I went to college, I enrolled first as an engineer because I didn't know, really, anything about—I didn't know what engineering was, and then the end of my first year I learned enough about what engineering really was, and I decided I didn't really want to be an engineer. So I changed my major to Math and Physics [0:05:00], and it was only really when I started applying to graduate schools that I made up my mind as to whether I wanted to be a physicist or a mathematician. And to tell the truth, it was a really bad experience with the Math Department that made me make a decision to go into physics, more than any other thing, which is not a good reason, but.

**CP:** Well, you did your undergraduate at Rice University.

**JG:** Yes, I did.

**CP:** What was the decision there to attend Rice?

**JG:** Well, when my parents moved to Texas, my father had a job in Arlington Junior College, and it was just assumed that I would go to Arlington Junior College, and then go off to some place like the University of Texas, or whatever, for my second two years. I just didn't think too much about it. One day, one of the students that I knew, a friend, asked me, "Well, John, have you applied to Rice?" And I said, "Hm. What's Rice?" [Laughs] And she was rather shocked and annoyed, so she told me what about Rice was, and well, that sounds pretty good, so I applied the last day for application, and got accepted. In those days, Rice had so much endowment, they did not charge any tuition. So I just had to come up with room and board, and my parents decided, well, I guess we can afford that, so I went to Rice.

**CP:** So, you started out in Engineering there, and then you switched to Math and Physics instead?

**JG:** Yes. Yes.

**CP:** Was there any mentor that you had there, or someone who influenced you in any particular direction, or did that come later on?

**JG:** Not too many. There were some people who I felt closer to than others. Interestingly, I think some of the most positive experiences in Rice were not in the sciences, but were in literature, English literature. I really did get challenged in those classes, and learned how to think, learned how to read literature more in-depth and tried to understand it. And I think that's had a major influence on my life.

**CP:** What was the environment like at Rice for you?

**JG:** Rice was a forbidding place. It was a good school; it had very good students. Year in and year out the average SATs of their students ranked at or near the top of any university of the United States. It sort of modeled itself on Cal Tech, and for some reason there was a feeling that even though its students were very good, it needed to challenge that. And it took great pride in flunking out half of the students that they admitted. I didn't like it. I was pretty unhappy at Rice.

I didn't do particularly well. I had an average that in today's scale would be sort of a high C-plus. And to tell the truth, I would probably not get admitted to graduate school at Oregon State with that average, but Rice was Rice, and there were places that understood it. I even got a scholarship to go to the University of Illinois, which was interestingly my first choice of graduate school. I went, and the University of Illinois was a much happier place. I did very well there. I felt quite at home, and that's when I learned that it was really fun to be a physicist.

**CP:** Why was it your first choice, Illinois?

**JG:** Because for some reason decided I wanted to study solid state physics, and University of Illinois was at the time regarded as at or near the top of the solid state physics universities in the world.

**CP:** Tell me how things progressed for you there academically.

**JG:** Well, I did—I did well. I was one of the better students. I wasn't the best student. I wanted to be a solid state experimental physicist despite the fact I couldn't see very well, and kept getting criticized because I couldn't scrape the [laughs] the insulation off of copper wires a lot. I did a thesis. Actually I followed another student, and did something that was kind of a take-off of what he had done, but using a—was looking at properties of impurities in liquid metals, which was high-temperature experiments. And we were getting weird results—not reproducible results. [0:10:00] The marker that we were looking at was the nuclear magnetic resonance frequency of the host metal, and it got dramatic shifts that were not reproducible, strongly temperature dependent.

And my thesis advisor was about to say, "Well, we're going to have to give up on this, because we can't do anything if we can't get reproducibility." And he went off on vacation. And while he was gone I discovered the reason for the irreproducibility. It had to do with internal oxygenation of the impurity. By eliminating the oxygen, and all of a sudden we got reproducible results with these giant temperature-dependent shifts. And he came back, and well, it was a good piece of work, very nice experimental work, and he recognized it. After that he decided I was going to be a really good student, and insisted that I get a good job afterwards, so.

**CP:** So you got a master's and a Ph.D. at Illinois?

**JG:** Yes.

**CP:** Was this work sort of the foundation of that entire swath of work?

**JG:** Well, that was my Ph.D. thesis.

**CP:** Okay.

**JG:** It was basically—the crux of my Ph.D. thesis I did in that month. I had a lot to clean up and finish, but I finished. Back in those days, you did a Ph.D. thesis in five years, and got out. And so I did.

**CP:** How would you define solid state physics, for those who might not know?

**JG:** Oh, solid state physics. One of my thesis advisors defined it: a solid is something that hurts when you kick it. [Laughs]

**CP:** [Laughs]

**JG:** But, you know, physics was sort of divided into solid state physics, nuclear physics, and elementary particle physics, at the time. And there are subdivisions of that. But solid state physics was sort of the more practical field, and I felt quite at home.

**CP:** Do you remember what attracted you to solid state physics initially?

**JG:** Well, I don't know. I just felt when I was studying the solid state physics as an undergraduate, it was something I sort of understood and could relate to. I also had a summer job in an aircraft company near my home. And one of the summers I was asked to do a report on semiconductors. And I researched semiconductors and got rather interested, and wrote a nice report. I remember the report had to do with the motion of electrons in holes. And the person I wrote it for read it, and he said, "Well, John, this is all very nice, but you've got to go back and change this. Holes don't move." [Laughs] And I was astonished, because holes are a standard thing in semiconductors, which showed me that he didn't know anything about semiconductors at all. [Laughs] So it was not the first time in my life that I discovered somebody who I thought knew everything actually knew very little.

**CP:** You said Illinois was a happier place for you. Tell me about the environment there.

**JG:** Well, Illinois was a very friendly place, where faculty members called you by your first name, and you called them by the first name, and that was really quite strange and unusual to me. It was where you expected to do well, and the faculty did their best to help you do well. At Rice, you always had the feeling they were doing their best to figure out how to flunk you out. Rice has changed nowadays, to be fair to them. They are a very different university. But this was their history. It was a cruel place when I was there, and Illinois was not. Illinois was fun; I enjoyed it. I was challenged. In the end I felt very proud when I got my Ph.D. from Illinois. I met my wife there. [Laughs] So it was very happy memories.

