

ORAL HISTORY TRANSCRIPT- PATRICK GREEN

Narrator: Patrick Green (PG)
Interviewer: Melanie English (ME)
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Two audio files: First file, 67 minutes, 46 seconds; Second file, 3 minutes, 9 seconds

Time Code	Transcription
	Audio File 1, 67 minutes, 46 seconds
0:00 - Introduction	ME: This is an oral history interview for the Washington County History Museum with Patrick Green at Planar Systems on February 24, 2012. We'll begin by just asking you to state your full name.
0:26 - Narrator's name, birth, childhood	PG: My name is Patrick J. Green. ME: And, when were you born? PG: I was born April 12, 1951, well into the last century. ME: And where were you born at? PG: I was born in Iowa City, Iowa. I lived there until I was fifteen and my father was transferred with his business. We came to Portland. I've lived in this area ever since.
0:45- Early interest in science	ME: When did you first become interested in science and technology? PG: When I was a little kid. I mean, I loved to go and go off. When I lived in Iowa we always lived in towns, we'd call them. They were always the size of Eugene or Corvallis. But I'd go out and capture ants or bees or spiders and put them in jars ... most of the time let them go, if they didn't die. I'd go and get frogs and snakes and that sort of thing. And I always read about astronomy and whales and birds. And I don't know, it just always appealed to me to know about the natural world and then also how things work. I tried to take stuff apart I didn't always put it back together. I don't know where it came from exactly but I just always like to know how things work and know about how to categorize stuff and that holds true to the... and build things. I think that's a common trait among scientists and

2:00 - Education	<p>engineers. Most people start pretty early doing that sort of thing.</p> <p>ME: Where did you attend college?</p> <p>PG: I was planning on going away to college, but from, but due to some family constraint I ended up going to Portland State and got a bachelor's degree in chemistry and then stayed and got a Master's degree in chemistry. And did some interesting research. My master's degree got five papers published and learned a lot.</p>
2:28 - Slide rules, calculators, and early computers	<p>ME: What was the field of science and technology like then?</p> <p>PG: Well, that's an interesting question, when I used a slide rule and there were computers I used were driven by card cardboard punch cards basically and you loaded them in the morning and got your output in the afternoon on long rolls of paper. It was really clunky just incredibly crude by today's standards. Nothing was digital. Everything was paper based.</p>
3:14 - Calculators	<p>All the data taking was paper based. Two things come to mind related to this. When I was a graduate student in 1973 the first year I taught labs in chemistry for freshman labs the first lab we always taught a slide rule drill and one person had this little thing in their hand that they paid a hundred and fifty dollars for that would multiply divide add subtract and do square roots; a calculator. And that was kind of unique and they didn't need to do the slide rule drill. Because slide rules, you had to learn how to use them. They're better than long hand on paper but they're kind of clunky to use. The next year in 1974, it was just the reverse calculators had gone below maybe fifty dollars maybe seventy dollars and just rather than learn and have to deal with how to do a slide rule everybody but one person had a calculator. So it was just exactly the inverse of the prior year. And we all pretty much threw slide rules away, and the other thing that happened is another graduate student bought a Hewlett Packard 35 calculator which had an incredible capability. It could to logarithmic calculations it could do all the trig functions, it could do exponentials, all the kind of stuff you did on paper with logarithms; looking up the values and in a book. And so calculations were taking several hours you could do in fifteen minutes. So</p>

5:28 -
Computers

this one guy, he was a veteran so he had a little more money than the rest of us graduate students, he paid four hundred dollars for this HP 35 and I don't think he had it very much from the time we all borrowed it we borrowed it overnight to do stuff. Anyway it was quite remarkable. And just one more thing- after I finished my graduate studies I worked on an EPA grant at Portland State and we were doing these calculations on these Hewlett Packard hand-held calculators which was just wonderful, but when you have a lot of data you had to enter in keys, there was no way to print stuff out. So Tektronix came up with a computer called the 4051 which was certainly one of the first desk top scientific computers and it was one of the first desk computers period for scientific stuff. And it was just incredible and it revolutionized what we were doing taking data and... This was in the late seventies I think we got this in about seventy-seven or so and since then it's just been a steady march of computer from having one computer to having everybody have a big clunky tower computer. I remember when I had my first laptop and I was able to take stuff home and sit on my deck away from everything and do stuff on my laptop. And the other thing we always had admins, you know, at the time they were called secretaries to do most all the typing of you know if you had to write a report you would write it long hand and give it to the admin and there were a lot more of these secretaries around that were just doing typing of reports and such and of course they were filed as paper. In maybe the late eighties that started to go away and pretty much we were all responsible for our own stuff and writing our own reports and in the early going that was really difficult software was really not all that streamlined. Then I got a Macintosh, actually, and that made it a lot easier. Right now the admins that we have, they don't do any of this stuff to speak of, so. Ok.

ME: So, were there a lot of computers in your department in the seventies?

PG: No, in fact it's almost laughable. There was a calculator, a mechanical calculator, over in the math department that if we had a bunch of calculations we would go to use that prior to getting all these calculators.

