

Oral History with Georgia Hicksky, June 30, 2020
Interview by Benjamin Spohn for Hagley Museum and Library
Hologic oral histories project

Q: Today is June 30th, 2020. I am sitting down to interview Georgia Hicksky in relation to the ongoing project on the medical imaging business and Hologic specifically. So to get us started and get to know each other a little bit better, can you tell us a bit about your early life and educational background?

A: With my early life, I've been basically in a medical imaging business since 1967, I guess, a long time. I was in pre-med at the University of Wisconsin and then decided to go into radiology, which I always wanted to do from the start. And then, did that and then had a year of advanced in ultrasound.

Q: So at that time, was ultrasound a new technology?

[00:01:01]

A: Yes, it was. And because, at that time I was responsible for buying equipment. And ultrasound was an unknown. So if you're responsible for buying the equipment and it's an unknown type of technology, that's why I took the year to take a course. And I didn't do any clinicals or anything like that. I took the course to understand ultrasound because of my position I had at that time.

Q: So what's that like to start to learn how to appreciate a new technology?

A: It's exciting. I also, I was before CT, also. So my first job out of school was at a clinic in Seattle, where we did, we used what was called the polytone at that time. And the polytone basically took slices with a regular X-ray machine that was devised to take slices and different like, elliptical hypochordal, different types of views to create what would be the rudimentary CT.

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So that was one of my jobs at the hospital I was at. And so, before CT I worked in radiation therapy before it was cobalt at the time. It was beginning of everything. I also worked in

nuclear medicine because I could remember equipment. I would go, when people were on vacation or if people had days off, I would go into the different labs and work. And so, this was 1967 to 1969, when I did that.

Q: So you were able to teach yourself a lot of this new technology?

[00:02:47]

A: Yes. I have that kind of brain I guess.

Q: That's a great or type of brain to have.

A: I guess so. I can just remember all of it. And it was fascinating. It's always been really fascinating to me with equipment and how it works and interaction with equipment. So that's from the start right out of school, I was like that.

Q: So what drew you to radiology in particular?

A: Well, I wanted to be in the medical field when I was in high school. But I didn't want to be a nurse because at that time, a lot of nursing was paperwork and I didn't want to do that. So I decided to go into radiology. But my mother wanted me to go to college because radiology at that time, basically, was more of an associate type of degree. And so she wanted me to go to get a college degree, so I went into med tech, which is lab, like a med-tech type, which is lab work. And finished almost all of that, decided that wasn't the thing I wanted to do. So then I went into radiology after that.

Q: And you used the phrase, nuclear medicine. What's that?

[00:04:04]

A: Nuclear medicine, it would be like PET scan or when you inject some type of a technetium-99, an iodine type solution. Not iodine, but technetium-99, where you'd inject into the body. And then you take a look at, say, the thyroid or the brain. It was a dot matrix at that time. The machine was like a dot, dot, dot, dot, dot matrix on a piece of paper.

Q: I can't help but pick up on that you were entering into the field in the late 1960s. Did you did have to face any extra obstacles entering into a field like that as a woman at the time?

[00:04:49]

A: Because I came in on a level of more of the technologists, the nursing technologist level, that was mostly women at that time, anyway. There were a few men, but it was mostly women. So it wasn't that much of an obstacle. The obstacle was when you wanted to get out of that into upper-- get out of that level into a management type level. So that was more the obstacle. Because you're dealing at that time, you're dealing with all, the majority of radiologists were all male. So that's kind of the atmosphere that there was.

Q: I'm just writing down my notes. So what came after that initial first-- actually, you said your first job was in Seattle. Who was that with?

A: It was Mason Clinic.

Q: And then what happened?

A: I took a job with a group radiologist and at that time when I took the job, it was three radiologists. And when I left the job 30 years later, it was forty-five radiologists. So I started with them, just changed jobs, started with them. It was an outpatient imaging center where you didn't have to take call because I had a family. So I didn't have to take call and I didn't have to work weekends. So it was outpatient imaging center. And I worked there, probably a year or two. And then, I was going to quit because of some of the people I worked with, and then they actually hired me to manage the office at that time. So from then on, I managed their offices probably from 1971 until I left in 1999. I managed their outpatient offices and they're technical energy, outpatient imaging centers.

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I helped order their equipment and I did a lot of other things for their offices. By the time I left there was five offices.

Q: Wow. Was this with Radia Medical imaging?

[00:07:06]

A: Yes. At the beginning it was Puget Sound Radiology. But then it turned into Radia as it got bigger the last few years.

Q: And this was the part of your CV that said you were responsible for design and construction of some of the clinics, too. Can you tell me about that? That sounds fascinating.

A: Well, when I started we were just at the one office where I started, a small office. And then, as the radiology group got bigger, they decided to make more outpatient imaging centers. So one by one, I would put together the imaging centers, pick the equipment. Usually I was working with one radiologist who was kind of their out-patient person and both of us got along really well. So I'd work with him in putting together equipment. And then I would work with a manufacturer who was really good at-- especially one person, not a manufacturer but an imaging group that sold. They were dealers that sold equipment. So I would work with them, working through the different types of equipment.

Then I'd go to other dealers and look at their equipment. But it was putting together the imaging centers and I started with a smaller one and then got bigger. And then we actually put one in a department store in downtown Seattle to see if that work. So women could come for their bone densitometry and their mammography. And we're like at the laundry department and it was downtown, so that they could get there like at their lunch time or when they had a break or whatever. And I put together that imaging center also.

Q: Was that unusual for the time to put an imaging center?

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A: No it was not, because Nordstrom's, it's just from Seattle, so Nordstrom's kind of did it in theirs. To begin with, they were putting imaging centers in their different places. They were putting imaging centers in their different stores. And so we decided to put one in the Bon

Marche, which was at that time, was sort of like Macy's or a Marshall Field's type store. I don't know if you're familiar with those. So we decided to put one in there. But that only lasted, all of those, that concept, only lasted a few years, not very long. Because women just didn't want to go to a department store to have a mammogram and a bone densitometry.

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They wanted to go where they-- because they really didn't trust that. Who's going to read it? Who the radiologists would be? It just was too foreign to them, so they just didn't accept it really well. That whole phase went away, probably I would say, after maybe three of four years. It wasn't very long.

Q: I find that tremendously interesting though.

A: Different, yeah.

Q: I've heard of all the department stores used to have lunch counters or restaurants, but I've never heard that some used to have medical imaging centers.

A: Yeah, and I say, it was a brief period of time. And it was, I'm trying to think when it was, probably within-- just going back to the imaging centers I put together, probably I would say, the early '80's, sometime in that time frame, early to mid-80's.

Q: Was it more localized to the Pacific Northwest or was it nationwide?

A: We did the one there, but other radiology groups were doing other ones in different stores. We were just the local radiology group that did it at that time. And then, as I said, everybody else had their own. Say, if Nordstrom's wanted to do it, or Marshall Fields wanted to do it, then they would have a local radiology group do that with them.

Q: So I think this has prompted a small, personal research project to see if there's anything like that at my local mall.

[00:11:07]

Yeah, you're in Delaware, I don't know.

Q: I'm actually up in Pennsylvania. So my local mall would be King of Prussia, which is one of the-- it's either the first or second--

[00:11:22]

A: These were not at malls, because that was kind of before the malls were really, really popular. This was more in the big department stores that had them, like the downtown areas of the cities like Seattle, Chicago, San Francisco, those type of things, not the big malls. I think some time they might have had them in malls. They would have emergency rooms in certain malls, like where you go in and get checked and things like that. I don't even know if they do that anymore.

Q: I've noticed that in my area, as the malls have started to suffer a bit, that a lot of outpatient medical has taken over some of that space.

A: [00:12:08]. We were doing it for convenience sake, but the patients, the women, didn't like that.

Q: And that was just solely the issue of trust or was it like--

A: I think it's a combination of trust and also, right now, what kind of takes the place of that is mobile mammography. It will go to different companies. It will go to different areas, maybe underserved areas or something. But there's some that go all over, just different companies. And I think sometimes people they just, unless their doctor refers them, because you can go and get a screening mammogram without a referral. You just have to have somebody to send it to. Sometimes that makes them nervous, who they're going to. Who's going to read them? How their doctors are going to get them. It's just kind of foreign to them, unless they're doctor actually sends them some place. I think that's why it wasn't accepted.

Q: Did you also have any issues with-- was the idea of getting an annual mammogram still a foreign concept to a lot of women during the late '60's, '70's and into the '80's?

