

An Interview with

GAYLE SPIESS

OH 503

Conducted by Thomas J. Misa

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Gayle Spiess Interview

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Abstract

Gayle Spiess grew up in Minneapolis and attended Valparaiso University (in Indiana), graduating in 1977 with a Bachelor of Science in mathematics. She had worked for Sperry Univac one summer during college, then after graduating took a full-time professional position at Plant 8 (Eagan, MN) doing programming for a Navy ship project.

She notes support from her direct supervisor as well as self-study in 16-bit assembler code, which she used for more than a dozen years. Her working group was stable for 3-4 years, even when she physically worked on a top secret project in Building 6 near the original Engineering Research Associates (ERA) plant in St. Paul. Back in Eagan, she worked on a Navy communication system (NAVMACS) and assisted with warship installations in Virginia, Japan, and Australia. Later she did programming with the high-level language ADA as well as C, which became the dominant programming language.

A major responsibility was software for the air traffic control (ATC) group from 1993 to 2002 (eventually part of Lockheed Martin), then first-line management and project engineering for ATC (2002-7). She discusses recruitment and characteristics of successful project teams and managerial strategies for them. She also relates observations about changes in corporate culture with the Unisys merger, Loral acquisition, and Lockheed Martin purchase.

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Misa: My name is Tom Misa. It's the 14th of December 2015, and I'm here with Gayle Spiess at her home in Little Canada, just north of the Twin Cities. We're doing a set of interviews for the Sloan Foundation to try to understand the experiences and careers of women who worked in the computing industry from the 1960s through the 1990s. Gayle, could you take us back and say a bit about your childhood or upbringing, grade school and high school years, were there any special activities or hobbies or classes that especially attracted you and might have set you on the path toward a later technical career?

Spiess: I lived the first 12 years of my life in south Minneapolis [and] attended John Erickson Grade School. After sixth grade I moved out to Hamburg, New York, which is outside of Buffalo. I lived there for seven years, so seventh grade through twelfth grade I went to school out East. When it comes to particular items or experiences that lead me towards an engineering area, I don't really think anything in particular, except that I always liked math. But I can't think of anything or any specific experience that did that for me.

Misa: You were in Hamburg, New York, from seventh to twelfth grade?

Spiess: Yes. Actually, one year after that, after my freshman year in college we moved back here to Minneapolis.

Misa: Were there any math or science classes that you might have had in high school that were engaging or stimulating, or any teachers?

Spiess: I can't think of any in particular. No, I don't think so. I'll think about it but no, I just always liked math.

Misa: Were there any family members, or members in your community [who] also maybe worked in a more technical capacity, or gave you some kind of role model?

Spiess: My father was an entomologist, so he was in the science lines, as was my grandfather, his father was the same. But otherwise no, not really. Mom worked at home taking care of us kids, so she did not have an outside job so there was no influence there. So no, there was not really any.

Misa: Said you went to college for one year, but then your family moved back here?

Spiess: I went to Valparaiso University in Valparaiso, Indiana. So I was there my freshman year and my parents were still in New York. And then after my freshman year they moved back here to Minneapolis; but I went my four years at Valparaiso.

Misa: What options when you were finishing up high school did you consider? Were there other colleges in the area that you were interested in, or types of training?

Spiess: Actually, when I went off to college I had filled out my application that I wanted to major in biology. I applied to Valpo [Valparaiso]. I applied to the University of Minnesota St. Paul campus. And I applied to Cornell. I visited the Valpo campus and I don't know, it just clicked when I visited the campus and said, 'Yes, I like this.' At the time, we were still living in New York so I really didn't want to come back to Minneapolis at that time, it was too far away. Valpo was like halfway in between.

Misa: Indiana to Buffalo is reasonably close.

Spiess: It's about eight hours versus 16 hours back here. So yes, things just fell into place without me really going after something, if you know what I mean.

Misa: It was in biology that you were majoring at Valparaiso?

Spiess: Yes, that was the plan.

Misa: That was the plan, okay. Did it work out, then?

Spiess: No, and actually it wasn't really that I didn't like biology but when I started my freshman year, you just started taking the basics to get things out of the way and had a biology class, I had a math class, I had a Spanish class, whatever. And all of a sudden it was the end of my sophomore year and you had to declare your major. I'm looking at how all my credits have lined up and I had taken a math class every semester. And I

looked at it and said well, if I'm going to get out of here in four years, I better major in math. I had 20-some credits in math and everything else was like eight credits here, and five credits here, and that's what pushed me into getting a math degree, which is what I ended up getting was a B.S. in Math.

Misa: Bachelor of Science in Math, so the biology just somehow slipped through the [cracks].

Spiess: Just disappeared; slipped through the cracks.

Misa: So it must have been some interest in math and most people wouldn't be taking math courses all the time, so you were marching through and enjoying that, and that seemed a natural major.

Spiess: Yes. And when I graduated it was a requirement that if you had a math major, you either had a minor in education or a minor in business. I had a minor in education so I had my teaching certification to teach secondary math. I didn't even really consider business. I didn't really know what business was; I didn't know what business meant. I never had any experience; I had experience in the classroom so I didn't have a concept. I mean that word is thrown around but what does that mean and what do you do? You go to this building and what do you do? At that time it seemed like for women it was teach or be a nurse. Those were like the big areas. This was 1977 when I graduated.

Misa: 1977 when you graduated from . . . ?

Spiess: Valparaiso, and I graduated from high school in 1973. So even [among] my college friends, there were a number of nurses, there were some elementary ed teachers, and a few of them were in fashion merchandising. But there were no real technical, engineering-type women that I knew at the time. Valpo has a very strong engineering school.

Misa: Did you have any contact with that?

Spiess: No. But at that time, there was only I think one or two women in the engineering program.

Misa: How many women were in the math program?