9:09 –
Personal
computers,
Macintosh
versus PC

And I think it was in seventy-four, thereabouts anyway my wife bought me a scientific calculator similar to the HP but it was Texas Instruments and it cost one hundred and fifty dollars and it would do all these same kind of calculations and it pretty much became a requirement for all of the graduate students and then later for students. And so then everybody came and that was just part of your school supplies in the mid-seventies was to go out and buy a calculator depending on and the complexity was depended on what requirement you had and that took the onus off of the university to some extent but for doing big calculations and modeling stuff they still had main frame computers, you know, they had the footprint of a house just incredible by today's standards and then they just started getting smaller and you know a real step forward with these powerful computers got to be the size of a refrigerator but they would pale in comparison to my smart phone and my iPhone. But the computer power what I could do with my iPhone would run rings around something the size of a refrigerator. It's just incredible.

ME: Do you remember when you got your first personal computer at home and what that was?

PG: Yes, I bought a Macintosh for my family. That was probably... That's a good question. I built a single board computer. I'm not an electronics engineer but I know how to solder and so I had a friend who was selling these so I built a single board computer in 1979 and it wasn't very useful; I'd just play around with it. But we had an Apple computer in the early eighties at my house and they were incredible. And it became an expectation I'd say, like I'd say mid-eighties, mid-eighties let's say, that every engineer had his own computer and they were typically IBM computers. But some people like Macs and I like Macs. At Tektronix I had Macintosh. And they were completely incompatible at the time. If you had Word on the Macintosh the application, you know the Microsoft application; it wasn't compatible with Word on your PC. And if you had a Mac and a PC at work... I did at different times, the files you did at home

<p>10:46 – Early career, career objectives</p>	<p>you'd bring them into the other computer they didn't work or they had functions that didn't work. It was really annoying.</p> <p>ME: And so, you were in grad school for chemistry and then you worked for Portland State on a grant, but when did you step into the job market? Did you know what your career objectives were?</p> <p>PG: I wanted to have a good job that was interesting. Seriously, I mean I could have stayed on, I was working EPA, Environment Protection Agency grant money, and I was being paid a reasonable salary, but it was not the sort of salary to prosper on, but it was great training. When Ronald Reagan was elected, well, it looked like he was going to be elected, I</p>
<p>11:39 – Tektronix</p>	<p>decided there that there probably wouldn't be any more EPA funding, so I better get a real job so I applied to Intel and Tektronix. And the short story is I got the first offer from Tektronix and I started there in September of 1979.</p> <p>ME: Did you know a lot about Tektronix already?</p> <p>PG: I had a friend whose mother worked there. I knew some people who were working there... not a lot, I didn't know a lot but it was clearly, most everything that I heard was very positive, it was a progress place to work, lots of challenges. The people that started Tektronix were clearly people, people persons, people persons. Howard Vollum and Jack Murdock were very concerned about the welfare of their employees which wasn't a given and certainly isn't today. It appeared that they were doing stuff that seemed like I could contribute to and that turned fortunately correct or at least it appears to be thirty years later.</p> <p>ME: What was your first job there?</p> <p>PG: I was... it's funny most people don't think why do you need chemistry for doing... I'm a display engineer, basically I've been a display engineer my whole career, so why do you need chemistry? Well the screens on cathode ray tubes or the liquid crystal material that goes into liquid crystal or the color filters those don't just happen it's typically a chemical process that's used to fabricate these things, and certainly a</p>

14:39 –
Learning,
innovation

process, if not a chemical process and you use materials that it's important to know the physical properties and toxicity and the working characteristics of them and so a chemistry background is really useful in that. The first job I had was for was to be the screen process engineer for a full color CRT which really is sounds ancient right now but we were trying to make a very bright a very rugged cathode ray tube that could be used in an aircraft application. The project was originally going to be used for a Tek instruments but it turned out it was going to be too expensive and we found some outside money a customer that was interested in this to put these displays to put a color digital display in aircraft and so that took several years but I had the opportunity to be the person that worked up the process for doing phosphor deposition and there were some other patterning steps it was called photolithography. And I learned a whole bunch and Tektronix was perfectly willing to support me in learned this. They had a great library to tap into what had been what was the published literature. I went to conferences. There were an incredible number of expert in a wide range of technologies to learn from and work with. It could hardly have been a better situations, just an incredible support structure a very expensive support structure the products that Tektronix made were expensive to support all that. But it was a place that was unique in the world.

ME: Did you work in other positions with Tektronix?

PG: I was an engineer, an engineer manager, a product manager, project manager, as well. So I went from kind of being only a process-based to being more device-based so I was the project manager, engineering manager the development of some other devices. Some them didn't make it into manufacturing but they were all in you'd call them R and D side. And again some devices that were there was a projection display that incorporated a liquid crystal cell into a cathode ray tube. Very high resolution we showed incredible projection projecting images and eighty-nine, about 1989 that were very ahead of their time in terms of their

resolution. We worked with Eastman Kodak on this to some extent, but there was an economic downturn and the funding went away and I went off to work on something else. But I worked... in the bio I sent you, you know, I've worked on cathode ray tubes, liquid crystal displays, ink jet printer heads, on 3D displays, on touch panels, transparent displays, most recently, and incorporating LED into various devices. It's all been a nice challenge and fun, stimulating.

ME: While you were at Tektronix though, what project did you work on that you were most excited about or that you feel was your biggest contribution to that company?

