Oral History of Ann Hardy

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Recorded July 22, 2016
Mountain View, CA

CHM Reference number: X7849.2017

Brock: Oh, great. And I know our conversation, our last conversation, prompted some thoughts and reflections afterward. So I thought maybe we could hear from you about those ideas and reflections before diving back into the chronology.

Hardy: Well, just a couple very minor comments. And they come from my days at Livermore. And one of the things that we talked about, Livermore and STRETCH and the 6600 over there, and one thing, that if anybody ever writes up the history of STRETCH, I want to make sure the engineers who put the lights on the engineering console that had the address of Last Branch are the most ingenious people. Because it made debugging so much easier. It just cut down debug time enormously from what it had been on, like, the 704 or 705 or any other machine, because you knew where you had come-- how did you get into this mess? So I want to congratulate the engineer, whoever thought of that. And talking to the engineers more recently, understand it was kind of an accident that [it] got there at all, but it was a very lovely accident for the programmers.

Brock: Could you elaborate on how, why, that was such a beneficial design element?

Hardy: Yes. Of course. Because you get this crash and this printout, and… But you can't imagine how you got to this point in your program and what could possibly have caused you to get here. It's not in the regular flow. And if you get the last branch, if you get to identify the last branch, then you can see how you got here. Now, that even doesn't make any sense. You could put a stop right there over in place of the last branch, so then you can work yourself back and finally figure out where the computation just didn't make sense. And it was so much quicker than anything else, because you knew exactly which path to follow to get back to the problem. And without that, it was much harder. Once you have operating systems and other things in control, then it's not the same. But when you're on the machine by yourself, having that path back to where the bug really was is very, very helpful.

Brock: How had you done it with the IBM computers that you had been using before STRETCH?

Hardy: Just take a lot of time. It just takes more time. You just try different things and see. But they're random. You have to try sort of random things. Unless you know where the last branch came from. You put a lot of blocks in your code here, there and everywhere, and see what happens, but some of them make sense and some of them don't and so it just took a lot more reruns to find bugs. And before machines had this one little address in the corner, which they sort of accidentally put there, apparently, debugging took a lot more time.

Brock: Did other computer designers incorporate that as a feature, or did the operating systems come…

Hardy: I think that-- I haven't been on the hardware since then. I suspect the operating systems, I suspect they didn't, because I think the operating systems came in and made, at least for the majority of the programmers, much easier. Do you…

Hsu: Yeah. I was just about to ask a similar thing about how did the operating system change that? Do they just introduce a layer that makes it impossible to get down to the--

Hardy: It didn't make it impossible-- well, it made it impossible to get to some, a lot, of the bugs. Because you just couldn't get to that part of the machine where you could totally screw it up.

<laughter>

Hardy: So that really helped a lot. And they have, they tend to stop you before you-- they tend to stop your program. I mean, I stopped programs that weren't making, you know, that sort of weren't doing-- that were just looping, looping, looping. And so you don't get into this absolutely nothing on your printout state when you have an operating system. But if you don't know that it's crazy, then you get nothing but loop, loop, loop, and that's not helpful.

<laughter>

Hardy: It takes a lot more time to debug. So that was, I was very grateful for those engineers. As were everybody else who worked on the STRETCH. That was the first thing programmers taught each other when they got to the STRETCH is, "What are these lights over here on the engineer's console?"

<laughter>

Hardy: But they don't tell you about, but what you want to know. And I don't know why they never put it in the programmer's manual.

Brock: Hm. Huh.

Hardy: You know, that had to go word of mouth.

Hardy: And it made a huge difference in the amount of time. So that's why I really want to congratulate them even though they tell me it was kind of a mistake.

Brock: Do you have a grasp of the story of that mistake?

Hardy: No, I don't.

Brock: Okay.

Hardy: I don't.

Brock: Yeah. That's for a different conversation.

Hardy: It was a-- yeah. You know, STRETCH tried everything.

Brock: <laughs>

Hardy: And they tried everything. And so they wonder, you know, this is just one more thing they tried to see what made any difference, and this turned out to be very handy. And STRETCH, there were a gazillion ways to write a little subroutine, because it had so many instructions that did almost the same thing, that you'd combine them in different ways. And you couldn't, for most of the time, you couldn't make any difference in the amount of time that your subroutine would take, how many microseconds that were going around or anything. It's like… So they tried everything. They tried every instruction <laughs> under the sun and…

Hardy: But this was a good one. So that was that.

Brock: Yes.

Hardy: The other thing I wanted to say about Livermore, it was a government-run operation. It was the only place I worked where women got treated reasonably fairly in terms of salary. And we talked a little bit about--

Brock: We did touch on that a little bit.

Hardy: Yeah. Discrimination and even that, even in the early '60s, the government was trying to be [a] little more fair about salaries and recognition and… then-- private industry was not in that game.

Brock: Was that pay equity something that you had known about before you went? It was something you discovered?

Hardy: It was something I discovered.

Brock: Hm. Did it lead to…

Hardy: I probably, you know, it was fine while I was there. You know, I just thought I was an anomaly at IBM, because they didn't have any, you know, I didn't know anything. I just thought the fact that I wasn't getting paid even as much as the lowest paid man working for me, I thought that was sort of just an accident. And so then I went to Livermore and fine, everything-- then it came back into sort of a reasonable balance between me and the men working for me and so forth. Then I went to Tymshare and went back to the IBM style, so… <laughs> But you don't know that. If you don't know anything about pay scales, you don't realize what's going on until you look back and… Over the whole history.

Brock: Was that a discussion about these, about pay equity or inequity? Was that a discussion that you began to have with other women at the time? Would it be something that you would discuss with other women colleagues and women in other parts of your life?

Hardy: Well, about the only other woman I knew with anything close to my responsibilities was Fran Allen. And she had a few objections, a few problems with this also. So I don't know if she talked about it, but she and I would talk about it. But one of the interesting things I learned, in rethinking [about our] conversation, was that the culture at the time was pervasive and it included men and women, so the only women who felt discriminated [against] and were, were people, were the one or two women, who were managing groups in a business, and… Because everybody else was a secretary and they were getting paid secretary salaries and they weren't threatening anybody and it just didn't occur to anybody, men or women, that this was unfair. I'll tell you one little story to give you an example of-- it wasn't just the men, it was also the women. Everybody bought into the culture, the story of the culture. I was working for Tymshare. Dave Schmidt had left to do MASCOR. Which we might get into. And so I went to Tom O'Rourke's secretary and said, "I was due for a raise. Would you put me on his calendar so I can discuss my annual review with him?" And she said, "I will NOTput you on his calendar." She said, "I don't know why we pay you anything at all. You are married."

Brock: Wow.

Hardy: Okay. That's the culture. That is the-- that was the culture. Thank goodness it's not the culture now. At least people don't say that anymore. If you don't say it, fewer people think it. But that was the culture, and that was 1969. So, you know, it's hard. It's just very-- there was nobody to talk to. There

weren't any other women. I was always the only woman in the room for 20 or 30 years. It was just like always the only woman in the room.

Brock: And even if it were a room filled with people just from, I don't know, like, in the time-sharing industry more generally or some-- any professional grouping, you're always the only woman in the room?

Hardy: Yes. As long as it was professionals, I was the only woman in the room. Now, there were other things like the ASTA Conference. That's the travel agency, American Society of Travel Agents. And lot of travel agents are women. But it's not the same. It's just generally not the same kind of environment at all. So yeah. And so ASTA there were women in the room.

Brock: Hm. In all those times you were the only woman in the room, was that remarked on? Did that make people, the men in the room, uncomfortable or did they note it? Or I'm just wondering how, if it was remarked on.

Hardy: Well, pretty much--

Brock: <laughs>

Hardy: They didn't notice. If I said anything, if I agreed with them, they thought it was a good idea. And if I disagreed with them, sometimes they got quite angry, because women don't talk back to men. And so…

Brock: Well, how did you manage that? Did that make you more kind of a pick-your-battles approach, or did you just think that, "Well, I'm going to get such a bad reaction no matter what, I'll just speak as freely as I feel"? Or I don't know how I would react.

Hardy: You're careful about the way you put things.

Brock: Hm.

Hardy: When you realize, you know, which guys are going to overreact. Some men are fine. They just ignore you even if you disagree with them. And others get really angry. And so when you figure out some guy's going to get really angry, you're really careful about the way you bring up subjects.

Brock: Hm. I'm just interested, just to stay on that theme of if--

Hardy: How do we-- yeah.

Brock: If men didn't even like you… If men didn't like to be contradicted or disagreed with, how did that work for, presumably you were managing mostly men?

Hardy: They didn't-- the men who work for me are not the problem. They--never had a problem with those guys.

Brock: Really.

Hardy: In fact, you know, I started two companies. In both cases the men, men had been working for me before, and they asked me to start the company and be the president. Both cases. So the men who worked for me were very happy about it. It's only the men that are VPs, executives, and think they-- those are the men who can't deal with a woman having an opinion. And… But the guys who worked for me, the tech guys, and even the sales guys who worked for me were fine. They didn't have a problem. It's only the ones who wander up.

Brock: Well, we got there from talking about pay equity at Livermore.

Hardy: Oh.

Brock: Yeah.

<laughter>

Hardy: Okay.

Brock: To go back to the last branch, I guess.

<laughter>

Hardy: Thank you.

Brock: Yeah. So well, I wondered if there were any other reflections and comments that were derived from the last session that--

Hardy: Oh, yeah. Yeah. The one-- I think there was only one other thing that… And that was I wanted to comment. You asked about what books I read.

Brock: Yes.

Hardy: And I didn't answer, I didn't say very much. But the thing that discouraged me from reading a lot of books and biographies is that the only ones where the person was successful were men. There were only two women in my-- until I graduated from college that I'd ever heard of be successful. That was Joan of Arc.

<laughter>

Hardy: And Madame Curie. <laughs> I wasn't really into either one. And other than that, I'd never heard of a successful woman. Yeah. All the stories that have women are nice women. They don't go off and do business things. And so it was, those are my only role models.

<laughter>

Hardy: And it kind of…

Hsu: They both died tragically.

<laughter>

Weber: Yeah. And related to their jobs.

Brock: Yeah.

<laughter>

Hardy: So that--

Brock: Interesting.

Hardy: You know, it's so much better now. There are-- starting in grade school. The books starting, and that my Grandson is reading, the women have a real role to play. They're not necessarily second-class citizens. That was never true for--in the collection of books that were available when I was young. And so anyway, that's… You asked about books, and there's a reason I didn't read a lot of them, because the men won every time.

<laughter>

Hardy: And the woman went back to washing dishes. And it just didn't seem like a very interesting life to me, so…

Brock: Yeah. So why expose yourself to it over and over?

Hardy: So why expose myself to it. Right.

Brock: Fascinating, actually. Well, then maybe we could shift gears slightly and kind of go back into the chronology that we were working our way through last time. And we roughly, we had talked a little bit about the Integrated Systems Division for which you were the vice president at Tymshare, I believe from 1976 through '85.

Hardy: Yes.

Brock: And I would just like to ask you, if you could, to just describe for us again kind of that heterogeneous nature of the division and how it initially came together?

Hardy: Okay. Well, starting about 1970 or so, we acquired Graphic Controls. Tymshare acquired Graphic Controls. And Tymshare had had, a patchwork accounting system <laughs> up until then, to say… <laughs> To compliment, to… <laughs> It was done with the least amount of input and organization as possible and… But Graphic Controls had a fabulous one, so… And I'd been on the team that did the interviewing at Graphic Controls. And they were in Buffalo, New York. And they put me on the team because many of the key employees, technical employees at Graphic Controls, were women, and they didn't know how to ask women if they were-- what they knew. So, you know, the men who usually do this, didn't know how to evaluate the women. So they put me on the team to go back and talk to the women, and-- which I did. And they were, actually, they were really good. A really good team. And so when they came back to Tymshare and we went through the, you know, "Are we going to acquire them? Are we going to offer them jobs?" And it was so funny, because all the men who were on the team said, "Let's offer them all jobs, because most of the employees are women and their husbands

won't move to California. So we could be gracious and offer all of them jobs, and most of them won't come." Turned out that every woman came. With her husband.

Hardy: So it's-- that's how-- I knew they were going to come. Said they were going to come. But the men didn't believe me, so… But that's the huge difference in perception of the world from the woman's point of view and the man's point of view back in 1970. Just you couldn't, there was just no common ground. Anyway, once we acquired Graphic Controls, then I got to manage the conversion of the accounting system from Graphic Controls. And we did another one and integrated our accounting system in theirs and another, yet another, acquisition. And so we had a good accounting system, which is why I had been managing for several years before the-- we got to the point where we had the Integrated Systems Division. One of the-- we did a lot, Tymshare did a lot of acquisitions up until about 1975. Did a lot of acquisitions. But they were all companies like Graphic Controls. Which were in the same business we were in. Or they were in something that, you know, some hardware, you know, minicomputer, which would help with the Tymnet nodes manufacturing, or design or something. [In 1970 Tymshare acquired Computer Center Corporation, CCC, which used PDP-10, as did Graphic Controls. Bill Weiher and Dick Gruen came with the company, and Bill was responsible for the PDP-10 operating system.] So that's the kind of companies we were acquiring up until about 1975, which was when we acquired United Data Systems, which was managed by Bernie Goldstein.