Spiess: In the math program [pause]

Misa: I'm not asking for an exact number.

Spiess: There [weren't] many men or women in the math program that got degrees in math. I don't know, I could probably look that up, 15, maybe. And out of that 15, I can think of maybe four or five of us, maybe a third, something like that.

Misa: Not half, but way more than was in the engineering school, sounds like.

Spiess: Yes, there was more women in the math program than was in engineering. That engineering program was pretty rigorous and you almost had to start it freshman year. With the programs or the classes that they had laid out for you, you almost had to start right from the beginning.

Misa: Did you ever consider doing an engineering degree?

Spiess: No I didn't. That was another thing, I didn't know what that meant. What does an engineer do? Unless it was building bridges or something. I never got it or thought much about it.

Misa: You had a science background from your father but it doesn't mean you understand everything about the work.

Spiess: Yes, he was looking at bugs, you know?

Misa: Right.

Spiess: So that I understood.

Misa: So when you were finishing up at Valparaiso—you said you graduated in 1977—

what kinds of things were you looking at? Looking to find a job, or to do additional work or training?

Spiess: When I graduated, it was a job. I came back to Minneapolis and moved back in with my folks. Let me back up a little bit, because this moved me in a direction; the summer between my junior year and senior year in college I worked at Sperry Univac. I had a summer job. It was not an internship — I don't even know if they had internships there or anything — but I had a job and I worked as a programmer aid for the summer. Basically what I did was the programmers would write their code out on coding sheets, and they'd hand me their coding sheets and I would input the data into the [UNIVAC] 1100 system. Then I would compile it and go down and pick up a listing and bring it up and give it to the programmer. And they'd review it and make changes and give it back to me. I'd update it and go through that cycle [again]. What it did was free up the programmers. It can be a tedious job just entering data. I mean this was before people had, obviously, PCs on their desks or anything, so rather than them sitting and writing and designing their code on coding sheets, and then going and entering it, it took that entering off of their plate so they could concentrate on coding more.

Misa: Had you had any contact with computing at Valparaiso?

Spiess: I had one FORTRAN class and I can't remember if it was my junior or my senior year. I think it was my senior year, and I didn't like it at all.

Misa: You did not like it.

Spiess: I did not like it. I said I will never do this. This is boring. Valpo only had one or two computing classes. There was no computer science degree, it didn't exist there yet. So they had one class and maybe a second one showed up before I graduated, I don't quite remember, but I didn't care for it. But I liked my summer job, but I really didn't have to think much. I didn't have to think about coding like I did when I was in class. So at least I had made contacts from that summer job.

Misa: Was that the sort of thing that you were home for the summer and . . .

Spiess: Needed a summer job.

Misa: . . . happened to go down to the nearby company?

Spiess: Well, my godmother was a secretary there, and actually she was — her name was Thelma Carlson — and she was secretary to the general manager of the plant. She said well, if you're looking for a job why don't you let me talk to — his name was Ray Fawcett, he was down in personnel at the time — and she talked to him and he said have her come in for an interview, and see if we can find her a job. So that's how that happened.

Misa: That sounds like a fortuitous connection.

Spiess: Exactly, because otherwise I would've never been there. My folks lived in Golden Valley and Plant 8 was down in Eagan so it was nothing I'd have happened on. The summer before that I had worked at what was called Poppin' Fresh then, but Baker's Square [now], so I was a waitress the summer before. So this was like oh, a little more money here from that. So that was my summer job. When I graduated, I came home and I think I just probably lounged around for a month and mother said I think it's time for you to look for a job. I'm like ewww, okay. So I actually was planning on teaching, I wanted to teach. There weren't many places at the time that were looking for teachers, or maybe the timing, I was ahead of it because I graduated in early May and so this was the first part of June, and a lot of schools were still in session, or they maybe didn't know what they were going to need for the next fall. I'm not sure but at that time I only sent my resume to I think it was Anoka and Rosemount. And then I sent my resume back to Sperry. They called me in for interviews. I spent a day and half interviewing, and then they called and offered me a job, and I said okay. After interviews — the day and half worth — they had asked me before I left what my top three choices were for jobs because they were different jobs, different groups that I interviewed in. They offered me the top two that I had; you know, pick one, which one do you want? So that was how it all started, and I never left.

Misa: You never left, okay. [Laughs.]

Spiess: So here I am 37 or 38 years later, here I am.

Misa: What were those jobs you thought you might be interested in?

Spiess: The first job was for a group working for the Navy. The thing with those job interviews, most of the jobs just sounded very interesting. Here I'm 22 years old and don't know anything, and they're talking about oh, this Navy program is going on this ship and this is how this works, and so it was just kind of fascinating. So of the two jobs they offered me, one was working on system for the Navy, and the other was for the Marines. I don't really remember the specifics. I know I had also interviewed for some jobs working with the compilers and things, and I was like that doesn't sound too good. But the application things sounded a lot more fun and interesting than compilers and databases, which I didn't really understand all that either but it just didn't sound very exciting.

Misa: So which one of the Sperry facilities did you actually go to when you first joined, not the summer job but the full time?

Spiess: It was the same; it was Plant 8 in Eagan. Univac Park on Pilot Knob.

Misa: Right.

Spiess: So that's where I worked the summer, and that's where I worked when I joined full time. And when I joined full time, it was not in the group that I worked in when I worked there that summer.

Misa: That programming group.

Spiess: Right, it was a different group. So I went to work for a man by the name of Don Woodard and he was my direct supervisor. The group I was in wasn't very large. They had somebody in charge and then there'd be different little organizations underneath that one person. So the smaller organization that I was in there was maybe 15 or 20 people. I was the only female programmer. There was a couple secretaries in the room where we sat.

Misa: So you were hired in to do programming work?