**CP:** Was she also a student?

**JG:** She was. She was an undergraduate student. We were married before her last year.

**CP:** So who was important to you at Illinois, as far as—I assume you had a mentor who kind of guided your research at least?

**JG:** Well, my first thesis advisor was David Lazarus. He was the professor in charge of the lab. But I was actually working with a man who was a post-doc when I started, named Peter Flynn. And Peter was a brilliant guy. He was a guy from the northern part of England, and spoke all of his life with a terrible Yorkshire accident. [0:15:00] But he was quite a brilliant physicist. And during the time that we worked together for three years, he was promoted from being a post-doc to assistant professor, and then about a month before I was to take my final exam, he was promoted to associate professor. At Illinois, assistant professors do not actually have students, or didn't at that time, so you had to have associate professorship and tenure before you could officially take on students.

So, all the time I was there, I officially had been David Lazarus' student, but in truth, Dave knew less and less about what I was doing as time went on, because he had great confidence in Pete, and Pete was my real thesis advisor. And the day that Pete got promoted to associate professor, Dave came into my lab and said, "I've got some good news for you." "What's that?" "Pete has been promoted to associate professor." I said, "That's great. He now has tenure and blah-blah-blah." And he said, "And I have some more news for you, too. I just went into the office and changed him to be your official thesis advisor. I hope you don't mind." He turned around and walked out of my lab! [Laughs]

So I claimed to have a record at Illinois, being able to graduate in only one month. [Laughs] From the time I took on my thesis and my final thesis advisor. But both of those people were very good friends, and remain very good friends. They both passed away recently, within a few months of each other. They were great people, and they both influenced me greatly.

**CP:** Did you do any teaching at Illinois?

**JG:** I was a research—sorry, teaching assistant for a year or two, and taught undergraduate labs and undergraduate quiz sections, and then became a research student, and did research after that.

**CP:** Did you take the teaching piece of it easily, or—?

**JG:** I enjoyed the teaching. But I enjoyed the research, too.

**CP:** Yeah. Well, you finished up your Ph.D. in 1966, and you took a post-doctoral year in Munich. Is that correct?

**JG:** Yeah. I went to Munich in the summer of '66, and stayed a year, and they asked me to stay on longer. I had a NATO fellowship that paid very well, $500 a month at the time, and because I was married I got an extra 50 bucks. And Germany at that time you could live like a king on 550 bucks a month. The German assistants, the graduate students who had equivalent—sorry not graduate students, post docs who had equivalent positions to mine, were making considerably less money, but were still able to live. And my advisor told me I could get a German assistantship if I wanted to stay on for another year; he'd like that. But I got an offer from the University of Pennsylvania to become an assistant professor, and that was hard to turn down, so I didn't.

**CP:** Yeah. Well, tell me about that. That's basically your first job?

**JG:** Yep. Well, I went to Pennsylvania. I was only twenty-six years old. I was really very young, and frankly just didn't know how to be a faculty member. By the time I learned, I did okay; I did a reasonable job of teaching, and a good job of research, but the bad years set in at that time. The University of Pennsylvania had over-hired. They had at one time something like 35 assistant professors. Funding began to disappear all over the place, and they just couldn't promote very many of them. So I was not promoted. And they apologized profusely, because they said, "You deserve to be promoted, and a couple of years ago, you would have been without question. But we don't have the money to do it."

So quite a few good people found themselves on the job market. And there were no jobs; it was really tough. There were relatively few really good jobs. And I applied for those that were acceptable to me, and thought if I didn't get an academic position I would try to get an industrial research position. But I wanted to stay in academia. Long story short, I got a very nice offer from Oregon State, largely because I fit into a niche. Oregon State was trying to expand its solid state physics at the time. Melvin Cutler was their best known solid state physicist, by far. [0:20:04] And the work that I had done on liquid metals for both my post-doc and graduate work really fit nicely with him, and so he felt that I would be not just an asset to the department, but really make a team. And we did. So he was my mentor, and we worked very well together. We got grants together. Eventually I branched off and began doing other things, as is expected. But we remained very close friends, and he remained my mentor for as long as he lived.

**CP:** Had you been working on liquid metals at Pennsylvania as well?

**JG:** Yes, I did. I did a number of nice experiments on liquid metals. At Illinois—I mean at Oregon State, I began to work on other materials and use other techniques. But with Mel for a while, and then by myself, I got some very nice grants. We did have some good students at Oregon State in those times, and I was fortunate to get some of the really good ones for myself, and I recruited a few more. So, the research went pretty well. I was pretty well-funded.

I began to work on materials; I began using a technique that had been practiced by a good friend of mine at Pennsylvania called perturbed angular correlation spectroscopy. Ken Krane at Oregon State also was involved in this sort of field, so it was sort of natural. I invited Bob, my friend, to come out and spend a summer—sorry, to spend a sabbatical, and he brought his PAC apparatus, and by the time he left, I was doing PAC. Bob continued to visit Oregon State in summers for many, many years. I was able to support him for summer pay among my grants. I guess we probably had the best regarded PAC solid state physics lab in the world.

PAC was largely practiced—very little in the United States, but it was quite popular in Germany. So I spent a lot of time in Germany. I'd already started in Munich, so we just became particularly honorary Germans. And to this day, we go to Germany several times a year. I find some excuse, or just get on an airplane and go. We do speak fairly decent German, my wife and I. But it largely started because of the strong professional overlap with the German physicists that didn't exist so much in this country.