Brock: Oh, yes.

Hardy: Got him? <laughs>

Brock: Yeah. We touched on him last time.

Hardy: Yeah.

Brock: Yeah.

Hardy: Bernie Goldstein was… UDC had data centers here and there. But really Bernie's real life was back on Wall Street. And there were other, there was one other guy, well, a couple guys, who came with him. But Bernie's real heart was in Wall Street in hedge fund management and so his business was really not managing UDC but buying and selling companies.

Brock: Right.

Hardy: So when Bernie came on board is when we started acquiring companies that weren't just like us. But were moving forward. And we acquired a travel agency company and we acquired bill paying, online bill paying, online airline reservations. We did a hospital automation, which we shouldn't have done, but… And we did something for the trucking industry. Because the way, which I knew nothing about, but it was fascinating, the big, long-haul trucks, there are locations throughout the country where they all meet at a certain time of day, move their goods around and take off. And they spend about half an hour at the switching site, and then they move on. And one of the things we did was automate, put all of that information, on Tymnet. So that when they got to the center, the center had the current manifest for every truck. And it was already all there ready to go. Every trucker knew exactly where the goods were that he was supposed to get on his truck and where he was supposed to put his goods, and it just went like magic. So it was a very, very interesting-- now they did this before. They did this with teletypes and telegrams and that sort of thing. It's not that they didn't send it, but it was much harder and more expensive to update and keep it current. It isn't that they didn't have this idea. They did have the idea of having [a] current manifest, but it was so much easier to keep current.

Weber: And the coordination would be done by the trucking companies in their offices and then each trucker would just get a list?

Hardy: Yes. Right.

Brock: Okay.

Hardy: Yeah. So… And it's fascinating. These switching sites are fascinating to be at, because they do nothing for hours, and then they say, "At four o'clock we're going to have 20 trucks here." Are going to arrive at four o'clock. And at four thirty they'll all be gone. And, you know, if you haven't been there, you go, "Sure."

<laughter>

Hardy: At four o'clock, 20 trucks drive in, like, "ch-ch-ch." And they all move their stuff around, and four thirty they're all gone.

Brock: <laughs>

Hardy: And who would've thought. It's certainly not, it wasn't an area that I had any familiarity with, but it was very interesting and certainly helped make that run go smoothly. No mistakes. Your stuff didn't stay on the wrong truck. <laughs> For sure.

Brock: So these, all these new acquisitions then came into your group?

Hardy: And so-- and they all came into my group. And the reason is because Ron Braniff was running the traditional business. And the main thing-- and what you don't want to do is rock that boat. Because that's your big revenue source. And so all these other little things that aren't big revenue at this point but are certainly a value to the company and a good use of their resources' experience, want to put them somewhere else. So I got all these things that didn't match traditional business.

Hsu: Sounds like these, a lot of these, were applications of--

Hardy: Yeah.

Hsu: --the systems and not--

Hardy: Applications of-- yes. And by this time we had not just the 940, but we had the PDP-10. And somewhere along in there we got the 370/158.

Hsu: Oh. Were they all running different operating systems or…

Hardy: Yes.

Hsu: Okay.

Hardy: They were all running different operating-- they were all running-- the 940 was running the Berkeley-- you know, one I did from Berkeley. The PDP-10 was running--

Hsu: TOPS-10 or TOPS-20 or…

Hardy: I think it might've come to that, but it was, it came with, the guy from-- oh. I knew I'd forget this. There's a Computer Center Corporation. I think that's at-- Computer Center Corporation up in Seattle.

Brock: Oh, yeah.

Hardy: That had done a lot of work with PDP-10 operating systems. So we got the guy [Bill Weiher] from there who had done all that and he came down and did the PDP-10 operating system, added Tymnet and

everything we needed. They had a pretty, it came with a pretty sophisticated operating system. That was Bill Weiher]. He did a lot of work. Then we got the 370. And we hired a man named Bill Frantz, who knew the operating system. That was a VM. One of the interesting things we did-- have we talked at all about Gnosis?

Brock: I don't believe we did.

Hsu: I don't think so.

Hardy: <laughs> One of the things that-- I told you about--it took us three months to get crashed.

Brock: Mm-hm.

<laughter>

Hardy: So one of the things that became apparent at Tymshare that wasn't apparent to almost anybody else was that you really needed security. And so by 1970 there was a small team of people. Dale Jordan. I think it was Dale. Maybe Bill Weiher and Norm. I know it was Dale and Norm. Somebody else. Were put, designed, this operating system called Gnosis. Which is a capability-based system, and if you want to know details, you really need to talk to, interview, Norm. But it's fascinating. And it was-- and we'll get more into Gnosis later. We renamed it KeyKOS. So… <laughs> When-- later. But at that time it was Gnosis, and it was extremely reliable. And so we had plain VM running on our 370, but we also had 370s which ran Gnosis with CMS as the shell, basically.

Hsu: CMS stood for… [Conversational Monitor System]

Hardy: Well, it was—VM, [Virtual Machine,] was CP, [Control Program,] at the hardware level and CMS on top.

Hsu: So by VM you mean virtual machine or…

Hardy: Hm?

Hsu: VM was…

Hardy: Virtual-- VM was the name of an operating system.

Hsu: Oh, oh, okay.

Hardy: The name of this pair that came together. Like UNIX is sort of a pair of software.

Hsu: Oh, okay. Okay.

Hardy: And VM was a pair. And CP was on the bottom and CMS was the shell that all the apps interfaced with. And so what we, one of the things we did, was replace CP with Gnosis. So we had an extremely secure environment and-- virtual machine environment here. And one of the applications we got to run on that was from one of the credit card processing companies. They needed to have a place to record the transactions that was safe, secure. So we ran this Gnosis with CMS. They had been using CMS, so this is easy for them. And in two different computer centers. And when the transactions would come in from the credit cards, they immediately were saved in two locations of the country. So it greatly improved their reliability. And… But that's the way Gnosis worked. It had immediate backup as many times as you wanted, wherever you wanted. And so that was one of the interesting things we did.

Brock: And that was specifically for your kind of applications-oriented group, or division, rather?

Hardy: Yeah. It didn't start out in my group but it ended up there. <laughs>

Brock: Okay.

Hardy: Yeah.

Brock: And with that more secure operating system, Gnosis, was it, just briefly, was it a question of making many changes to make it more secure or was there kind of one big thing that was changed?

Hardy: For Gnosis?

Brock: Yeah.

Hardy: It had to start from [a] blank sheet of paper.

Brock: So it had [been] a complete redesign.

Hardy: There was nothing like it. There was nothing like it. It didn't copy any-- it didn't have any instructions from any other operating system. Because to get something that secure you have to start with the architecture. And none of the others had started with a secure architecture, so you couldn't lift anything.

Weber: And it was for IBM computers then?

Hardy: It was for the--

Weber: 360, 370.

Hardy: It was for the 370/158, right.

Brock: Mm. I remember-- oh, I'm sorry, Marc. Please.

Weber: But who were the other users? I mean, you would think this was used by banks or…

Hardy: Well, anybody, any of our customers that were using CMS.

Weber: Oh. But other companies used Gnosis then, right? Or it was just--

Hardy: No. That was--

Weber: --once you acquired it? Okay.

Hardy: That was, Gnosis was ours. [We designed it. We wrote the code.] We ran it--

Weber: Oh.

Hardy: Gnosis was ours. Tymshare's. We ran it on our 370s for people who wanted straight CMS. And so we could offer them very high levels of security.

Brock: Got it.

Hardy: But it was more ours than the 940 operating system was ours or, you know, it was just ours. We wrote it from the ground up. That was it.

Brock: Well, I recall from the last time we spoke that the time-sharing operating system that you developed once you got to Tymshare then was sold--

Hardy: Yes, to--

Brock: --to Scientific--

Hardy: --SDS.

Brock: --Data Systems or what-- yeah.

Hardy: Yeah.

Brock: Did you consider offering Gnosis to IBM or at this time was it better to keep that as your…

Hardy: Well, we were still learning how to use this at that time. And we didn't, by the time it was running, we were very-- by the time it was up and running the company was very focused on these random acquisitions. So the guys didn't have a lot of spare time to work on this anymore because… And to the extent it was regular sales, then people could use it. But we couldn't advance it very much and it isn't regular sales. Selling an operating system isn't regular sales. And so it just, I don't think anybody thought much. They wanted-- increasing the value of the company by growing our revenue. And that's not what this was about. It was a time when security in big computers was not considered very important. Because people thought that many-- well, minicomputers were coming along. Everybody thought they would have their own minicomputer in their department. And so they didn't need security with just our guys. And then computers kept getting smaller. Well, then the next argument after that was, "Well, I've got one on my desk. I don't need any security. Nobody else is using it."

Brock: <laughs>

Hardy: And all of this is, you know, before… It's 10 years before, or 15 year before, the internet comes along. So until you have the internet, nobody's really connected very much. And they all looked at being connected on Tymnet as kind of strange. You know, it's just a one-off. And--

Weber: I was curious about the various acquisitions. So did you, how did you, integrate them into your own offerings? Were you…

Hardy: What? Which one?

Weber: So these various companies that you acquired, how did you integrate them into what you offered? Were you basically offering a suite to anyone that involved travel and the various ones, or were they all special cases?

Hardy: They were all special cases.

Weber: Okay.

Hardy: There was no connection between the marketing from the, you know, like, the travel agencies and the regular, Ron Braniff's group.

Brock: Okay.

Hardy: No connection.

Brock: I had another question just on that with integration. Did you, while the businesses may have been separate, how did you integrate these new acquisitions into your division? Did you integrate these, you know, did you integrate them into a single group or did you keep them separate or…

Hardy: Well, all the travel went together and there were different-- there was a basic travel group that we acquired, Western 29, which was the first. But then we did a lot of development on-- I think more than acquiring more travel companies, we developed Western 29 using Tymnet. And taking advantage of what we could do in the Tymnet engine. So I think we covered a little bit about this.

Brock: Yes.

Hardy: Last time. And so we just made-- it was so easy for us to expand from their base. We did most of that. And sold to the airlines. We sold to the travel agents. It was… And those of us who worked on the project, we could go anyplace in the world with our little [terminals], which had by that time, teaching-wise, had become things you could carry. We could go anyplace in the world and make travel reservations, so

we didn't have to know when we wanted to come home when we went somewhere. We just went and then when we're ready come home we just got our little 'iPad'.

<laughter>

Hardy: Made our travel reservations to come home. So yeah, it was very… But that was good, because it tested--we were testing, "How does this work? How is it going to work?" You know, pretty much works that way today. I now do it from-- I actually do it from my computer at home.

Weber: And who were your competitors in the travel space?

Hardy: <sighs> Nobody else was really doing. The competitors were really the airlines.

Weber: So the Sabre type.

Hardy: Yeah, Sabre. And they had-- it's fascinating working with the airlines, because some of them like American and the-- who was running the airline really made a big difference. Because they changed over time. At that particular time, I wish I could remember his name but I cannot, the guy running American understood that automating reservations was going to be a big business, and they, American, put a lot of effort into automation there. And there were years when it was Sabre that was the most profitable and sometimes the only profitable <laughs> division in American Airlines.

Hardy: And yet other airlines, like TWA was actually technically ahead for quite a while. But the executives at TWA didn't see the opportunity. They were still more concerned about airplanes than automation. It was fascinating talking to all of them. Just different guys see it differently.

Brock: <laughs>

Weber: In the U.K., travel reservations were done on video tech systems like Crestel.

Hardy: Yeah.

Weber: You didn't have any dealings with them?

Hardy: No.

Weber: Okay.

Hardy: No.

Hsu: I had a question about integration at the technical level. So you mentioned you have now three different hardware--

Hardy: Operating systems.

Hsu: --and operating system platforms. Did the different platforms interact or were they separate? Like, if you had a host, a 940 host, and you had some application on that machine, you couldn't then move to the PDP machine and run the same application?

Hardy: We did not port the-- I don't remember if we ported any of the apps. But it certainly wasn't the general idea. We picked up customers for the PDP-10 because there were, you know, departments and aerospace companies that were using PDP-10s. And so they had their apps and it was convenient.

Hsu: So it was a matter of providing the right services for the customers that wanted them on the certain platforms.

Hardy: Right. It was-- yeah. We got the platforms for the customers.

Hsu: Mm, okay.

Hardy: Uh-huh.

Hsu: And I guess it didn't matter because they were all connected on Tymnet, so you could just login to whatever host had the applications you needed.

Hardy: Yes. Right. Exactly. Yeah. You could go, customer could go, to whatever he wanted.

Weber: But your internal stuff was more on the 370 than, like, I mean--

Hardy: Internal--

Weber: --why did you put Gnosis on the 370, for instance, not another platform?

Hardy: Because it was the newest.

<laughter>

Hardy: What can I say?

<laughter>

Hardy: You know, it was just stronger, bigger, newer. It's going in the right direction. The hardware had a better design.

Hsu: So you mentioned VM. So was VM IBM's time-sharing operating system?

Hardy: Yes. Yes.

Hsu: Yeah. Okay.

Hardy: Yes, it was. Mm-hm.

Brock: Well, you mentioned your kind of application division and then contrasted with the traditional business of Tymshare. What was the relationship like between the two? Was it intentioned or were you kind of an internal customer for the traditional business or how did that relationship work?

