An Interview with

LYNNE ANDERSON

OH 502

Conducted by Thomas J. Misa

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Lynne Anderson Interview

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Abstract

Lynne Anderson grew up in Moorhead, Minnesota, and graduated in 1985 with an
electrical engineering degree from North Dakota State University. She joined Sperry
(later Lockheed Martin) working at Plant 8 in Eagan, Minnesota (where she worked for
28 years). She joined an electrical engineering design group, and worked on a variety of
military aircraft and avionics projects, including the F-4, P-3, P-4 and others. She offers
a close description of the design and specification-writing processes, along with the
design reviews that accompanied these projects. She discusses her experiences in
working with male-heavy teams as well as the characteristics of effective project
management. She rotated through several high-profile areas, including cost engineering,
project engineering, and program management that gave her wide insight into
Sperry/Lockheed projects. Much of her work involved proposal development and project
management. Later programs she was involved with were the Q-70 and Joint Strike
Fighter. She shares observations about the change in management style with Lockheed
Martin's ownership.

Misa: My name is Tom Misa [and] I'm here in my office with Lynne Anderson. It's the 12th of November, 2015, and we're doing a set of interviews funded by the Sloan Foundation, trying to understand the perspectives of women in the computing industry, broadly from the 1960s to the 1990s. Lynne, could you give us a bit of background about any interest you might've had as a child, growing up, or in high school, of any things that might've connected you to technical subjects or technical interests?

Anderson: My grandfather was probably key in my growing up. He was a doctor and I used to go on rounds with him, and I decided a long time ago that I didn't want to be in a medical field. My mom was a bacteriologist, and my grandma was a chemist, so I wanted something different than what they were all doing because we always talked about medical things at the dinner table. So I was looking for my own little niche in the world, and I always liked to take things apart and put them back together. My mom said well why don't you try engineering? So I went to North Dakota State University and I really liked it. I ended up graduating from NDSU.

Misa: What kinds of things did you like taking apart? Vacuum cleaners, or bikes, or something?

Anderson: Oh yes. I took bikes apart, I took vacuum cleaners apart, I made a little switch in my bedroom that would turn on my lights from the other side of the bedroom where I slept. I had bunk beds so I added a light switch on when I was fairly young so that I could turn lights off when I was reading in my bed and go to bed, and I wouldn't have to get

out of the bed and turn the light off. Just a lot of different things, you know the old game systems that I even forgot the name of them, but it had Pong on them and things like that. When it broke I tried to put it back together, and take it apart.

Misa: You said that your mom was somebody who suggested that you try engineering. Were there other people that supported your idea of doing something outside of medicine but in a technical, or math and science oriented field? High school teachers, or members from your family?

Anderson: Yes, I had a high school teacher, math teacher, Val Smith at Moorhead High School. She encouraged me to go on to engineering or something with math because I had over 100 percent in the class and we really connected. And then she ended up teaching at NDSU, too.

Misa: Oh, okay. And where was it you went to high school?

Anderson: Moorhead, [Minnesota].

Misa: Oh, so that was actually pretty close to North Dakota State, right across the border there in Fargo. Did you think of any other place, or was that the kind of obvious place, close to home?

Anderson: Well it was close to home and had a strong engineering program, and all my relatives were up in that area, so it was just kind of a natural fit. My mom taught at Concordia, the branch in Moorhead, so stayed close to home.

Misa: Can you say something about your fellow students at the time, was it a more general engineering program or did you end up specializing?

Anderson: I was in the electrical and electronics engineering program at the time, and that's where I graduated from.

Misa: Were there any women who were fellow students at the time?

Anderson: There were three of us that graduated out of I think it was close to 90.

Misa: Three out of 90, so whatever that is — four percent or five percent.

Anderson: Four percent, yes.

Misa: Pretty small. And you graduated when, may I ask?

Anderson: 1985.

Misa: Sometimes Society of Women Engineers on campus provide a kind of rallying place for women who are interested in engineering fields to meet and socialize, and deal with the environment. Do you remember anything like that at North Dakota?

Anderson: Yes, I was a member of SWE, and it wasn't a big group and I wasn't a real active member or leader in the organization, but I did belong.

Misa: Do you recall any professors or other people, staff members that might've been particularly supportive or encouraging in terms of helping women engineering students through the program?

Anderson: My advisor was Floyd Patterson at NDSU, and he was always very encouraging and supportive of me getting the classes I needed to graduate on time, and, you know, just getting through the program.

Misa: Did you have any ideas about what you might like to do beyond graduation? Did you think about going to work in industry or doing graduate work?

Anderson: I was planning on going into industry. I wanted to get some experience, back then, we didn't have a whole lot of labs that you did actual design work and it was pretty limited on what you could do for the design work. Now they have more at NDSU. So I wanted to get out into industry and get more experience.

Misa: What kinds of jobs were you interested in after graduating?

Anderson: I wanted to get an electrical engineering design job. I didn't want to be in test or anything like that; I wanted to be in the design group.

Misa: Now, the design could be involved more with electronic circuitry, or with power, something like that.