Spiess: To do programming work, and a lot of people that were hired back in that timeframe had math degrees. They did not necessarily have a computer science degree because I don't know how many schools offered that. I know the University [of Minnesota] did. I think the big schools maybe had computer science degree programs.

Misa: The University of Minnesota was just starting in the 1970s really to get they called it computer science studies, and then they actually formed a department. But that was actually only getting off the ground in the 1970s. There were a few pioneers but the

1970s is nothing like computer science being a formal recognized academic discipline. So math majors, that was a very common way that they got into programming because math had some connection into the thinking.

Spiess: The logic.

Misa: The logic and being oftentimes formal languages. Some people say set theory was important for some kinds of work. So there's all kinds of ways into that; the math major way was a lot. That's your generation; was math majors.

Spiess: Yes. I took a self-paced programming course called The 16-bit Assembler Code. I had a notebook that was a three-ring binder type, two or three inches deep that I'd go through and do little exercises and things.

Misa: So there wasn't a formal course that Sperry sent you on, but it was a self-study or self-paced kind of tutorial?

Spiess: Yes, that's what I started on. My direct supervisor I mentioned, Don Woodard, he really took me under his wing. So I was 22 at the time [and] he had to have been in his mid- to late-forties, maybe. But he kind of became like a second father to me and he treated me that way. He would — and I mean this would never ever fly these days — I sat across from him and he would call me 'Little Girl.' Not in a condescending way but it'd be like, 'hey, Little Girl, let's go get a cup of coffee.' 'Hey, Little Girl, what about

this?' So it was a very nurturing type of relationship and I never thought he can't say that to me, you know? It just seems natural with him and actually, his daughter, he had a daughter that was about my age or maybe a year or two younger, too, so I don't know if that kind of fueled the connection a little bit.

Misa: Could have seen something in you, in connection to the daughter.

Spiess: Yes, how would I want my daughter to be treated if she was here? I adored him, too, you know; it just worked two ways. The rest of the males in the organization all treated me very well, so it was an easy place to go to work. I was learning new things. [I] traveled some, so that was always kind of exciting. We were working with a Sperry group out in Charlottesville, Virginia, so my first trip was out to Charlottesville. I went on a couple trips out to San Diego because the system I was working on was going on a submarine. So we brought it out to San Diego, so I got onto a submarine. And as I turned a little green in the confines of the periscope room my boss says I think you better get out of here. I get a little claustrophobic.

Misa: Submarines are not good place then.

Spiess: So one look at me and we went and got off of that thing. So that was all exciting and all my other friends were in a hospital situation and doing different things, they weren't doing what I thought was as exciting.

Misa: Going to different places and having a piece of software that you had some part in writing.

Spiess: Yes.

Misa: Going out and assisting on a submarine system, or something like that.

Spiess: Yes. And that whole time frame was when I joined Sperry full time to — it must've been 1980 or 1981 — I worked in that same organization for those three or four years.

Misa: Same supervisor, then?

Spiess: Yes, that whole time.

Misa: That was a stable team, then.

Spiess: Yes it was. I actually went to work up at Plant 2, the one on Minnehaha and Prior, for one year, and that was 1979-80, I think. Still in the same organization so I still had the same supervisor, and there were four of us programmers working up there on a top secret program. They had — I don't know if you realize it — but up at that plant there was a building off to the left that they called Building 6.

Misa: Yes. Don't tell me that you were in the basement of Building 6. [Laughs.]

Spiess: I don't remember if Building 6 had a basement, I don't remember that, but I was in Building 6.

Misa: I've been told that the secret projects were in Building 6, and the top top secret projects were in the basement of Building 6.

Spiess: Oh.

Misa: I don't know whether this is true, but that's what I've been told. [Laughs.]

Spiess: I don't know about the basement.

Misa: This is back in the 1950s and may not be connected exactly to your work.

Spiess: Oh. Well we were working on a top secret program in Building 6 in that timeframe.

Misa: That's the same spot. That was a crazy facility. People even in the 1940s when ERA was moving in, it was a little bit down at the heel, had been a radiator factory back to the 1930s, or something.

Spiess: Oh, yes. It was a glider factory.

Misa: A glider factory during the war, but a radiator foundry before then.

Spiess: Oh, before that.

Misa: There's all kinds of stories about birds coming through.

Spiess: Oh yes, and things falling out of the ceiling. Some of my friends — that I met later — had worked in the main building there at a time, I think, earlier than when I was up there. Yes, they would talk about stuff falling out of the ceiling, and crazy stuff.

Misa: So what was Building 6 like when you were there? You said top secret projects, you may not want to talk about it, but can you describe the environment of the building itself?

Spiess: The environment, well, it's not a big building.

Misa: No, it's fairly compact.

Spiess: You'd come in the front door and Stan Dunwoody was his name, who was in charge of the project at the time, and his office was up front. Then you went either to the right or the left. I always went to the left and down there you had a door you had to go

through, with I think it had a cipher lock, I can't remember how you got in there. But it was just a big open room, and that's where we had our desks, and then there was a computer lab area right off of there. There were four of us programmers there, and the person that I reported to there also was in my group that I had come from. But Lauren had been working there for a while so then he took me under his wing. The other two people that were working had come from another organization so when I first went up there I didn't know them, but I knew Lauren. His name is Lauren Cady, and he taught me a lot about programming in respects of how meticulous we should be and how careful. He was a person that did everything exactly. We had coding sheets — I don't know if you've ever seen a coding sheet . . .

Misa: Sure.

Spiess: . . . but he was meticulous about things being in the right column, and lining up, and just care . . .

Misa: Real attention to detail.

Spiess: . . . detail, detail, detail, and very careful. Nothing he did was haphazard, it was all thought through very carefully.

Misa: Were there any kind of programming concepts that you were learning at that time in Building 6?