Hardy: Well, there really, aside from the fact that we were friendly, there really wasn't much business overlap. Ryan is a very good sales manager. <laughs> He kept his guys really focused on what he could sell and what was profitable. And we focused on the experimental.

Brock: And so what was he really selling at that time? He was selling just access to this time-shared computing, metered by the hour or…

Hardy: Right.

Brock: Essentially.

Hardy: And… That and yeah. Primarily that's what he was offering. Different group was selling Tymnet.

Brock: Right.

Hardy: And they had more overlap than I had with them. Yeah.

Brock: Well, unless either of you have a question, I wanted to shift to just to ask you about your life as a manager in that decade, I guess. And just if you could speak to your approach as a manager of a large organization and also the balance bet-- did your role as a manager mean that you were moving farther away from direct technical contributions yourself? And just your life as a manager in those years, I'd be interested to hear about.

Hardy: Well, I had… You know, I had two kids by that time. My second daughter was born in 1970. So all this time I was in management, I had two children. And they survived. I mean, everybody…

<laughter>

Hardy: I mean, I was just-- guess I was listening to somebody this morning, because of all the Republican stuff. Ah, well, children never do well when their mothers work, was his position. And I just want to say. So I want to say that my children did just fine.

<laughter>

Hardy: They… Well, once you have children, your whole life is spent managing personalities that are not always getting along.

<laughter>

Hardy: But trying to do things together. You know, they're trying to build a big house or something, and they're trying to do something together and yet they don't get along perfectly well. So you figure out all kinds of techniques for getting, teaching, helping kids, people, learn to compromise. And it doesn't matter whether it's kids or adults or anybody else. People, it's just the way people are. And as I think I mentioned last time, when people have these arguments, I listen to them. If you listen long enough, they usually, they figure out that they have a lot of common ground and this was just like peripheral stuff

they're arguing about, so… And, you know, if you're the manager you can listen to these things and point out that, well, our priority is this or that. "This is a good idea, but our priority is over here." And so you can settle some things that way. So managing was-- it totally took me away from the technology, at some level. Obviously not totally, but at some level I wasn't in the details any more. And it was probably a good thing not to be micromanaging. Although it would've been fun.

<laughter>

Hardy: I'm sure they all appreciated that I was not micromanaging. But I sat in on the design meetings. So it wasn't-- there was some level at which I really did understand what was going on. And if you understand the design you don't have to understand the code, as long as they're doing the design. As long as the design is going to come out-- what they're coding, is going to code to the design, then you're okay. And so at that level I knew what was going on, but not at the code level.

Brock: And were you in charge both of the decisions about the technology strategy and the direct business strategy as well for…

Hardy: Yeah. Right.

Brock: Yeah.

Hardy: So I didn't, you know, we had travel. We had Italcable, and we had banks, so… But big, big industry coverage. But mostly it was just you had to understand the product. You had to understand the architecture and the design or you couldn't sell it. So you kind of had to be on both sides.

Brock: Right.

Hardy: It wasn't like Ron's job. I mean, "Here's the machine that you're used to." I couldn't say that to anybody.

<laughter>

Hardy: So I kind of had to know what was there, whatwas coming.

Hsu: Do you miss coding?

Hardy: Hm?

Hsu: Did you miss coding and being down in the details?

Hardy: I think I could go back to being a programmer any time.

<laughter>

Hardy: I really enjoyed programming. It's just, you know, maybe I said this before. That some people like to do puzzles. I just like to program. It was just fun. So I'm sure I'd enjoy it if I went back to it.

<laughter>

Hsu: Was it easier to raise children as when your job was a manager or when you were engineer?

Hardy: They both have their challenges.

<laughter>

Hardy: No. I don't think I could prioritize one over the other. It's just you have to figure out how to manage the time and… But the only, the down-side, of being a manager, was I traveled a lot. But that got my kids using e-mails in the 1970s, so…

<laughter>

Hardy: So maybe that wasn't all bad. They feel really comfortable with e-mail.

Weber: So you had the terminal at home. They would send you e-mail wherever you were.

Hardy: Right.

Weber: How did you handle childcare? Who took care of them when you were at work?

Hardy: Well, I really lucked out and I don't know that you can do this well today. But I haven't looked. I found a nanny who was, had, like, a teenage 20-year-old daughter, and she came in and took care of the kids for, like, the first 10, 15 years of their lives. And she was English. My kids grew up with an English accent.

<laughter>

Hardy: Well, they've lost it all by now. But she was just wonderful, and she was there-- she was flexible about our time. She was there when I needed her to be there. And so it worked out okay. I think it's probably much harder to do these days, but in those days it worked fine and… Or I don't know if it's harder. It's different. There's more women working, so they've probably figured out better ways, you know, good ways to do this. That was, there were no-- there just weren't women working, so there was nothing organized to help you get this kind of nanny service that I got.

Brock: Hm. Jump back to the coding thing, I was curious if there was something from your experience with programming that related at all to your approaches or techniques or viewpoints as a manager. Was there any connection between the two sorts of work?

Hardy: Well, you appreciate that you have to have an architecture, you have to have a design, before you get started coding, or you're going to have a mess on your hands.

<laughter>

Hardy: And somewhere along in there, '76, '77, somewhere, I hired-- when I didn't have time to do this-- I hired a woman, her name was Charlotte Helanderand she had put together a booklet on how to do reliable code. And she was fanatic about getting all these designs done ahead of time, document the designs, outline the whole thing. And before you write any lines of code. And her procedure was such that when we actually followed it, it was amazing how many fewer bugs there were. All the programmers said, when they first heard about--I was going to, they were going to follow her procedure, everybody was angry.

<laughter>

Hardy: I said, "Just do it once, and if you don't want to do it again, if it doesn't work, you don't have to do it again. Do it once. Here's the program that needs to get written now." But once they'd done it, they never wanted to do it any other way. Because they didn't have to spend the next six months debugging. They wrote the code, they did it. They ran, you know, they did a couple test runs, and they were done.

And that's not the way most software was written in those days. I don't know about now, but in those days most software--

Hsu: Isn't done now.

Hardy: --you write the code and then you spend the next six months debugging it. And if following her procedures, that was it. You were done. And so it took more time up front and… But it took so much less time on the back end and it was so much less expensive in the end for the company, because all the bugs were out in the beginning. The customers were happy. So it was a much better, much better process.

Brock: Hm. What do you think of the contemporary discussions about the Agile software development methodology, which seems to be the antithesis of that approach?

Hardy: I don't know enough about it.

<laughter>

Brock: Fair enough.

Hardy: I know I'm not going to get to go do it again, so…

<laughter>

Brock: Yeah.

Hsu: But this method was sort of like a more stringent version of the waterfall method or…

Brock: Yeah. Yeah. It was-- yeah. She really insisted on detail. But boy did the results ever-- and as I say, they hated it going in, and afterwards they wouldn't write it--

<laughter>

Hardy: They wouldn't do it any other way. It didn't matter. Afterwards, they would tell their managers, "I'm not--" you know, they didn't work for Charlotte the next time. They worked for somebody else. "I'm

going to do this Charlotte's way. Yes. I know it's going to take me an extra couple-three weeks, but I'm going to do it Charlotte's way." <laughs> It was just like so crazy.

Hsu: Was that taken up by any other companies or any other divisions?

Hardy: I don't-- not any other divisions. I don't-- she got this out of some class she took. So I don't know that-- there aren't other companies doing it. Yeah.

Hsu: Okay. So it wasn't original to her.

Hardy: It wasn't-- yes. It was not original to her. She may have refined it or… But she'd certainly heard these ideas someplace else before.

Brock: Mm-hm. Well, perhaps this would be a good time to turn to the story of Doug Engelbart and his SRI group coming into your division.

Hardy: Yeah.

Brock: I thought maybe we could begin that story just by asking, you know, when did Doug Engelbart and his activities at SRI first come to your attention? You know, and not necessarily at Tymshare or-- at all?

Hardy: I was visiting Doug Engelbart at SRI in the '60s. So I can't remember how, I mean, that's so far back I… <laughs>

Hsu: Was that when you were at Berkeley?

Hardy: I'd been following Doug Engelbart for-- I'd followed Doug Engelbart forever.

Hsu: Oh. Was that when you were at Berkeley or at Livermore?

Hardy: I can't remember whether it was Livermore or early days at Tymshare. But right in mid-'60s.

Brock: What brought you there to do that?

Hardy: He's interesting.

<laughter>

Hardy: That was when I-- you know, I didn't have kids and I could do things that were interesting, and something great would come along. <laughs> Yeah, that's-- and so yeah.

Brock: What did you find in particular interesting at that time?

Hardy: Well, you know, Doug had everything years ahead ofeveryone else. He had monitors. He had his five keypad keypad, and just like-- he had a mouse. And between the mouse and the keypad, everything was done and it was just absolutely so far-- you could see how, "Oh, if only we could have this technology." <laughs> You could see how great it would be, but of course the monitor itself was $100,000 and one couldn't do that. <laughs> So it took a while to get there.

Brock: Was he open to you and other visitors just from the community of computer people coming in or…

Hardy: As far as I know. I mean, I didn't-- yeah. Yeah. As far as I know.

Weber: How did you hear about him initially?

Hardy: I don't even remember, but I know that Norm and I went over there. So Norm was-- it might've been Norm. But I, you know, I don't know how, exactly how that came about. It might've been me; it might've been Norm. He was just famous. You know, he'd given a talk. He was well-known.

Weber: And were you at the conference where he gave the big demo?

Hardy: No.

Weber: No.

Hardy: But I can't remember whether we got there before or after, but we saw the… <laughs> We saw enough of the demo to be very impressed.

Brock: And was he having to seek out sponsors for his work at that time or… I would imagine?

Hardy: At that time he was getting covered. Yeah.

Brock: Okay.

Hardy: It wasn't until much later, the late '70s, that they stopped covering him. I think it was the late '70s, not the early '80s.

Weber: Well, his--

Hardy: Right in--

Weber: His budget was cut a lot in the early '70s?

Hardy: Yeah. And then--

Weber: And then SRI basically wanted to find some way to get rid of--

Hardy: Find another home. Yeah.

Weber: --his project and that's--

Hardy: Right. And that's how--

Weber: --<inaudible>.

Hardy: And he-- it was really Laszlo that found him, not me. Do you know Laszlo?

Brock: No.

Weber: No.

Hardy: Oh.

Brock: <laughs>

Hardy: How did you miss him? <laughs> Laszlo's unmissable.

<laughter>

Hardy: Laszlo came [to Tymshare] in the fairly early '70s as-- probably mid-'70s maybe. As VP of the Technical division.

Weber: At?

Hardy: Hm?

Weber: Where?

Brock: Tymshare?

Hardy: Tymshare.

Weber: At Tymshare. Okay.

Hardy: Yeah. And he stayed I guess it must've been 10, 12 years into the acquisition. And Laszlo, well, you know, Laszlo was very enthusiastic about trying new technology, trying new things, exploring ideas. That was what he liked about Tymshare. <laughs> And it gave him lots of room to do that. And so he was, of course, a natural to pick up Doug, when their funding ran out. Unfortunately, Doug did not get a lot of funding at Tymshare. Got some, but not a lot. And--now, he was a great asset and contributor to the groups that were-- there was a very technical group in Tech Division that was sort of exploring new ideas. And that's where Gnosis was being developed or enhanced or whatever it was doing <laughs> at the time. And so Doug was very much one of that. He wasn't one of that group. He didn't write Gnosis code or anything, but these guys all were interested in exploring lots of different ideas. And so Doug, Doug fit really well into that, into that community, even though there were different projects. Doug personally did. And I just had a lot of admiration for Doug. He was a great guy. And it's a shame that they stopped funding him.

Weber: And how many people came with it roughly?

Hardy: I'm not sure more than-- I'm not sure if anybody came, but certainly not more than one or two. It was really all over.

Weber: And they went to work on turning NLS into Augment, right?

Hardy: Mm-hm.

Weber: Talk about that process. They turned their NLS system into Augment--

Hardy: Yes.

Weber: --when they were at…

Hardy: Yes. At Tymshare.

Weber: Can you talk about what you knew of that effort?

Hardy: Well, I didn't know-- I don't think I know a lot about that, except that that's what they were working on. They were working, as I say, very, very independently. They didn't join Tymshare into my group. They joined Tymshare in this technical part of, this technical group in the Technical Division. Where they were exploring Gnosis. They explored Augment. All of the Gnosis development and notes and documentation is all done in Augment. So they were close and-- yeah.

Weber: And that was under Laszlo though?

Hardy: Yeah, it's under Lasz.

Weber: Okay. And what's the first name. Laszlo?

Hardy: Laszlo Rakoczi.

Weber: Or Laszlo. Okay. And then, do you know what the--what was the thinking for what to do with Augment in terms of offering it over Tymshare, offering it as a product or was it not even to that point?

Hardy: Lasz didn't have to have that vision. He just knew Augment was worth supporting and maintaining and developing.

Weber: So there was not --it was really a research division. There was no clear path to--

Hardy: It was-- yes. Tech Division was a research division.

Weber: Even though Gnosis was deployed.

Hardy: Yes. Tech division. Gnosis was deployed. I was telling, I reported to Laszlo. We had sales too, you know, as I say, airlines and travel agents and banks and all kinds of places. But it was still a research division.

Weber: So Augment and other projects were seen as more long-term research. Okay.