Anderson: I was electronic circuitry.

Misa: Electronic circuitry.

Anderson: Yes. It was actually Sperry when I hired on. It was the Sperry heritage of the Lockheed Martin, if you go back through the heritage, so I was in the Sperry group when I hired on.

Misa: Did you come here then to the Twin Cities for your first job?

Anderson: Yes.

Misa: What plant did you work at?

Anderson: Plant 8 in Eagan.

Misa: Oh, in Eagan; so from the get-go. Some people had worked in other different places.

Anderson: I was at Plant 8 the whole time I was there, 28 years.

Misa: Can you describe a little bit your first day at work, what that Eagan plant was like, what your perspective was, what it appeared to you, and how you were brought into the organization?

Anderson: Well it was cubicles, you know, a mass of cubicles and it was designed kind of in a square around a courtyard. I just remember the old wall dividers, the orange and red and green wall dividers separating people's offices. And I remember back then we could, people could actually smoke in the offices. So it was big and new, a big and new experience.

Misa: What kind of work were you hired to do?

Anderson: I was hired in the electrical engineering design group, and my first job, because I started kind of in the middle of a program that they were working on so they just gave me a document to be responsible for. So my first job was just finishing up this document on an F4 upgrade for the Israelis. And then the next job I got to do actual

design work, which was an upgrade to the P3 electronics — designed a module for the P4.

Misa: Can you take me through a bit of the steps you would go through, in terms of doing a design of a complicated avionics package?

Anderson: You get a specification to design to, so you have to read through the specification and parse out the requirements into the board design. We actually designed boards that fit into an overall computer, and each engineer was responsible for one board. If it was like the processor board then you'd have more than one engineer, but I had my own board. The first one was fairly easy. So you'd take that requirement spec, and you'd parse it out, and then get the interfaces all defined, and then you just work on it in different chunks and make sure everything's talking to each other. And when we started we didn't have a whole lot of where you could connect the designs together. It was all done on great big size D sheets of paper, and stickers of the different electronics that you'd plop on. So it wasn't very automated back for the first one, so it changed quite a bit from the time I first worked there. You'd just draw your lines and you'd show that it goes to the other board, and where it connects to. And we'd work on the firmware. If you had programmable logic then you'd work on the firmware. And there was no connection of the boards, you did all of the checkout in the lab, so there wasn't any double checking to see how it was going to work because it was all done on paper with stickers.

Misa: So it would be the case, obviously, the computer has many pieces that get brought together but you're working largely by yourself, is that right?

Anderson: Yes.

Misa: So you had . . .

Anderson: Yes, we had design reviews.

Misa: . . . one board and somebody else had the board that may be physically connected and intimately related in terms of function, but you wouldn't necessarily be working closely with them at all.

Anderson: Yes. You just had the list of the connections and what you needed to tell them. But then we'd get together; there'd be like a weekly design team get-together so you could discuss things. And then there'd be the official, like the preliminary design review and the critical design review before you released your design. So that brought in other experts that had done many board designs, to actually look at it and review it in depth to make sure that we'd go, you know, before we built them up [so] it wouldn't be a disaster.

Misa: The design team with these reviews, how large a group of people would that be?

Anderson: Probably 10-12.

Misa: And were there other women who were also doing design engineering?

Anderson: Very few at Sperry, at that time. Kim Rothman, Paula was there. There were not very many. Catherine Sweat. Her husband worked there too, they were both engineers. Not very many.

Misa: On your early design team you may have been the only [woman] then, maybe.

Anderson: No, because I was in the airborne group and Kim and Catherine were both in that group.

Misa: Both in that group.

Anderson: Yes. I don't remember a whole lot in the other areas, like in the power area I don't think there was a female there for decades.

Misa: Was that a notable experience, working in something of a guy's environment or how did that work?

Anderson: No, I never really paid much attention to what the percentages were, or how many were guys. I always got along well with the guys. I like watching football and I could converse with them. It wasn't weird for me, I guess.

Misa: And your supervisor at the time?

Anderson: Dave Albee. He was a good leader; he could pull together a team quite well and was quite successful on these programs over the years.

Misa: How do you think he worked as a good leader? Pulled a team together but did he have any special skills, or tactics, or whatever?

Anderson: Well, he was in the area quite often. I think I learned that from him because I got to be known — they gave me kind of the hard programs when I moved into management they gave me the harder programs or the ones that were in trouble, to fix. I think he taught me that you have to be present. If you're not present and you're not checking with people every day, and just going down to the lab and talking with people every day that you're in town, then you don't hear about the problems until they're massive.

Misa: You mean physically present?

Anderson: Physically present, yes. Going down and making sure you're talking to everyone on the engineering floor in engineering design area, and in the lab. You find out a lot more about the program, and you can answer questions better about the management if you're that in touch with what's going on.

Misa: So being in touch, listening to people, listening to early problems, not waiting until you have a formal design review then somebody says oh, I'm gonna get in trouble if I've got a problem.

Anderson: Yes.

Misa: You can talk to the supervisor and say well this isn't quite working out right. You've got a sense of the process.