[00:13:29]

A: Yes, because there wasn't really a screening, per se, set up like there is today. So it was hard. I'm just trying to think. We went through so many different types of screenings on the way. But there wasn't, at the beginning, there wasn't the early screening mammograms and there was not the criteria set up at the very beginning. Now, I think, with, as you talked about it, with MQSA, they have to try to get people in for screening. They try to have to get people in for follow-ups and, you know, all that kind of stuff. So I think that helps a lot. And there's a lot more, at that time, there's a lot more emphasis on it. And there is all the time on saving lives and you're on a list, say, as far as screening goes.

Q: Can you tell me, you mentioned the Mammography Quality Standards Act, MQSA. Can you tell me more about what exactly that is and how that impacted your work?

[00:14:36]

A: It was in the early 1900's, I think, or 1990's. I think it was like 1992 when it became effective. But it was in that era that I was responsible for the outpatient imaging centers. And also the radiologist covered five hospitals at the time. So you had to keep track of the radiologist. You got to keep track of all the equipment. You had to keep track of all the radiologists' CME's, the continuing education credits technologists. That all had to be kept. And at that time it was all paper. There was no manual way to do it. There was no software to do it at the very, very beginning. And so, I was responsible for all the five offices and the five clinics to make sure that they were up to the standards, when the inspector came around.

Because we have an inspector come once a year and we had to keep track every day of the equipment, which would be your processors because it was automatic processors at that time. Processors, the film, the QC on the equipment. So every day, every quarter, every year, there was different things to do and chart. And I actually helped with about five other people. We set up the Mammography Society for the state of Washington to address MQSA, because MQSA was so foreign to us and we had so many questions. So we set up this, I'm going to say, the Washington State Society for Mammography. We set it up just basically, to how to get through MQSA.

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And there were five of us when we began. When I left, there was like 350 members. I don't know exactly what there is now; I left in 1999. But that was set up to address MQSA, because we were responsible for charting and making sure that the radiologists did what they were supposed to do, as far as MQSA went also.

Q: It sounds like it must have eaten up a lot of your time.

[00:16:45]

A: Yes, it did. And especially, because it was, at the beginning, it was manual. And then, eventually, companies started coming out doing software. It still was rudimentary when I left and I think from then on, now it's gotten much easier. I think they could chart it easier and things like that. I just haven't been around it since 19-- well, a little bit in Hologic, but not much. I really didn't deal too much in that, other than if there was a question or a problem with images. Then, we would look at what their MQSA was doing.

Q: Could you say something about switching from paper recording? You know, recording everything on paper to going digital?

A: Just in that sense? The thing is that you had to set the software up to begin with, because if a radiologist would say, calcifications or whatever, you actually, the end-user, had to work with the group to set up coding. Actually, everything-- like if you said, calcifications, there had to be a code behind it that would actually create a report. So it was our responsibility to work with the manufacturer of the software to set up everything. So we had to set up the criteria. We had to set up what the reports would look like. We had to set up the follow-up letters, what the follow-up letters would look like, the callback letters, to make sure that nobody was left out of the loop.

You know, they're supposed to come back. Sending out registered letters, that all had to be in the software. And so, we had to work through that a manufacturer of the software and how to do that for our particular companies, or for our particular imaging centers. And I did work with that for all of the imaging centers in [00:18:35]. I worked their chief technologist or whatever it was, to make sure that they did the same thing. Because we all kind of have the same radiologist, so we all had to have the same basic database.

Q: And at that time, the actual images themselves, they were still--

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A: Analog.

Q: Okay, so still film-based.

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A: Yes, film-based.

Q: Did storing all of the film pose any specific unique challenges?

A: We just had a huge room. We'd have an index card like the library. You'd have an index card and then you would go and store your images according to number, usually. So there was a number. When they come in the door, they would get a number, like a clinic number or whatever. If they come back, obviously use that same number. And then your images were stored by number. And so, they're film jackets, they call them film jackets, and with the film jackets you would have-- because the outpatient imaging centers I ran, they also had MR, ultrasound, CT and mammography. They have everything. Mammography was part of it, but I did all modalities.

So within the jacket, you would have individual folders. And the folder would be like a CT folder, a mammo folder, ultrasound folder within the major jacket. So it's sort of like the digital side of it. You know here's your digital thing and within that is your digital folder.

Q: Paper versus real folders.

A: Yup. I mean, when you went to digital, you had accommodate everything that you did in the film world.

Q: Right, right. Did that make things easier, where you could transmit images without having to physically carry a folder somewhere?

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A: I was in manufacturing. I left in '99 and it was still folders. Because of my background, it was easier for me to design an imaging center because I knew from the time they walk in the door to the time they walk out, what they do in the film world. So we had addressed all those steps in the digital world.

Q: So when you were designing a new center, did you take patient feedback, too, for how to do things better?

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A: It was years later, though, I went to and it wasn't at that time. I think it was more-- when it's imaging centers, it's more work flow. It's the flow of the department, not, the patient would be more of, do they like the gowns? Do they like where the waiting room is? They wouldn't have any particular say, because they're not dealing with any of the equipment other than just to be done. So theirs is more of their comfort or if they had to sit in the waiting room too long or had to sit in their booth too long, that was more of the thing. The design with patients or technologists was more when you're designing equipment. That's where you get more involved, not when you're designing an imaging center. Because, again, that's more work flow.

Q: So that takes us up to 1999. Is there anything else you want to say about that time in your career before we move on to what comes next?

A: Well, probably, the reason I ended up with Lorad [00:22:27] at that time was because I bought a lot of equipment from Lorad. And I bought a lot of mammo equipment. And biopsy equipment. I didn't buy the bone densitometry that we did, but I did the biopsy and mammography. And I bought a lot of equipment from them the last couple of years especially, for different centers. And so, I decided I wasn't going to work again. So I moved to the East Coast and they contacted Lorad and said to contact me and to try to see if I would come and work for them. So that's kind of how I ended up there.

Q: So before we talk more about Lorad, I just have to ask a quick aside. You talked about buying bone densitometry machinery, but not from Lorad. Were you buying Hologic's bone densitometry machinery?

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A: Hologic didn't have-- oh, Hologic, yeah-- no, it's G.E., I think we did. I think it was G.E. I can't even remember. It starts with a P, the profile? Maybe it is profile or something, but we bought G.E. at that time. Because we had different-- we had a G.E. CT. We had a bone densitometer from G.E., and then the mammo equipment. Because at that time, Lorad was number one, basically, in the mammography business over G.E. It was kind of always against G.E. because the other manufacturers were European and the majority of them, they just couldn't get it. So G.E., we were kind of up and down. But at that but at that time, I think it was almost, I want to say, maybe 60, 70 percent type over G.E. for the equipment. So we would always buy the best equipment.

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And even when you dealt with film, when you're buying film, from say, Dupont or whoever, you're buying it from a better Kodak. You would always buy one type of film for, say, everything else, CT or whatever. And then you would buy a different type of film for mammography because it was so specialized.

Q: Why do you need a different type of film?

A: Well, it's specialized just for mammography. It has more resolution; it's more detailed. It's totally different than general film. And they would swap back and forth, some of them. They'd go between, usually Dupont and Kodak, who had the best film. Somebody would come out with a better film. And then, they'd, you know, they'd have something that was better than the other one. They're different based, too. There's a blue base; there's a brown base. There's a green base film. So it depended what the look you like, the look your radiologist liked. So there's a lot that goes into this.

Q: So what do you mean by the different color bases for film? I haven't heard about that wrinkle yet.

[00:25:20]

A: Well, if you look at the old X-rays, some of them, like, say, AGFA was especially. AGFA had a brown base. So when you look at AGFA, it looks brown. You look at Dupont and G.E. I think Kodak was more of a blue base. Dupont might have been a blue base, too. But it has, the look of it, the background look of it looks blue, versus AGFA, which is a brown base. And those were kind of the major two, the blue base and the brown base. And it's just the look of it. And brown base to me also looked muddier. Blue base was much clearer, had kind of a clear look to it. Like, you say, if you look at a light and it's a blue or brown base, it would be the same thing.

Q: And the different color bases didn't necessarily impact the quality of the image, it was all down to radiologists' preference for the color?

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A: Not necessarily, because there were other things that they did. There's other, they had different like, HD's. They had high-definition film that would be only for mammography. But the preference would be also the brown versus blue. And so, once radiologists were used to looking at blue base mammography, and it is, to me, it's much clearer than brown base.