Hardy: Right. Exactly.

Brock: At the time, was that--

Hardy: It was a fun place to work.

<laughter>

Brock: Sounds like it. Was the company doing very well so it had ample profitability to support that kind of exploratory effort?

Hardy: It was doing well, and then, of course, there were some, there was another, dip, economic dip. And I think Laszlo wanted to continue to explore, so he had enough resources to do that. He couldn't put a lot of money into it, but he didn't have to fire the people, and… But this is at the same time that Bernie Goldstein is adding companies like crazy. And with clearly the intent of building enough revenue that you could sell Tymshare to somebody. This was not a-- this wasn't an accident that we got acquired by MDC [McDonnell Douglas Corporation]. This was how do you put together, you know, the kinds of things like all this investment in the travel industry, was a perfect match for MDC. Because they're in the travel industry. They're selling airplanes. It's the same guys, okay. <laughs> So this is all a build-up to selling Tymshare. And there's a fascinating paper, maybe if I ever get my hands on it again, by Art Caisse, about what Tymshare could be. But it was going in this other direction by that time.

Weber: So what--

Brock: Who had written that paper?

Hardy: Art Caisse just wrote up-- went to Tom O'Rourke, to tell him, "You know, we could be doing all these other things."

Brock: Okay. Hm.

Hardy: "Where we've got the perfect technology for all this going in this direction." By that time it was too late.

Weber: But why the strategy to sell it, do you know?

Hardy: Hm?

Weber: Why was there the strategy to sell it?

Hardy: Bernie wanted to. And--

Hsu: He was the CEO at the time?

Hardy: No.

Hsu: Oh.

Hardy: Bernie was a VP.

<crew talk>

Hardy: Okay. Bernie was a hedge fund manager. Not a manager of a corporation. And so Bernie wanted to sell it. Tom had made all the money he ever expected to or more than he'd ever expected to make. <laughs> And he wasn't going to do-- he knew how much work it was to start a new market. He wasn't going to do that. He just wasn't. And there wasn't the right leader to do much of anything else.

You know, if they could've had [a] different set of VPs and someone might have been the right leader to pick it up. Maybe if Dave Schmidt had stayed. I often wonder if Dave Schmidt had stayed if it wouldn't have stayed as Tymshare, but he didn't. And so that's what happened.

Hsu: Hm. So what were some of these future directions that were cut off because of the acquisition?

Hardy: Well, there's so many different things you could do when you have the Tymnet and the hosts, worldwide hosts, worldwide network. There was-- you could've been the internet. And it was ready to develop into that level. So it's, yeah, there were lot of, a lot of ideas. You could've made it a lot more public and had something very much like the internet. But it wasn't… Now, I don't want to imply that there isn't a lot of work to get from there to where the internet is today.

Brock: <laughs>

Hardy: But…

<laughter>

Hardy: But it had sort of the basics in place.

Weber: Was there any talk of doing, you know, the way CompuServe had added their CompuServe Information--

Hardy: Yeah.

Weber: --Service for the public, and they started like you guys, as a business-to-business.

Hardy: Right.

Weber: You could've easily done that, right?

Hardy: We could have. And as I say, there's this paper by Art Caisse, and we all talked about, we all knew about, but it wasn't the way the executives, the top guys, wanted to go. It all depends on personalities. Think there was a crowd down one level who wanted something else, but…

Weber: And as a public company, they were serving the stockholders perfectly well with a--

Hardy: With a sale.

Weber: --profitable acquisition, so…

Hardy: That's exactly right.

Weber: Profitable sale.

Hardy: So… <laughs>

Brock: Could you, was that strategy, of kind of grooming the company to make it an attractive acquisition? Was that something that you recall kind of seeing at the time, or did that become clear in retrospect?

Hardy: I'm not sure how clearly I saw it, but I have to say I wasn't surprised. <laughs>

Brock: Okay.

Hardy: And I don't know how else to explain it. I didn't know what, I didn't necessarily know that-- I knew that Tom had turned down the chance to do the CompuServe thing.

Weber: Oh. There was a concrete offer to do that?

Hardy: Yes.

Weber: Well, talk about that.

Hardy: Well, there wasn't a concrete offer to do it. But there was a very concrete plan for how you get from where we are to making this a more public service.

Weber: The Art Caisse paper?

Hardy: The Art Caisse paper.

Weber: Okay.

Hardy: And we all knew about that. And we knew that didn't-- and we knew Tom had turned it down. So where does that leave you? Okay. <laughs> That leaves you that this is definitely going into the acquisition mode. The be-acquired mode.

Weber: Do you remember the timing roughly? I mean, the paper came out, or it was circulated. How long before the sale was that? Couple years?

Hardy: I don't remember, but, you know, we all talked about this for a long time.

Weber: Years.

Hardy: Yeah.

Weber: Okay.

Hardy: You could see this opportunity. And you could-- the opportunity was so obvious with, like, the online reservation systems. The translation of the languages between the travel agent, the airlines, the ability to capture the transaction information in the secure environment. It was so obvious how many things. You know, the travel agents immediately find this very convenient to have access to a computer on their desk. And it doesn't matter whether they're making reservations or looking up something else or, you know, it's great. So it was obvious what the option, you know, that there were enormous possibilities out there. It just wasn't, it wasn't Tom's thing. And there wasn't anybody else who was going to take it over. So…

Weber: And I know your access points were used for access to CompuServe quite a bit.

Hardy: Hm?

Weber: Your access points were used to access CompuServe.

Hardy: Yes.

Weber: But how many other networks did you have gateways to or did you have…

Hardy: Well, we didn't have a lot-- well, we didn't have a lot of access to-- we had NIH, which was certainly an interesting place. But they hadn't intended to be public. You know, they didn't-- but there was so much opportunity there to get access to information that could've been made public had Tom been willing to move the…

Weber: So it wasn't what you had so much as the next step, yeah.

Hardy: As what we could see if we could work on it. And just wasn't there to work on. You know, just they didn't want to work on it.

Brock: Was that in the first half of the 1980s that this discussion was going on?

Hardy: Second half of the 1980s.

Brock: Second. No.

Hardy: Oh, no, '70s.

Weber: Late '70s.

Brock: Second half of the '70s.

Hardy: '70s. First half of the 1980s. Right.

Brock: Okay.

Weber: Because Engelbart came in around '75 or something, right?

Hardy: Yeah.

Weber: Engelbart came around '75, '76?

Hardy: Engelbart came about ’75 and so did Bernie Goldstein, UDC.

Weber: And the sale to McDonnell Douglas is like ’78?

Hardy: ’85. ’85. [Actually, it was 1984.]

Weber: Oh, oh, it’s that much later?

Hardy: Yeah. It’s 10 years later. I think--

Weber: Oh, sorry. I thought it was <inaudible>

Hardy: I think Engelbart might’ve been later than that.

Weber: ’78?

Hardy: I think he was more, yeah, closer to ’80 than ’75.

Weber: But these discussions that are in the late ‘70s and it just coasted without making that decision to expand until the mid-‘80s. Okay.

Hardy: Yeah.

Weber: It’s a long time.

Hardy: Yep. And we all talked about it, and, you know, we’d go out for a beer once in a while with Tom and the whole crew and talk about things casually. It just-- Tom wasn’t ready for it. And I don’t blame him. <laughs> You know. It’s… He was not ready for it. He’d done his thing and that’s why I say it’s too bad Dave didn’t stay. He might have been ready for it. Was more like Dave to be ready for it.

Brock: Was the group of other vice presidents of the company, were they like you, people who had been with the company from an earlier period? So was that part of the leadership, it’s the leadership that had kind of started the company were still with the company?

Hardy: I think that was true -- well, I think there was an executive VP level, and that's Laz who hadn't been there in the beginning and that's Warren Prince who hadn't been there in the beginning. Alden Heintz was pretty early but he did mostly international, wasn't really involved in any of these. I mean, he picked up and went internationally with anything that already existed and that was-- he did a good job of it, but that was his job. So I think that most of the top level had come in later. Ron Braniff, of course. And Ron Braniff was there very early. He wasn't our first salesman, but he was really close. And the VPs from the very early days, they had all left.

Brock: Okay. So it was really a question of Tom O'Rourke really being the central leadership figure.

Hardy: He really was. Yeah.

Brock: Okay.

Hardy: Yes. Absolutely.

Brock: Oh, go ahead.

Hsu: He just had no ambitions to expand beyond what--

Hardy: That's right.

Hsu: --Tymshare had already achieved.

Hardy: He-- yeah. And you know, he sells the company, he's got plenty of money. He can do what he wants. I can appreciate that. He was-- yeah. That was where he wanted to go, so that's okay. That's where it was.

Brock: As you got into the early, the first half of the 1980s, I was curious about, well, as personal computing and personal computers sort of are coming, you know, really on the rise, how did that look from the perspective of Tymshare, the rise of the personal computer? And also I wondered, in this, by the first half of the 1980s, how important was time-sharing itself versus the network, like Tymnet versus time-sharing, just those two?

Hardy: Well, yeah. I think Tymnet became very important. Because by the early '80s minicomputers were doing a great job and there was a minicomputer in every department in these big companies. And

they had been using Tymshare. Now, they didn't have to use Tymshare anymore. They could do their tests on their little minicomputer. And so I think it was coming to the end of time-sharing in that sense, that everybody thought they were on minicomputers, they didn't need security, because it was, as I said, "It's in my department. And I have a--" And then I can have a computer on my desk and that's even more private, so why am I worrying about all these other things then? So yeah. It was, I think the timing, if you weren't going to go in this other direction, the timing was right to sell the company.

Hsu: So was that significantly eating into Tymshare's business?

Hardy: Hm? What?

Hsu: Was minicomputers and personal computers, was that eroding Tymshare's business?

Hardy: Yeah, yeah. It was making sales harder.

Weber: But for Tymnet it was fine, right?

Hardy: Not Tymnet. Tymnet was going strong.

Weber: Right, right. Yeah. Yeah.

Hardy: It was only Tymshare.

Brock: Oh. There was-- I'm just looking at my notes. I'm trying to remember when Tymnet became its own subsidiary.

Hardy: Well, I have that in my notes.

<laughter>

Weber: Well, I'm looking at Wikipedia, '79.

Hardy: Okay. Yeah. That's--

Weber: About ’79, it says.

Hardy: Oh. Let me see.

Weber: But it was a wholly owned subsidiary.

Hardy: It was a wholly owned subsidiary.

Weber: But then it became a common carrier, which was a question you wanted to ask.

Brock: Yes.

Hardy: Okay, 1979 spun out Tymnet from Tymshare. Earlier on it had become kind of a wholly owned subsidiary of Tymshare. And then it became totally…

Weber: But it was still owned by Tymshare.

Hardy: Still owned by Tymshare, but much more independent than it had been earlier.

Brock: And that was simply to allow Tymnet to somehow grow on its own or…

Hardy: Yes. On its own. Right. And-- yeah. Because Tymnet was expanding at a great rate. So divide the companies up and then Tymnet looks fantastic.

Brock: <laughs> Ah. And this is again part of this--

Hardy: Sale. <laughs>

Brock: --Wall Street financial sector point of view on the--

Hardy: Yes, <inaudible>

Brock: I get it.

Hardy: Right.

Weber: But they did acquire both.

Hardy: They acquired both.

Weber: But they could separate. Right.

Hardy: Yeah. But they separated out Tymnet immediately, right.

Weber: And Tymnet became a commoncarrier, computer network.

Hardy: Yeah.

Weber: Can you talk about what that meant for the business?

Hardy: I don't-- it did. And I don't remember what the implications of that were. Yeah.

Weber: Okay.

Hardy: It's an interesting question. I'll have to look that up.

<laughter>

Hardy: I didn't get that far in my notes. <laughs> Trying to remember all this.

Brock: Well, thinking of that time of the mid-- now if we're in the, getting to the middle of the 1980s, I just was wondering if the kind of circumstances for women in business and women in computing, women in programming, had changed by that time significantly.

Hardy: Well, not significantly, but definitely.

<laughter>

Hardy: A lot of women, it was interesting, a lot of women came to me after they joined Tymshare, and said, "I came to Tymshare because they had a woman as a VP. It's the only company I can find that's paying any attention to the fact that there are women in this field." And so they, we ended up, by the '80s, of having several, several women in computing. And it's certainly one of the things I wish we could work on for today. And the more I think about it, I don't know if you want this on tape, but the more… <laughs>

Brock: Please.

Hardy: The more I think about all this history and what I went through and what the women today are going through, I wish we could so some-- I think a few little changes, a few more, a little bit more attention, we could get a lot more women into this field, and boy, I think it would really improve the field. Certainly make the applications for users a lot more user-friendly. <laughs> And we, you know, nothing's a hundred percent either way, but there are more women who tend to look at that a little differently from the way the men look at it. And so I sure wish we could get a lot more women into the field.

Weber: What specific changes would you make?