**CP:** And Bob's last name is—?

**JG:** Bob Rocera [?] We are still very good friends.

**CP:** What do you remember about your first impressions of Oregon State and of Corvallis, when you first arrived?

**JG:** Well, I liked Corvallis. Oregon State was—well, it was not the same quality of university as the University of Illinois, or the University of Pennsylvania. And for a while I guess acted sort of embarrassed. And one day I realized I should stop that, because it was up to me to make Oregon State a better university. In fact, Oregon State was not a bad university, but the Physics Department was not very strong. And the sciences, at least the physical sciences, were not as strong as they could have been. And so I was instrumental in helping us organize a materials research group. And Oregon State is a much better university today than it was when I came here. And I'm certainly not solely responsible for that, by any means, but I certainly did play a role. And I'm really proud of that. So Oregon State is quite a respectable university now in the physical sciences, and certainly a good place to spend my career. I've got little regret, looking back on it.

**CP:** Well, I'm interested in knowing how the department kind of changed and evolved, and became better over the course of the time you were there. [0:24:58]

**JG:** Well, the department had sort of become an old boy's club. Everybody did a decent job of teaching—most people did a decent job of teaching, but there was very little research going on at Oregon State when I came. Mel Cutler had a good group. There were two or three others who were respected, but they didn't have any funding, and without funding, you can't fund your research students. You can't attract good students; you can't attract post-docs.

Mel understood that you had to get money, and he had funding. He was able to attract students. He was able to attract good post-docs and visiting faculty members. And when I came we became a team, and together we were more successful than either one of us would have been alone at the time. And so, we sort of pushed the department into redefining itself. And not trying to be all things to all people, but defined ourselves into three areas: solid state physics, nuclear physics and what's called AMO, atomic molecular and optical physics. We chose those three areas because those were areas in which there was some strength. And we tried to build and to hire good people into those areas.

And surprisingly, we were able to do it, even though Oregon State was not very strong. Corvallis is a very attractive place to be, and the university itself was completely respected university. It's one of the top land-grand universities in the United States. And so they could see that even though they were moving into a department that was not, at the time, ranked really high, that there was quality around it, and they could influence the quality. So we were able to attract some first-rate faculty members and surprisingly good graduate students.

We had an exchange program. We, the university had—the state of Oregon had an exchange program with the state of Baden-Wurttemberg in Germany, and so we had a lot of good German students who came over at pretty much the American graduate level, and for a number of years, they anchored the quality of our department, just because we had all of these really good German students. They attended our courses, and set a standard. Many of them stayed and did research; occasionally some would stay and do a Ph.D..

And when they did go home, many of them were able to leap-frog a lot of the German traditional years of doing this, doing that. They would not even have to get a Diplome degree; they would go back with an American master's degree, and they would be accepted into a Ph.D. program in very good places, at the Max Planck Institute in Stuttgart, several universities in Baden-Wurttemberg. It became clear that these German students who would come to Oregon State and gotten a master's degree had learned a great deal, especially of theoretical physics. And that played very well. So Oregon State had a very, very good reputation for doing a good job of training students in Germany. And it sort of filtered around, and became a good thing around the world.

**CP:** That's really interesting. So is this connection with Germany still going today, as far as you know?

**JG:** Well, the exchange program has, I guess, died. But there's still a pretty strong German connection. We get German visitors. Several faculty members in the department are German. So yeah, the exchange program is gone, but there is still a good German connection.

**CP:** You mentioned Melvin Cutler and Ken Krane. Were there other folks on campus that were important to you?

**JG:** There were several, several people who had a big influence—one person who I really appreciated. The year that I lost my sight happened—just before the beginning of school in September, early September, I went in for an operation,

which didn't exactly go the way it was expected, and I ended up losing the sight in my good eye. And I was scheduled to teach a course, sort of a senior-level course in Thermodynamics. And Cliff Fairchild told me, "Look, I've taught that course before. Don't worry about it. I'll just teach for you." [0:30:00] And he taught it for two quarters. He said, "You've got some barriers to overcome." [Laughs]

I had a major research group going at the time. I had a dozen students, post-docs, visiting faculty, etcetera, etcetera, and nobody could take those over. I had to keep on doing that. So even at times when I was in the hospital in Portland, I was on the phone talking to my students, and I would come in and look like death warmed over, I guess, for quite a few months before I regained my health. And after two quarters, the third quarter of the year, I went back to teaching. But Cliff—Cliff was just absolutely wonderful. He said, "You've got a lot of things that I can't help you with, but I can teach your course. Just don't worry about it."

**CP:** Mm. That's great. Well, we sort of got to this point. Why don't you tell me about what happened in 1988, the surgery that led to your blindness.

**JG:** Well, I had had glaucoma basically forever. And the drugs were getting to the point where they were just not working. Gradually, gradually, my vision was getting worse. And my doctor said, "Well, there's a simple operation. We can put in what amounts to a drain plug in your eye, and that will keep you from slowly going blind." And the joke is, it did.

**CP:** [Laughs]

**JG:** So I woke up blind, and because my eye just reacted very, very negatively, my doctor consulted people all over the world, few of whom had ever seen anything quite like what my eye did. But in the end, nothing could be done. The vision was gone.

So, well, I learned to use a computer with a screen reader. That was a very happy day of my life. Because I started tape recording things, and then I couldn't find it, and I had tape recordings that would go on for hours, and I wanted something in the middle, so learning to use a computer with a screen reader was great. And I could read words, and write words, but I couldn't read math. And I certainly couldn't do anything with graphics, and graphics were very important to me, because my students were producing data that was displayed graphically.

This PAC technique was a radioactive counting technique, and so we got data as a function of time as the isotope decayed. And the physics you got out by fitting that decay to a function. And this function had a horrible number of parameters, and dozens of parameters. Well, you can fit anything if you've got dozens of parameters. And there was so much garbage done in this field by people who would just take a model, any model, and you could fit it. And then they published data, and published conclusions over nonsense. So, the reason that our lab was highly regarded was because we took great pains to make sure that we checked, and double checked, and triple checked, to make sure that we were not publishing nonsense. We were getting real physics in.

But when you can't see the data, you can't see the little nuances that tell you, "Oh, this fit looks pretty good, but it's not good enough." And eventually I just had to give up doing that kind of physics because I couldn't see the data. So, I started working on technologies for graphical information, accessibility to graphical information, and accessibility to math. The National Sight Foundation, which had just gotten into—had just realized there was a serious problem with accessibility of science to the people who were blind, just adopted me. I walked into the NSF to see my program manager, because I was doing a lot of NSF-sponsored research. A lot of people came gathering around. They were not interested in talking about research; they were interested in finding out how the hell a blind physicist can operate!