Q: So with buying equipment, too, for an imaging center, were you kind of expected when you were buying the equipment, was there any sort of expectation or understanding that you would equipt the clinic? That you would be locked into one manufacturer's specific ecosystem?

A: Sometimes, because most of the time I was okay, that I could suggest. Again, I worked with one radiologist who, he was the person I'd go to. He would be the person I'd go to for equipment, things like that, unless a radiologist was on the board of one of the manufacturers. And that would be more of like a CT manufacturer. We had a radiologist at that time that was on the board of G.E. And so, we would get through all these things and we'd find a piece of equipment that was, hadn't-- say, if they'd had speed like a CT with more speed, timing and that kind of stuff was better than the one for the equivalent price from G.E. And so, he would push the G.E. because he's on the board. That was the things I'd run into. That's all politics, you know?

Q: Of course. Those can get messy, so we'll leave that alone. So 1999, you moved to the East Coast and Lorad comes looking for you, essentially, right?

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A: Yes. They wanted me to apply at that time. And I said, "Well, I would just do a training or the training I would do part-time. And if they needed me to go train on the equipment, I would do that. So for the first seven months, I trained on the equipment. And then manager of the, it was called applications at that time, the manager of the applications department quit, was going to quit. And so they interviewed six people. And I didn't want to be interviewed for it because I didn't want to manage people, because I'd managed a bunch of people before and [00:28:56] and I just didn't want to go down that path again. So then I found out who was applying for the job and I thought, oh, I've got more experience than they do, so I applied for the job and got the manager's job.

So I started managing the applications group. I think there was 13 of them at that time. That would have been 19-- I started in October, so that would have been 2000 because, let's say, June of 2000, because I did applications for about seven months or so.

Q: So what was the day in the life like, in that position?

A: Again, we were still analog. I mean, we were still film based. So it was training. It was making sure that we had worked with sales to get the equipment out. And at that time, I started to work with the-- at that time, they were starting getting into digital. They were still analog. So I would go in because of the applications job I had. I'd go in and listen to the engineers and things like that. But it was mainly with 13 people. We had one person international and 12 in the U.S. So it wasn't like, we had a lot of equipment going up, but not like anything like it got to be after a while.

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So it was managing that, managing one person who scheduled everything, working with sales because the end of the month comes and sales wants, you know. It's just kind of working with that stuff. And then working within the department on applications and how they interact with the engineering department.

Q: So you were essentially learning the new technology as it was being developed?

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A: Well, then I went into some of these. Well, then Hologic bought, Hologic bought us in September of 2000. And so, I just started the new job in June of 2000. So Hologic bought us and Jack Cummings became the President of Lauren at that time. And then, dealing with Trex, before Jack came in. Trex was owned by the president and the COO., I think. They were from Picker and they were from Picker Service. And so, they really didn't have the background or the knowledge. So I would go, with the COO I would go in and sit with him on conference calls and things like that.

And they'd him a question or like, on an investment call, they'd ask him a question. He turned it on mute and he'd ask me a question. So they just didn't have experience at that time. Again, they were from Picker Service. I dealt with all these different service ones in my clinical life. I dealt with Picker and G.E. So I knew a lot of the things going on.

Q: So you were able to keep them in the loop, so they understood everything that was going on.

A: [00:32:27] . I don't think they were there that long. I mean, when I started, I don't know how many years they were there. They weren't there that long. The Lorad was run by this one guy for a long, long, long time. And then, when he retired, they came in. And it wasn't that long I don't think. And I don't know if Trex fired them. I don't know for sure.

Q: But then in September of 2000, Hologic comes knocking and buys you.

A: Right.

Q: And at that time-- let's see how straight I have my story, is they purchased Direct Radiography Corp. first. And that was a company that was smaller than Hologic. But then they bought Lorad and I believe Lorad was almost the same size as Hologic.

[00:33:15]

A: Yes, probably.

Q: That they doubled the size of the company overnight.

[00:33:20]

A: Yes, yes. Jack was the one that negotiated all that stuff. And I think part of his negotiation was he wanted to then be the-- wanted to run Lorad.

Q: And that's what sort of turns Hologic at that time into a three-pronged operation with the facility down in Glasgow and then Danbury and Boston. So what was that like, working at a company that had just changed that much seemingly overnight?

A: I was actually glad, because I didn't like the way it was going before, the management, things like that, so I was glad. And every one of us had like 15 minutes for an interview with Jack or to talk to him. And he asked me if I was going to stay, because I think some people were going to leave. And he asked me if I was going to stay and I said, "As long as I'm having fun, I'll stay." So that was my 15 minutes. To me, it was because of Jack that the company did what it did. I mean, he was, not everything, but he was one of the major players.

Q: So would you say he was responsible for keeping up that company culture?

A: No, no. He changed. He changed the company culture to begin with. I mean, all the people that were there previously, the management, they all left. He as different, totally different type of person.

Q: So he helped company culture of the better?

A: Yes, yes he did.

Q: How so?

[00:35:10]

A: Well, say for instance I was going in and I was responsible for applications, of reaching applications people. And then I had to in and listen to the engineers developing a new piece of equipment. That would be our first digital piece of equipment. And I went to Jack and I said, "They're doing it all wrong." Because I'd been in the field 30 years at that point, worked on all this equipment. I managed people that worked on the equipment. I'd managed the equipment and I said, "They're designing it all wrong." And he's like, "Well then do something about it." And I said, "I can't. I'm responsible for applications." So he made me, okay, so now you're responsible for product management. They had no product management. It was all engineers that were designing it. So they had no clinical, they had no product management or clinical input at that point. So Jack's like "Well then I'm adding another department for you." I was the only product manager at that time so it gave me some ability to then speak up about what I thought about the equipment.

Q: So he was not afraid to empower his people when they knew what they were doing.

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A: Right. I think the best thing, one of the best things, about Jack and I've said told this to a lot of people, is that what he did is he took a group of people, not a lot of people. But he took a small group of people, maybe five to seven people, for their experience and what they could do, not your pedigree. He didn't care if you had a Ph.D. or an M.D. or whatever. Or a masters. He just didn't care. He cared about how you could get the company moving forward with-- basically, help the company move forward with your expertise. He was more interested in your expertise versus your pedigree, which I've read, sometimes is a way some of the companies have gone who really move fast. And so he took a small group of people and worked with them to help him build the company.

Q: Clearly it worked very well. So what was going on in the development of the imaging machines that you felt needed to be changed or done differently?

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A: Well, when we go back, I think at that time there was, they had bought Bennett. And Bennett was their-- they actually bought Bennett, which had a digital system at that time. It

was a small detector. And I think they actually got it FDA-approved, but they never sold it. So anyway, they bought Bennett at that time. That was a small detector. So there were things like that, what they were talking about, going with a small detector and different kind of controversies on what to do. From my medical, from my clinical background, I knew that in the area I came from, 30 percent of the women have large breasts. You have to use-- there's 18 by 24 film there was, and there was 24 by 30. There's two types of mammo film, 18 by 24 and 24 with 30. So if you went with an 18 by 24 detector, and that's what the Bennett was, if you go with the 18 by 24, it was a different technology, too, which wasn't as good a technology. So if you go with the 18 by 24 detector, you're leaving 30 percent of the women out.

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And so that was one thing that I thought for was the detector. How they're building the equipment, because none of them had ever worked on the equipment. So how they were building it at that time. And what they basically did is, they took an analog system and made it a digital system, for the very first one. So it was modifying what they had. And I think G.E. did the same thing. Most of them did the same thing. To get to the market quick, you just took the detector, or you take the piece you have and modify it, which kind of limits you on what you can do. But that's kind of what they were doing for their first digital machine. So that would be Selenia, the Selenia system.

Q: Were you involved with the development of any other imaging machines?

A: Anything with mammography would be the, like the biopsy equipment, the work stations for radiologists workstations. I was responsible for all the equipment for mammography at that time. So anything that was developed for mammography from 2001 to 2011, not necessarily me at that time. I was the first one to begin with, then we added. It was the team, product management team, that was responsible for all that design through those years. We had to sign off on everything.

Q: In order to sign off on a product, what sort of criteria would it have had to meet?