Anderson: Yes.

Misa: Early feedback or something.

Anderson: Yes.

Misa: How long did you work as a design engineer?

Anderson: I started in 1985, and I moved into what was called cost engineering around 1991 or 2-ish. Cost engineering was kind of a growth area for what they called high potential people back then, because then you got to see a broader scope of what was going on in the building. I came out of the airborne group, and we worked on F-4s, and we worked on the B-2 bomber, and we worked on P-3s, but I didn't really know a lot about what the shipboard portion of the building was working on. So the cost engineering, you actually worked with the engineering group to generate the proposals back then so you got to see the broad spectrum of the whole building.

Misa: There are a couple of people that used that phrase "high potential," that's not just a generic phrase, that was a specific initiative.

Anderson: Yes. They funneled people into that cost engineering group — it was like a three-year rotation — and then you'd go off and after that it was 21st Project Engineering role. Then I moved into program management after that.

Misa: So cost engineering, program management [pause]

Anderson: Project engineering was what they called the head of engineering group.

Misa: Can you say a little about those three years in cost engineering?

Anderson: I worked on some really big proposals for the F-23. We actually lost that one; the F-22 won it. And then light helicopter storage management system, so we worked on some really big proposals and I got to meet a lot of people that I didn't get to work with before. I got more visibility with upper management during that time, because we'd have our proposal reviews with upper management to see how we were proceeding. And if they needed to offer us help with contacts or things like that, so that was my first real introduction with upper management, with "mahogany row."

[Laughter.]

Misa: I've heard that term. How large was cost engineering at the time, just roughly back then?

Anderson: Six or seven of us.

Misa: Oh, so it was really quite a small group then.

Anderson: Yes, and Dan Holstein ran it, and I thought he was a good leader, too.

Misa: It sounds like a funny topic, though, because cost engineering, it sounds like it could be minimizing costs or doing something very narrow. This, on the other hand, sounds like it could be quite broad — developing proposals, writ large. This is a much broader role, not just figuring out what something is going to . . .

Anderson: No, not just the actual pricing portion of it.

Misa: . . . dollars and cents, or something.

Anderson: No, not just the actual pricing portion. We were responsible for the technical volume, and the cost volume, and the management volume in cost engineering. So it was the whole gamut.

Misa: That's really proposal development across several different functions.

Anderson: Yes.

Misa: Was it common for people to do that for a relatively brief period of time, say, a three-year rotation because you'd been involved in this kind of special targeted initiative?

Anderson: It was set up to not get you stuck there, so they didn't want you to spend more than three years there. So after you'd gained experience they wanted to move you on. But cost engineering, the organization group actually went away not too long after I was there. And then they just set up a proposal group. They kind of got rid of that.

Misa: It sounds more like proposal development was what you were doing, rather than the phrase cost engineering.

Anderson: Yes.

Misa: So it may have been some internal [pause]

Anderson: But then they quit moving the High Pots through it, you know, in the proposal development so I think we lost a little bit of an opportunity to expand the top engineers when we got rid of it because they didn't move them over into that proposal management group anymore.

Misa: So that was the means then for people at a relatively early stage in their careers to get unusual company-wide perspective, access to upper management. At the time, were there understood different tracks for engineering management versus more general management, or was it the case that people more or less did a combination of the two?

Anderson: A lot of our program managers came up through the engineering group so we didn't have a whole lot of managers that came from the finance group, or marketing, and actually a lot of the engineers would move after they gained experience, moved into marketing, moved into — not necessarily finance — but a lot of our program managers really came from there.

Misa: From the engineering side.

Anderson: Yes. So they groomed people to be project engineers, then they groomed them to be program managers that would cope with the logistics and the finance, you know, the whole program; the factory.

Misa: So can you help me understand then, those next two moves? We probably should spend some time with each of those. So the project management, can you describe that a bit?

Anderson: Program manager covers the whole program, not just the engineering field; the project engineer covers the engineering group. So the project engineer reports into the program manager. And then there's the finance group that reports into the program manager, and the marketing group; and the head of the factory, the operations manager reports into the program manager.

Misa: So that's a much, much wider field of expertise that you're trying to coordinate, and a larger group of people that you're in contact with on a daily basis.

Anderson: Yes. The program manager's the primary interface with the customer, and then the technical questions go to the project engineer from the customer.

Misa: Was there a particular reason — just thinking about why the engineering people were particularly effective in moving into these program managerial roles, as opposed to you said the finance or marketing people.

Anderson: It could be just plain numbers because the majority of the building was engineers. I would guess out of 1,000 people I would say probably 700 of them were engineers.

Misa: That's a preponderance, then.

Anderson: Yes. So I'd say 70 percent of them were engineers, so it's a smaller pool. And I don't think the finance group ever got the broader picture back then of what was going on, and they really couldn't communicate on technical issues with the customer. A lot of the customer issues were technical, so I think that's why. The customer interface was very technical you know, you worked form the technical side of the Navy, and the technical side of the Air Force so it just leads to engineers being promoted, I think, at the ladder of who could communicate with those people.