Hardy: <laughs> I should've known you would ask that question. Well, one of the big differences, which we talked about last time, is that, about Tymshare, is that it was customer-oriented, and of the five companies that had the SDS 940 system, ours was the only one that could pass the Harvard acceptance test. I think that's because we were customer-oriented, and I think women are more customer-oriented. They're just more… I mean, I said I loved programming and <laughs> I really did love programming, but I was also always interested in how the customer would see it. What the customer would see. And I didn't have to-- one of the things that became apparent as we hired, as men worked for me who had studied computing in college, is that they teach you how a program really should look. You know, subroutine shouldn't be any longer than it needs to be or what…

<laughter>

Hardy: Or whatever. And if you're going to use this code over and over, you should always be in a subroutine, and… And so there were lots of rules that make programming-- definitely good ideas. Definitely. I'm not objecting. Except that they became higher priority to be a clean program than to have a program that met the customer needs.

Hsu: So like structured programming techniques?

Hardy: Yeah. And they were all good ideas. But it took a woman on the team to kind of get a little balance to that and make-- and I had women on my team, so a little balance to that so that you're also

worried about, “We don’t have to fix this right away. We can--” because it’s running. It’s operational. It’s meeting the customer needs. And it was, it’s very hard, for some of the guys to overcome that, that need to make it perfect. That’s what got them A’s.

<laughter>

Hardy: But there’s more to consider when you get into the business than just the beauty of the code. Even though I like beautiful code. <laughs> So that, it’s…

Weber: No, go on.

Hardy: No.

Brock: Oh.

Hardy: I think I would just balance it a little bit more. I think I would make-- and, of course, the managers of the programmers these days, they’re all men. Or they’re certainly mostly men. They’ve all been through Stanford or someplace where they’ve learned how to code correctly. And that becomes more important than the customer. And I even think I would just help people learn a little more balance. At least based on what, the way things were going, back when I was managing these guys. Just it’s okay if it’s not perfect. If it’s doing what the customer wants, it’s okay.

Brock: <laughs>

Hardy: And we’ll fix it later. <laughs> You can make it beautiful later. Do what the customer needs. And I think it’s hard in a lot of programming areas, projects, it’s hard to get that.

Hsu: Oh. But on the flip-side though, if they had all followed that strict procedure, that strict engineering procedure you mentioned, that Charlotte had introduced, a lot of those, the sort of perfection ideas, might’ve been addressed earlier in the first place.

Hardy: In the first place.

<laughter>

Hardy: Exactly.

Hsu: And they wouldn't have had to been fixing it later on.

Hardy: They wouldn't have to be fixing--

Hsu: While it was already deployed.

Hardy: That's exactly right. That's exactly right. That's what I liked about it. You got both reliable code and you got much better structured code. You're right.

Weber: I assume you were paying women the same as men in your group. But was that different from other groups within Tymshare?

Hardy: Well, I don't know what all groups paid women. I suspect I paid them better than most groups. I expect the women working for me got paid better than they did in many other places. Was also easier in my group, of course-- maybe not of course. But was easier in my group for women to be recognized as competent or potential leaders or something. And as I was saying earlier, this is just culture. I've stopped blaming… <laughs> I've stopped blaming all the men. I told you my little story <laughs> about the secretary. Stop blaming the men for this. It's just the culture. And it infected everybody. And so it's very basic to try to get it changed. So I'm not criticizing the other guys for not noticing this. I think it's just really hard. Really. If you've been told all your life, <laughs> you know, that little girls are raised to be Cinderella since… <laughs> Or Joan of Arc, one or the other.

<laughter>

Hardy: It's just hard to change that perception. It's hard to change that perception. Unless you really work at it and think about it.

Brock: Well, I had just an extremely different follow-on question to one thread before maybe we tackle just the McDonnell Douglas acquisition itself and what that meant for you. Which was we'd been talking about computer security, secure operating system. The engineers crashing…

<laughter>

Brock: The Tymshare computers from the--

Hardy: Right.

Brock: --moment they turned on. I wondered if, with these financial transactions and the banks and things like that, if you also worried about computer security from the point of view of organized crime or from state hacking.

Hardy: Well, I did. But there's not so much you can do about it, because the customers didn't worry. They just didn't know. Back in '70s and '80s, early '80s, they just didn't know. And there was, you know, I didn't go out and try to tell them all, "If you let us do it it's all going to be insecure."

<laughter>

Hardy: And so if-- and it was just not, they didn't think of the information on their own computers as having any insecurity. They did think they could get hacked or information could be stolen by in-house. In-house. Every company worries about in-house theft, as far as I can tell. That's just a major problem no matter what the company is. And so how NSA let that guy, Snowden, run away with all that stuff, is just amazing to me, because every other organization I've ever worked with is just really paranoid about in-house security. But other than that, outsiders' interest, they just hadn't faced that issue.

Brock: Looking ahead, because I know you continued to be involved kind of in this area of secure computing, if you will, were there, was there some sort of event in particular or development in particular that put this kind of computer security on people's map? Was there like a cause celebre that made everybody wake up to it or…

Hardy: I think they're still waking up.

<laughter>

Hardy: I think that a lot of people aren't quite awake yet. <laughs> I think it's amazing. They always think, "It's not going to happen to me," and some of these thefts, when you dig into the details, it's just amazing how little precaution. We were, in the '60s, we encrypted all our passwords. Some of the stuff that's stolen these days is stolen because the passwords aren't encrypted. It's just, I mean, I can't even, you know, imagine what's going on. It's…

<laughter>

Weber: Did the Morris worm make much of an-- do you remember the Morris worm as a big event for this?

Hardy: Oh. Yeah. Yeah.

<laughter>

Weber: That's a little later, but yeah.

Hardy: Yeah, that's later. Yeah. I don't… Yeah. There's been so many incidents where people should've figured out, and they didn't. They should've learned, and they didn't.

<laughter>

Hardy: And they think, until it happens to them, that the insurance to cover the problem will cover the problem and it won't be a problem. And that it's easier to pay for the insurance than it is to actually build the system that's reliable. It's cheaper to pay the insurance. And… Or it's, in the banks, "It's cheaper to charge your customer a little more than it is to solve the problem and make your deposit secure." The banks are getting better.

<laughter>

Brock: I hope so.

Hsu: Wow.

Hardy: But that is their theory. I mean, I've sat down and argued this with them. With banks. That is their theory. It's cheaper. "It's better, it's easier, for us to charge more and cover the losses than it is to secure the system."

Hsu: Wow.

Brock: This was a conversation you had in the--

Hardy: With a banker.

Brock: In the '70s and '80s?

Hardy: In the ‘80s, yeah. Or maybe later.

Brock: Or…

Hardy: <laughs>

Brock: Okay. Wow.

Hardy: Yeah.

Weber: The credit card system’s based on being insecure, but making up for it afterward.

Hardy: Yeah, exactly.

Weber: And charging the high rates.

Hardy: Exactly. And the banks are too. There’s… Now, I think they’re beginning to worry about this a lot more than they used to. Now that-- well, for one thing there’s an international effort to break the banks and that’s a lot more scary than the homegrown kind of stuff, so anyway.

Brock: Well, maybe we could get into how fast or slow the McDonnell Douglas acquisition was from, you know, how’d you first hear about it until you decided to leave? <laughs>

Hardy: Well, it was very quick.

Brock: It was.

Hardy: It was very quick. From the time anybody heard about it to the time it was done. And it was, I think, I personally think, that the whole thing was negotiated by Bernie. And he just had the authority to negotiate it and didn’t talk to anybody, and that was it. And when he was done, his deal was done, it was over. And there was no-- was a one-man show.

Hsu: So Tom had given him just carte blanche to do that.

Hardy: Yeah. Yeah.

Hsu: Hm. Wow.

Hardy: So I think it was a one-man show. And as far as I can tell from even talking to people who were very close to it, it was-- that's it. And so it was very quick, because nobody else had to really discuss it. It was just like, "Shoop," done. And they, we got acquired, like, which-- early '84. And I left about a year later.

Brock: Okay.

Hardy: Yeah.

Brock: Well, at the time McDonnell Douglas, correct me if I'm wrong, my impression is that it is one of the, at the time one of the nation's largest aerospace and defense contractors.

Hardy: Absolutely.

Brock: And--

Hardy: Was really McDonnell Douglas and Boeing at the time.

Brock: Oh.

Hardy: The two major airplane manufacturers.

Brock: Oh. That there was a duopoly or whatever. <laughs> Yeah. Okay.

Hardy: Yeah. There were two.

Brock: <laughs> Got it. And then it became one, I guess.

Hardy: And then it became one.

Hsu: <laughs>

Brock: But… Okay. So I wondered if, from the perspective of McDonnell Douglas, why they would purchase both Tymshare and Tymnet but also if that was a big deal for them, you know, in terms of the sorts of, the kind of scale of company that it was.

Hardy: I think we were not a big deal.

Brock: Okay.

Hardy: And the reason, both Boeing and McDonnell Douglas, who were the only two at the time, had, in addition to all their airplane manufacturers, had, did sell, time on their computers. Because they had a huge store of computers for when they were modeling airplanes. <laughs> And then they would get in a different stage in the cycle and then they would have lots of spare computer time and so they wanted to sell it. So we were, in that sense, we understood how to sell computer time. And that's-- and we were just augmenting that. That wa-- basically giving them the resources they needed for when they really needed their own resources. And giving them access to the market that we understood better than they did. So that was basically why they, I think, basically that was the reason given for acquiring us.

Brock: So just to play that back, to make sure I'm understanding it, it sounds like then it was a way for both McDonnell Douglas to internally manage its own computing assets so people could get whatever they needed inside the company, but also it's kind of like adding all of McDonnell Douglas's computers to Tymshare.

Hardy: Right.

Brock: Okay.

Hardy: Yeah, exactly. And Boeing, by the way, had exactly the same kind of service at that time. They were-- Boeing's-- actually, I knew more about Boeing's at the time than I knew about McDonnell Douglas. It was more successful. This is before the acquisition, when I-- it was more successful, and it was Boeing Computer Service or something like that. And it really was, that's exactly what they did. Sort of wasn't as sophisticated as Tymshare, but basically sold a lot of computer time to random companies that needed computer time.

Weber: But they were really not, it wasn't a network like Tymnet.

Hardy: No.

Weber: It was much more of--

Hardy: No. It wasn't.

Weber: More traditional, in a sense then.

Hardy: It was just batch shop.

Hsu: Oh, wow.

Hardy: Yeah. Totally batch shop.

Weber: Wow. Okay. So really for technical type stuff or financial?

Hardy: Mm-hm. Right.

Brock: I remember that for a time, Boeing was manufacturing electronic computers.

Hardy: Mm-hm.

Brock: Had McDonnell Douglas done similar activity?

Hardy: I don't remember that McDonnell Douglas had anything like that.

Brock: Okay.

Hardy: They got acquired by Boeing for good reason.

<laughter>

Brock: Being that what? That the--

Hardy: Boeing was just farther ahead.

Brock: Okay.

<laughter>

Brock: Well, was it a push or a pull kind of a situation that led you and others to basically create a spinoff from a Tymshare or McDonnell Douglas after that acquisition? Were you running toward something or away from something?

<laughter>

Hardy: McDonnell Douglas was an airplane manufacturing company. They were not the least bit interested in having a woman as a VP. This is beyond anything you're imagining. <laughs> They made this amazingly clear.

Brock: How?

Hardy: Are you sure you want to know? <laughs>

Brock: Absolutely.

Hardy: <laughs> Well, one of the first things they did-- I mean, this didn't have anything to do with our acquisition. They had an annual meeting where they brought in all their key operators from everywhere. You know, VPs from everywhere. The annual VP meeting. And there were probably a hundred people in the room or something like that. I was the only woman. The local VPs who are the executive VPs all talked about what they were doing in their, you know, gave a short speech about what their group was doing. Every-- now, John McDonnell started off and he just talked about nice things about his company. But every VP who got up there started his talk and included in his talk a number of jokes that were derogatory for women, unbelievably bad jokes about women. And how this, you know, they made it very clear that, "This is the way we're going to treat you if you're here. If there's a woman in our company. This is what we think of women." And so it was pretty clear that this wasn't going to go over too well. After… <laughs> After the meeting, what was funny was after the meeting, John McDonnell caught me, like, instantly as we were walking out of the meeting, tried to make me believe that, you know, "We don't really mean this and we really…" <laughs> Because, you know, this is incredible discrimination 20 years after the nondiscrimination law has been passed. And had-- and there were all these, some of the guys in the meeting were good friends of mine from Tymshare. I could've, you know, this was an awkward

place for them to be because you could sue by that time. And win these things. So John McDonnell was really nice to me for the rest of the year. But I had a-- they assigned one man to making sure that I got out of there. He followed me everywhere for a year.

Brock: That was his job.

Hardy: His job was making sure I got out of there.

Brock: And just by being an annoying/menacing presence or…

Hardy: Well, you know, well, what they did was say, "Why don't you take Gnosis and spin it out as a separate company and sell it separately? We don't need Gnosis." I mean, they didn't--what did they know?

<laughter>

Hardy: And so they said, "Why don't you take Gnosis and spin it out as a separate company and take the team?" And this guy talked to the team and told them that, "This is what you need to do," and then he was there every single day. Making sure that if there was anything I needed in order to spin out gracefully, that he was in touch with John to make all this happen.

<laughter>

Hardy: So am I coming or going? That's [a] good question.

<laughter>

Brock: So he was real, I mean, I suppose it's nicer than him badgering you, but to be a facilitator to make your departure as--

Hardy: It was just--

Brock: --smooth as possible, but still it must've been, you know, something that you had, you know, helped to build after so long.

Hardy: I know.

Brock: Yeah.

Hardy: I know. But, you know, that wasn't one of the considerations.