PG: Well, the one that made the most money to start with from a financial standpoint was this avionics color tube as it turned out they, and this coincidentally that business unit was later sold to Planar and it made Planar a fair amount of money and I think it distinguished Planar for the higher performance display, that's the kind of thing that Planar tries to sell now. The, probably the most interesting project that I worked on that I was the most proud of in terms of the accomplishment was this liquid crystal light valve, this projection display that I described. It didn't ever... it wasn't ever a product from Tektronix but it had been an idea within Tek labs that had started languishing and there were some real technical issues to making it work. And I was asked to put together a team to try this one more time. And we were successful in overcoming the technical problems and we entered a showing full color images of a Blue Angels video in the Tek auditorium on like a fifteen foot screen and it was great. It looked just spectacular and there was nothing that was really available at the time that could do this it was simply and it was just a matter of being not being right from a business perspective for Tek to productize there was another attempt to productize in the TV products group and that didn't work out. Not everything works out unfortunately.

ME: Did you notice that a lot in the Tek labs, a lot of great ideas that they weren't able to market?

19:13 –
The
intersection

of
technology
and
business,
innovation
versus
marketing

PG: In particular, yes. In particular at Tektronix when I first started there there's a long story that I won't go into the details but I, just before I started there in seventy-nine, they had developed a scanning electron microscope, which is a critical piece of equipment for doing a lot of what's now called nanotechnology I mean it was important for biological science to look at small biological structures, very fine resolution. Also for integrated circuits. And they had developed a scanning electron microscope that just had incredible performance but it got to a certain point in its development and the project was killed and so they had prototypes in the – that's in the R and D where I was working and we got a chance to use these things even though they weren't products and there were numerous things like that and some of this is to be expected I mean, you know, if you're a venture capital investor today, you might invest in, from what I understand, you know like ten projects, if one goes big and two are pretty good, you know, that's a pretty good track record, so, which is, you know, nominally thirty percent, that's a good batting average, but it's not a very good success rate on a lot of fronts. So, maybe some of this is to be expected, but it seemed like more of them, more of these projects, could have been successful, but that's always the attitude of the engineer, you know, or if you give me just a little more time I can make it better, so that's always the case. And that continues. We've had that situation at Planar as well.

21:10 –
Planar spins
off from
Tektronix

ME: If you were at Tektronix in the eighties, you were there when Tektronix spun off, when Planar spun off?

PG: Yes, but I didn't spin off at the time. I knew the guys that were they were working in building fifty as well. Chris King and Jim Hurd were the two senior managers, the executive managers who spun this off. And John Laney who is also in this picture that I have in front of us here. And he still works at Planar as it turns out. So I knew those guys and I wasn't working on what they were working on I was working this avionics color display. But it was about 1994 I ran into Chris King at a conference and I

21:54 –
Leaving

<p>Tektronix for Planar in 1994</p>	<p>just mentioned that I had, that the group I was working in at the time, we completed what we were doing, it wasn't moving on and I was looking for a job. 'Well why don't you come work at Planar, so I did.' So that was the transition.</p>
<p>20:21 – Difference between Tektronix and Planar</p>	<p>ME: How did you find that company different from Tektronix?</p> <p>PG: Well, Planar's a lot smaller. Tektronix topped out at twenty-some thousand, twenty four thousand people in 1984 and when I left there were probably at least fifteen thousand still. Planar has never had more than a thousand people. So that was one big thing. We were working on pretty much one technology to start with, the electro-luminescent display technology. The intent was to develop a full color version of that and we came very close. It's one of the most difficult things that I've worked on. We had a good group, a critical mass group, I think; it's just proven to be very difficult. But it was, like I said, we did good work, it was a fun project, but sometimes, and it's actually pretty rare but this one was just not successful.</p> <p>ME: What were you hired to do then when you came to Planar?</p> <p>PG: To be mostly a project manager, an engineering manager, and the fact that I had a chemistry background helped because we were doing a lot of materials development and I knew enough to be dangerous? about the electronics and about the mechanical side of this stuff, so at least hopefully I was competent to manage this, I think that's been the case. And it just helped that I had the display background. The interesting thing about working on displays that I really liked is that there's a materials background which caters to my chemistry education, like I just said there's a mechanical side to it, you have to map these displays, and there are design consideration, you have to make mechanical designs that are sometimes critical for their performance, there's an electronic side, an electrical, there's an optical side, and even a human factor side, you have to know something about human vision because that's how you interact with these displays and so you have to have some insights, but it's a very</p>

25:10 –
Focus on
display
technology
in the
Portland
area due to
Tektronix

broad, eclectic mix of expertise and hopefully insight that you have to have to work on displays. There's really a focus on displays in the Portland metro area based on Tektronix's need to have displays for their instruments and so they invested heavily and because of that there are a lot of sort of unique display engineers in the area here that's spanned a number of different companies and has been useful for other companies that have come here, knowing that there are people with display expertise in the area. So Tektronix really, I'm one of the benefactors of this focus that Tektronix had.

ME: As a manager do work with teams or manager teams and how big are they here?

PG: Yes, I almost always do. There's development teams and they vary from just a few people to we've had as many as fifteen approaching twenty people on teams back when we were doing the color electronics and display development.

ME: Do you feel like there's a lot of cooperation and sharing ideas?