Spiess: Concepts...

Misa: Different types of languages.

Spiess: Right. For the first probably 14 years of my career maybe, I wrote 16-bit assembler code.

Misa: Really.

Spiess: Yes.

Misa: So that's very close to, you'd say close to the machine.

Spiess: Yes, very close to the machine. So that's what I did. So concepts like new programming concepts, not really. It was more all application-driven, you know we need to do this and how are we going to get there. And flow charts, meticulous, he was meticulous with flow charts. We did zillions of flow charts.

Misa: With some styles of programming you do a flow chart beforehand, some styles of programming you do a flow chart after the fact.

Spiess: Ours was before.

Misa: So it was part of the planning process?

Spiess: Yes, ours was definitely before. But yes, like how to approach things I think I got a lot from Lauren, [from] watching him work and how he did things.

Misa: So this 16-bit assembly language —

Spiess: Oh, I can still do it I bet. [Laughs.]

Misa: You learned it early on and so it sounds like it was a really basic fundamental tool you did for something like 16 years.

Spiess: Yes, I think so. So that timeframe at Plant 2 was 1979-80, and in 1981 or the end of 1980, the group I was in, the funding dried up on a program that I was working on. I was back from Plant 2, back to Plant 8.

Misa: Back in Eagan.

Spiess: Back in Eagan working on a different program and the Navy decided not to fund it anymore so there was no work in that group on anything else at that time. So I went to work on a program called NAVMACS – Naval Modular Automated Communications System that was a Navy communication system. NAVMACS probably started in the mid-

1970s but they were doing an upgrade and so I started working on that in 1981, I think it was. And so I moved out of the Plant 8 building. We had a facility called Corporate Square in Eagan, off of I think it was Neil Armstrong Boulevard.

Misa: I've heard that you'd had office space outside of the Eagan facility.

Spiess: Yes.

Misa: I've been to the Eagan facility, I don't know of a specific office.

Spiess: It wasn't far from Plant 8. I can't remember but there's a big parcel post sorting facility, or UPS, or mail sorting facility on Lexington. It was not far from there; it was down another street and would've been east of there a couple blocks. But that was called Corporate Square and we had Building C and Building D, so we had two buildings. I don't remember if we had any other ones. I worked in that building from 1981 until — when did I go back to Plant 8? It must've been in the early 1990s.

Misa: So it was about 10 years.

Spiess: Ten years or nine years that I worked in that program. That program also was 16-bit assembler, in that timeframe that's what I was coding, and like I mentioned, the system was a Navy communications system that we developed. It was originally installed on the *U.S.S. Mount Whitney*, which was stationed in Norfolk, Virginia, so I made a trip

or two out to Norfolk. And then it was installed on the *U.S.S. Blue Ridge*, which is the flagship for the Seventh Fleet, which is stationed in Yokosuka, Japan. So I had the opportunity to go to Yokosuka for about a month, which was nice.

Misa: A month, wow.

Spiess: And that was in 1985 that I went to Japan. The following year we were doing an upgrade to the system and the *U.S.S. Blue Ridge* was going to be in Sydney, Australia, for the Australian Navy's 75th Anniversary, and they were having a big wingding. They were having navy ships from countries all over the world come to Sydney harbor, and Prince Phillip came, and it was a really big thing. I was lucky enough to be able to go down there for about a month or five weeks to Australia to do that.

Misa: When you were on these trips to Australia or Japan, can you describe your work? Were you installing the software, doing testing?

Spiess: Yes.

Misa: Making sure the system was working?

Spiess: Yes, basically we brought the new software there and installed it, made sure it was running right. If there was any kind of issues or problems we'd record them, send the

info back here to Eagan for people to start working on and start looking at things, just trying to make sure of things.

Misa: So you weren't necessarily doing debugging but more installation, and then sending the bug reports or the things that weren't quite right back to Eagan.

Spiess: Yes. Well we could patch things. We had the ability where we had a big patch area. If we found a bug and found a problem we could write some code that would jump out to the patch area and we'd fix it, and write the new code, and jump back in. So we were doing some debugging things but the intent was not to go to debug. The intent was just to make sure it was working, but of course we would find problems.

Misa: You said you brought the software, do you remember how you brought the software? These days it goes over the internet or something but was it on tape?

Spiess: We had it on cartridge tape.

Misa: Cartridge tape.

Spiess: Yes, the USH-26 was a piece of hardware that you'd put the tape in and it would read the tape. So it was a cartridge that had the tape on it.

Misa: That was the software that ran the communications then.

Spiess: Yes. And when we built the systems here in Eagan, as we were developing we would have to build the system. So we were over at Corporate D, it'd run overnight building the system, and then it would get dumped out to a big mag tape over at Plant 8, and then we'd dump that onto a cartridge to be able to load it in the system. So there were lots of steps to get there.

Misa: Steps to get the software from your fingertips, so to say, onto the ships.

Spiess: Yes. And we went through a number of iterations of that NAVMACS software. We had three UYK-20 computers so that we had triple redundancy. So that was the first big effort to do that. It was a routing system, too, so that when a message would come into the message center, the communications center, the system would automatically route the message to whom it was addressed to, to that part of the ship. Before that, they had to come down to the comm center to get messages for whomever, but now they had stations around so the system would automatically distribute them.

Misa: Throughout the ship so that somebody wouldn't have to leave their station, they would get the message right at their station?

Spiess: Right there, yes. So that was all added into this upgrade. And then along the way we converted to some different military computers. Our original system ran on the UYK-20s. I don't know if you've heard those terms or not.

Misa: Yes.

Spiess: And then we went to the UYK-44s, so that was another phase of the program. I started in 1981 and I think it was maybe 1990 before that all ended. You know the government funded us for more work and more work.

Misa: So that was a real stable period.