[00:40:32]

A: Well, I was always watching out for the patient. I was kind of the advocate for the patient. And the engineers, it wasn't that they didn't care about the patients, it was that they were more looking at the bottom line. How they could get it out quickly, the bottom line, what they thought was the best. And I would watch out for the patient. So that was a challenging time. So we'd go round and round and round, but I had to sign off on a lot of things. There were certain things with the detector that they were going to do to save-- because they get wasted, detectors and things like that. So that costs a lot of money. So they would want to do different things with the detectors and I wouldn't off on it, because I thought for the patient it wasn't a good idea.

Q: Is that more, sort of, like the example you've already brought up before about using a detector that was a little too small.

[00:40:32]

A: Well, no. That's part of it, that's nothing. But like a detector, say, you have stitching lines. I don't know if you know much about detectors, but there are TFT's and if you have a bad line, then you can take two lines and stitch them together and that kind of stuff. They were looking at different ways to maximize the detector usage. And I just wouldn't go there because you're dealing with microcalcifications and I just felt that the patients would be impacted if we did that. That's an example. Most of the stuff I'd sign off on, basically because it was developed by the team and the engineers together.

Q: So you're talking about back at the time when they were still having to tile together smaller displays to make a bigger one.

A: That's G.E. That's not Hologic. Because we had the larger detector, we didn't tile like that. Because G.E. was the 18, 20, well, 18 by 24. Theirs might have been a little bit bigger, but theirs was a small detector. So if they had a large breasted woman, then they would have to tile. And we very rarely needed to tile because we had a large detector, what was big enough for most women. We very seldom had to tile.

Q: So one of the things that Hagley is trying to make part of its bailiwick, too, is a history of intellectual property. So to that end, do you hold any patents yourself?

[00:43:13]

A: I hold like, there's 24. But a lot of them are derived for the same one. I have like 24 patents, but they're all-- well, I have one in the workstation, the more mechanical patents.

Q: Can you walk me through some of the ones that might be what are your favorites?

[00:43:38]

A: I think the main one is-- because, and this goes back, because we had a small or large detector and in film base, you have your choice. You have a small bucky, they called them buckies at that time. So you have a small bucky or a large bucky. So if you had a large patient, you'd put the large bucky on.. You had a paddle that actually matched the large bucky, or a small with the small paddle. So now you have the large detector and you have a small patient and a small paddle. What do you do? So I went into the room with the engineers and my scheduling. She was a technologist. She went in and I positioned her and I basically said, "You have this large detector and you have a small breast and you have a small paddle."

For the CC-view, which is like straight down view, it doesn't really make any difference because you're in the center of the detector and you can bring the paddle down. But when you shift the detector to 45-degree angle where you do what they call a medial oblique view of the breast, I don't know if you know of any of this stuff. But you have to kind of shift the detector, so you take an oblique view. You take a top view and an oblique view on every patient that's screening, basically, on both breasts.

So when you shift it, okay, so now your paddle's like in the middle of the breast. And you've got small palomilla breast, but the breast is way up to the top because the breast is small and here you've got this larger detector here. So we had to figure out how to compensate for that. So I said to them, "Shift the paddle up to the top, so that it matches what the paddle would on the bucky in film. Shift it up." And then you would have to shift also the collimation. You'd have to shift the AEC, which is the automatic exposure. It tells you what the exposure to use. So you have to shift everything to compensate for this detector, the large detector, for a small patient.

[00:45:58]

And it was shifting everything. It was shifting the paddle. It was shifting the exposure controls. It was shifting the collimation. That all had to be shifted. And I didn't know how to do it. I could tell them, I could say explain to them, what, for example to do the image, what you needed to do, but not how to do it. So then they go and figure that out.

Q: So you had to sort of communicate and then go backwards and forwards.

[00:46:33]

A: Right. So I just back to film. I knew that film could accommodate the size of the breast, but we couldn't now. So then, I had to go back and take from film, put it on a large-- and I think we actually didn't have a detector at that time. We just used a large bucky because we only had film. So we used a large bucky and a small paddle and just said, here's what you got to do to make it work. Here's how much you have to move it and make it work like the same as the film. So most of the things that we went-- we went from analog to digital, was the accommodate everything we did on film to make it work. So that was the first one I did.

Q: Were there any other really difficult challenges at that time?

A: Yeah because we had a-- say, now you have no view boxes. There's no film anymore. So before you'd take a mammogram, you'd go into your outer darkroom. You'd put the film up on a view box. The radiologist will look in a view box and look at the film. If he did a biopsy, he'd look at the film. Well, there's no film anymore. So what do you do? So then we had to devise a way to-- so I said, "Well, you know, we've got to devise a way if you're in a room doing an ultrasound or a biopsy of some sort or even just an additional image, you're out in an outer hallway looking at an image." There's no film. So we had to create a digital means to look at film, to look at things.

[00:48:13]

So we created a small little workstation with a small screen-type thing, computer, that could be in the rooms, that could be in-- wherever you dealt with film, you had to have a small computer to look at a digital image. That was kind of the most challenging thing. And then, how do you move it? How do you move the images from one place to the other? How do you store them? You don't have any film jackets anymore, is like figuring all that out. And I could explain how to do that again. I'm not the engineer, so I'd have to say to them, "This has got to

move from here to here. It's got to be displayed on a computer. It has to be stored. We can't lose any data on it." And they'd have to figure out how to do it. So I was basically the workflow, the workflow of the department because that came from my background. I knew how the department worked. I knew the workflow. I knew the technologists, how they worked.

[00:49:12]

And so, that kind of was one of the big challenges that we had at the beginning of going from analog to digital. And then, working, we worked in workstation for 10 years, the radiologists. The radiologists had to have the tools and everything to work in a workstation, because it wasn't only equipment, it was everything else around it.

Q: What did you do if you had to print an image then, too?

A: Well, you could still print. You'd print it off the computer like you do anyway, like you print off your computer right now, you'd have a printer. And then you could print a film. It would print on the film. Or we could do-- then later on-- at the beginning, that's what we did. And then later on, it got to be like DVDs and things like that. CD's, DVDs and things. And then you can, I don't know where, you put them on drives or hard drives or something to move images if you wanted to take them to a different hospital or something like that, so that's when you would do that.

Q: That makes sense. So what was it like then to teach radiologists and technologists how to use all of this new equipment?

[00:50:31]

A: Well, the one thing that I had to do [00:50:37]. They wanted me to come up with a workstation for the technologists. So you take an image and what does the workstation look like for the technologists, as far as taking the image? I went to Jack and I said, "Well, the software engineers want to know what it's supposed to look like." And he said, "Well, you figure it out." And I had never done this before. So I kind of went back to my days of working with technologists. CT was already digital. Ultrasound was already digital. And the mammographers who did not want to be in the digital world or the advancements like that,

they would go to mammography, because they didn't have to deal with digital. They didn't have to deal with computers. So they didn't have to learn all that.

[00:51:22]

So I thought, well, I've got to be able to somehow get them to move from analog to digital. So what we did is, we designed an interface, a user interface, that looked exactly like their film system. So when we were teaching them, or if I was trying to sell a piece of equipment, I would say, "Well, you know the M4 you have," which was the most used piece of mammo equipment, you know, the M4 you have. "Here's the screen. Behind that screen is like all these things. Here's your icon for that. Here's all this stuff." So we made it look exactly like their screen film system. But behind that, we built the digital capability. So it allowed them to transition without being freaked out about a computer.

[00:52:10]

So that's kind of one way. Because I just thought back, and it's like, well, how can you get them to adopt? Well, make it make user-friendly. Make it something they're used to, and that worked. For the first generation we did that. And then we changed everything after that.

Q: So did the transition to digital prompt a lot of people to retire at that time, too?

A: I don't think so because we just made it as easy as we could. And again, because I found out from working with technologists over 30 years, you know, that there's certain things you have to do to make them want to do certain things, to adopt certain technologies and things like that. So that's kind of what we did. We just did it the easy way we could. And then we trained that way, we trained them. It was a hard going from analog to digital for them, it really was. But I think the harder part was the movement of film. I mean, it was even hard for me at the beginning, a digital world and learning PAC and things like that.

[00:53:26]

I no idea what any of that kind of stuff was. So it was hard for them to understand. So at the very beginning, going from analog to digital, there was a big learning curve for the applications group to train them. Because they're used to not having any film in their hand. At the beginning, they would use the old film because it was there. They didn't have any

digital films. So they'd put up the old film. You'd have D box, just to look at it. And then you'd look at the digital right next to it and that kind of stuff. So that was kind of a learning curve at that point, more than you want to know probably.

Q: Oh, no, no. No, that's exactly what I'm curious about, is how do you teach someone how to do something? Especially if they're resistant to it? Even though it is, it can do a lot better.