So we talked a lot, and I said, sort of, well, I had some ideas on how to write math so that it was easier, because blind people were having trouble reading math in braille. [0:35:00] And so there was a program manager in Computer Science who was walking by at the time, and he said, "What do you mean? Tell me about it." And I explained it to him, and he said, "I'm going to send you a check for $40,000. I'd like you to develop that." [Laughs] And I did, and I brought it in the next year and said, "Here it is. But I'm a physicist; I don't want to do this. Somebody else has got to take this and commercialize it." And he said, "Look. If you don't do it, it won't happen." And he said, "Just write me a proposal for a reasonable amount of money, and I will get the money for you."

So for several years, I got all the money I needed from the NSF. Then they started a program on disabilities, and pretty soon there are a lot of other pigs at the trough, as I called it, and it became harder and harder to get funding. And I sort of graduated from doing research into doing development, because as we learn how to do things, you know, we wanted to get it to market. And the NSF referees turned up their nose, said, "This isn't research. This is development." And I said, "Yeah, that's what I'm supposed to be doing." [Laughs] But they wouldn't fund it, so I got quite frustrated. The last few years at the university I started a company, and I realized, oh, there's such a thing as SBIR grants, and that's for development! So I started writing proposals for the company and was quite successful in getting money to develop technologies for the company, and the company has been quite successful.

**CP:** You mentioned that you were leading a big graduate student group when you went blind. How did that—I mean, eventually, over the course of time, your research shifted, obviously. But how did you manage that group in the interim?

**JG:** I can't even tell you. I managed it by managing it. I did a lot of talking. I would talk to the students; I always did. They would explain to me as best they could. What I did: my friend Bob Rocera? I would fax pictures—we didn't have email in those days—of the data to him, and Bob would be my eyes to try to examine the data. And I had other friends who did PAC, so I used a lot of other people to double check on what the students were doing. Students would do the fittings, and say, "I think I've got a good fit," but they were not as experienced as the old gray beards, and they often made mistakes. And we had to find those mistakes before we got published, and sometimes we didn't. We published some things that were—well, I won't say they were bad results, but they were not as good as they could have been.

The funding kept up for quite a few years, but eventually—it's kind of funny. There was a period of time; I was getting most of my funding from the Department of Energy at the time, and the Department of Energy was mandated by Congress to do a review of the research programs they were funding for quality, because there was a lot of concern in Congress that the DOE was funding things that were not as high quality as they could be, because they were spending a lot of money funding things in their own labs. And I think the suspicion was partly true that they were not funding things—they were not spending all their money wisely. So they were mandated to have a review of every research they funded. They had review panels.

The review panels were instructed to review these and don't use grade inflation. There was a category called "world-class," and they said, "We don't want more than one or two research programs out of the few hundred that were examined by these various groups; we don't want more than that, just one, or two, or three world-class. You categorize it as very good, good, etcetera, etcetera." My research program was world-class. This was well after I went blind. And I was pretty proud of that.

The next year, my funding was cancelled. And the reviewers were pretty blunt. They said, "A blind person can't do this." And they were partly right, but they were partly wrong as well. Because I was using—the things that I couldn't do, I was getting sighted—quality, sighted people help me do. But by that time, I was spending an awful lot of time doing research [0:40:03], accessibility research, NSF-funded, so it didn't hurt as much as it could have. But I felt sort of betrayed by that. But that's the way it is.

**CP:** Were you a singular figure? I mean, do you know of anybody else that was in the same position as you at that point in time? A physicist trying to do work without sight?

**JG:** There are a handful of blind physicists in the world. [Sighs] All of them are people who were blind in university, and they just didn't have the opportunities that I had, so they never reached the level of success in research that I did. Some of them became quite good teachers. Funny, funny—I actually don't know any of them personally. Well, that's not true, actually. I do know a few. [Laughs] Retract, strongly.

One of my best friends in the world today is a blind Japanese physicist who is a teacher in a small college near Tokyo, so. But he has not really—he's not a researcher; doesn't do research in physics. He's a bright guy, and good teacher. I did meet some other scientists who were blind. One of them was Professor Norberto Salinas, who is a blind mathematician at the University of Kansas, who was very well known, and quite a good mathematician, and well beyond my ability to understand abstract algebra. I think that he and I became sort of friends. We developed a braille code together, as an alternative to one, a unified braille code that we both thought was a disaster, and I think we were right. He died quite a number of years ago, and I sort of miss him. And I do know some—quite a number of other blind scientists, actually.

**CP:** Yeah. You continue to do some teaching as well, didn't you?

**JG:** Yeah, I did teaching. When the NSF was really funding my research very strongly, they insisted that I devote half my time to the research, and they paid half my salary. And so I was only teaching half of the teaching mode. And I very nearly had a nervous breakdown, simply because I couldn't get everything done. And so the department chairman at the time, Ken Krane, was involved in trying to work out a matrix of what university faculty actually do, and that matrix revealed that classroom teaching is not even fifty percent of what most research faculty in the Sciences and Engineering do. There are other responsibilities. They do a lot of teaching, but their teaching is more one on one, graduate teaching. And they do committee things, service, etcetera.

And so it suddenly became clear why I was about to have a nervous breakdown, because I was not working half-time for the university, for the Physics Department. I was working about 80 percent of a normal load, and getting paid 50 percent, and getting 50 percent for the other. And a normal load was like 80 hours a week. And so it was turning into working 120 hours a week, and couldn't do it. So, Ken said, "Well. You can't give up this, you can't give up this, you can't give up this. So you're going to have to give up classroom teaching."