Brock: And they, do you really feel, that that, all those crude jokes, were for your benefit that day, rather than this is just how they behaved at the previous?

Hardy: I don't know. I don't know whether they're just--

Brock: Yeah.

Hardy: I don't know. But it's clear that it's not an environment that's going to be very welcoming to women.

Brock: Either way.

Hardy: Either way. Either way.

Weber: The fact that they did not restrain it because you were there.

Hardy: Yes. Right.

Weber: Even if it was what they did.

Hardy: You know, and John knew enough to say something and get something done if he had wanted to. Certainly after the first guy. He could have done something, and he did nothing, so…

Brock: Wow. Well--

Hardy: That's McDonnell Douglas. But, you know, there are companies like that. The aerospace companies. I doubt if Boeing was much better. <laughs> TWA. I did a lot of work with TWA, but that would not have been a good place for a woman to work. So it's just the culture. It's just the culture. It's

the same thing I keep saying. It was just the culture. And it's very, very hard to overcome that. And it makes me, I have to say, it makes me somewhat sympathetic with the angry men that are in our political system right now or our angry voters, because these guys had everything. Everything was theirs back in those days. They were promised the world. And whether they were airplane mechanics or the VPs or whatever, everything was theirs. There was nobody else ever got hired to participate in these kinds of jobs. And now they have competition, and the world has changed. And I understand where they're coming from, that we promised them everything. We promised them all the stature and power and control. And we took it all away. The culture changed, and it took it all away. So I understand why they're disappointed and can't figure out what to do. Because they had everything without asking for it.

Brock: <laughs> Yeah. The world's tiniest violin, you know.

<laughter>

Hardy: Interesting.

Brock: Yeah. Well, before we talk about your experience for, I guess, being facilitated to start Key Logic.

<laughter>

Hardy: There you go.

Brock: Before we get into the--

Hardy: Very well said.

Brock: Yeah, yeah.

<laughter>

Weber: They greased the skids.

Brock: Yeah, there you go.

<laughter>

Brock: I just, you know, then from afar, as just to continue the Tymnet/Tymshare story, you know, what you made of what happened to it as part of McDonnell Douglas. If you could just tell us a little bit about your impressions of that. And then the importance or the contribution of Tymshare and Tymnet to computing and to Silicon Valley, if you could wrap up the Tymshare and Tymnet piece, yeah.

Hardy: Okay. Well, Tymnet is, you know, shortly after it was acquired, was sold off to BT [British Telecom], I think.

Brock: Right.

Hardy: And I still have lunch on a regular basis with the old Tymnet operators. So they had a good time. For the most part, it didn't impact their jobs a lot, but as they switched companies, as Tymnet kept getting sold to another company, another company. And that wasn't, you know, for the most part they just enjoyed working on Tymnet all that time, all those years. And course, eventually the internet took over. But by that time they'd all had a good run. They're happy with it.

Brock: Did Tymnet somehow become a piece of the internet infrastructure somehow or was there a day when they turned it off?

Hardy: Yes. [Turned it off – March 24, 2003]

Brock: Oh, wow.

Hardy: There was. There was a day when they turned it off. Everybody switched to using <inaudible> the internet. And they really, again, they were very different architectures. And I'm not the one to explain all the different architectures, but it is very interesting how the different tradeoffs-- it's a fun story of the different tradeoffs between the two. And so anyway, I encourage you to find that, track that down.

Brock: Would you describe that as a physical architecture or a software protocol sort of architecture?

Hardy: Yeah. It's a software protocol. The architecture. Physically they have all these little boxes sitting…

<laughter>

Hardy: Here, there and everywhere. But what's inside the boxes and what's the protocol and how it's managed, it's-- yeah. All that part's very, very, just completely different architectures.

Brock: And what about the-- oh, I'm sorry. Did I interrupt you?

Hsu: Oh. I was just going to ask was it difficult to separate Tymshare and Tymnet when Tymnet was sold off? Did they just disconnect the original hosts and then the minicomputer network was just sort of stand-alone?

Hardy: Well, that was after MDC, and by that time I'd left. So I don't really know, but it seemed, I think, they probably managed to maintain a relationship that they had time so they could continue to support their customers with Tymnet. And… But I don't know.

Brock: Well, there's, I guess, a question of what befell the other time-sharing companies is one. And then if you do have any thoughts about if you had to pick maybe one thing that was Tymshare's major contribution to the story of computing, if I forced you to choose one, you know.

<laughter>

Brock: What would you say?

Hardy: Well, I think for me personally, I don't… The fun thing was, in this career, was starting out with this EAM equipment and basic 704 supercomputers. And then getting into this online, you know, I told you, e-mail in the '70s to my kids, online airline reservations. Online bill paying. Online bank transactions. I did the whole thing.

<laughter>

Hardy: And my first application was automating a payroll program. And then I end up managing online financial transactions. Electronic checks and all kinds of-- what a, you know, it took steps along the way, but it was, and Tymshare was one of them, but it's absolutely fascinating to watch that range of development over those years. What did they do? They made, they did-- I think getting the-- there weren't very many of us, but making it clear that you could have terminals at home and in your office and that this worked for people, this was the better way to do computing, I think that was the big contribution. We weren't the only one who did that, but I think that we were so distributed in with Tymnet that you could do this from all over the world, and people were doing it from all over the world. I think it was a vision that people could use to move forward.

Brock: Have you, just thinking about kind of having these aspects of your life lived online, let's say, starting earlier than--

Hardy: <laughs> Most people. <laughs>

Brock: Most. Has that been, have you continued, to kind of build on that or would you describe yourself as a person who's really engaged with the online world or these sort of networking tools?

Hardy: Well, I'm certainly more engaged than most people my age.

<laughter>

Brock: Fair.

Hardy: Not to mention virtually all the women my age. <laughs> And yeah. I'm still pretty-- I'm certainly, you know, I live with my kids, my daughter and her husband and my grandson, and I'm certainly not as involved as my son-in-law. But he is constantly going, "Ah, I have the most--" I forget what terms he uses. You know, "--modern mother-in-law that I've ever imagined."

<laughter>

Hardy: "I've never heard of a grandma like you."

Brock: Yeah. Yes.

<laughter>

Hardy: So I'm certainly more involved than most of the people my age that he's ever heard of. <laughs> So yeah. I stay involved. It wasn't long ago that, you know, there was little organization that needed a website, so I wrote their website for them. So I still do a little bit once in a while.

Brock: Well, maybe let's turn to Key Logic and stories of the firms that you were instrumental in founding. So maybe we could, you know, what was the idea behind Key Logic and who were the founders and how did you get the backing?

Hardy: Okay. Well, this wouldn't have been what I would have thought to do, but seeing as how I was getting thrown out and given <laughs> the technology and the people, it seemed like it would be interesting to try. <laughs> And so we, let's see, the whole Gnosis group joined Key Logic. And that's-- I probably can't remember them all, but there's certainly Norm. And Charlie Landau and Bill Frantz and Alan Bomberger [and Steve Gimnicher]were certainly the key people, key programmers involved. And they wanted to do it. They really were enthusiastic about giving this a try. And my reservations, although it seemed like fun to try, my reservations were just basically that to-- one is that nobody really understands how much they need security. And we're selling a secure operating system, and it's really hard to buy an operating system from a startup. Because-- you guys obviously get that. <laughs> So those were my two concerns. But it was, you know, as I say, since we were getting thrown out, why, why not give it a try? And I somehow miraculously ran into Gene Amdahl one night at a party. And <laughs> was telling him about what I was doing. And Gene Amdahl was trying to get something other than IBM operating systems for the Amdahl machines.

<laughter>

Hardy: So I actually got funding from Amdahl to work on, to expand, this project. And so that's how we really got started. And, of course, also his connections helped a lot. So Gene Amdahl was enormously helpful to getting going. We did do a big sale to Sperry, who merged later and became Unisys. But it was Sperry at the time we did the sale. We did some licensing to ANZ Bank [Australia New Zealand Bank. Pronounced "A and Zed".] over in Australia, which was fun. A good excuse to go to Australia.

<laughter>

Hardy: And a few, and some other licenses. But as I say, it's really hard to sell. Unisys we sent one of our guys, Steve Gimnicherback, and he spent, you know, probably six months back there helping them understand the whole program. Because it's really, you have to take it over. You cannot just count on a startup to run your operating system. And an app, yes. It's… You can be more flexible. But the operating system, it's got to be yours.

Brock: <laughs>

Hardy: And we did run-- and we did what we did, the same thing we did at Tymshare. We ran it, we replaced CP, with-- we renamed Gnosis KeyKOS and we replaced CP with KeyKOS. We ran CMS, and so we could sell it to companies that were using CMS, and Amdahl could sell it to companies, that needed CMS.

Hsu: So these were all only IBM hardware?

Hardy: Hm?

Hsu: These were still running on IBM hardware?

Hardy: Yes. Or Amdahl hardware.

Hsu: Okay.

Weber: As an assurance, because you were a startup, you were giving them a license so they could modify it themselves.

Hardy: Yeah.

Weber: So if you cease to exist, it's not like--

Hardy: They had it.

Weber: Yeah.

Hardy: They had it. Right. Exactly.

Hsu: So it was more, the revenues were based on royalties. The revenue model of the company was based on selling licenses or royalties.

Hardy: Licenses. Yeah. And yeah, we weren't offering services. We didn't… We sold some licenses. Nineteen ninety hit, which was another recession, and it was just really hard to get sales at that time. It didn't seem to me to-- well, I was ready to do something else.

<laughter>

Hardy: So we sort of dropped Key Logic and then I went traveling and came back later. It just, Key Logic was too hard to… You know, it was just not the right-- just wasn't the right time with the right market. Might be another time when it was better, but I learned a lot. <laughs> And it didn't cost me anything.

Weber: Before we move on. But did McDonnell Douglas give you seed funding or not?

Hardy: No.

Weber: So that's why you needed Amdahl.

Hardy: Yeah.

Weber: So they were basically just giving you the right to take the--

Hardy: They just gave us the rights--

Weber: --give you the right to the code.

Hardy: Yeah. To the software.

Weber: And you were giving people, the customers would have access to the source code if you--

Hardy: Mm-hm.

Weber: --ceased to exist.

Hardy: Yes.

Weber: Obviously.

Hardy: Exactly.

Weber: Okay.

Hardy: Right.

Weber: And were you and Norm still together at this point or not?

Hardy: No. Norm and-- well, Norm and I got divorced in ’78 maybe.

Weber: Oh, okay.

Hardy: But we both worked for Laszlo at the time. Everybody went into a panic the day they found out that we’d gotten divorced.

<laughter>

Hardy: And about two months later Laszlo came to me and he said, “You guys, you’re both happier <laughs> now that you’re divorced.”

<laughter>

Hardy: And so we are very good friends, always have been. This wasn’t, we just shouldn’t have been married. It was just-- that happens sometimes. But we’re very good friends and we’ve always… So people who didn’t have to know, took them a couple of years to figure out we were divorced.

<laughter>

Hardy: It just… And, you know, we talked about technology the way we had always talked about technology.

Brock: It didn’t change your professional relationship in a visible way to the other people.

Hardy: To anybody.

Brock: Huh.

Hardy: No. No. It’s a--

Brock: That’s quite an unusual accomplishment or situation, I must say, so yeah.

Hardy: Yeah. It just-- yeah, it just happened to be the right thing for the two of us. And as I say, Laszlo panicked for the first couple months, and then he realized we were both doing better.

<laughter>

Hsu: Did he actually report to you at any point?

Hardy: Norm?

Hsu: Yeah.

Hardy: Yeah. Yeah. Wait. But not until they reorganized everything for McDonnell Douglas. And then, of course, when we did Key Logic and when we did Agorics. Yeah. He was one of the employees that was… But worked for us.

Brock: <laughs> Well, just a quick, two quick questions, about Key Logic. What did you need from a computing resources standpoint to do the company? Did you need a big office or just small office, a big computer or small computer? <laughs> Yeah.

Hardy: Well, it turned out we had a, we leased a 370. We were in the building over at MASCOR, which was on Great America Parkway. And we had a little corner of their computer room and ran our 370. So we were fine. Yeah.

Brock: And the-- oh.

Hardy: There was, there was a period in there, Key Logic, where they thought they needed a man to run the organization, [thought] it would be more successful. So they hired a guy named Mark Butlein and he only lasted for six months and ran through a million dollars.

<laughter>

Brock: Oh, awful.

Hardy: <laughs> So they got around to firing him, but it was, you know, the rest of us could've lived for a long time <laughs> on a million dollars.

Weber: With "they" being the board, I guess.

Hardy: The board.

Weber: And what kind of board did you have?

Hardy: Well, there was outside investment by that time. And so the investors and Tom O'Rourke were on our board.

Weber: Hm. So Amdahl was not on your board?

Hardy: Amdahl had left by that time.

Weber: Okay.

Brock: Was it a venture capital firm, that?

Hardy: Yeah.

Brock: And the customers for the people that you, for the companies to which you were licensing the software, was it any particular kind of, like, end user? Was it a bank, was it the government or…

Hardy: Oh. Well, we licensed it to the bank. And it was just processing. It's the same processing we'd be doing at Tymshare, only it was on license to the ANZ Bank in Australia. It was the same kind of processing, just a lot of their transaction processing stuff, so we did… And it turned out that running, if you were, applications were running CMS on Gnosis, they were at least five times faster than running it on CP. So on the one hand I'm talking about, you know, don't worry about the architecture, worry about the people. But <laughs> there's a point at which it's better, <laughs> you need to start worrying about the architecture. [If] you could make that much of a difference, you need to think about your architecture.