PG: Yes, that's one of the great things about Tektronix I thought and certainly at Planar. A lot of selflessness. A lot of sharing. A lot of camaraderie. People are interested in doing the right thing and moving forward. You know, very rarely if ever, you hear a harsh word or hurt feelings or mean spiritedness. That was an important part of Tektronix. I mean, it was all about getting the job done and doing the right thing and that's the case here. You know, a lot of the spirit that came from Tektronix is found at Planar. And a real lack of inhibiting formality, maybe that's a tortured phrase, but not a lot of formality that would inhibit getting stuff done. So that's good for creativity. I mean, if you have an idea about something that is maybe not exactly what we were working on. For example, if I had something like that, I'd feel completely free to go off and pursue that within reason you know you wouldn't want to run whatever you're working on off the track but a lot of freedom and that's great.

ME: What was your first big project that you worked on with Planar?

PG: Well it was this color electroluminescent display project and again that was a lot of interesting chemistry in the materials. We were trying to do something that was pretty difficult given the fact that liquid crystal display technology, which we weren't involved with at the time, was coming on fast. There had been a massive investment in Japan. The companies from with names we would all recognize Hitachi and Toshiba and Sony and Fujitsu, Sharp, they were all investing millions of dollars in development in liquid crystal displays that could do color. And Planar had this electroluminescent display technology that was monochrome and it worked fine but people wanted to see color. We see the world in color and you wanted to take that on your display and it just turned out that from a materials perspective it was very difficult to find materials that would emit blue light. You need a material that emits in the green, and the red, and the blue to get a full color display. That's the simplest way to do it. And mother nature's just not been very forthcoming in providing a blue emitter. There was one clever engineer that came up with a way to do this with a certain material but it didn't have all the characteristics that we needed. It was very close, but as they say, no cigar. So, like I said earlier, that project was not successful. Since then, if I may, I've worked on a project. I was the project manager and project manager engineering manager for a spheriscopic 3D display. There's been a lot of interest in that of late and we did this about four or five years ago before it starting becoming prominent again in the theatres and that was a lot of fun. Again, it was very important to understand sort of human vision and perception of 3 dimension and understand the characteristics of this display versus, the one that we were developing versus other displays and now that 3D is more of a... it's kind of a household concept at this point, you can buy 3D displays at electronics stores that you can bring into your home, the ones we were selling were just for more professional use. Now Planar has other 3D displays you know we kind of broke through with this first device. I'm very, very happy with the way this has worked out.

32:24 –
Global
connections,
international
travel

ME: Do you have Planar products that you use in your home?

PG: I have a Planar monitor, a desktop monitor. Most of what we sell, historically, has been; they're called imbedded components. This is what prompted Intel to put the little decal that says 'Intel inside' otherwise you never knew that you had their processor. So, I can recall taking one of my children to an emergency room and there were some medical displays, some medical equipment that had our displays in it. And I could tell that they were our displays and I talked to one of the nurses (and the good news is my daughter wasn't serious going into the emergency room) but I was talking to one of the nurses and I mentioned that I worked for the company that makes those display and she said to me 'When I see those, those yellow displays that's the color of those monochrome electro luminescents that's a medical display to me, I know that's a reliable product. And even though you know there's the box and the rest of the electronics, the thing that you look at was the Planar display on that. And this woman, this nurse, she identified a medical display with the color of the electroluminescent display that Planar produced. That isn't a home thing, but it certainly is something that that you can identify. Now more recently, we sell these monitors, like I said I have one at home, and it's fun to walk around there's a hardware store about four miles from here three miles from here 285th and TV highway at the checkout stand they have Planar monitors and they didn't even know we were here in the proximity to where they're located.

ME: Planar is in so many different areas of business and also globally?

PG: Sure.

ME: Have you traveled a lot?

PG: I've travelled a fair a lot and I really appreciate the fact that I've been able to. I've gone to Japan, and Taiwan, and a bunch of places in Europe. We have a manufacturing facility in Finland. So last winter, in January and I was thinking this might have been ill-advised to go to Finland in January and it was kind of interesting actually they had already had their

34:17 –
Oregon
location and
global
economy,
competition,
Asian
market

they were past their time in December were they had a minimum amount of light during the day, I think they have like four hours of daylight in December. It really gets people down and when I was there in late January it finally got to be light during the day at 11 o'clock and it was pretty dark by four. But Helsinki, we have a facility outside of Helsinki, is a wonderful place and the Finns are great. It was very enjoyable. I've been to conferences like I say in Japan, in Taiwan, Germany, and in England, and Scotland, and not always but sometimes have an opportunity to stay, stay an extra day or something most of the time it's you there, you come back. But it's very nice to do this overseas travel and I've been able to travel not to every state in the country but probably more than thirty states in the country, all over the United States and some in Canada on various business, so a fair amount of travel.

ME: Being located here in Oregon, do you find that you do feel a lot of competition with a lot of the global or the Japanese technology firms?