A: Right. You have to make it intuitive. I'm the type of person when I look at a computer, I don't read a manual. It has to be intuitive and I just work my way through it. So I wanted that to be what they would do. It would be so intuitive from their prior equipment, or their prior life in mammography, that they would be able to move through it quickly and easily. And so, that's kind of my mindset when I was looking at all the stuff and all the software interfaces. That was kind of all in my mindset.

Q: So what was it like to develop a training course? How did you know if it was going to be an effective course?

A: We have two steps. We went from analog to digital and we went from digital to tomo. So we had two different steps. So the first step, going from analog to digital, you develop a course that identifies the gaps, and how they transition from analog to digital. You had to train them that. We had to set up a course for the radiologists on how to use a workstation. We had developed a work station. Because when digital came along, there was no way-- hospitals had PAC systems. They all have their own PAC systems to archive their images and that. And they had them for CT. Because everything else was digital already.

[00:56:07]

But now, all of a sudden, here comes mammography along. There is no tools on their workstations to deal with mammography at all. And their PAC systems couldn't store mammography. They couldn't store them. So you couldn't store the images. You couldn't read the images. So we had to develop our own workstation and our own archiving system for the first few years to handle that until they got up to speed, until the manufacturers got up to speed.

[00:56:38]

And we worked really closely with the radiologist on developing that workstation because they're the ones that were working on it. So we worked really closely with them in developing the workstation and setting up the training for that, for that into analog, from analog to digital and for hanging protocol. Because we had to have different ways they could change their hanging protocol. Everything was changeable on what they wanted in the workstation. And we worked really closely with the radiologists. We had advisory boards. We would meet like four times a year with radiologists. We'd have workstations there and they would work on the workstations. And they'd say, "Well, this needs to change, that needs to change."

[00:57:22]

And we'd send out different product managers to deal with radiologists on what they wanted to see. Because we could only do so much when it came to the workstations. And then they had to be able to move their things around. They had to be able to adjust and we had to adjust to them. And so being a small company and [00:57:40] bureaucratic levels, we could move quickly. We could really quickly on changes, which made a difference. Like the G.E.'s of the world, or the Siemens of the world, they couldn't move quickly because they had all this set-in bureaucracy that you have to go through. We didn't have that.

We were product management. There was product management and there was corporate marketing. There was no big product marketing group. We did our own stuff. So we didn't have to go out and take surveys. We do have to like, all this kind of stuff. We just worked through it and worked really closely with a technologist and a radiologist on, once we got the equipment up and going, so they could advance it. That's how the training would come about. We worked really closely with them, and we knew exactly what needed to be done. And then, eventually, when tomo came along, that was a whole different story. But going from analog to digital, that's kind of what we did.

[00:58:43]

And then there's also the images, too, what the images looked like. I worked with one particular person down at Delaware who did the image processing. He was a medical physicist, did the image processing. He would send me images. I'd take a look at him. Once

they get to a certain point, we'd send them to the radiologist. So kind of working through that, so it's like every aspect.

Q: Do you remember who that was down in Delaware?

[00:59:14]

A: James was his last name. He was the one that did most of the medical physics as far as anything with the X-ray tubes, anything with medical physics. He was the one who did it. And then he would work in image processing and I would work with him on image processing, actually all the way through tomo.

Q: Which was a more challenging transition, analog to digital or digital to tomosynthesis?

A: They both have their differences again. Again, when I explained the analog to digital, that was just because of the different technologies. Now you're dealing with something that you have to sell the radiologists on, that it works. And the other thing, too, is we built a piece of equipment from the ground up. The other one, we modified analog [01:00:26]. Now we're building a piece of equipment from the ground up so it would do what we wanted to do. And then we had to, again, modify the workstation to make sure that it could take care of tomo. We worked a lot with radiologists on what they wanted to see. It was just all the images that we had. Now we're moving tons of images, tons of data versus like one image for each breast.

We're moving tons of data for each breast. So you had to handle all that, how to move this, how to store it, then training. We had to get it through the FDA, because the FDA didn't really take kindly to us at the beginning because it was a brand new technology. So we had to work real closely with the radiologist and how you transition from digital to tomo. What the images look like, how you store them. Can you do it without digital images? Then, can you do it without taking any digital image at all, only tomo? I mean, it was just like one thing after the other. It was steps. And then, working the FDA.

[01:00:26]

So once the tomo system was finished and out there, I was moved into tomo training, to set up tomo training. So I still had the applications group, but then the product management then went into marketing. It got more into, if you have an MBA and a marketing background type thing. So they were running everything and then I moved into-- they disbanded that whole group and I moved into training for tomo.

Q: Most of the training programs that you worked for, would have been strictly with tomo?

A: No, all of them, all the way up. I was responsible for training from all the time I was at Hologic.

Q: Okay. So what were some of the challenges of devising a training program?

A: I would say, I'll go more with tomo because training for tomo is, there was no training. There was no training at all. I mean, the radiologist had to learn how to read all over again, how to read something very different than what they had. Technologists, not as much, because we try to keep the workstation and everything pretty much, they just have to learn the nuances and things like that. It was really the radiologist that had the major step in the differences, because tomo is so different. Basically, once they did the FDA-- well, before we were doing research and that kind of stuff. So we did the research and the FDA research. Then we would work with MGH. We were working with Betty Rafferty at MGH and Sally Freedwell.

[01:03:47]

And we'd work with some radiologists on training. And they would read the images and they would train before it actually went live. We started training and then, the radiologists really were trained by other radiologists. We couldn't train them at the very beginning. I mean, there's not us training, because we're not radiologists. But we would work with the radiologists to set up the training program. So a radiologist would train a radiologist. And I worked with the FDA. It was my responsibility to set the hours of training for tomosynthesis with the FDA.

[01:04:26]

So I'd set it at eight hours for the technologists, eight hours for the physicists, and eight hours for the radiologist for the training programs. And this had to be done worldwide, because tomo was in Europe before it was in the US. So we set up a training center in Boston. We set up a training center in Hong Kong, a training center in Belgium and a small one in Australia. And this, basically, was to train radiologists on how to read tomo. That was the main thing. Because it was a whole new deal. It was not mandated in Europe. You didn't have to get the hours in Europe.

But they didn't know how to read it. And if they don't know how to read an image correctly, the technology will fail. So we wanted to make sure that they read it. So we worked with radiologists all over the world to set up training courses. We were responsible for the software for the training. We were responsible for the setting everything up. So we had a group of people that set up the machines, made sure the software was on there. And then a radiologist would come in and train everybody. And when we were selling hundreds of systems, it was quite a feat to train everybody.

And there was an issue at one time, that one of the radiologists wanted us to do 16 hours of training for the FDA. And I'm like, "No," because they'll never do it. And you don't want to put something on somebody that they're not going to do, it's going to fail to begin with. And so, we did eight hours. And then, there was updates. If they were having problems, we'd have them come back for free to have another training class or another update. So that was the hardest part, training the radiologist. And they were resistant to it, also. You know, they're like, "We have all these images," so we worked really closely with them, mainly on the workstations and the images.

[01:06:31]

What the images will look like, if we could get rid of 2D, not have to do-- and the radiation. The radiation was a big to-do, also, the amount of radiation you get. Because at the beginning, they wanted their 2D image and they wanted their 3D image. So it's double the radiation. So we had to get through that. There was a lot of hurdles we had to get through when we went to tomo, for acceptance purposes.

Q: Right. And I know working with the FDA can sometimes be a fraught pursuit.

[01:07:04]

A: We had a group that met every-- I wonder if it met, like, once a week we had a group of us that met at Hologic. And it was from every aspect. It was from the research group to the engineers, to the image processing, to myself. We met every week and to go over all the issues and all the problems we were having. And then, one of it was dealing with the FDA. That was more, mainly, Lauren did a lot. Jane wrote a lot of the stuff, between Lauren and Jane. I did the training. We had to do the training. But basically, the training was basically just saying, "This is how we're going to train." They didn't have to see your whole training thing. They just wanted an outline of how we trained and the amount of hours we required. We didn't have to do that that much. But it was up to Lauren and Jane, Andy, Jay, you know, that group that did the FDA submission and things like. We just only had to do a certain part of it.

Q: Right. But I do understand that the FDA does, to a degree, regulate what you're allowed. I'm trying to think of phrasing, the FDA does regulate to a degree what sort of claims you're allowed to make within your training material.