Spiess: That was very stable.

Misa: So would that working group be largely the same people? You said funded by the Navy in stable fashion for that long period of time.

Spiess: Pretty much, yes. So we were basically the same set of software people that whole time. We had the same customer.

Misa: Can you say anything about the number of women? You said there were a few, you were never the only woman, it sounded like.

Spiess: Right. So when I hired into my original group I was the only female. Along the way they did hire another female. She didn't last at Sperry very long, maybe five years.

Misa: Oh, but five years.

Spiess: Yes, I guess it's relative when you work there 37 years, it wasn't very long.

Misa: Oh, when you said she didn't last very long I thought maybe five days or something.

Spiess: Oh no, no, no. It was years. And then when I went to work on the NAVMACS program in 1981 there was one other female programmer, and there were maybe eight or nine male programmers. And then Ruth, the other female programmer, her husband got a different job and they moved away, then I was the only one.

Misa: So for many of these years you were the only woman programmer in this group?

Spiess: Yes. We had women programmer aids. They weren't the technical kind but we had women in the working group so it wasn't like I was the only one around.

Misa: Did you have any connections to other women that may have been working in other groups at the time? In other words, was there a women's network, or lunch group, or some other way of [connecting]?

Spiess: No, not really, not then. I usually ate with the people I worked with, the guys that I worked with would go eat lunch. So no, not really. When that program ended I did some

IRD work, research and development work for six months maybe or eight months. And that was I think writing C code, or ADA code; [it] might've been ADA. So somewhere along in there, toward the end of my working on NAVMACS, I took an ADA class. That's another language that was developed.

Misa: That was famous for a while, it was going to be something like COBOL, it was going to completely transform all government computing. It didn't quite turn out that way. For a couple of years the Defense Department was really pushing ADA.

Spiess: Really pushing ADA, yes. So I took an ADA class. Oh, I was so confused. You know I went from assembler code to ADA. And when they were first talking about types, I was like what are they talking about? Integers, characters, I'm like it doesn't matter, just put it in a register. It just took a while for that jump because I still wanted to [pause]

Misa: That was up about six levels of abstraction, I think.

Spiess: Yes.

Misa: Because you'd been working in assembly code, ADA wasn't even a regular programming language like FORTRAN or COBOL, it was designed to be very structured and limit programmers and to be impossible to write bad code.

Spiess: Right.

Misa: Not everybody really liked or appreciated ADA.

Spiess: No. And so I kind of struggled through that. And then I worked on a program for a little while where I used it, so I got used to it. But that program didn't last for long, either.

Misa: Did you say you also worked in the language C?

Spiess: Yes, I'm getting there. So when the IRD program ran out of money — that's another thing — research and development money is you got it/you don't have it. It's crazy money. I went to work on a program, it was called the Egyptian Fire Control System, and that was in C. What I was doing for that program, I was writing code for the display processor. It was kind of in between code. So they had the regular application code that figured out what they wanted on the display, and they would send a message to my display processor code. It would decipher that message, and then I would send a message off to the — it was called GKS, it was a graphic kernel system that was written by another company that would actually then take that and put that information onto the display. So my display processor code was kind of a standalone set of code that I interfaced more with the graphics kernel code than the application code. I was on loan to a group to do that, so I was off by myself doing a lot of that code. I didn't interface a lot with the application code people because they were more concerned with the algorithms doing all this and that. Except for the person who knew what was supposed to be on the

screen and needed to send my code the message so that I could decipher that message and send it to the graphics kernel to put it up on the display.

Misa: The graphics kernel had been written by another company, so did you have any contact with that company?

Spiess: Yes, I did. They were down in Oklahoma and I can't remember the name of that company. So yes, I communicated a lot with them when something didn't work. And this was my first foray, really, into C. All that code was written in C. I had taken an after-hours class when they had taught C at work there. That got me started but otherwise it was [pause]

Misa: Was there a class also in ADA that you had taken? Or was that something you learned on the job?

Spiess: I took a class that they offered. They used to offer lots of classes, off and on right at Sperry, where someone in the company would teach the class. That really went away years later. I don't even know when I took my last class.

Misa: Back in the 1980s and 1990s, or just through the 1980s, you think?

Spiess: Into the 1990s. So that's when I first started writing C code, and that made a lot more sense to me than ADA code. It might've been because I was doing some ADA, so I

went from assembler to ADA to C, rather than assembler to C to ADA. So I don't know if that helped or not, but after that it was C code for the rest of my career whenever I wrote anything.

Misa: So you had a brief period where you were coding in ADA, but mostly it was the assembly code but then it sounds like C became really the dominant language.

Spiess: Yes. ADA was maybe two years, tops. And after the Egyptian Fire Control System — we did a lot of postal work. We did a postal bundle sorter program. I was supposed to go to work on there and then the money dried up on that, and that's when I went up into the air traffic control arena. So that was in about 1993 or 1994. And then I spent the rest of my working career up in the air traffic control.

Misa: Air traffic control was a huge project for decades and decades.

Spiess: Yes. So I did software up there from 1993 to I think 2002. Then in 2002 I became a first line manager for a software group, and I did that from 2002 to I think it was 2007. And then in 2007 I became a project engineer on adding GPS tracking to our air traffic control system. So as a first line manager, I had the responsibility of all the HR type of functions for the people that were working for me. You know evaluations, and reviews, and education planning, and career planning. Then in addition to that, the air traffic group worked that as a first line manager you had the responsibility for some project areas, but maybe just one area. So if we had a program where you had systems,

you had software, you had test, you had training, as a first line manager I'd have responsibility for one of those areas. So when I first started I was working on a program called ERAM that was being run out of Rockville. We became Lockheed in like 1995, and in 2002 when I became a first line manager — well actually had Micro-EARTS first, and that was a little bit different thing. But usually what they did was I would get maybe a software component, of which I was responsible for meeting cost and schedule. Or I'd get a test component of a program and have to meet a cost and schedule of the test program. When I became the project engineer then I had responsibility for all of those disciplines but then I would have a first line manager . . .