And so the last three or four years at Oregon State, I did no classroom teaching, which sounds kind of strange. What does teaching do? Teaching is classroom teaching, right? No, it's not; it's a lot more than that. And that was something other people could do. Nobody could do the teaching of my research students. Nobody could do the specialized committee assignments, and nobody could do certainly the research on blindness that I was doing. So I reduced my workload from 120 hours a week to 80 hours a week, and I was pretty happy. [Laughs]

**CP:** [Laughs] How had you been managing the classroom?

**JG:** I would lecture, and I would write on a board. And I would occasionally make sure—I would ask the students, "Now, you tell me if I'm writing too close to what I wrote before." [0:45:01] I was not efficient at writing. I'd make a lot of space, because I didn't want to overwrite what I had just written. And then I would erase the board and rewrite it again. And that worked okay. I did try, at one time, using my computer and just developing equations on my computer, but it was way, way too slow, and the output was non-standard, and the students didn't understand what I was doing, so I gave that up pretty quickly.

I went through one period where I would give the students notes on what I was doing, and they would write on the notes, and what would happen was that it would work well for the good students, for like, say, a third of the students in the class. But for the other two-thirds, it sort of gave them an excuse to be intellectually lazy, and they did worse by having my notes. And it's something strange about human nature, I guess. I was disappointed that that didn't work out better.

But, I wrote on the board. And some of the classes I taught, especially the advance graduate classes, were things that actually, even before I lost my sight, I would let the students themselves do a lot of the classroom work. I would assign them little projects. "You teach this section, you teach that section, you teach the other section." And I'd spend a lot of time with each one of these students, helping them understand what they were supposed to do, helping develop it. Because there's nothing that teaches you better than having to teach somebody else.

This worked out very, very well. And the students liked it. They felt they got something out of it. Some of the students were better lecturers than others. We'd eventually get complaints, "X, Y, Z is doing a good job, but Mr. Z over there is being lazy." And Mr. Z was being lazy. He was one of the ones who didn't come in to see me to help him develop it, so he just got up and extemporaneously put nonsense on the board. So in that case, the unfortunate thing is that he was hurting himself, but he was hurting the others as well. And so I had to start enforcing some other kinds of standards. And this was pretty much graduate level work, but. So it was a lot of innovation.

Another thing that I started doing very early on was giving untimed exams, because I realized that by doing timed exams, you were really hurting a lot of students who had disabilities, like dyslexia. They could go in and get tested, and then get extra time on exams, and other students would feel, oh, well, they're cheating, because they got tested, and their doctor said they're dyslexic, so now they get double time on this exam. I said, "Well, I'm tired of this. You can all have double time on the exam. My exams are not based on fast you can do something. They're based on how well you can

do something." And the interesting thing was that the results of the exams didn't change qualitatively, and most of the students finished in what would have been the allotted time, anyway. But a few of them remained and worked.

And a few of them I'm sure did better, because they had enough time. And these were people who were not diagnosed as having learning disabilities or whatever, but they did. They just didn't know it. And when I was growing up, I was blind and didn't know it. Well, they were dyslexic and didn't know it. But they were able to do the exams without the pressure of time, and did a very good job. So that was something—and I've advocated for that ever since, is give exams that require people to show what they know, and not have fast thinking to do it. I've always felt that if I was going to hire an engineer or a physicist, or something, I would rather hire somebody who can do it right than somebody who can do it fast. Doing it right is—if we're doing it right and doing it fast is great, but doing it right is much more important than doing it fast.

**CP:** Tell me about learning to cope with blindness in everyday life.

**JG:** Well, the things that you think about—you can't drive a car. That does not keep you getting point A to point B. [0:50:01] You just have people to drive you, or ride the bus, or you are to walk with your cane, etcetera, etcetera. It's a pain not being able to drive a car, but it didn't really change my life very much. It's the things you don't think about that are—that are hard things. I don't think—well, nobody thinks, but how do you know how much toothpaste to put on the tube? How do you find the soap when you drop it in the shower? Those are the problems you face! [Laughs] You don't think about that. And people ask, "What about television? Don't you miss television?" Well, I didn't watch television when I could see. I don't miss television at all. And when I do watch television, occasionally I will have to ask somebody, my wife usually, what's going on. But most of the time I can keep up with the action just from the dialogue.

**CP:** Mm-hm.

**JG:** I get irritated watching sporting events, because there are sportscasters that tell you what's going on, and there are others that talk about So-and-so and So-and-so, whose wife has pneumonia, etcetera, ignoring what's going on the field, because they know you're looking at the thing; you're keeping up what's going on on the field. So there's some sportscasters that I can't stand listening to, because they don't tell me what's going on.

**CP:** [Laughs] Yeah. So, you learned to get around with a cane?

**JG:** Yeah, I did. And I'm reasonably competent with a cane.

**CP:** How about braille?

**JG:** Braille I learned, but I am not—I'm very slow. Now, I can read braille like I can play the piano. I know where the keys are on the piano, and I could, when I could see, read music, so I could play a note, but playing a note and then stopping, and then putting your fingers, and then playing another note—that's not playing a piano. And that's the way I read braille. I just read braille sort of one character at a time. And that's not very useful for really getting information.

I use a screen reader, and it speaks to me, and I'm very efficient, talking reasonably fast. So I don't need braille much, but there are things that would be a whole lot easier for me to do if I did read braille, for example, reading math, trying to look at tables, trying to look at matrices, things like that. Any tables, any structured data, are difficult to read in audio, and it would be so much easier to be able to read with a braille display on my computer. But, my braille is not good enough to do that, so it's not—it's not faster for me.

**CP:** Did you sense that people that you had known started to treat you differently after you lost your sight?

**JG:** Well, there was a period of time when there were a lot of people that sort of avoided me, because they just didn't know what to say. And it was easier to avoid me than it was to—to try figure out how—they don't want to hurt my feelings; they don't know what to say. Most of my good friends? Pfft, I'm me, right? So, it wasn't a big problem. And after a while it became no problem.

**CP:** Well, you talked about the switch to accessibility research and development in your professional world. I'm interested in knowing what sorts of resources existed at the time for academics who had lost their sight, and then how you started to specifically address the lack that existed there?