Misa: When you were doing the project engineering side would you have contact with somebody in the Navy, but it was on a more restricted basis?

Anderson: One of the things I always wanted to do, because the operators sometimes would get a new product — the actual Navy operators would get a new product — and they wouldn't like it. So one of the things when I worked on the E-2C upgrade — that was my first really project engineering — I ended up being the program manager at the end of that program. I worked with Captain Shepard and I said you know, we're working

on this human interface for the hardware and the software but we don't have any of the naval operators coming into our design reviews. Is there any way we could get some of the fleet people in?

Misa: People actually using the product.

Anderson: Yes. And so he was really — yes, that's a good idea. We ended up bringing people from the Atlantic and the Pacific fleet in for the review and they loved it. They got to sit down at our mock-up at the design review, and they got to tell us, you know, I don't really like the feel of this. I'd like to have the keypad over here, and then the joy stick over here. I just don't like the feel of it. We got really good feedback that they would've ended up with something they may not have really liked.

Misa: That wasn't common, though.

Anderson: No, it wasn't common back then.

Misa: That's fairly astonishing to have essentially the design be kind of technology driven rather than . . .

Anderson: Specification driven.

Misa: . . . spec driven.

Anderson: Yes.

Misa: Rather than connected to how are people going to use this in an operation. This is really important if you've got the joy stick in the wrong position. It's like you're not going to be nearly as effective as an operator, one would think.

Anderson: Yes. There's like a paragraph in the spec about those things but you didn't get the experience of the guy that was sitting in the back of the plane actually running that work station. So one little paragraph in the spec doesn't cover all of their experience.

Misa: Do you have any idea of where that inspiration came from? That's a model that you'd seen somewhere else, or read about somewhere else?

Anderson: No, I just thought it was important.

Misa: Seemed common sense. Okay. It seems common sense today, but I think at the time having users directly involved in the design was something a little bit novel. I don't think that was nearly as common as it is today.

Anderson: Yes. Because I think they counted on everything being in that spec and you just can't roll 20 years of experience into a few paragraphs.

Misa: And a spec itself, you largely treat that something like a black box — you weren't necessarily trying to understand the spec, but you knew that that was the design that you needed to meet.

Anderson: Yes.

Misa: Can you give us maybe an example of where a spec was either particularly helpful or something that was unhelpful or ambiguous to understand? I'm trying to figure out the level that the specs were written at.

Anderson: Okay, well, every "shall" is a requirement in the spec and every "will" is a desirable, it's not a firm requirement. So you take the "shalls" and you decompose them down . . .

Misa: So and so *shall* do such and such.

Anderson: Yes.

Misa: On the other hand, so and so *will* do such and such — the *shall* is the really crucial [pause]

Anderson: The firm requirement. Yes. So you decompose your spec down to the *shalls*, and then that drives your design. And then the *wills*, you try to accommodate. I'd go back

and forth with my Navy counterpart, like the E-2C case it was Commander Dishman. Sorry, it's been a few years. [Laughs.] He was the technical lead, and if we had problems with meeting a requirement or problems understanding, then we always had a Washington office right in Crystal City, that we'd go out and meet with them and work with it more one on one with the Navy. But like in the E-2C case, Northrop Grumman had the airplane so they had requirements in there for the production of the airplane.

Misa: So Northrop would be the prime contractors right?

Anderson: Yes, in this case Northrop Grumman was the prime contractor, we were a subcontractor, and the Navy was kind of in between. So if we had trouble with a requirement we'd go back to the Navy and the Navy would go back to Grumman and say can we relieve this requirement or could we change it because it would be easier to meet? And sometimes they'd say yes and sometimes they were firm in this, say no. One of those cases was the EMI requirements, the electromagnetic magnetic interference requirements, on the computer and they dictated that we *shall* use the Northrop Grumman cabling in our testing. We said that doesn't make sense because the cabling could be bad and we'd be responsible for it. If the cable failed, we don't know.

Misa: Your design might fail regardless of whether it's your design or it's the cable.

Anderson: Yes. So I fought long and hard and finally won on that one, so we had shielded cables coming in, so we were just testing our . . .

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Misa: Your unit.

Anderson: . . . yes, but Northrop Grumman was trying to have us test with their cables and we might never pass.

Misa: Secondarily, of course, you need to test the whole system, including the units and the cables, but you shouldn't be responsible for their cables. I mean they could just add some slight amount that would send your design off.

Anderson: It could fail.

Misa: Exactly.

Anderson: So that was a tough battle [and] it took many months to get that fixed.

Misa: Did you end up traveling quite a lot to Crystal City?

Anderson: Yes, especially when I was a program manager. I was on the Q-70 program, and then there were shipboard workstations on that program, and there was subsurface, and there was the cats and dogs programs. And they gave me all the cats and dogs so I had like six different customers, so I'd have to go off to Washington quite often because they never coordinated any meetings, you know. The air traffic control guys didn't

coordinate with the E-2C guys, so I'd have to go out many different times to the different customers.