Weber: But who were your typical customers? Or how many? I don't know how many you had?

Hardy: We didn't have very many customers. And that was pretty, you know, corporations. [There] was a company in Japan that we licensed it to. Same kind of thing.

Weber: Banking.

Hardy: Banking and-- yeah.

Weber: But banks were really the target market.

Hardy: Banks were a great target. And companies like Sperry that we talked to people, talked to company-- well, one thing about the software is that it did require a relatively sophisticated hardware. You had to have privileged memory and you had to have paging and that kind of hardware. And early minicomputers didn't. So we talked to some minicomputers companies that had gotten that far along, but for the most part, they weren't up, the hardware wasn't up to having that sophisticated an operating system. You have these stages that the whole industry went through. It got really good with mainframe computers and then it dropped down with the minis <laughs> and then they had to, the minis had to get more sophisticated as the hardware technology improved and a lot of the-- you know, they had-- you couldn't build a minicomputer and have all these features in the beginning. Technology wasn't there.

Weber: Trickle down computer.

Hardy: Yeah, computer.

Brock: When you closed Key..

Hardy: Key Logic.

Brock: ...Logic. When you have left that behind, was it then that you went to Mexico to study Spanish? I think I remember reading something about that.

Hardy: I did. It was one-- that was the first time. I did go to Mexico to study Spanish. And that's when I had signed up for a course for two weeks and thought I was really nervous about how much I'd like Mexico. So I signed up for this two week course and thought, "Oh my God, I hope I can last out two weeks." And I stayed three months. I only came back because I only had three months visa. It was-- so I had such a good time. I really enjoyed the people, the culture, the language, the music, the whole, you know, it just-- I was in the right place and just really, really had a good time. And I'm still friends with the people I met that first time that first three months in Mexico.

Weber: Where in Mexico?

Hardy: That was Cuernavaca.

Brock: And you had to come home because your visa had expired or whatever it was.

Hardy: I didn't want to be an illegal immigrant.

Brock: Very good of you. Very good of you. Was it then that you got involved with Agorics or was that at some time later?

Hardy: Yeah, then the next thing that happened-- let's see. That was '92, so started Agorics probably about '94. You might have these numbers better than I do in my head. But, anyway, there were a couple of years in there when I-- that's when I started Hardy Group. And I did a lot of consulting. There were-- how did I get to know these guys? Well, anyway, it's all intertwined. They had this company, Xanadu, which was a subsidiary of Autodesk and…

Brock: Is this the Ted Nelson?

Hardy: Yeah, Ted Nelson.

Brock: Wow.

Weber: But you knew Ted before that?

Hardy: I didn't know Ted before that, but I met-- I knew the guys who were working for him, at least some of them. And in the Xanadu company.

Weber: Roger Gregory or PhilSalin.

Hardy: Yeah, Marc Stiegler, Mark Miller, anyway. If I could remember all their names. There were quite a few of them and I knew them. And so they were trying to figure out some things about how do we grow Xanadu? Do we do that? Do we get out? Do we do a lot of other things? And so, I was consulting with them and just sort of all their various business issues. Marc Stiegler. I came back-- well, one, first, because I was out of visa. I had to come back. But Marc Stiegler was calling me in Mexico from Xanadu while I was in Mexico and saying, "You have to come back and help us. You have to come back and help us." So that's how I just came back sort of into this consulting job and stayed around most of the time doing consulting. Did take a couple more trips to Mexico, but most of the time for that two years, I stuck

around and did some consulting. And Xanadu basically fell apart. And Ted is very creative, but he's a little erratic. And..

Weber: But theoretically, he was not involved in the day to day operations, right?

Hardy: Theoretically.

Weber: How did it work in practice?

Hardy: <laughs> You know, yes and no. Because he wasn't involved in the day to day operations unless he wanted to be and then he took over. So it was like-- sounds like Donald Trump. <laughs> But he's [a] brilliant guy. He's certainly fun to work with, but just kind of a roller coaster. Anyway, Xanadu ended up folding, but the guys, Mark Miller-- by this time everybody knew it was going to fall apart. Mark Miller had gotten a contract to do market based resource allocation from Sun Microsystems. But Sun had told him they wouldn't give him the contract unless he had a business. So he said, "How about starting Agorics so that we can get this contract from Sun." And that's how Agorics got started. And same guys. All the Xanadu guys. Not all of them, but a good hunk, most of the majority of the Xanadu guys came over. And that was the core of Agorics. We did deliver the market based transaction, which was just a-- this was all for Bert Sutherland over at Sun. And it was just a research project. How would things work, if you had to pay for every resource as you go, how does that work out? And so it was just a example of what you could do in a market based [system].

Brock: Micro payments, that sort of thing. So I've been thinking, using the Xanadu type micropayments as a model.

Hardy: So, yes. This was a long continuum. But while we were at Sun, the-- is when the FSTC eCheck project started as part of the Financial Services Transaction Consortium. One thing I forgot to mention about KeyKOS, Key Logic. Let me go back now that I'm back on government just momentarily. This was a very—KeyKOS was a very, very secure system. We had it evaluated by the NCSC and it was given the highest possible most secure rating anything that wasn't developed in a secure environment. You couldn't have done better, so it was a very, very secure system. And I mention that, because it comes <inaudible>. <laughs> And it was Linda Vetter, who had worked on security systems in other companies, came to Key Logic to do this and managed this relationship with the NCSC.

Hardy: So, anyway, back to Agorics. FSTC and eChecks, electronic checks came along. They're all on-- if you look up FSTC, this all shows up.

Weber: Okay. Got it.

Hardy: So there were a number of-- it was certainly managed by Bank Boston. Gee, wish I could remember his name. He was really good. I'll look it up and give it to you later. Frank. Frank Jaffe.

Brock: Oh, that's familiar to me.

Hardy: From Bank of Boston. Anyway, he managed-- the government had-- Congress had passed a law that said the Federal Reserve has to be able to send electronic checks and sign them electronically safely, so here's the eCheck project, make this happen. So there were a number of companies involved in this and managed by Frank Jaffe out of Bank Boston. And Sun was one of the companies. And so we contracted with Sun. Sun contracted with us to write their part of the software. And that worked for about six months when one of the managers of Sun decided she wanted to take over and be the eCheck-- do the eCheck work. And so then we-- but by that time we had written some very nice software so that IBM hired us to do not what they were doing, but additional work that needed to be done on a project. And so they, IBM, paid us now for more of the work and we continued to work on that project until the whole thing was delivered. And it was-- that was a really interesting project. And, again, Linda Vetter came back. Linda, who had done the NCSC, came back to Agorics, because security was such an issue and that was her area of expertise. So we had a lot of good security expertise on how to do that, which is another reason some of the things that get hacked today just blow my mind.

Weber: And so what was the final deliverable?

Hardy: What was the..

Weber: What was the deliverable?

Hardy: Oh, the software that they could use at the Federal Reserve Bank.

Weber: For the eChecks. Right.

Hardy: For the eChecks.

Weber: And there was at that point no direct link to the micropayments at Sun.

Hardy: No. No. No, they were totally, totally separate projects.

Weber: Because, obviously, your background was at this point secure transaction processing that leads to both, but okay.

Hardy: Yes, they-- by this time, by the time eCheck was actually delivered and usable and all of that, Bert had moved on and Sun was changing and it was a very different time.

Weber: And what year approximately?

Hardy: Must have been 2003 or so.

Weber: Okay. So the micropayments was what year, then?

Hardy: Ninety-four? Ninety-five?

Weber: And the eChecks are mandated by Congress late '90s?

Hardy: Yeah. Well, no, they were-- well, probably mid-90s and it takes Congress a while to get going.

Weber: But the micropayments, there was never any finished product.

Hardy: There was never anything else involved with that besides, you know, just minor consulting and…

Weber: But did that project ever go anywhere? Not really.

Hardy: No. It was just something they were looking into and it never really went anyplace. As I say, Sun was reorganizing. You know, Sun got acquired by Oracle in 2010.

Weber: Oh, this was late. This was not back in the Java days. No it's later.

Hardy: Yes, Java was-- yes, it was back in the Java days, but they were already, by 2000 Sun was waffling.

Weber: But they were not—OK, because it seems like in the mid-90s, they could have plugged that into some sort of digital cash.

Hardy: They could have. They could have done something with it and didn't, right.

Brock: If you wouldn't mind tracing that line a little bit more in bold for me, because I don't understand what the Xanadu micropayment idea was and then how that relates to resource allocation with micropayments. You know, what kind of resources and who's making the payments, I guess, on the Sun side. So if you wouldn't mind explaining that a little.

Hardy: Well, you can write a system where, you know, like we talked about, you can't get on the short queue unless you pay. And you can, if you want to run, if you want a resource, if you want to print, there's a payment. Do you want to do this? Do you want to do that? How much do you want to do it right now? And we certainly had timing as one of the criteria for how much things cost. The sooner you want it, the more it costs. And so you could delay running something or using some resources until it was really available or you could demand it right now, [in] which case the price went up.

Brock: Is this for the internal accounting of a large organization?

Hardy: Mm-hmm. Yup.

Brock: I see. So it is a way to allow different people or entities within the big organization to make decisions about how they're going to use a common computing resource.

Hardy: Yes, exactly.

Brock: I get it.

Hardy: Yup. Yeah, it was certainly a good use of it.

Weber: So not looking at the Xanadu model of applying it to the public at large.

Hardy: You could do a lot with it. It isn't that we didn't talk about it, but what we did was a much more limited example.

Weber: So for internal pricing and internal business.

Hardy: It was for internal pricing is what we…

Weber: Sharing.

Hardy: Yes. We had lots of things we could have done. It didn't turn out that way. They had lots of good ideas. This was a group with these guys that-- the old Xanadu guys, the Agorics guys, they were really creative. Very, very good team. It was a fun team to work with, because they were just-- as I told you, Tom didn't want to do this next thing at Tymshare. These guys were always moving it forward, always moving it forward and always with good ideas, so it was fun.

Weber: Could you give us as much of a list as you remember of who they were?

Hardy: I can certainly go back and send you a list of who they were.

Weber: Sure, that would be great.

Brock: Wonderful.

Hardy: I don't know if I have-- I can look and see, if I have them all. But I can certainly, especially if you remind me.

Brock: Okay. Can do. We promise. Do those stories of these micropayments relate at all to the story that is so big on the contemporary scene of cryptocurrencies and digital cash and all that?

Hardy: Yeah. Right. There was a great conference meeting, meetup or something last night. I wish I could have gone to it, but I had-- I thought I should probably sleep, so I didn't fall asleep today. But it was all about blockchain and payments, micropayments. Yeah, you know, it would have been fascinating, over here at Stanford. They do those once in a while. I'll get the next one.

Brock: Were the people involved with Xanadu and Agorics involved in that later?

Hardy: In what they're doing now?

Brock: Yeah, in that sort of world.

Hardy: One of the guys from Agorics is definitely involved. He has actually talked over there at one of their meetings, so, yeah, definitely involved.

Weber: Which one?

Hardy: Kurt Thams.

Weber: Kurt Thams?

Hardy: I hadn't mentioned him before. His name is Kurt Thams. T-H-A-M-S.

Weber: So if you were in that world, you knew about DigiCash. David Chaum, did you meet him?

Hardy: I don't remember again. <laughs>

Weber: CyberCash.

Hardy: CyberCash, but knew-- I was in-- yeah. All of these, yes. I vaguely remember all of them.

Weber: And did you have anything to do with CommerceNet, the CommerceNet Consortium?

Hardy: I don't think so. Although, it certainly sounds familiar.

Weber: Wells Fargo was a big participant on it.

Hardy: Yeah, Wells..

Weber: Visa.

Hardy: Yeah, and Wells Fargo turned out to be a good bank to work with even though I don't like banking there. Yeah, they-- Wells Fargo was-- maybe we did do more than I can remember right off the top of my head here, because I do remember working with Wells Fargo and they were a good bank to work with.

Brock: And then did you decide to kind of wind down Agorics after that electronic checks project?

Hardy: After eCheck. After the eCheck delivery, right. We had a few other-- Agorics did a lot of consulting, random little consulting and we had a few consulting contracts to wind down, but Linda took

them over, took over Agorics, which was great. Wound down everything and I went to Mexico, which was my-- ever since I'd been there the first time, my dream was to get back. So then I had three years before my grandson was born, so... <laughs>

Brock: And it sounds like you've been very involved with your grandson.

Hardy: Grandma ever since. I'm very involved. [I love it!]

Brock: Well, I wonder if we could shift gears maybe a little bit or maybe one last time for the interview today and just ask you for-- well, there's one question that I have about the changing scene for women in computing and business in the '90s and the 2000s in that phase of your career. And then maybe we could turn to just even broader gauge reflections about your career in computing. So maybe we could turn to that.

Weber: This is really a question as to what we want to do. So I would actually like to hear more at some point about your involvement with the Xanadu operating--whatever. But we're more than three hours without a break at this point. Do you want to do that in a separate short thing?