[01:08:28]

A: Correct. You can't claim anything that hasn't been proven. So therefore, they've gone back. I don't know how many times, because I've been gone for six years. But they would go back and apply for something else or do another research study or something like that. They'd have to do research studies and do another thing to make sure that they could claim something. Because that gets to competition. Your competition will claim one thing and so they would go back and try to say-- because we got approval for 2D, 3D together at the beginning. You had to do both at the beginning, because that's the only way you could get approved and we were the first ones to get it approved.

So you had to do it together. And then, we wanted to do it so we didn't have to do 2D. So you have to keep going back. You have to create what's called C-View, which is a digital analog digital image type of thing. It's just steps that they had to go through to appease the FDA with the radiologist. Because it was a big, big learning curve for the radiologist. It's like going from film to see CT, doing CT. You're seeing a lot of different things.

Q: Can you compare and contrast what it would have been like working with the FDA versus international regulatory bodies?

[01:10:00]

A: International is easy. We got approval for them pretty fast again. Again, that was all Lauren who worked with that. But that was-- we probably had FDA approval internationally. I want to say, maybe two or three years before we did with the U.S. I want to say it was like 2009 that we got approval. It was 2011 before we got approval in the U.S. It was a couple of years, because there are huge clinical trials here to prove the technology. They don't over there. They do, again, Lauren would be better to speak to that because they do a lot less than what we have to do. It's a strict, stringent, their rules and regulations are much more stringent in the U.S. than they are internet and to the rest of the world.

[01:11:02]

But we had an applications group that-- the rest of the world was basically run out of Belgium. So I had a group of people that worked in Belgium that traveled all over the world to train the technologists, the radiologists and the physicists. Again, along with a radiologist that would go. We had training meetings. We would train them how to work the equipment. We trained the radiologists how to read equipment. We couldn't train them, because we're not doctors, we couldn't train them on how to read. So then, we would have seminars set up. And they were not they were not required to take them. But we strongly said, you really need to take and we kind of-- we didn't force the issue because you can't. But we did a lot of trainings in all different parts of the world dealing with the dealers and the radiologists. And we did, we trained people all over the world.

Q: What do you think made them willing to come and sit through extra training that they weren't required to?

A: Because I think it's so new to them. They were looking at images. Instead of looking at one image, you might be-- the images for the size of the breast is how many images you get. It's like one-millimeter slices. So if your breast is five centimeters, they were dealing with 50 images versus one image. And I think they didn't know how to read them. It was too foreign

to them. And I think just being doctors, they wanted to be trained on it, even though it wasn't required. The dealers that we had at that time, we had really good dealers all over the world. We had to train sales and we had to train dealers.

[01:12:51]

The applications group trained the sales also, and so did the education group. So we trained the dealers really well and a lot of them eventually bought their own training equipment, because we set up several, I don't remember how many workstations that training groups owned. But the dealers, finally some of them, brought their own network stations and set up their own training with the radiologist. And we'd take a look at it to make sure the training was good. They'd send it to us. And it got to be, they would push it, too. Because if the radiologist is not happy, it's not going to buy another piece of equipment. So they would push it, too. So it gets really back to making sure they're trained right, so that the equipment is used correctly.

Q: So is there one procedure or technique that's much more difficult to teach someone how to do properly than any other?

A: Probably the biopsy, when you're doing biopsy. Because once you take an image on a tomo system, say you do screening on tomo or digital, you do a screening. And if something comes back that's not normal, you have to figure out what to do with it. So either extra views, which all has to be built in, or you have to biopsy. It's difficult to biopsy on a digital system versus a tomo system. So we had to devise a thing, because you're looking at different things. So we had to devise an add-on piece of equipment on to the tomo system. Or there's a table. We have a table that you lie down. You have to teach the technologists and the radiologists how to use that equipment, how to set it up and how to do the biopsy.

[01:14:55]

Technologists really train them on how to do the biopsies through the training applications group. Because you have to teach them how to use a piece of a piece of equipment that actually takes a core sample of the beast. So to me, that's much more difficult than teaching them how to run the X-ray machine or the machine itself.

Q: And then did the trading vary, whether it was standing biopsy table or laying down table?

[01:15:32]

A: Yes, there's different approaches that you go in. And the biopsy table, it might now, but the biopsy table at that time didn't have tomo on it. I think they came out with a new one maybe a year or two ago. So the upright one had tomo on it. So you could take a tomo screening and figure out where the lesion. We're finding 40 percent more invasive lesions than we did with digital. So that means they're very difficult to see. So you can't just take a digital image up there and see the lesions. So the upright one did a tomo to find the lesion. Then you could you could biopsy it. So that was kind of the difference. And again, I think they might have tomo on the table right now. I'm not for sure.

Q: So essentially, your increase in what you could pick up meant that you were picking up small lesions?

[01:16:26]

A: Yes. Actually, my sister-in-law just had one and she was, on our system, six millimeters. That's like quarter of an inch they picked up. That's when they're really small. So it makes a difference. To me, and I think most everybody at Hologic say the same thing, it's much better than we thought it would be. We didn't really realize it would be as good as it is.

Q: That leads me to a question that I was planning to ask more toward the end of the interview, but I think we're at a good point to ask it now, which is, what did it feel like to be part of something so important? Did you ever experience an ah-ha moment during product development? Where you or your colleagues recognized that you'd created something that was going to impact so many lives in the way that it has?

[01:17:39]

A: I'd never experienced anything like this. And this is sort of like a once-in-a-lifetime thing for most people. Digital was one thing, but when we went to tomo and were able to see the small lesions. And even on fatty breasts, we would, which normally on fatty breasts you can see everything they say. When we found a lesion on a fatty breast that you couldn't see with the digital and it was in Europe. And so, from then on, a doctor would go, "Well, I'm only

going to take it in my dense breast patients. I'm not taking on fatty breast patients. I'm not going to use it on that." And I would pull that image up and I'd say, I'd just tell them, "Look at the digital image. You don't see anything. The tomo, and it's a fatty breast. You can see a lesion there." So that, and another image where we could see a lesion on one view. Our competitors at that time were only doing one view. They were doing the oblique view and we were doing both.

[01:18:54]

The oblique view, we couldn't see anything; the top view we could see a huge cancer. So it's those moments like that, that are like, wow, that's just with tomo, to create the tomo. That was what was amazing. I think another thing too, is when I was working in the workstation, Jing was on the phone. We were dealing with, he wanted me to look at images and things like that. So I was like scrolling through things and scrolling through things. That's one of the other patents. And I was kind of scrolling and making this, you can take one slice, one millimeter, and you can make it bigger and bigger. Would you look at that? And I went all the way up to the top and I'm like, whoa, you can look at everything. So then they thought about taking the tomo image and make it into a digital image by stacking it somehow. And so, that was another one that was like, whoa, this could happen. Because just working on the equipment you could see these kind of things.

Q: So throughout all of this, did you ever have to deal with any insurance companies?

[01:20:06]

A: No, we had a whole group that did that. We would sometimes have to provide information to the insurance group, but we didn't really have to deal much with insurance groups. A lot of times they'd come to the applications group or something, or product management, we would just send them to the insurance group. And tomo was the main thing. Digital was not a big deal, but tomo was the main thing. So by the time of tomo, we had a group that did that.

Q: So for gathering information for how to change training and whatnot, what and how did that happen? Were you going out into hospitals and visiting? Or was this something that happened at RS and A every year? Or a bit of both?

[01:20:55]

A: For training information, it would be everything. We would learn something-- when you're training somebody, at the very beginning when you're training, you set up your training and you're training somebody and they ask a question that nobody's ever asked. Or a radiologist, at the beginning, they don't know. We never trained them something. We never taught them something at the beginning. It kind of evolves, usually. You try to do the best you can at the beginning. But it's ever-evolving. And again, that's why I'm saying, with a small company like we had we were not able to change things a lot to meet the need. And, again, we could change it really fast.

Q: Were any of the training courses that you developed online instead of in person?

A: When I left. I think they started a year before I left and we were putting together a digital training course, a digital tomo training course, because they had to have the eight hours. And it was just getting to be too much. And we were putting out so much equipment that, like, say the radiology group I was working for. We installed a piece of equipment, but you might have to train 15 to 20 people for that one piece of equipment. So it was getting unwieldy on how to train everybody. It was getting expensive. So before I left, I set up a group to develop online training, which they have completed now.