PG: Yes and more all the time. The Japanese in particular identified display technology as something they wanted to target and develop and develop a competency and develop products in the 1980s starting with color picture tubes that the starting in the 70s actually they bought a patent rights from various American companies to do that. But the interesting thing is that it's gone from the sort of focus the center of development for display technology from Japanese to Korea to Taiwan and now is in mainland China. And Japan is having a real struggle with their display manufacturing because it's very expensive and it requires incredible amounts of investment for the manufacturing facilities. I never would have guessed that in 2012 that a 55 inch diagonal, I mean we're sitting in a conference room with a 55 inch diagonal monitor that you can go to Fred Meyer or any consumer electronics store and buy a TV of that size for less than a thousand dollars. That would be unheard of that would have been if you would have told me or any display engineer in the 90s that that was going to happen it would have been science fiction. I mean there still was

36:47 –
Daily life

talk about how we were going to have hang-on-the-wall TVs then. It's just incredible how much has been invested and the progress that's been made and I don't know where it's going to go from here. It's just incredible. You don't really need displays a whole lot bigger than that. It will be interesting to see what happens. I think what will happen actually to answer my own question they'll be incorporated into walls. They'll be even more ubiquitous. We're working on stuff sort of like that actually I show you the transparent display downstairs anyway, it just continues to be very exciting to work on display technology. I hope I answered your question.

ME: So, what does your work week look like here?

PG: I, I really like the way my work week is structured. I don't have a whole lot of meetings I have to go to. Again, being in a R and D position, I get to work on the fun stuff you know which is very I feel very lucky to do that. But I get here in the morning at 8:30 or so, usually get to find my own day and get to assist in defining what some other people do that I work with. We typically have specific goals for the day and the week and longer-term in mind to development of certain devices, targeting say showing to a customer or a trade show, so we have to figure out what do we have to do to make this work, to present a, to create a device that is presentable and if we're further along in development how do we transition this to manufacturing, what are the issues that keep this from being manufacture-able. The day is usually spent in some meetings or in lab or working with computers, looking for information or whatever contacts on the internet, meeting with vendors, every week we probably meet with at least two or three vendors, products that will assist us in doing what we do and then there's some time that we spend recording on progress and the good news is it's not onerous part but it's real important to do that and we have a meeting every Monday in this room actually were we kind of review what we did small team people kind of review the progress we made in the last week and talk about what we're going do in

40:35 –
Inspiration,
new ideas

the coming week. And I've been in those meetings where they were huge and you went around the table and it got pretty boring and it was pretty much a waste of time. But we have a pretty productive constructive approach to this and so it's really... 'Let's talk more about that data, what does that really mean, what should we do to try to figure out what that really means or what should we do next as a result of learning that.' And then almost every day I go someplace to have lunch just to clear my head. There's places within walking distance. Several days a week I have lunch with people who work here at Planar or work someplace else. I try to network at least once every couple of weeks to have lunch with somebody I haven't had lunch with for a while just to keep up with what's going on. It's important to do that. And then, every Sunday morning I write a weekly report. I don't know why it's worked out to be Sunday morning, but I spend about an hour and I write usually a one page summary of what I've done in the last week and what I plan to do in the coming week and that's the basis for this Monday meeting I was telling you about and then I send this out to a bunch of people so they keep track, so they can have input on say, 'We really that' or 'The need for that has gone away.' One of the things that I really appreciate is I rarely am just working on one thing I get a chance to diversify. I feel like I'm a real lucky guy.

ME: How do you get new ideas? I know you said you attend conferences and you have a lot of people that you work with who are probably inspiring too.

PG: That's a great question and a tough question to answer simply. For this transparent display which is probably, I mean, it is the most recent thing we've been working on and it's an innovative eye catching device that we hope will be an important product moving forward. It's combination of seeing something similar at trade shows and also the we we're it's complicated I don't think I want to go into the gory details of exactly the similarity but we're working on another project were the transparency of the LCD was a problem and we were noticing that under

the right conditions when you ... the display to white content we could see through to the backside of the display and we were seeing some things we didn't want people to see it was distracting to the content on the screen. As it turns out what we did to fix that problem or to address it anyway was real important to this display. So if we hadn't do that other project and haven't got this sort of seed of an idea we wouldn't we'd be much less further along. So actually we were able to turn around a first proof of concept device in a matter of a couple of weeks. So two big elements are you know the germ of the idea which sometimes they come in the shower sometimes you hear about it from somebody else or somebody else had a good idea and you just jump on it. But the thing that makes that happen almost always is you've done your homework in some sort of supporting way. We've done a lot of work on light emitting diodes for example. It turns out that for this particular device, illumination is really important. And so we had a bunch of these, we'd done a lot of work about efficient LED that were appropriate for this application. So Abraham Lincoln said that chance favors the prepared mind. So the concepts that I'm doing, that my colleagues are doing, my near colleagues are doing, it just helps to sort of be prepared, think broadly and learn about. I call it a bag of tricks. So it's important to replenish your bag of tricks or stock it as much as possible because it really helps. Sometimes you have ideas that are just you know, stupid, you know they sound great for a little while and then you realize that no, that's really dumb but sometimes the key part of an idea is, of making it feasible is to be able to respond from your bag of trick and it's just a chance thing that you happen to learn about or hear from a vendor about or whatever. So you have to be kind of a sponge. Those are my two lines about bag of tricks and be a sponge. When we have interns and engineers I always tell them to be a sponge and enhance your bag of tricks.

ME: So, what factors do you think have contributed to your success in your line of work?