Misa: Okay. So the cats and dogs would be somewhat smaller programs?

Anderson: Smaller programs, but they added up.

Misa: Q-70 was huge, right?

Anderson: Q-70 was huge but my portion of it was probably like $35 million per year, and that's the smaller programs, yes.

Misa: Still seems like a lot of money, but for a big program, it's . . .

Anderson: About $35 million out of usually around $200 million we went through a year.

Misa: Can you describe your work on some of the other projects you did as a manager, then?

Anderson: I was on the Joint Strike Fighter. I was the internal program manager because actually I got really tired of traveling. So at that point after Q-70 I said I'd like to do something more internal. My kids are getting older; I want to go to their hockey games,

stuff like that. So I was what they labelled as the Internal Program Manager on Joint Strike Fighter. So I managed the engineering group and the logistic group, and the requirements, and just did the internal stuff; and then we had Paul Anton, who did all the traveling, did all the customer interface.

Misa: As a program manager, you don't have line management responsibilities I think, but you're coordinating with a huge number of people, is that right?

Anderson: Yes. There were about 200 on JSF.

Misa: 200 people that you'd be in contact with.

Anderson: Yes.

Misa: Can you give me some clue about how you'd kind of structure your work so that you would be able to keep each of those contacts in reasonable order?

Anderson: You count on your leads. Actually it was more than 200 because we had subcontractors, like Raytheon was doing a couple of the boards in the computer, and L3 was doing the secure portion of the computer. And so we had a lead, like a subcontract manager, running that portion. So I could go to those leads and find out information, and then there's a project engineer that I could go to, and then there's usually a head software person or a head hardware person underneath the project engineer on really big programs.

So like if the project engineer was gone I always could go to those leads. But then I'd do the wander through the cubicles and talk to people, and make sure that I was present and they could talk to me about any issues. I had a few issues with some of the project engineers when they thought I was stepping on their toes once in a while, but I said if you're not here, I need to know what's going on, so you're not going to stop me from doing that. [Laughs.]

Misa: How could they think that you were possibly stepping on their toes?

Anderson: I don't know if they thought I was. I think one of them thought I was going around them, that I was checking on to see if it was being reported up correctly. That wasn't the case, I was just going around checking with people, seeing how they're doing, seeing if they have any issues.

Misa: So this person was thinking that you were somehow looking behind their back or something.

Anderson: Yes. But for the most part, I only remember one person that was really upset with me doing that.

Misa: Was it fairly common for people in that kind of program management to have a more informal style of I don't really want to say management, but of staying in contact with people?

Anderson: No, it was rare.

Misa: Rare.

Anderson: Yes, most of those people sat in their offices and they'd wait for their leads to come to them.

Misa: In some ways, as a manager — I'm putting easy in quotes here — but it would be easier to be a little bit isolated from this really large group of people. You said early on, you had a supervisor that used that more hands-on [pause]

Anderson: Yes, Dave Albee did that. He was always talking to us, out and about and checking. I really believe that that's why I was successful as a manager is because I knew what was going on with the programs, and I could defend it. I'd go to other management meetings, like the whole surface, we'd have like monthly meetings with the head management, and some of the mangers couldn't answer the questions, you know? Didn't know what was going on a little below the surface.

Misa: Oh, so they may have gotten the report but if you talked to somebody, and you have a conversation with them, you have a much firmer idea about what the project is doing, what the problems are, the parts that are really solid and the parts that might need a little extra attention.

Anderson: Yes, and knew more than what was on the weekly report. And you could defend something, too, if management wants to step in and do something, no, that's not a good idea because we're working this out, and here's the steps we've used, and what our plan is forward.

Misa: Was there ever an attempt to try to learn from that more informal style of management and encourage that with other people?

Anderson: I always encouraged that within my group and within people that wanted to advance. I always told them, watch out for yourself, you know there's no one that's going to come and pluck you and say you're an all-star. But if you want something, you have a goal to reach something, make and plan and work with it and try and find a mentor, but you be responsible for that plan to move forward. And be in touch with the people, because I saw so many people that were promoted up and then you never saw them again. They never came down on the floor and they'd never go around.

Misa: They'd just vanish.
[Laughter.]

Anderson: Yes, they vanished into "mahogany row" and we'd never see them again.

Misa: You talked about the mentoring function that a lot of people are interested in, was that a formal requirement or formal program?

Anderson: Not to start with but I always picked someone that I got along with, and sometimes I kind of initiated it. Will you help me get to this next goal? I wanna do this. I had a few mentors through the years. Dave Albee was one of them, the first project engineer, and Dan Holstine was the head of cost engineering; and then Rick Martin was the vice president of engineering at the end — or actually vice president of programs — at the end before he retired.

Misa: So it sounds like those mentors had a big positive impact, and helped you develop your career.

Anderson: Yes.

Misa: Did you serve as a mentor for other people coming up?

Anderson: Yes, and then as the years went on we had more formal mentor programs. And I was a mentor for a few people through the years, and tried to guide them through how I did things, I guess.

Misa: As it became more formal, was there a particular name that that went on, or was it just mentoring?