[01:22:28]

And so, we were working with our manufacture out of Germany who manufactured the workstation, because we had to have the software that now worked online because we're training the radiologist. When you train a radiologist, you train him to work on a workstation and look at images and manipulate the images and that kind of stuff. We now are training on a computer. So we had a set up software for the computer that would work on your computer and you'd be able to do the same thing as you did on a workstation. So that was really complicated. Kathy Wilson, she's the one that was responsible for that. She was the one that did that.

[01:23:06]

And she worked with the radiologist. She worked with the manufacturer of the workstation to put it all together. It wasn't finished when I left, but it has been finished since.

Q: What were some of the toughest calls that you had to make?

A: In the industry?

Q: Hm-hmm.

A: I had one in my medical field that was a toughest call I ever had to make. But I think, how to design the first digital workstation, when I was put in charge of designing the technologist's workstation and I had no background in how to do that.

Q: What made that so tough? Was it just the idea of having to absorb so much knowledge so fast and then translate it?

A: Yeah, it was. Luckily my mind, my mind kind of works in a square. So I like to put everything together. And I was working with a software engineer, too, that would send me prototypes and we'd try them and we'd go back and forth and back and forth on the computer just trying prototypes and seeing what we could do. That was probably one of the challenges. When I had to set up a training course for tomo, it had never been done before. Nobody had training courses for tomo. Nobody had training centers. Nobody had training courses. And so, there were just a lot of steps along the way. When it went from one technology to the other, I was sort of flung into it. Like, here, figure it out.

[01:25:13]

But I had a lot of great people, that's the main thing. If you have a lot of great people that can do what needs to be done, and they're all technical, all the technical people.

Q: So have you been involved with any other major advances in medical imaging?

[01:25:38]

A: I'm doing some consulting right now, just for an ultrasound, breast imaging ultrasound software. I have been for the last five years. But I really can't say too much about that, because it's a start-up company. So I'm just dealing with that. I have gone-- the former COO of Hologic, since I left there. He left there, too. He now works for Phillips. But he sent me over to Europe to look at their latest product to see, give my opinion and what I thought it would fly or not, their tomo product. That was probably about four years ago, to look at their tomo product to see what I thought of it. And to talk to the engineers about it. So that's kind of what I've been doing.

Q: To your knowledge, has Hologic always considered itself a women's health company?
[01:26:48]

A: Yes, the first so many years we did. We actually called ourselves a woman's health company. That was actually like our logo type thing. Then it got to be kind of a thing where they didn't want it. But that was long after we were well on our way, well established. Then they got into cytology. They bought Cytech, so that's cytology. So that's everybody. And I think that's kind of when it changed a little bit, is that, now you're into cytology, which is everybody. And then they bought, what is it? It's the one in California. Again, that's all genetics and DNA. And so, it gets away from the women's health. Because the woman's health was basically bone densitometry and mammography biopsy, that stuff. It was the Lorad, Hologic original group.

Q: So what parts of your career would you say that you're most proud of?

A: I think the development of the digital and tomo, both. I mean, that whole career. I mean, I never thought I would, because as I said, I was in the clinical field and then getting into this and being able to help women. I had two really good friends who died of breast cancer. And so, my thing is, I would say to the engineers, "Would you want your mother or your grandmother or wife be done on this piece of equipment this way?" And then they would change it. You have to bring it personal to them, because they're not used to being in the patient arena. And so, it sometimes doesn't get personal enough with them. So I would try to bring the personal side of it in. And I think fighting for the rights of women to have the best equipment is really what I'm proud of.

Q: So is there anything that you would do differently if given a chance?

[01:28:54]

A: I don't think so. No, just thinking back, no. It was a learning process for everybody. Hologic was built basically by Jack being a CEO. He became the CEO in 2001, because the founder of Hologic died at that time, one of the co-founders, and so Jack became the CEO. And Jack is a unique individual. He's a visionary and again, like I said, he empowered people to do the job. He didn't micromanage you. He empowered you to do the job. He hired Rob Cashella and Rob Cashella was a COO. And so, Jack being a visionary, and I've talked to a lot of a lot of the people that work there feel the same way. Jack being a visionary, winning over doctors, having meetings with doctors all the time. He went over the medical communities is what he basically did.

And Rob staying at home and running the nuts and bolts of the company, to me, was that two best combinations that I think there ever could be. And not getting mired in the muck of processes. And I think that's what destroys these companies, when they get into process. You can't move fast like we moved with all that processes and the layers. We didn't have any layers. I reported to Jack for a long time. I reported to the COO for a long time. So it was just like, we had a whole group of people and we didn't have layers. If you've got layers, you can't move fast.

[01:30:55]

And all these processes, you just can't fix things fast. When you're producing a new technology, you have to be able to move fast to get that technology out there and work with the end-user to do it.

Q: Did that get more difficult as the company grew?

[01:31:14]

A: Yes. Because you got more ideas. We were built with clinical and technology. Technology being the engineers, the physicists, the clinical group. Our group and the product management all had either, we were all from the field. We were all technologists. I had a Ph.D. that did some of the image stuff. But we all had a technical background, all of us. None

of us had marketing backgrounds. None of us had business backgrounds. We knew the product. We knew the field. We knew the radiologists. And one of the things I've always said is, I know one of the questions you asked is if, how much user input you get.

And I had gone to a course one time that was put on by the business manager at Yale. And he said to me, "When you're creating a product, you don't do it from the start with user input at the very start, because they don't know what they don't know." So if you're creating a new product, they're not going to know all the things, because you're hearing it from everybody. You're hearing it from every part of the world. You're hearing all this input. So you design it from your knowledge, from the knowledge you're hearing. But you don't sit down with a user group to begin with, to begin a product. And that's kind of what they do in big companies.

We just created the product. And then, once we have like the full model of it going, we would bring the end-user in. And they would look at it and then they would give us, "Where do you put your hand?" You know, that kind of stuff. But when you're creating a new technology, they don't know this new technology. They have no idea of what to do in the new technology. And so, that's kind of how we design most of the equipment. We bring end-users in, when we get to a certain point with a new technology.

Q: And then how do you do the balancing act between that user feedback and what patients who are having, forgive me if I'm wording it awkwardly, who are having the equipment used on them, say?

[01:33:40]

A: Well, we listen to both of them. You get complaints, but the complaints usually come through the technologists, from the patients. You really didn't get any patients, a lot of patient feedback. It would come through the technologists or the doctors. And that would be more, the time they have to hold their breath, the compression paddle hurts, the way they have to hand put their hand. It's that kind of stuff. Patients usually don't complain a lot, unless it's like hurting them. And then you'd have to explain why it shouldn't hurt, but why you have to do so much pressure. And you train the technologist how to talk to the patient about why, the importance of what is happening. But to patients we would try to redesign the paddles to

make them much more comfortable. But patient input into a piece of equipment, there's not much. And it would come through the technologists, if anything.

Q: As I've seen the latest, or more recent designs with the curved paddle instead of just a straight bar of plastic.

[01:34:50]

A: Yes. That was quite a while ago that was designed.

Q: So looking back on all of this, what would you say was the most rewarding part of the job?

A: Again, I think just being there to give-- I think just being able to use my clinical knowledge to transfer it into products. As I said, I had 30 years of working in the industry and being able to take that knowledge, which I thought I would never do, take that knowledge and put it into developing new equipment. You basically don't know how much knowledge you have over 30 years until you start something new.

Q: So on the opposite side of things, what was your least favorite are the least rewarding part of your job?

[01:35:59]

A: As the company got bigger, dealing with the bureaucrats, things that were going on, different people and fighting. When we were developing the original equipment, we would discuss things to create a product. And it was a great group, but then as it got bigger, it was just dealing with a lot of people who wanted their own way on certain things. And you knew for the end product, it's just not going to work. And somebody might say, you got to do it anyway. You know what I mean? That was more near the end, than anything, things that they wanted to change.

[01:36:43]

I mean, it's not changing things that they thought they could do, which we tried hundreds of times to do and it didn't work. Things like that, that was the hardest, just the bureaucratic

process it started to go through. One time, this is just an example. I think it was Jack or Robert, somebody sent two of us to Siemens. And I was working with a guy who was the president of Siemens medical division at that time. And we were looking at them to help us with our workstations and replacing the images, the little workstations for the technologists and stuff like that. I said to him, I said, "Okay, so if the color of your workstations are beige, which is, you really need a dark color if you're going to put an image up there. How long would it take me if I'm a customer of yours to change that?"

[01:37:35]

He said, "You'd come before CT, MR, ultrasound, [01:37:40] medicine, mammo, and then there'd be you." So that's how you get things done in a big company. And I think that was one of the things that our company started to be.