45:55 –
Patents
versus trade
secrets

PG: I think the last thing that I was just talking about is important. A lot of being creative in general and especially in engineering or in science is about analogy and keeping track of broad scope of things. That wasn't eloquently put, but you get my... range of knowledge is useful. It's pretty incredible sometimes how a small thing experienced ten years ago might be useful in assisting you with moving forward with a good idea. So I try to be broad. I'm trained as a chemist but I don't do much pure chemistry anymore and frankly I'm happy with that because I enjoy do this kind of, being involved with this other stuff and working with people that have expertise in a broad range here. So I think you asked how I've been successful. I think I work well with people and I keep my eyes open, try and be an effective problem solver which is the core of most all what I do at this point is problem solving. Part of it is understanding what the problem is to start with.

ME: Now how about the patents, you have five patents?

PG: Yes... that was in the bio I sent you I think. There's going to be some more here. It's interesting. I had some. I was involved in some work that was innately patentable at Tektronix. Some of it was chosen to be a trade secret. It's expensive to file for a patent and so when you can have an idea and you can prepare a discloser unless there's an obvious business benefit often patents aren't pursued. And now it takes like four years to get a patent it's really this is a huge problem. But yes, I've been involved, there was a patent for this color tube and we've got some stuff that's patentable more recently as well. But most of the time, frankly, it just a fair amount of what we do is treated kind of the equivalent of a trade secret which is something that you; if you do this formally you write it up and then you put it on file, but you don't share it. At least there's a formality there that if somebody else patents something you can say that had prior -. There's been some changes in the law that is not as effective, but anyway...

47:30 –
Writing

ME: Your bio also said that you do some writing that you publish in science journals?

PG: Yes, and that's kind of an alternative to somethings. If it's more data related, it depends, you write a scientific paper. So starting back with my thesis I think there were five papers that were published and I was doing fluorine chemistry and on the EPA grant there were, I've kind of lost track of these, but there were four or five papers that we published it was on air pollution chemistry. Most of the projects that I've work on at Tek and here there's some kind of opportunity to publish something if you want.

Working in industries is a lot different than working in an academic setting. In an academic setting this is one of the signs that you're being productive is to publish a paper. In an industrial setting it can be but on the other hand you don't want to publish critical information that would share leverage with your competitors so there's a fine line in being careful with what you publish. Sometimes a paper that's published is not really so much scientifically you're just kind of declaring that here's a new product or here's a new feature of a product and it's almost like advertising. That isn't as pure from a scientific standpoint and it's not very satisfying sometimes. But it gives you a chance to illustrate what you've been doing and to talk about your work which everybody likes to do that. That's what you're giving me a chance to do right now.

ME: So, how about, without disclosing any company secrets, what are you working next or exciting about?

PG: Well, the thing I showed you downstairs, the next thing is probably this transparent display and I can talk about that because we've been showing it at trade shows. It makes use of some characteristics of liquid crystal displays that most people don't know about. As I mentioned earlier, we've been working on LED and liquid crystal displays don't emit light so you have to illuminate them in some way. And we have some experience and some knowledge of how to do that. There are some, excuse me, other optical characteristics of liquid crystal displays that we think we know how to optimize to make them look better as a see-through display or view-through is the trademark that is going to be used for these

products. So this caters nicely to some expertise that we have and I've been trying to drive this. It's fun most everybody we show this too, there a 'gee whiz' aspect to it. Actually that spherio display that I talked about earlier that had the same effect, people would... it has a very interesting effect. I don't know if you've been to a 3D movie or seen a... it has a... it's a unique... it give you a unique perspective to see things in 3D both literally and figuratively.

ME: So from your time here at Planar what product that you've worked on do you feel is your most significant contribution?

PG: Probably that spherio. Frankly before that I worked on a number of projects that were a lot of fun and we did some good work but they didn't make it as products. Which, like I was saying earlier is not an uncommon thing but is a pretty frustrating thing. We worked on one project, and unfortunately, I can't tell you about it in detail, but it was a touch panel technology that was just extraordinary. I was not the originator of the ide. The two engineers that were working for me at the time came up with this really clever idea and it was the sort of thing were the concept was we implement it was very close to being product worthy but it had a couple of flaws it had a couple of issues that we were having trouble figuring out. I said earlier, an engineer always wants more time to try to figure things out. The CEO at the time decided that he didn't want to finish working on this but we had several patents, some of the patents that I was talking about earlier were related to this project. Really kind of disappointing. As it turns out we benefited from this later on. I probably shouldn't say any more about that.

ME: But you do find that even if you kind of have a little bit of a failure you can learn from it and possibly use it?

PG: And we did publish two papers out of this, for example, so there's some record of this. And we went to these trade shows and we had these prototypes and frankly I think there was general agreement that this was a worthy effort a worthy technology to work on. But you really like to make