Anderson: Mentorship Program, yes.

Misa: Mentorship. Were there other ways that people thought about career tracks? It's kind of fascinating to think about people moving through these projects that are immensely complicated. Were there paths, especially for people working on the engineering side where you could see oh, he or she is more or less following an accustomed path through and into the company?

Anderson: There were people that pretty much told you I want to become a project engineer, so you'd try and set up a path for them so they'd have a small program, or they'd have the head of the hardware engineering leader, or the head of the software engineering; and then move up into program manager. So there's little steps that you could take to get where you wanted to be, or you could just apply for the position openings and hope to get in there, but that was tougher to do that. I applied for one job after I got in the building.

Misa: One job; the rest were just incremental adjustments or promotions . . .

Anderson: Yes.

Misa: . . . when somebody said okay, time to go here; rather than saying I need to move to some other place.

Anderson: Yes.

Misa: What about that cost engineering job? Was that the one that was the high performance [pause]

Anderson: High Pot.

Misa: Was that something that you applied for?

Anderson: No, Dan Holstine moved me into that. He said I think you need to go here.

Misa: So that kind of informal mentoring had a really large role.

Anderson: Yes.

Misa: Can you say anything about broader issues of recruiting people into teams? What worked well for you?

Anderson: I spent a lot of time on that, actually, because after I was in cost engineering, I usually had in on the ground of the program, and generating specs for the government, and took it through the proposal stage, and took it through the implementation stage. I was very seldom at the end of the program. After a few years I'd want to move on, I got

this handled so it's time to move on and do a different program. But when you're at the spec level and the contract award phase, you're starting to think who'd be good on this program, and which engineers have the real specialty to do that design, and which ones would be really good with the customer as the project engineer. So you start thinking real early in the proposal phase on how you're going to guild that team and you actually work with management to get those people assigned early.

Misa: So at some point in time then you were actually involved with writing the specifications, so they weren't always just black boxes that would come down and say you must do this.

Anderson: Yes.

Misa: Can you say a little bit about how that discussion, mostly with the Navy, I think?

Anderson: Yes.

Misa: . . . would go, in terms of trying again, to solidify the specification language, which is quite formal, and how the interactions with the Navy counterparts would go?

Anderson: Oh, you'd go back and forth for many months getting those specifications worded right with the government and sometimes they'd have a little heartburn with what you wanted to change, and other times they'd say that's good, we'll roll that into next

phase. And you'd generate the words for them, and hopefully that would come back at you in the next revision.

Misa: So it sounds like a lot of face to face iterations, so you're going to Crystal City . . .

Anderson: Yes, or they're coming here. You trade off, and we're working on those specs. Hopefully, by the time you get to the proposal phase and they launch those specs out for bidding, you know that you can meet every "shall" in that specification.

Misa: That required "shall."

Anderson: Yes.

Misa: Who else would be participating in writing the spec? Were there other companies as well that would have their input?

Anderson: Yes.

Misa: Did you have some special role in that?

Anderson: The other competitors, the people that you *know* would be bidding on that stuff, would be actually feeding the Navy too, with things that they wanted in there.

Misa: Was that kind of a negotiation where you would be negotiating with the Navy, and another team would be negotiating with the Navy?

Anderson: Yes.

Misa: So the Navy is kind of adjusting the . . .

Anderson: Yes. So they'd have to make it fair, but they couldn't put in a requirement — like we had a proposal called BAMS, it was huge. I wasn't responsible for the management volume which ended up 13,000 pages.

Misa: The volume as a part of the contract was 13,000 pages. That's a pretty good size document.

Anderson: Yes. The actual proposal when we sent it to the government, took two pallets to do.

Misa: Good gravy.
[Laughter.]

Anderson: But like Northrop Grumman would come in and say I want this airplane to be jet propelled. But our solution wasn't jet propelled, it was driven; it was based on a Predator UAV, and it was solar engine propelled. So there's was always those battles and

you could see where Northrop Grumman was trying to influence it, and we were trying to influence it, and then the Navy had the job to kind of smooth it out and make it so it wasn't focused, or it wouldn't be. They could rule out a couple of the companies that were planning on bidding on it.

Misa: So the Navy was making choices that structure who's likely to be most successful, or who's going to be the top bidder.

Anderson: Yes.

Misa: Then there's another phase in terms of contracts, and the dollar volume, and things.

Anderson: Yes.

Misa: Proposals sound to me to be absolutely fundamental to this work.

Anderson: Oh yes. Getting the specs done the way you want them and getting a good customer relationship early, when you're doing that is very important, I think.

Misa: Are there special techniques to talking to the Navy counterparts that you found effective?

Anderson: Everyone's an individual so it really depended on how open you were to the communication. I had some programs where they'd listen to you and then they'd make the decision. And other programs where they're like we don't want to talk to you and you're gonna get the spec no matter what it is, and you're just gonna have to live with it. The only thing you do with that case is say here's why I'm saying this and hopefully they'd listen. Then there were a few Navy people that kind of turned things around after they left building. You'd get an agreement with them, and they'd come back and it'd be completely different. So I found a way to stop that, and that was we'd have the side meeting minutes. [Laughs.] There was one particularly Navy guy that always had a reputation for doing that. So we'd come to agreement, we'd have a plan, we'd have the meeting minutes, and he'd sign it and I'd sign it, so that he couldn't go back to Washington and turn it around and say something different.