Misa: Oh, help with the HR.

Spiess: No, as a project engineer I had no HR responsibilities. I had no one directly reporting to me.

Misa: Oh, so you're responsible for output but the first line manager would take care of personnel issues.

Spiess: Yes. And then the first line managers reported to me from a project perspective, not from an HR perspective. So then I had a first line manager managing each of the disciplines, but then I had to make sure they were getting their portion done on schedule and within budget.

Misa: Can you say a little about your work as a manger, then later as a project engineer, involved with essentially trying to create teams, motivate teams, and then manage teams?

Spiess: Yes. So of course we always had to look at the scope of the project to figure out how many people we really needed for a team. We would first look at finding a strong technical lead.

Misa: A person, that is.

Spiess: A person that could then lead the rest of their team. And it usually was a group effort, so it was like all the first lines would get together with the project engineer and we would have a list of people who were available. So we would go through that list and select who we thought would be the best software lead, the test lead, the training lead, and then we would just try to form teams from that set of people that were available to us.

Misa: What kinds of characteristics might you have looked for? Of course different leads would have different technical expertise, but what are the general characteristics of someone who would be an effective lead?

Spiess: We would look for people who were very organized, who could drive a team, people that were *people* people, that could work with their team. I mean, there were people that were technically sharp but they weren't the best at communicating or being

able to deal with people. We had some people that were really, really smart but they had a hard time being able to deal with someone who wasn't at their level.

Misa: So where would somebody like that fit in?

Spiess: We would probably put them on a team but not in a lead position, not in a spot where they would have to work directly [with others]. They might have their own corner of stuff that you could just let them go do. Or if we did have to put them in a lead position we would have to watch pretty carefully to make sure that they didn't come down too hard on people, and people that were trying. I mean there were some that; you get such a mix of people. Air traffic organization was probably about 180 people.

Misa: Good size.

Spiess: So you had people that would dog it, you know, that wouldn't carry their weight. But then you had others that would just try like crazy and work really hard. So it was like you had to look at their personality to see if they would fit the mold of a leader. And we looked at the technical portion to make sure that they were technically able to give direction, technically.

Misa: Right. When you were doing this, were you doing any recruitment from outside of the company or was this mostly forming a team from within?

Spiess: Forming a team within. Sometimes with one of our programs we didn't have enough people. We were air traffic, but we would go over to the Navy, we called them 'the other side.' Before we became Lockheed the air traffic group and the Navy systems group and that, we all reported up to the same person. We were all kind of like one group. When we became Lockheed, the air traffic group went together with an old IBM group out in Rockville, Maryland. So we reported up that way, so we separated from the rest of Lockheed in Eagan. We were in the same building but there were a couple of levels.

Misa: Reporting was then going in different directions.

Spiess: Yes, we reported out East. But eventually they reported — I don't know — couple levels up to the same person where before we all reported the same way. So we would go the 'the other side' and tell them we were looking for eight or ten people to help out. Who do you have? Do you have anybody available? And if they didn't have what we needed we would bring in subcontractors.

Misa: So you wouldn't necessarily be hiring somebody, you just do subcontracting then.

Spiess: Right. We had quite a few subcontractors for a while. And that also made it easier when it came down to, if the funding started getting cut, the subcontractors were [pause]

Misa: Subcontractors would be the first to go.

Spiess: Yes.

Misa: Where would you locate good subcontracting groups?

Spiess: There were companies; Aerotech was one.

Misa: In the Twin Cities?

Spiess: In the Twin Cities, yes.

Misa: So they were basically on tap.

Spiess: Yes.

Misa: You could draw on them.

Spiess: Yes.

Misa: They might work for you, or they might work for somebody else.

Spiess: We had one person that was in charge of subcontractors and she would call the subcontracting houses and say here's what we need, send us some resumes. We'd look

over the resumes and say okay, this guy looks good, this guy looks good. Okay, bring them in and let's interview them, and off they would go and we'd either hire them or not hire them. Some of the subcontractors were there for years.

Misa: Really.

Spiess: Yes. You mentioned motivation, and that can be really hard to motivate people when you've got deadlines. Our programs weren't short-lived, they were a couple years or more sometimes, and to keep that motivation level — we would have some tight schedules sometimes and it could get old constantly asking people to put in more time and put in more time — one thing we did at times was we'd bring in dinners. We'd have signup sheets and we'd say okay, tonight we're going to Chipotle, write down what you want. Then one of us — usually me at that time — would go buy the food, bring it in, and so people wouldn't go home, they'd stay and work, and here's your dinner, you don't have to worry about eating.

Misa: So a bit of a treat, but also an expectation that you might put in a couple extra hours after the dinner was done.

Spiess: Yes. People always impress me with what they can do and what they get done. Most of them were all really dedicated. They all wanted to meet their schedules. I had one guy one time, [I] gave him a schedule, he came to me and he said Gayle, we're not going to meet this schedule, we're going to beat it. And he did. He had a two-person team

and he did. I mean he was the only person I've ever known that when he got a monetary award he split it with his two team members.

Misa: Oh really? So not just taking it personally.

Spiess: Yes. So motivation can be hard.

Misa: You said that the reporting structure changed quite dramatically when you were working with air traffic control, the Lockheed partner part of that was reporting in a different direction. But there was an even earlier change in company culture when Sperry was merged to form Unisys.

Spiess: With Burroughs.

Misa: With Burroughs, and there was some to-ing and fro-ing there. Ultimately you would've been Lockheed Martin, but there were two or three other corporate parents.