**JG:** Well, there weren't resources to deal with. The university partly funded a helper for me. Started off just hiring an undergraduate to come in and read to me for an hour a day, but as time went it became clear that I needed more than that. I needed, really, a full-time assistant. I needed a guy who could edit my papers that I was writing, and could just be an assistant. I just had an awful lot to be done that I couldn't do, and I was being not very efficient, because the student was just not able to do that much. So I convinced my program manager on my grants to fund half of a research assistant for the grant, and the university funded the other half. So the university did come up with a fair amount of money to hire this guy, and it was amazing. [0:55:02] I put an ad in a couple of local papers and then I got a hundred applications, including a couple from people who had Ph.D.s in physics.

And I ended up not hiring the Ph.D.s in physics; I ended up hiring a man who had a Bachelor's Degree in physics who was very, very good, and he worked for me for quite a number of years, eventually got a much better job. He cried when he told me he was going to quit. But at the time I was in much better shape, and I could get another assistant. Funny, I don't have one here at ViewPlus. But the type of work I do, I need one less. And you know, a lot of things I couldn't do then I can do for myself now—lots of things online that had to be read to me then.

**CP:** So there weren't any real technologies at that point either that were useful to you?

**JG:** Oh, yeah. I had a DOS computer with a screen reader, and it was marvelous. I could read words. People would give me a Word file, or a WordPerfect file, or a text file, and I could read it. Or I could write one. I could write things for my students to pass out. And if a student wanted to write something, they could give it to me on a big floppy disk; this was before the days of email. Then when email became—became popular, learned to use email. I know that my last sabbatical, in 1993-‘94, I went to Konstanz, Germany, was when I really started using email. And I learned what academics now know, is that the sabbatical is no longer getting away from home, because I spent most of my time there doing work that I would—keeping up with the research at home, and the minority of my time doing sabbatical work. So, the influence of email. [Laughs]

**CP:** So what did you start to specifically address in the accessibility work?

**JG:** Well, accessibility to math and science. So, we began to develop technologies. Other people have done math accessibility; I've also done some. Quite recently I've written a very nice interface to FML that I think is going to become very popular. And I wrote that myself. I'm not much of a software engineer, but I managed to do that. But it was really graphics. I wanted to find a way so that when somebody publishes something in an electronic format, for example, on the web, or an electronic book, that the graphic can be automatically accessible. Because the words are. And the math is, if the math is in FML, and it can simply be read by a blind person. Why not the graphics?

I don't think anybody else in the universe had the imagination to imagine a way that graphical information could be accessible to a blind person without somebody else doing it. And I think even today, there are very few people who do. But we set about trying to make technologies that would do this. We're a long way from—from reaching that goal, but now we know that there's technologies that can make it possible. They can make it possible for people, reasonably straightforwardly, to publish graphical information in a form that is automatically accessible to a blind person.

Automatically accessible by our method means that you can read a description, that the graphic has internal to it some metadata that has a description of the graphic, which is enough information a lot of the time; you don't need any more. A lot of the time, it isn't. For example, there's no way you can write meta-information you can read that really tells you what the map of the United States looks like. You need to be able to feel it. So in that case, you push a button, and you print a copy to make a tactile copy, and you put it down, and then you start feeling it, and it will say Washington, Oregon, California. And depending on how it was made, and who made it, it may have lots more information in it. We have some maps, for example, that if you double tap on California, it will say, "California was the thirty-first state into the Union at such-and-such a time. Its estimated population is something or other." [1:00:01]

But the point is that if that document, electronic document, is published, I can access it without any help from anybody else, because everything is self-contained. And that's what we started working on, and it took baby steps, gradual steps, and many, many research projects. But we're at a point now where we—we have technologies that allow people to take a graphic and "make it accessible," easily, and for a student, for example, a college student, to be able to take that and read it easily. We're still not at a point where things are being published with stuff being accessible, but we are getting to the

point where there is some software that will allow you to download from your authoring application to make it accessible information. So that's been my project, and it's still not finished, but it's getting closer.

**CP:** Did you attract any graduate students who were blind?

**JG:** I did. One of the German exchange students who happens to be Iranian came to Oregon State, and he stayed to work with me, and did a master's degree in Computer Science. And I became an adjunct member of the Computer Science Department and supervised his thesis. And he's stayed in the United States, and he's become quite a well known person in the field. He was the assistant director of the Access Technology Group at the University of Illinois until recently, and he's moved to the University of Washington for a nice position.

A young man came from Pakistan, because Pakistanis would not allow him to study physics because he was blind. He took a little bit of physics at the University of Pakistan. They told him, "You can't get a degree here." And he chose to come to Oregon State because he'd heard of me and my group, and felt that for whatever reason, he would be more successful. And he came at a good time, because we had a little program that could be used to read and write math. And it's still being used by this guy today, and by a few other people. We've got better ones now. But the faculty at Oregon State, many of them learned to write in this language. It's just a linear way of writing math, and it's pretty straight forward. And even if they didn't write it, they could read it, and he could work on his exams and turn it in. He learned to read tactile graphics.

He was very, very, very bright. He came over, and his mother was not a poor lady; she paid his tuition. His father had passed away. She paid his tuition at Oregon State for one year, and then the Oregon State offered him a scholarship, because he had—he was doing brilliantly in his courses. And he remained on scholarship only three years. He finished his bachelor's degree in Physics. And the faculty members in physics would come up to me and say, "John, where can we get more blind students?" [Laughs]

**CP:** [Laughs]

**JG:** He went to Harvard to do his doctorate work. He's actually finishing up at Harvard at the present time, I believe, in some very exotic field of theoretical astrophysics. So, we did have at least a couple that we're very proud of.

**CP:** Tell me about the founding of the Science Access Project in 1990.

**JG:** Well, just one day I decided to call it that, because I just have a place for my research to be, and we needed a website. And I guess we didn't have a website in 1990, but the web was invented about 1993. I first heard of it when I came back from sabbatical in Germany in 1994, to a big disabilities meeting at that time in Southern California. Everybody was talking about the World Wide Web. What's that? So they explained it to me, and I came home, and we put up a website. We were one of the first university research groups to have a website. But it was just [1:05:01], one day I was having a meeting with the group, and I said, "We've got to call this group something." So, we called it the Science Access Project, and that was it.