<p>53:35 – Planar’s location in Washington County, Tektronix’s influence, local focus on display technology</p>	<p>money for the company on these things I mean that’s why we’re here. That’s the added sort of objective that’s not; you don’t have in an academic situation. A paper is pretty much an end in itself in an academic situation. You want everyone to read it and stimulate thought and discussion and all that. You know obviously universities are not out to make money. That’s why we’re here at Planar to be a profitable company, so I want to contribute to that.</p> <p>ME: We’ll transition kind of to talking more about the company and its success and how... its location here in Washington County. How do you think it’s affected its success or maybe been detrimental in a way?</p> <p>PG: I think it’s been a positive thing. Like I mentioned earlier, because Planar is a display company, the fact that Tektronix sort of set the stage here with the focus on displays there’s a lot of people in the local area that can be tapped into either to hire as employees or as consultants that have display experience. Having the expertise in this area has been a big plus. I mean, going back, not that I... me as an example let’s say, Chris King, chief technology officer, he didn’t have to go off and recruit me, I mean, I just drive to a different location now, instead of Tektronix, I drive to Planar. It’s very handy to be able to do that. Now this is why you have recruiters and headhunters to find people throughout the world to find the right expertise but I think there really is an advantage to having a center of excellence in display technology in the area.</p>
<p>55:11 – Growth of Silicon Forest, Tektronix’s influence</p>	<p>ME: Have you... since you’ve lived here since you were younger, you’ve seen that concentration, the concentration in tech firms grow here a lot</p> <p>PG: It’s incredible. Hewlett Packard move up here in the 70s to... from the Bay area and moved to and put their facilities in Corvallis and when Intel started building here. And all the companies that have been spawned from Intel and from Tektronix so that this is now called the Silicon Forest. Tektronix was pretty much isolated when they started Tektronix in the 1940s right after World War II. Howard Vollum was a radar engineer and that was one of the reason why they develop all this expertise from the</p>

<p>56:27 – Recollection of first hearing the term “Silicon Forest”</p> <p>56:54 – Difference between the Silicon Forest and the Silicon Valley</p>	<p>ground up because they were so far away from everything else that they it was a lot easier to have their own electronic expertise. They developed their own CRT capability and all the rest. Now that’s, from a business perspective that’s kind of frown on, that’s what’s happening now, that’s what was happening then.</p> <p>ME: When do you think you heard that term first, Silicon Forest?</p> <p>PG: That’s a good question. I’m not sure... probably in the 90s. There was a book that came out. About that so I honestly don’t remember for sure.</p> <p>And there’s, these two posters that were done by an MBA student at PSU. I have both. I have one, the more recent one in my office. It’s great.</p> <p>ME: How do you think this area the Silicon Forest differs from the Silicon Valley?</p> <p>PG: I think it’s a little more a laid back. That’s both a good and a bad thing to some extent. I’ve been to the Bay area and the San Jose area a bunch of times and gotten some sense. I know a bunch of people that have worked there I think there’s it’s much more intense... That’s a good question... Much more diversified in the focus of technology and probably more diversely successful. One big difference and this is maybe too much of a gory detail but I’ve always wondered about this. In the Bay area there, they have some incredible universities they have Stanford and Berkeley and smaller UC branches have developed in the area. There’s nothing. And I mean they are intimately involved in the technology development. In the Portland area, there isn’t anything like that. Portland State, I mean I’ve always wondered. I mean Portland State has really not been a big player in technology development and neither has Oregon State historically or University of Oregon and of course they’re geographically removed, not by much, but Berkeley and Stanford are right there, Palo Alto is just the northern end of the Silicon Valley and I think that’s had something to do with it. And I’ve talked some, after I was doing what I was doing at Tektronix I went back to the chemistry department at PSU and mentioned this you know, why... Because there was no involvement</p>
<p>57:41 – Lack of technology education in Oregon</p>	<p>ground up because they were so far away from everything else that they it was a lot easier to have their own electronic expertise. They developed their own CRT capability and all the rest. Now that’s, from a business perspective that’s kind of frown on, that’s what’s happening now, that’s what was happening then.</p> <p>ME: When do you think you heard that term first, Silicon Forest?</p> <p>PG: That’s a good question. I’m not sure... probably in the 90s. There was a book that came out. About that so I honestly don’t remember for sure.</p> <p>And there’s, these two posters that were done by an MBA student at PSU. I have both. I have one, the more recent one in my office. It’s great.</p> <p>ME: How do you think this area the Silicon Forest differs from the Silicon Valley?</p> <p>PG: I think it’s a little more a laid back. That’s both a good and a bad thing to some extent. I’ve been to the Bay area and the San Jose area a bunch of times and gotten some sense. I know a bunch of people that have worked there I think there’s it’s much more intense... That’s a good question... Much more diversified in the focus of technology and probably more diversely successful. One big difference and this is maybe too much of a gory detail but I’ve always wondered about this. In the Bay area there, they have some incredible universities they have Stanford and Berkeley and smaller UC branches have developed in the area. There’s nothing. And I mean they are intimately involved in the technology development. In the Portland area, there isn’t anything like that. Portland State, I mean I’ve always wondered. I mean Portland State has really not been a big player in technology development and neither has Oregon State historically or University of Oregon and of course they’re geographically removed, not by much, but Berkeley and Stanford are right there, Palo Alto is just the northern end of the Silicon Valley and I think that’s had something to do with it. And I’ve talked some, after I was doing what I was doing at Tektronix I went back to the chemistry department at PSU and mentioned this you know, why... Because there was no involvement</p>