Misa: So just to take the silly example of jet engine versus snowmobile engine — I'm sure there are many other very specific comments — he'd say okay it's going to be a snowmobile engine and he'd sign off on that, then he wouldn't come back and say jet engine or something like that. So kind of pinning down the discussion.

Anderson: Yes, he didn't last very long with my programs.

Misa: Oh really?

Anderson: He went off to do other stuff; he didn't like that. He didn't like being boxed in.

Misa: He wanted a little bit more freedom to kind of push the contractors around a little bit.

Anderson: Yes, he was famous for that.

Misa: And how long did you do the management part of that?

Anderson: Probably I was in program management longer than anything else at Lockheed Martin. Oh man, I would say close to 20 years.

Misa: So you saw a bunch of different projects come in over the years.

Anderson: Yes.

Misa: Can you step back a bit, Lynne, and make any comments about how the working environment or corporate culture, if you wanted to say, ended up changing over those years? Lockheed Martin, of course, got bought and rebought. You came in as Sperry, then there was the years in the 1980s . . .

Anderson: Sperry, yes. Univac, Unisys, Paramax, Loral, there was a whole . . .

Misa: And then Lockheed Martin for a much longer period.

Anderson: There was always just a little bit of culture change when you changed the name of the sign out front, and we went through a whole lot of presidents during that time frame, too. And the presidents — you cannot change the culture within the building. Some were so strict and stern and yellers, and then other ones that were easy to work with.

Misa: When you say president, you're talking about . . .

Anderson: President of our division.

Misa: Of your division, okay.

Anderson: So the culture I think kind of matched the person that the overall company sent to run our division. There were tyrants, and there were good leaders that were working with their directors and managers over the years.

Misa: Would you say that the individual presidents made a larger difference or did you see any big changes between say, the Sperry years and the Lockheed Martin years?

Anderson: I think the presidents were very influential in our buildings. But then towards Lockheed Martin, we became part of a really, really big organization so that's when you had to apply for jobs [pause] if you wanted them. [Laughs.]

Misa: Okay.

Anderson: And you had to have more formal rules because the company is so big you have to have those rules otherwise it becomes a mess and things don't go well. So there was more training, mandatory training, and more rules, and more focus I think on finance. And I think that actually hurt us in some cases.

Misa: Can you help me understand why that might be the case?

Anderson: A case on a proposal, where Lockheed Martin just wants to win it and so they'll cut 25 percent off the price that the bottoms-up people generated in order to win it. And then they'll work it after they win it by changing requirements and things like that.

Misa: To bring it in with that lower price.

Anderson: You go in with that lower price to the government to win it. Sperry never did that, or very seldom did that. We bottomed-up it and we'd defend it to the president, and they submitted it because it was important that we not nickel and dime it to the customer afterwards. But the culture changed, I think, with Lockheed Martin where they wanted to

win the contract and then they'd work it afterwards instead of going in with what you think it would take to do it.

Misa: What you're talking about is kind of pushing the costs down, not trying to pass cost overruns onto the Navy but it was really almost kind of working the employees, in some sense, not the Navy.

Anderson: Oh yes. We'd have our budget cut by 25 percent. I don't know how to do that, you know? I don't know how to do that because the bottoms-up people came up with this and what do you want me to cut out? [Laughs.]

Misa: That's right. Which person here?

Anderson: I can cut it out but I'm not sure I can buy into getting there. I'll do my best to do it, but [pause]

Misa: Was there ever a temptation to put in an extra 25 percent, thinking that you might have to cut 25 percent?

Anderson: Oh yes, people did that. After you get burned a couple times.

Misa: That'd be really hard; working with a group of 10, all of a sudden you lose 25 percent of that. It's like hello!

Anderson: Yes. But we did that for a few years because it used to come up pretty darn close to where the bottoms-up proposal was going to be. Unless you could find a completely new way of doing it, you know, but usually it rolled up and you'd get into financial reviews where "you're not meeting your costs." I know, but I'm meeting my original proposal. [Laughs.]

Misa: That's right, that should count for something.

Anderson: You should try talking to the government about it.

Misa: Lockheed Martin along with IBM was quite famous early on, as being model employers, especially dealing with employment of women. Did you see anything in your experience that might shed light on that observation?

Anderson: There were more women — when we turned to Lockheed Martin — there were more women in management roles than I'd seen in the past. You know, like we'd interface with other divisions, we'd be doing this box and they'd be doing the weapons system, or they'd be doing something else. And so our interface on a Lockheed Martin level, like if the Joint Strike Fighters headquartered out of Ft. Worth and we were doing the ICP, and then Womego was doing another portion of it; and there were more women in the director positions, and the project engineering program manager, than in the other heritage companies that I worked with.