Q: So I'm winding down toward the end here. I don't have much left on my list. What would you say the largest change to the imaging business was over time?

A: All imaging or just mammography?

Q: I guess we should be more specific with mammography.

A: Okay. To me, I think going from analog to digital because-- well, there's two different things. Analog to digital is the equipment and what you had to do to move an image, because there is nothing created to move mammo image, nothing. There's absolutely nothing to move to create a mammo image. So that had to be all created. I mean, everything, every workflow. We had no work flow from analog to digital. So we had to create the work flow. When it came to tomo, it was just a whole new technology. We had the work flow already in. We had the structure already built. I guess, to me, the hardest thing was building the structure for workflow, from my perspective for everything. And with tomo, it's still doing the training. Setting that all up was a monumental task, to train everybody in the world.

Q: So just a quick side one for housekeeping, with the eight hours training, was that considered a normal amount of training for a new thing?

[01:39:53]

A: Everything was different. With analog, with film, we didn't train the radiologist at all to film, because it was looking at film on a view box. We had to make sure that they liked the look of it. Do you like the look? Is too light, too dark, you know, that kind of stuff, we would do that. But with the training-- what was your question again? Sorry.

Q: Was the eight hour training time considered a normal amount of time?

A: Not necessarily. Every technology is different. And as I said, the FDA, for our FDA submission, we had to put the training hours in because there was no training set up for tomo. We were the first ones to be approved. So there was no training courses set up at all for tomo. So we had to come up with hours. I just came up with the eight hours for the technologists, eight hours for radiologists, eight hours for physicists. In analog, I think there was eight hours already but not for the radiologists and the physicists. There was eight hours of training already for the mammo techs, for the mammo technologists, but not for the radiologist.

So we added the radiologists. And again, like I said, some of the training radiologists wanted to put it at 16 hours and that was just too much. They asked me to set up the training, so I'm like, "Okay, here goes." And that seems to work. It seemed to work really well, after the fact. And again, they could always come back. If they were having issues, we'd suggest them to come back. [01:41:44].

Q: And was the training group-based or individual, that you could only train one person at a time?

[01:41:51]

A: It was group-based. We could train the radiologists how to run the equipment, the technologies how to run the equipment, the physicist testing you have to do. But most of them would go to physicist courses. Our service people would train the physicists. The applications group would train the technologists and the applications group would train the doctors on how to run the workstation. And then was a group session. We'd have these group sessions. We'd have them in the training centers. We'd have so many a month in the training

centers, where they sat at a workstation. They had a radiologist teaching them what to look for, going through testing.

Then they get certified that they trained for eight hours. So that's how we did it. And we'd have, like, the RS and A we had training. We had ECR, we had training. We'd set up training centers there, at the trade shows. So that's kind of how we did the eight hours of training until right now, as I said, they're online. And I really don't know how many people do online, I really don't.

Q: So was there anything that you might have expected to change over the course of your career that didn't change?

A: No, not really because, as I said, I was kind of thrown into this, which I didn't expect. I'm shocked that I can do it. You know, that I have the ability to do it, which was really a shock to me that, you know, you reach back in. But again, it's all from experience. When I worked in the medical field, I told one of my supervisors, when he was wanting me to do design an imaging center. He said, "Off the top of your head, how much is the equipment going to cost?" [01:43:51]. And I'd tell him, I said it was a gut feeling. He said, "No, it's not a gut feeling, it's experience." And to me, when it comes to the clinical stuff, experience is like the answer to everything.

Q: So that is actually the end of the list of written questions that I had. So this is, I guess, the last question and it could be the most important. Is there anything that I haven't asked you or that you wanted to talk about that we haven't?

[01:44:38]

A: We probably talked about everything. I'm just looking at my list here to see if there's anything else. Probably not. It's just working through every aspect of clinical and from analog to digital and then digital to tomo and everything around it, including the images and image processing that we went through, and how I worked with image processing. It's interesting, Jim would be the one that would create the image process. And then I'd have the other medical physicist look at it and then I would look at it. When they look at image, they look at

infantile little things on the image like pixels and all this kind of stuff. When I look at an image, I look at an overall image.

And it's probably because I've looked at them all my life. I looked at screen film and digital and so when I look at them, I look at it differently. I maybe look at it more like a radiologist looks at it. That's one of the things that, to me, it was fun to do, is to work with image processing. And then, as I said, we get it so far and then we'd have a radiologist look at it when it got to a certain point. That was interesting and that was rewarding to try-- to me, the rewarding was trying to figure out how you solve a problem that you have in the workflow or in the way a radiologist wants to do something. And creating a group of people that could do that, could put it all together. I know you talked to Kathy Pickett, too, didn't you?

Q: Yes I did.

A: She was in the group that I had. So it was people like Kathy Pickett. It was other people like Kathy Willison and Robin Hillman. It was all these different people that made it happen. They're the ones that made it happen, made the wheels turn. And it went from 13 to 124 worldwide. So they're the ones that that made it work.

Q: Wow, that's quite a jump.

[01:46:55]

A: Yeah, and four training centers worldwide. You're only as good as the people that are there. They all had their what they did. Kathy was training and Robin was training and Patrick Suvey in Europe was training. They all made it happen. We'd come together and we'd meet two or three times a year [01:47:23] with the group and what could we do better? How could we fix this? It was a great, great group and that's what made it work. From Jack, from Rob, all the way down. That's how we could move so fast.

Q: Anything else?

[01:47:49]

A: I don't think so, that I could think of. Jim sent me a big list, but I'm like, I think I covered everything. That's two, right?

Q: What's that?

A: Jim sent you a list, too?

Q: I wrote the list, unless he sent me his own, too. I don't know about that. And then oftentimes, I'll ask one question. But, you know, the answer will cover the next two or three questions.

A: Well, the other thing, too, I know he wanted me to say about the RS and A, is that, what we would do for the RS and A and for ECR is, I worked with Pam Cumming and Pam Cumming was in charge of corporate marketing. So what I would say is that, I would say, "This year for RS and A, let's, like when we first came out with moving images. This year for RS and A, our goal is to teach them are going from analog to digital and how we move images." Now, I'm not talented at all in any of that stuff. So then, she takes it and moves with it and she put a whole RS and A together on how to move images.

[01:49:03]

So I would deal with the equipment, make sure the equipment is there. I'd tell her what we wanted on our voice, but our message for the time is, she would make it work. So it was a lot of great coordination and working together to make all this thing happen. And then she did all our brochures for our products. And then I had somebody, I think Pat Hall was on your list to begin with. But Pat Hall was a really good writer and so she would take-- I wanted only technical specs in there because as a buyer, I looked at that kind of stuff. But they wanted more the flowery type thing.

[01:49:51]

So what we would do is, I would give the technical specs and Pat would work with corporate marketing to create a brochure, a beautiful brochure. So we would kind of do it that way to get the knowledge and the product out, things like that. So that worked well. This was before we had a marketing, we just had corporate marketing, that was it. We did our own stuff.

Q: A good co-grabbing for RS and A. I think I overlooked that. Were you involved in any other trade organizations?

A: Yeah, all the trade, like ECR. The applications group was responsible and the product management group was responsible for every trade show that we were in, to make sure the equipment was there, the training was there. And so, we had to represent the equipment. I worked, for a year and half I was the Executive Director of the Komen Foundation in Southwest, Florida. And then I was the President of the board, the foundation board for ASRT, where we would distribute money, donations and things like that, to further the applications training worldwide. And it was in all products, it was not just mammography. But my thing was mammography, so we would we would give money to technologists, to Radiologists Without Borders that was responsible for-- I was president of the board of that foundation for a couple of years.

[01:51:44]

I was on the board for like eight years, but that was great. And the training worldwide, a lot of times in certain parts of the world, would just send them a piece of equipment there and they're never trained. I mean, you send it there and they're never trained. Then they have no idea what to do. They've never seen a mammo image or anything like that before. And then, you expect them to do it. So what happens is, usually it's philanthropic that sends technologists and doctors to different parts of the world to actually read the images and train on the images. And train on how to run the equipment. And that's more third-world type countries that have problems like that.

Q: And your philanthropic work worked on bridging that gap?

A: Yes.

Q: All right, anything else you'd like to get on tape while the recorder is still running?

A: I don't think so.

Q: Well, thank you very much for sitting down with me today and I'll go ahead and shut off the recording.

END OF INTERVIEW