Spiess: Right, Loral was another one.

Misa: Paramax or something like that; it's a complicated time. I'm interested less in the uncertain years of the transition but did you notice basic differences between the Sperry organization, the company culture or corporate culture, did that change with the reorganization?

Spiess: So with the merging with Burroughs, I don't remember much culture change. It might be that I just can't remember. But there was a big culture change when we actually became Loral for one year before we became Lockheed Martin. And for air traffic, there was a huge culture change when we did become Loral we started reporting up to Rockville, Maryland, to the IBM organization because they were purchased at the same time that we were. Loral bought us and they bought it was IBM Federal Systems. So there was mucho culture change when that happened.

Misa: Can you talk about that a little bit?

Spiess: So here in Eagan we were 150 or 180 people. Federal Systems out in Rockville was 1200 people and we got absorbed into them. They didn't get absorbed into us, so now we're having to follow the IBM culture is what happened.

Misa: Oh, okay.

Spiess: And it was always for a long, long time, we felt like they didn't care about us. It's always Eagan's fault in anything that went wrong. We're never going to get any work because they're going to take it all. So there was for many years a lot of bad feelings or mistrust.

Misa: Mistrust.

Spiess: Mistrust of Rockville. The upper management, the president of air traffic was out there, and they'd come to our Christmas party and then zoom off and we'd never see them again. They'd come into town, you had an all hands meeting and you'd hear all this good stuff, we're going to do this and we're going to do this, we're going to be back here every month, and we're going to build these relationships, and blahblahblah, and pfft, off they'd go and you wouldn't see them for another six months.

Misa: Okay, so there's some distance.

Spiess: Yes, the distance was a big problem. So that was very hard, especially I think for non-management, you know the programmers, the software engineers. They didn't work with the Rockville people for a long time. Well, maybe some of the management did, or the upper management, so they starting building a relationship.

Misa: [They] had some clue what the IBM folks in Rockville were doing.

Spiess: Yes. Well it was always like we're just getting the crappy work. It's not the good stuff. They're keeping all the good stuff. So it was a competition type of thing, and we did completely different things. It was air traffic but Rockville always had the en route air traffic software and we had the terminal software, so we really were separate and we always felt that with the terminal software and systems, they didn't care about that

because it wasn't their thing. It was hard to get them to realize how important the terminal stuff was because they were all involved in just their en route stuff.

Misa: That goes way back to the 1960s, I think, so it goes way, way back.

Spiess: Yes, so it was very hard, very hard. I don't remember when ERAM started, this latest en route program, but they gave Eagan a big chunk. Eagan does all of the display stuff for their en route ERAM program so that started to help, I think, to build relationships between the lower levels because now the software people here doing stuff had to communicate with the software people out in Rockville.

Misa: Right.

Spiess: So just getting them involved that way helped a lot. But it still took time. It was like, 'Ewww, Rockville, now what are they doing?' So we had to do things the Rockville way, which wasn't always the Eagan way, when it came to developing.

Misa: Can you give an example?

Spiess: Just the way that the PTR databases are completely different, and the way they run their software meetings, and what they expect, and how they do things, and how they test things, and it was just different from the way the we always did things.

Misa: So a whole host of policies and procedures, the whole nine yards then.

Spiess: Yes. The terminal thing still stayed their same way but as people got off of some of the terminal things to work with ERAM, it was just a learning curve. And Eagan always felt, for a long time, that anything we suggested was just poo-pooed, you know, because it was Eagan, what do they know? So that was very hard.

Misa: It must have been frustrating, too, because you at least expect to have your ideas heard, whether they're picked up is another question. But what you're describing is really the big change with the reorganization of your Loral ownership. Was there any discernable cultural change when Lockheed Martin became the corporate parent? It sounds like Loral was a big shift.

Spiess: Yes, that was a big shift, and it lasted. We were only Loral for a year so [pause]

Misa: But the relationships changed even beyond the year ownership from Loral?

Spiess: Yes. From a Lockheed corporate culture, no, I can't think of it as a corporation. You know somewhere along that way — and it might've even happened before that — we started having to do all kinds of compliance training, and that might've even been before that. I think it came out of the Ill Wind investigation back in the late 1980s, I think it was mid- to late-1980s when we were fined. We've always had time cards at Lockheed, at Sperry, where you wrote down your charge number, and the charge numbers are

associated with your project. You have to record how many hours you spent working on that charge number. And back in the 1980s, a lot of times if one program ran out of money and the other program didn't, people would still work on this program but they would use a charge number from another program because that program had money.

Misa: Had money in it.

Spiess: Yes. So that wasn't legal and we got caught doing that, but I think it was probably commonplace all over the defense industry at that time to do some of those things. So then we got fined. People I think went to jail, I don't remember. And from that point on we had to do a lot of compliance training, for certain we had time card training because we had to fill a time card out every day. We have to do it every day.

Misa: So you were accounting for your time.

Spiess: Yes. And then along the way there was lots of like you'd have to take a diversity online 20-minute or half hour course. But the compliance training there was, I don't know, maybe 15 subjects you'd have to go through every year.

Misa: Fifteen different subjects for compliance training. That sounds like it's very serious. [Laughs.]

Spiess: Yes. Fifteen, maybe I'm exaggerating a little but there was [pause]

Misa: But multiple parts, yes.