Misa: So Lockheed Martin at least seemingly, had a greater proportion of women in those professional, responsible roles.

Anderson: Yes.

Misa: There was — at least with computing — around when you came to work in 1985, a peak year for women going into white collar professional computing. On aggregate, at least, women are less attracted to computing today than in the mid-1980s. Are there any parts of your work experience that might illuminate what was going on?

Anderson: No, the only thing that I've noticed within my family — I've got four daughters — and I've got son-in-laws, and my son-in-laws are all gamers. And my daughters don't like to play games. Well, they never liked taking things apart and putting them back together, so they're not like I was. I don't know if that's the trend; I don't even know the gaming industry that well, but what's the percentage of gamers that are male?

Misa: It used to be the case that the majority of gamers were male. But now, if you look at gamers today, it's half women, half men. Now the men who are gamers say 'oh yes' — I'm not endorsing this view — but they say 'oh yes, but the women aren't real gamers because they play casual games and different games.' And so then it becomes sort of like there's guys gaming and then there's girls gaming, and one is real and one is not. I don't want to try to enter into that, but there may be some preferences, even though there are a

lot of women today — younger women and older women, too — playing games, but they may be playing different games than men sometimes consider "real" gaming.

Anderson: Yes, that's the only thing I was thinking. I didn't have a whole lot of issues with people not accepting women in the industry. I did have one experience in college [where] I had a postcard mailed to me and I think I have a picture on my phone, I keep it in my bedroom. I've got my Lockheed Martin exit picture and it has all the signatures and little notes from friends; and then I've got the little postcard I received when I was a freshman in college. And it says 'half the people will not graduate and the other half will not pursue a job in their field' or something like that, and I keep that to remind me that there are people that I'm pretty sure was targeted to women but I'm not sure.

Misa: There was a time when engineering prided itself on being tough, and you get the freshman class and okay well, in three years, half of you won't be here, two thirds of you won't be here, that's kind of macho, we're really tough guys here.

Anderson: Yes, that's it. But it was anonymous, the postcard that I received freshman year in college, and there was a misspelling on it, too. 'A lot of sweat,' and they spelled it 'sweet.' [Laughter.] So I figured it must be an engineer.

Misa: Okay. Maybe not an English major.

Anderson: Maybe not. I can't find it, but [pause]

Misa: That postcard you thought may have been aimed at you being an engineering woman?

Anderson: Yes.

Misa: Seems a little bit ugly. Or just dumb.

Anderson: That's the only thing I would say I didn't really like. But there were other comments like oh, you're my first female manager. What? Who cares?! [Laughs.] Oh, there it is. I found it. I don't know if you want to see it.

Misa: Just read it into the recording.

Anderson: Okay, it says "Lynne, half the freshmen will not use their degree because half of them will never graduate. And furthermore, half of the seniors opt not to use their degree even after they've got it. A lot of money and 'sweet' for so few successes."

Misa: Wow, and it looks like it's typed out or something like that, on like an index card or something.

Anderson: Yes, it was mailed to my mom and dad's house. So I keep that handy.

Misa: Little puzzle there because you are among the half that survived, succeeded, and prospered.

Anderson: Yes, that's why I put it in. [Laughs.]

Misa: To heck with whatever that sentiment's supposed to be. You've done remarkably well. You said you had your separation or retirement, is that right? When was that?

Anderson: 2012. I was there until — I was one of the last few people leaving the building.

Misa: Can you just tell me, a little bit beyond our interview exactly, the feeling at Lockheed Martin when the [Eagan] facility was being shut down?

Anderson: Oh, that was a long two years, a long miserable two years. Saying goodbye to all those people, yes, it was tough. I wouldn't want to go through that again.

Misa: Are you still doing some kind of technical work?

Anderson: No. [Laughs.]

Misa: You're just retired.

Anderson: Yes.

Misa: Okay, that sounds like a happy turn of affairs, then.

Anderson: I take care of my granddaughter on Mondays and Tuesdays, and then I head to — well, we have two places up north, a cabin and a farm. So I watch my granddaughter on Mondays and Tuesdays, and then I head down here because I still have one in college at Stevens Point, Wisconsin, and she plays hockey so we head down here and go watch her on weekends.

Misa: Any luck with getting any of your four daughters to enter a technical field?

Anderson: I don't know. I've got one who is a director at a Life by Design, which takes care of people with mental and physical handicaps. They own houses and they have programs and stuff like that. Then one of them is a vet tech. She loves animals and that's always been her niche. And then another one is a RAB radiologist, MRI person at North Memorial. And then Betsy, the youngest, is at Stevens Point and she actually finished her undergraduate in three years, and she's in grad school and finishing up hockey this year. But she's a biology major, and she is getting her master's in water resource management.

Misa: So you've got some technical daughters there, too. They're doing different things.

Anderson: Yes.

Misa: Can you think of any questions that we might've discussed, or that you'd like to speak to in the interview? Things that I might've asked?

Anderson: No, I'm good.

Misa: Okay, well great. This is very interesting, thank you.