**CP:** Was that the germ of what became ViewPlus?

**JG:** Well, ViewPlus was founded because one of the Science Access Project students discovered a high resolution embossing technology, which was one of the missing technologies. We needed something that was high resolution, better than the braille embossers at the time, to make high resolution tactile graphics, one of several technologies that we needed, but it was—it was the one that we just couldn't find. And one day, he came up with a brilliant idea. And he wrote it up for the Collegiate Invention of the Year award that year, rather hurriedly, just the day before the deadline, and sent it in. And I was in Austria, at a meeting, when I got an email from him, or her—yeah, it must have been an email—that just said, "We won!" So, we got—that was a great thing. First Prize was an all-expenses paid trip to Akron, Ohio. [Laughs]

**CP:** [Laughs]

**JG:** The joke is, second prize was two all-expense trips! [Laughs] But he won, and as his advisor I also won; that was very nice. We filed for a patent; Oregon State University agreed to patent it. Big deal! We paid it all. Oregon State University because it was done there, got the patent, and has gotten lots of royalties from it. And that was the genesis for

forming ViewPlus. I offered the invention to Braille embosser companies; there are a couple of them. And I said, "We've got our new technology, high resolution embossing. You make really neat tactile graphics this way." "No, I don't see much future for that." They weren't interested. So I realized it was either I form my own company or have it die. So we formed our own company, and well, those companies are sorry they didn't take me up on that offer now.

**CP:** Yeah. And the student was Peter Langner?

**JG:** Yes.

**CP:** Okay. Well, tell me about the early days of ViewPlus, getting it started.

**JG:** Well, we made lots and lots of mistakes. It was founded in 1996, when this patent was—was issued. And we had to form an agreement with Oregon State, and a post-doc of mine and Peter—eventually, we sort of reformed it, so that they could take it over, because I was a professor and I wasn't going to run a company. So they said, "Okay." So they took it over and convinced me they could get funding, and they could do this, and they could that. Well, they couldn't. And so they started telling me, "Well, you're going to have to give this—we need half a million dollars. You're going to have to come up with it." I said, "Just a minute! Wait a minute. You are in control of the company, and you want me to give half a million dollars?" "Yeah." I said, "No, it's not going to work that way."

So my wife and I then took control of the company back from them, and then my mother invested $100,000, and we went out and found friends and family who invested more, and we scraped out. In the meantime, Peter had built a prototype, and we actually sold that prototype during that first year, which was 1999, to a friend, on the agreement that we'd eventually buy it back. And the next year, we had developed something that was a lot more robust, and we began selling them in the year 2000. Things went on from there. We improved it some more. The company grew fairly steadily.

It was about 2003 where we reached the point of break even; until 2003, we still had to keep investing in the company. From 2003 on, it's pretty much been self-sufficient. We had not actually tried to make a profit, because we reinvest the money into the company. The time has now come that we need to start making enough of a profit that we can pay back those initial people who invested money in the company. And will hopefully be doing that. That's my goal. [1:10:01]

**CP:** What point did this facility come into being, that we're in right now?

**JG:** In 2003 we were in the Business Enterprise Center, which is downtown where the Goodwill Industries store is now. Goodwill Industries had bought that site. When we moved in in 1999, we were already told that the lease would run out in 2003. By 2003 the company had gotten to be a decent size company, and we looked around, and moved into the building next door to this one, which is a bit smaller, but it was just about perfect for us then. But within a year or two we'd outgrown that building, so we moved our manufacturing plant into this building, which was about 80 percent vacant.

The Business Enterprise Center subsequently moved into this building, and Rich Carone bought it. When the Business Center Enterprise Center moved out of this building, Rich came to us and made us an offer we couldn't refuse, essentially to remodel this building to meet our needs, and charge no more than we were paying already. So we did that, and moved into this building. It's been a very good building for us. It's actually a little too big for us, but it's not that much too big. And as we grow, we will be happy that we have that space.

**CP:** And all your manufacturing is done here?

**JG:** Yes. Yes.

**CP:** You have a facility in Germany, too, I understand?

**JG:** We have an office in Germany that's mostly a service center that provides support. We will be beginning to do European sales from that, but at the moment it's mostly just providing a focus so that our European dealers have a place to get support, and if something breaks or whatever, they can send it there and get fixed.

**CP:** OSU is now doing what it can to try to spin off businesses that are cultivated from research done at OSU. I don't presume that anything like that existed for you.

**JG:** No. No, no. Instead of being able to invest in businesses, OSU had the thought, "Oh, if we're going to license something, it's to make money." So they were very, very much a money making, money grubbing enterprise at the time. So it cost us a lot of money that we paid to Oregon State to form this company. It was really kind of ridiculous. And Oregon State has made quite a bit of money from us, licensing, paying our royalties to them.

**CP:** Uh-huh. So you had to essentially buy the idea from OSU? Am I understanding that?

**JG:** Well, they patented it. Of course, I paid for the patent, all the expenses, all the patent expenses, and then we turned around and had to license it from them. Is this fair? Not really, but that's the way it works.

**CP:** Yeah.

**JG:** So like Rice, Oregon State has improved. Now they actually do things to assist the company, instead of standing in its way, to commercialize.

**CP:** Well, what have been some of the benchmarks in ViewPlus' growth, since it's founding, for you?

**JG:** Oh, I suppose 1999 was a benchmark. That's when Carol and I decided we are going to have to take over the company and somehow make it run. We had no idea, but it was either that or just give it up and let it die. It was those, only two choices. So we took it over, and we were very fortunate to be able to hire Art Neeley, a wonderful guy, as a first employee. And he had retired from Oregon State, so he could work for us for no money. We paid him equity, and now he's a major owner of the company. He retired here, too.