Spiess: Yes. Let's see, what else. So as a female, over my years — and I retired in March of 2013 — I always felt that I was treated well. There were a few times where there were some people that I didn't care for too much, or I didn't realize at the time maybe was a little discriminatory. But basically over that 36 or 37 year time frame, it was really the people that I worked with that kept me there. I never thought very often about leaving and going somewhere else. The programs I worked on were always really exciting. Even the air traffic stuff, I got over to China four times. I think in like a year and a half I spent three months — not all at the same time but I think I went for a month and another time two weeks — so I got over to China back in the late 1990s. I got over to the U.K. a couple of times, some programs we were working on. So it was always interesting to me. The subjects were always interesting [and] getting some travel in there was always exciting. I spent a lot of time jumping around here in the mid-1980s. That NAVMACS program I worked on, the government hired an outside company to do all the testing and they set up a test bed out in Cheltenham, Maryland, outside of D.C. So I spent a lot of time traveling to D.C. to support test efforts out there. Even though we were working most of the time, sometimes we'd get an afternoon off to do a little sightseeing and get around in those areas. If I was gone for any length of time, we might've worked Monday through Saturday but we always had Sunday off to do something. So yes, it was a fun career.

Misa: It sounds like you had quite a notable and interesting time.

Spiess: Yes I did, I really did. And like I said it was really the people.

Misa: Assembler code switch to C —

Spiess: Assembler code, yes.

Misa: And then the project oriented work.

Spiess: And when I think back I said I'm never doing this kind of work, ever. When I was taking that FORTRAN class, and I'm like, what?! [Laughter.]

Misa: You never programmed in FORTRAN though?

Spiess: No, never.

Misa: Some science and engineering applications I think to this day are still written in FORTRAN.

Spiess: Yes. So I kind of just landed in the job and kept going. I still have dear, dear friends. I'm supposed to be organizing a lunch for a few of us that worked on that NAVMACS program back in the 1980s. I still go out for beers with some of the people

that I worked with on the air traffic control stuff, so I have friends going back to 1981 from my working career. We get together.

Misa: A measure of the satisfaction you must have had.

Spiess: Yes.

Misa: Well, anything else we might add to the recording, Gayle, just to make sure we've got a complete [record]?

Spiess: I think you had a question or mentioned somewhere in there having to do with compensation; if I felt compensated fairly, being a female versus against the men.

Misa: Talk about some of that.

Spiess: When I first started working no one ever talked about salaries much. At least between coworkers, I mean it was almost like taboo. It's my business, it's nobody else's business. And I always had the — feeling's not the right word — but I always felt that if my supervisor gave me a raise of x, that's what I deserved. Never questioned it. They were the boss, they knew what was right or wrong, or dollar amounts. So I never thought much about how does my salary compare to Joe's or Bob's or anything, it's just I'm getting what I deserve. When I became a first line manager, now I have the visibility into everybody under me, and all the way across the organization because we would have to

get together as managers. And we basically when it came to salaries and things we had to rank people. You know, here's our top person in the group, in the organization down, and you would see salaries and that was a little eye-opening because then I could see that there were a lot of people making — I won't say a lot — but there were people making more money than I was making with a lot less years of working there.

Misa: So it seemed like something of a disparity.

Spiess: Like a disparity, but I understood that from where I started with a salary, compared to where someone 15 years younger than me started a lot higher just because of the year. My starting salary was about \$12,700 or \$12,800 a year. I'm not sure what they're coming in at now, but I think now the starting salaries are \$60k or might be \$65k. So that was a little eye-opening but from the time probably when I got to be the project engineer, I started getting bigger raises. It might've been just because my boss at that point said this isn't right, with what you're doing you should be up higher in the salary scale.

Misa: Do you think there were disparities between men and women?

Spiess: I think a lot of it in the air traffic organization was that. It was an organization when I went into it that they had been together, that whole group, for a long time. There were people that hired into the air traffic organization and had worked there for almost 40 years.

Misa: Wow.

Spiess: Yes, they have not ventured out of their track.

Misa: Of their career, their life, anyway.

Spiess: Yes, and there were a lot of them so when I came in I was an outsider. And that was the days before, I think when managers had more discretion on who gets how much. So I think at times it was not an old buddy system, but they didn't know you as well so other people that they knew more or worked with more got bigger raises. I think it was a very hard organization to break into, very hard.

Misa: Oh.

Spiess: It was very tight. And then as things change, as we became — I don't know if it was because of Lockheed Martin — but then all of a sudden, the first line manager didn't have that much discretion on salaries and who got what. It was really all based on ranking and besides that, a person was given — we had like one to five. I don't remember all the terminology, but if you were an 'exceptional contributor' you might get a five percent or six percent raise. If you were the next one down, this was the percentage you would get, while before I think managers just might have gotten a pot of money and they could divvy it up however they wanted.

Misa: Just divided it as they saw fit.

Spiess: Yes, so I think that's changed a lot now, that they can't do that, just on the process of how things are done now. So I think by the time I left, end of my career, I was compensated certainly where I would expect to have been compensated.

Misa: Well that's good.

Spiess: But before I was a first line manager, I would have never known. Things are kind of different because some of these people now, younger people that are 15-18 years younger, they'll talk to each other about their salaries and they'll say here's what I'm making, what are you making?

Misa: So just boom.

Spiess: Yes.

Misa: Change in workplace culture, workplace norms.

Spiess: Yes. Or what percentage did you get for a raise?

Misa: Oh wow.

Spiess: Yes. Would've never ever thought of asking anybody that question because it would've not been any of my business. But it's like how do you know what they make? When you told them we talked about it. I'm like, jeez, okay. And they are more open about salary ranges and how we do all this stuff, from earlier days it was just never discussed. It was here, the manager said what you're going to get, and that's it.

Misa: Keeps the managers a little bit on their toes, I suppose, to make sure things are at least fair and reasonable. If everybody's talking about it, there's not secrets.

Spiess: So I don't know what else, at the moment. Were there any other questions? Did you get what you want?

Misa: We've gone through, I think, your career, and working relationships, and I was intrigued about the cultural changes. It's important with this set of interviews to also reflect on your work as a woman. I think we did a pretty fair treatment of the set of concerns. Thank you very much.

Spiess: Glad to do it.