Hardy: Yeah, let's do that as a separate short thing and I'd probably have to think about that for a little while, because Xanadu was sort of squeezed in between a lot of other things. <laughs>

Weber: OK. But we won't do that now.

Brock: We could have a separate discussion about the whole thing.

Hardy: Yeah, I'd be glad to chat about that sometime. And women in computing. Well, of course, when I was running companies, as you can see, I'm talking about Linda and Mary and we had women in my companies. But although we had women. I had women in my companies, but it was-- there just weren't many to hire. And, apparently, that's still the way it is. But, for some reason, what I read, and I don't know the women in computing these days, really, what I read is they come for a while and quit. And I'm not entirely sure why that is, because I personally found it was a fabulous career path. And a lot of women worked for me I'd have who were mothers. They could come in, you know, for a few hours in the afternoon and do QA or something. So it was incredibly flexible hours. And I'm not sure why they quit today. I mean I managed to have two kids and work full time. And, you know, it's-- I just don't know what's changed. I don't know what's changed. Because it sounds like people are more expecting women to be there these days and nobody expected a woman to do anything [back then]. I mean they were just amazed that a woman could write an operating system. And lots of people just never believed it. Did I tell you my story about-- Dave Schmidt hired me to write this operating system, but really didn't believe, really

didn't know that there was-- that it was difficult to write an operating system when he hired me. Because he told me later, he said, "I never would have hired a woman to write an operating system, if I had known what was involved." <laughs>

Weber: Back handed.

Hardy: But he did and-- but they all, they all believed that Norm must be doing it somewhere, somehow. Somehow or other Norm was writing it at night. The woman who directed personnel for ten years, the last ten years of the company told me just a few months ago that she knew that Norm had actually written the operating system at night. I said, "He didn't even work there." And she said, "Well, he wrote it at night." You know, it's just like-- it's not possible that you can write an operating system. It's just not possible. And Dave Schmidt was, as I said before, Dave didn't really believe it either until the day my first daughter was born. Then everything was working. I had stayed up until midnight the night before and everything was really stable. And she was born nine o'clock in the morning. And then, but it turned out a customer called in that morning, called Dave that morning, and wanted a little enhancement to the operating system, another function, another BRS or something. And so he promptly called Norm and said, "Oh, we need this extra BRS for in the operating system." And Norm finally-- you know, I told you before, they never interviewed Norm. They just assumed he knew the operating system. Well, at that point, Norm needed to tell them, "I don't know anything about the operating system. I've never looked at the code." And so that was the day Dave, finally sunk in that I actually was the only person who knew the code. And so at three o'clock in the afternoon, this is the day my daughter was born, my phone rings. I'm in the hospital. My phone rings. It's Dave Schmidt. He says, "I've got to get this enhancement into the operating system right away. Would you mind if I bring a teletype over to the hospital?" I said, "No, thanks. I'll be home in a couple days. That'll be soon enough." But, you know, that's how hard it was for people to actually imagine that a woman had done that work. So I think we're not that bad anymore. And so things have changed and it should be better and I don't understand why women are not in it, except for this-- except that they're not necessarily as focused on this beautiful code as they are on getting the job done.

Hsu: Do you think that thing about how Dave Schmidt wanted you to fix that thing right then and there-- I mean today's tech world is still very much like that, right? You've got to do it now, now, now and it doesn't matter what your personal life is going on. Do you think that could be one of the reasons why women are leaving?

Hardy: I'm sure that that probably is that. And I guess my advantage was that they didn't have anybody else. And so they couldn't-- you know, like well, promote somebody else over me. If you're not going to be here 24 hours a day, then we'll promote somebody else. Well, there wasn't anybody else to promote. And probably there's more depth these days and there's probably somebody else that you could, "Well, we'll put this man in charge, because you'll be out for three days having a baby." And, you know, it's crazy. It's just-- it is. It's just crazy. And I hear these things all the time. I knew at Tymshare there were guys who would take off a year to travel in Europe or something. Would never ever impact their job, their future,

their pay, anything. If a woman takes off three months to have a baby, "Well, we can't pay her," you know. It's not worth as much as a man. It's just like, it's all in the cultural perception. And as I told you in my earlier story, it infects the women as much as the men. It's just the culture. It's very…

Brock: Maybe it's still just the culture still today.

Weber: Oh yeah, who knows? You know? If its--

Hsu: But the culture can change too.

Hardy: Culture change—it's much better than it was, much better than it was, but it takes a long time for culture to change. People don't change easily. And that's-- I think that's all-- hopefully, another generation, kids-- you know, the girls are learning to program in the second grade now just like the boys. And maybe by the time my grandson is up there, they'll all be-- they'll be able to keep more of the women in. They treat them-- they don't really separate boys and girls nearly as much now as they did before. So maybe they'll eventually figure that out.

Brock: Maybe we could ask you if you would mind reflecting on just the changes over your career in the practice of programming, of making software. Just if you could give us some thoughts or comment about that change.

Hardy: Well, I stared out with, you know, here's your machine and this is what I want it to-- these are the answers I want and analyze this data and tell me. And so quality of software or how you program or what you use or should this be written in FORTRAN or COBOL or in the assembler? Nobody knew. And you just sort of jumped in and tried things. By later on, I certainly had learned that you're much better off being very organized about how you design your software and always had a much, even all the way into Agorics, much more structured development style, which everybody after the first try appreciated. And because it was so nice to deliver software that didn't have bugs in it and that was-- that actually met the customer requirements. So I think it went from totally off the wall and the people who had the requests, whether it was, oh, we need a compiler or we need an analysis of this data, the people who were requesting it had no idea what you-- how you might go about doing that. They just knew a computer would do it if you asked somebody. And these days at least the managers have been in programming and that helps. But, boy, it's been-- and as I said before, the big step forward was going from, it's fun to sit in front of a supercomputer and have total control, but it's not nearly as efficient as having a timesharing system and a terminal in your office. And it's easy to give up all that control for the convenience and efficiency. I do wish-- they talk about teaching code to kids, teaching kids to code. And I wish somewhere along the line they would teach kids how computers actually work, which, as far as I can tell, they don't do. And it's-- I just did a-- I told you I just did the website and that's the level at which they're teaching kids to code. And you don't have to know how computers work to do something like that. And I think it would

be very helpful to all of the programmers out there, if they were-- and to all the users, if there was just basics about how computers work. Even my friends, who are in their 80s, almost the only thing they do is send email. They can't figure anything out, because they haven't the vaguest idea how it works. And I can, you know, so they call me, "Come help." And so I come over and, you know, it's a nothing, because I know how they work. And there isn't-- and you could have a short course. IBM taught us how computers work in six weeks. They can have, you know, you could have a short course on how the heck computers actually work. Sure would help people.

Brock: That's a great suggestion. I guess I had one other kind of big, wooly question to lob at you, which was just thinking about from the time you were working on that computer behind the windows on Madison Avenue to today. We've gone from a time when a computer was an extreme rarity that people didn't know what it was and connectivity between these computers was nearly non-existent to a state of affairs today where computers, even computers in the form of microcontrollers, are, it's hard to avoid them. You know, truly ubiquitous as is the connection, the network of these computers. And I'm wondering if you could reflect on what it's like to have seen and participated in that change.

Hardy: I just I really feel very lucky. It's just been amazing. And it's been fun to have to go back for this meeting to have to go back and think about all these steps along the way and just watch how things evolved. And I was lucky also to be in such an interesting place. You know, being at IBM was the only place to start, because they had the only computers then. Well, not quite, but it was definitely a big coming organization. They had the customer base, because they had the EAM equipment. I ended up at the lab with supercomputers and the Stretch and the supercomputers, the 6600. And I ended up at Tymshare with the network and the evolution of timesharing or shared computers and shared networks. And it was-- I was really lucky, really. And I enjoyed all of it. And which is why I can't figure out why women keep dropping out. I'm just not the right person to ask, because I never-- I was never tempted to drop out. And it was always, could see what was coming next and it looked like so much fun that, why drop out now? And so I don't-- it just, it was great. I was very, very lucky and asked the right people the right questions at the right time. I was very fortunate to end up there and watch it all happen. [I was probably more fascinated by the technology than many women. The other “advantage” over women of today is that I had such low expectations. No matter what I found, I knew I didn’t want to live like the women in my Mother’s generation. I was prepared for a world that was even more unfair than the one I found. That doesn’t mean it was easy to deal with the lack of respect and the unfair compensation, but it was easier than it is for women today who expect to be treated fairly.] But, on the tech side, I have to say now that I've been out of it for almost ten years, things change so fast. I mean I am certainly not up on what's going on today. And, you know, ten years ago I would have known it all. And I was ahead of-- you're in it. You're talking to people of a wide variety. Everybody at Agorics had some favorite area that he followed, then we'd all sit down and talk about it, so you knew everything. And these days, if you're not in it, you can't keep up no matter how good a background you have. If you do anything else, you can't keep up. It's changing so fast. And people don't change that fast, which is why there's a lot of contention and concern in the country. People don't change very fast. And I was with this guy last week, who just wrote up a whole little pamphlet about how the government needs to regulate the computer industry, because they're destroying everything by changing things so fast. And I completely disagree with him. I

don't want to slow down the computer industry. On the other hand, I'm very sympathetic to the idea that why can't we build a simple computer for these people who do nothing but email and maybe watch a video once in a while? It doesn't have to be as complicated as it is for the 80-somethings or 70-somethings. And as that demographic grows, the industry should think about providing something that doesn't change every few months so that they can stay connected. Because these days every time there's an upgrade, which happens every few months, I have to go in and help them, because they don't know what to do next. And I hope we can figure that out as one of the next goals of the industry is stabilize things for the people who are not-- don't need the change every few months.

Brock: Keeping that customer in mind yet again.

Hardy: Right. The customer.

Brock: Well, I think that's all the questions that I had unless one of you would like to ask another question.

Hsus: Yeah, I was actually interested in going back to asking about security and your ideas about the future of security. You know, obviously we've talked about how insecure things are today and the internet wasn't developed on secure principles.

Hardy: That's right.

Hsu: So do you think that it's possible to retrofit the internet with security or do we have to replace it with something new from the ground up?

Hardy: I don't know. And I wish-- one of the things I wish you guys would do is interview Norm, who would have a much stronger opinion about that and a knowledgeable opinion about that. I don't know how they're going to. I never heard any good ideas about retrofitting the internet, but hopefully somebody's got some because-- or maybe it just evolves into, you know, the way we managed to move Tymnet. We did. There was one day, one night, when we shut the whole thing down and came up with a completely different system the next morning. And this is, you know, it was, everybody was scared to death.

Brock: I'm sure.

Hardy: I'm like, everybody, including LaRoy who wrote it all. Is it really going to work? And they finally had to give up and Norm and LaRoy worked late at night on this, trying to make sure that the new one was going to come up and it would work and finally they got too tired and he had to go home before they

messed it up anymore. And it turned out that the next morning nobody had looked at it. They'd given it four or five hours to just be alone and figure it out for itself, came in the next morning and everything ran perfectly, no glitches. That's LaRoy's coding. But yeah, that was so terrifying to everybody. I don't think you want to do that again. So they'll have to figure out some incremental way of spreading a more secure network and they need a more secure network and they need more secure systems, the nodes. They've got to clean those up and, hopefully, before there's any major catastrophes. There's so many potential major catastrophes to worry about. I try not to think about it. <laughs>

Weber: In some of the other answers, did we already get enough for advice for young people, advice for young women?

Brock: I felt like we had covered Ann's thoughts about computing. Advice for young women or for young people who may be interested in computing as a part of their lives.

Hardy: I wish I knew. I wish I knew how to get-- they're working on it. There are a lot of women's groups that are trying to get women into it.

Weber: But specifically, this was the Education department that uses it sometimes. What would be your advice to young people?

Hardy: [Hopefully, the young, and the older, will work to get and keep women in tech. The industry will be changing the world even faster in the next decades and it will be an exciting place to be. But, the developments for the future need to have women on the design teams. Our perspective, out needs and our experiences are different. Women must be there to make these changes work well for everyone. Women can only live in a better world if they participate in planning and designing the changes.]

[I'm not sure that young people need to change as much as the older people need to change – including the professors. Talking to men I know who are fifty and older, there is the assumption that women are being treated fairly, and, to say the least, that doesn't agree with the experience of the women I know.]

Hardy: Well, it's-- my advice is to stick it out in spite of the fact that the men are not being very cooperative, <laughs> because it is, in fact, a great career, if you can just hold on until the men relax. And the men around you will eventually relax, but... And I would also-- but I think there's a lot to be done in management and it's not just in computing. It's in all industry. We need to recognize that every once in a while women need to take off and have children or--you don't want the country to stop having children. So we just need a whole different culture about how we handle that and how we handle childcare. But I don't think it's unique to the computer industry. You know, the computer industry is mostly nerds.

Weber: <laughs> I noticed.

Hardy: And most women are not nerdy in the same way that nerdy men are. <laughs> And I think it takes a while for those personalities to get comfortable with each other. And I don't know exactly how you make that happen. But, for some reason, I really liked hanging out with people like Norm and John Cocke and these, you know, nerdy guys who are talking about weird ideas for how do you make the ARPANET secure and things like that. I always thought that was fun, but it's clear that most people don't. That's not their main form of entertainment.

Hsu: So that's definitely a cultural thing.

END OF THE INTERVIEW