And a young man who had not realized that he was going to graduate in applied physics, so he neglected to apply to graduate school, and suddenly discovered that he was actually in the kind of courses to graduate. And he came to me wanting a job, and I said, "Well, yeah, but if you're going to apply to graduate school next year, it's not going to work, because it's going to take you a year to really learn how to do anything." So he committed to staying two years, and he did. He stayed three years, and then applied to graduate school and went off. That young man is now an assistant professor at the University of Oregon, and has done well.

So, benchmarks were 1999, really turning it into a company, and somehow managing to run it, and I don't know how we did it. [1:15:00] Neither of us knew anything about running companies. Another benchmark was 2003, when we did break even. We went through some trouble periods when my son Jeff was CEO, and that didn't work, and the company had a major setback. He is now out of the company. I think next benchmark was probably last year, when we kind of turned it around, and now have a new CEO, Kurt Thiessen, who's doing a good job. Really, the company is looking pretty strong, so I guess 2013-'14 is another benchmark.

**CP:** Tell me about the role that your wife has played in the company.

**JG:** She is the person that made it work. We had to have somebody who could do bookkeeping, and she did bookkeeping. We needed somebody. We were trying to get a contract manufacturer to build it for us, because we knew we didn't know anything about manufacturing, and what we discovered was that they didn't, either. They just had really low quality manufacturing. So we decided, you know, we don't know that much about manufacturing, but we're going to learn, and turn out quality products. And so for a couple of years we manufactured, and we would have manufacturing day. So I would answer the phones—this is in the Business Enterprise Center. Everybody else in the company would go build embossers! [Laughs] Including Caroline, who learned how to handle a screwdriver.

She was sort of the office manager, and became, eventually became CFO, in practice. In fact, we gave her the title of CFO for a while. She still sort of—to this day, she sort of is working sort of odds and ends of the Finance Department, and odds and ends in HR. And she accompanies me, because I do a lot of traveling, and we really travel as a team. So she's—the company wouldn't exist without her. Because I was just—I'm not a detail-oriented person, to start with. Second of all, as a blind person, most of the things that needed to be done, I couldn't do. So, if she hadn't been around and hadn't been willing to do it, and capable of doing it, I don't think ViewPlus would even exist. We probably wouldn't have made the decision to save the company in the first place.

**CP:** What are some of the signature or flagship products, or product lines, that ViewPlus is responsible for?

**JG:** Well, we wanted to make something that made high resolution tactile graphics, and we did. We did not make very good braille in the beginning, and that became important, because very few people actually needed to buy a tactile graphics embosser. Even though they needed some tactile graphics, they needed to get braille out. And so over time, we began to improve the braille that came out of it. And now, it turns out very good braille and very good tactile graphics.

I understood for a long time that it was important to be able to print words along with the braille because kids in mainstream life, kids in mainstream classrooms, get braille, and if there's something they can't read, there's no help. If they ink words wrong there, they could get the kid next to them, a peer, or the teacher, or a parent would be able to read it to them, and tell them, "Well, it says so-and-so," even if they couldn't read braille, or if the braille had errors in it, so they couldn't read it, and they couldn't understand what the content is.

And we had an opportunity with Hewlett Packard to leverage their OEM color printer into something that would print color. And we were ourselves a little surprised at how popular that was. It became, very quickly, our most popular machine, and is still either our most popular, or tied closely to being our most popular machine, today. It's been on the market for a long time, since about 2005. So color ink is important. And it's also allowed us to branch into other things. [1:20:00]

These graphics are proving to be very, very useful to students with vision, but not very good vision, low vision students that don't read braille. They don't necessarily need the audio tactile graphics; they can see. But having something that's well, big, and embossed, so that they can use their eyes and use their fingers both, turns out to be very useful, and it's a much larger field than blindness. And also works the same way for dyslexic. Even autistic students are finding useful. So the color embossing has turned out to be important. So that's a benchmark.

Our audio tactile graphics is a benchmark. We have not been able to make it easy enough to use to really be the revolution that we believe it eventually will be, so we're trying to improve the usability. But still, we'll look back on that someday as a major, major invention of how blind people can access complex, high-quality graphics.

**CP:** So what do you see as long ahead for you, and for the company?

**JG:** Well, I want to—and Carol, my wife—want to turn over the running of the company to other people. It's not that we want to stop working for the company. I certainly want to continue to be involved in product development, product improvement, because it's fun and I enjoy doing it. But I don't want to be involved in day-to-day decisions. That's what we have a new CEO for, and new team leadership, and rebuilding our leadership team. I want the company to start to prosper and to make a lot of money, because we could do better things for blind people and for people with print disabilities, and we can also repay our stockholders. I did not start this company to make money for myself, and I think it's a good thing, because we've put a lot of money into the company and gotten none out. But, our heirs presumably would want to see some money coming from this. So, I'd like the company to prosper, and I would like to have a hand in it, but I don't feel that I want to continue to run the tiller anymore.

**CP:** Yeah. Well, my last question for you is: as you think back on your life and your career, what are some points of pride that come up for you? Things you're most proud of?

**JG:** Actually, I think the hardest time for me—surprise a lot of people—was my freshman year at Rice. I was always a good student in high school, but I went to high schools that were not very good. And I got to Rice and I discovered that there were students there who knew a lot, and I didn't know. I always was very good in math, but when I took the math placement exam, I scored maybe in the middle. And this included students in humanities, and liberal arts and architecture, and all sorts of things, not just science and engineering. And I was shocked!

Then I discovered that we started off with calculus, and I didn't even really know algebra; I'd never taken linear algebra. I was like being thrown in front of a truck. And I struggled and worked, and at the end of that year—most of the year I wondered whether I would survive at Rice, and at the end of that year, I began to feel like I could survive. I never did very well; never made good marks. But I survived it, and that was—I guess I'm proud of that.

And learning to cope with blindness, of course, is something that—you don't really have a lot of choice, but there are people who just don't, who just shrink into a shell. And I really feel sorry for them, because you just, you either learn to cope, or stop living. And I guess I'm proud of ViewPlus.

**CP:** Yeah. Well, Dr. Gardner, thank you very much for sharing about your life and the development of your company. And the best of luck with your future.

**JG:** Thank you.

[1:24:57]