<p>1:00:35 – Cost of living, housing market, quality of life</p> <p>1:01:17 – Silicon Forest and the local economy</p>	<p>with Intel for example and they do a lot of chemical processing. That's what I would have done if I had gone to work at Intel. And to my, and I'm confident that no huge effort has happened. So there's one big difference I think has limited the growth of the Silicon Forest because you get a lot of good idea or at least the core of ideas from universities and from the graduate students. And we hire a lot of Oregon State people for example. We have an intern program. I just don't think it's at the magnitude of what's happening in Silicon Valley. I'm no expert on this, but that's my feeling.</p> <p>ME: Would you say the both of your company a lot of your colleagues are from other areas? Are you kind of unique that you're from the Portland area basically?</p> <p>PG: No, not really, I'm thinking of people that I work with. I can think of several who went to school around here, at least to high school. Maybe they went away to school and came back. I'm not sure if I have a percentage. It wouldn't be far from half I bet if I really thought about it. People, what I hear from recruiters is that it's hard to get people to move away from here. The good thing about Silicon Valley is it's a center of expertise and business and great ideas but I went back down there a couple of years ago and was looking at a newspaper and they were touting the fact that you could get into a house for thirty five hundred dollars a month for a house payment. And just little fixer uppers were going for half a million dollars. So that's pretty crazy and that's one of the quality of life things around here. Houses got more expensive and they've come down a little bit most recently. But that was one of the reasons why Intel and HP and others have wanted to relocate here is that people could afford what they were doing or course there's all the great things to do outside of work.</p> <p>ME: Have you noticed too that the high tech firms have really helped this local economy a lot?</p> <p>PG: Yes, I mean it's hard to not find people, families that people didn't work at Tektronix. You know, this friend of mine from high school, his</p>
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1:02:28 –
Gender,
lack of
women in
technology

mother was the term's a she was an operator, which means an assembly line person, not a degreed person, not an engineer, not a technical position. But she made a living wage job, she had a living wage job, she made a living wage at it, she got full benefits and all the rest here. Tektronix doesn't have those kinds of jobs to speak of now. With outsourcing and with the... I'll call it streamlining that Danaher [Danaher Corporation] has done with acquiring Tektronix they just don't have many of those jobs now. And that's a real benefit for the economy. Not to mention that engineers are paid pretty well and that's a real boost to the economy as well.

ME: Another question, have you noticed throughout your career maybe more women have been involved in technology too?

PG: That's a great question and some but not enough frankly. I have a granddaughter and I'm trying to... she and her brother were just at my house over the weekend and we did science experiments. There aren't that many women certainly not in engineering. The company that we acquired, Clarity, had a woman who was the VP of marketing. But it's just not my experience has been not so much now. I mean I can count the number of women manager women manager and engineers I've worked closely with on my fingers on two hands unfortunately. Not a good thing. I think it's getting better. I don't sense that there's any bias. When we interview, when we get applications, they're typically men.

1:03:45 –
Diversity in
Washington
County

ME: How about the diversity in general? Washington County's demographics are apparently the most diverse in Oregon. Have you noticed that that it's changed over time a lot?

PG: No, I wouldn't say that. Diversity in terms of African American employees at Tek or at Planar, some but not a large number. Hispanic folks, certainly there more recently, yes, a lot more Hispanic people. And Asian people, people and people of color from China, probably more and more recently but a lot of folks have worked a fair number of mostly Chinese some Japanese and Korean engineers as well. And of course we

1:05:11 –
Company's
community
involvement

deal a lot with folks from the far east. And Planar has an office in Taipei and Shanghai. And Tektronix had a facility a joint venture called Sony Tek that was in Tokyo. But you look around at the engineers, for better or worse they're mostly white males.

ME: With you companies, do they have any interest in helping the local community through philanthropy or contributing in that way at all?

PG: That's a good question... Tek did a lot more of that and there were clubs that did that. There are some; there are some at Planar. A group of us just went to the Oregon Food Bank a couple of weekends ago and spent an afternoon, and that's something that happens on a regular basis. There isn't a great deal of that but some.

ME: Interesting...

PG: It's, what I find is it's mostly... It's driven by more of an individual kind of thing and... right now it's just not a focus for Planar

ME: And you mentioned you like to network a little bit, do you feel like the companies are competitive here or do a lot of people cooperative here and know each other?

PG: Mostly, cooperation. I think that the feeling is you don't want to burn any bridges on the one hand, but there isn't a tremendous amount that is top secret, proprietary. There's some but I think, at least my attitude and I think this is shared is that you know you have this feeling; 'I've got this problem today and can you help me a bit, maybe you'll have a problem.'

And it's kind of like that thing I was referring to earlier when you were asking about creativity; sometimes it's really useful to hear about somebody else's problem because you might have that problem later or maybe if you have a solution for it, that's a business opportunity. So it really is to your benefit to at least be open-minded about it. I have worked with some people who just don't like to share anything but frankly they've been successful, widely successful, I mean maybe momentarily or whatever.

1:07:26 –
Conclusion

ME: Well, I think we'll probably conclude now.

managers and he and Chris and some of the other folks that where, who started the company it was just the fact that this is going to work, we're going to make this work,' and it was very difficult and I think that's what makes all the difference. And on top of that they retained their humanity which is another thing that doesn't happen very often. That's what I wanted to say. Well anyway, he got leukemia. It was really sad and died relatively suddenly. Chris stayed at Planar until four years ago, five years ago. And like I said I think he's going to be interviewed for this too. He has a good sense of the early history and he's tried to write some of this. I think he'll be an interesting interview. So, anyway...