An Interview with

ANN HARDY

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Conducted by Jeffrey R. Yost

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Ann Hardy Interview

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Abstract

Tymshare, Inc., senior executive Ann Hardy discusses her prior work on IBM Stretch, and at Lawrence Radiation Laboratory (later renamed Lawrence Berkeley Laboratory and Lawrence Livermore National Laboratory), before focusing on Tymshare, where she was one of the first employees at start-up Tymshare and became one of the highest ranking women executives of a major IT firm in the 1970s. Her interview details the technical, strategic, and organizational history of the company—including her programming effort with Verne Van Vlear to get the start-up's initial time-sharing system operational. The interview also offers perspectives on TYMNET and Tymshare's acquisitions.

Yost: My name is Jeffrey Yost from the Charles Babbage Institute and I'm here today with Ann Hardy on April 3rd, 2012. Ann, I'd like to begin with a few biographical questions. Could you tell where you were born and where you grew up?

Hardy: Yes, I was born in Chicago. I grew up in Evanston, Illinois and stayed there until I graduated from high school. I went to college at Pomona in southern California. After that I moved to New York City. I was going to study physical therapy, I did that for a semester and then I studied education for a semester at Columbia. Decided I wasn't going to be either of those. Fortunately I had a friend who was an engineer at IBM at the time, he said why don't you go interview for a programming job at IBM. I'd never heard of IBM or computers or programming (my college dictionary did not even have the word computer in it so I wasn't as ignorant as that sounds now), but we took an afternoon and he briefed me on what to say in the interview and what I was supposed to have known. I went in for an interview and passed their little test – they had a little test that you had to pass – then they trained me and that's how I got into programming.

Yost: What year was that?

Hardy: 1956.

Yost: Ok. How long were you at IBM?

Hardy: I was at IBM for five years.

Yost: And this was out in New York?

Hardy: That was in New York. I started in Manhattan and then I ended up working up and down the Hudson River. IBM was expanding at the time and every few months they had a new site on the Hudson River. Then I ended up on the IBM STRETCH project in Poughkeepsie for a couple of years. I decided, after my part of that was winding down a little bit, to take a year and go back to school. I went out to Berkeley and when I got through there, it turned out they had delivered a STRETCH to Livermore. But of course there were very few people in California that actually knew how to program a STRETCH. So it was easy to get a job. So that's how I got to Livermore. I was there for three years and then my husband got a job offer from IBM which was in Menlo Park at the time. So we wanted to move from Livermore over to this side of the Bay. Tymshare had this little notice in Datamation about how they were going to do a time-sharing system and have terminals in people's offices. We had time-sharing on the 6600 at Livermore by that time so I was well aware of how much more convenient it was to work on a time-sharing system than to submit your batch deck and get it back in the morning. So I called them up and asked them if I could come over and lease a terminal for my house. Well, they had never thought of the idea of having a terminal in your house, but we chatted for a little while about their business plans. They didn't even have a computer yet so this was a little premature. I went back to Livermore and thought about our conversation. A week later I called them up and said, "You don't need a customer you need someone who knows how to program the machine you're about to acquire." They decided to hire me.

Yost: Was the Livermore system an outgrowth of Project Genie?

Hardy: No, Livermore just came out on its own. We called the system, "Octopus" when I was there. Later the official name was, "LTSS (Livermore Time Sharing System)."

By the summer of 1966 SDS had delivered a 940 to Tymshare and I wrote their version of the Berkeley operating system. Berkeley had great concepts and generally good design, but, upon delivery, the operating system only ran two users and we needed to be running forty in order to make any money.

Yost: So you were hired to rewrite this operating system?

Hardy: Yes. They just didn't know the significance of the operating system at that time. They were very focused on the user interface which is a good focus for a startup! They hadn't been involved at the operating system level before, but I had had experience at Livermore. I hadn't actually written the operating system, but those programmers were all my friends and I knew what they were doing.

Yost: When you were hired by Tymshare, this is in?

Hardy: It was February of 1966.

Yost: Describe the company, how many people were working there?

Hardy: Tom O'Rourke and Dave Schmidt were there. Barbara was the secretary. Verne Van Vlear was the technical person at the time and he continued to do a lot of the programming for a long time, not the operating system but on the exec. Berkeley operating system terminology: the component that interfaced with the hardware was called the Monitor; the component that interfaced with the Monitor on one side and the user on the other side was called the Exec.

Yost: Did he come from GE?

Hardy: GE. And Neil Sullivan who I think was doing marketing – and probably would have except that we didn't have any customers or a machine to run them on. But that was it.

Yost: Can you describe your first impressions of Tom O'Rourke?

Hardy: Well, my first impressions of Tom O'Rourke, well let me see I don't know if I can remember. He just seemed like a nice guy; an excellent salesman. And he turned out to be the perfect person too for those first years. I think it was probably Dave's vision but Tom was a marvelous salesman. They got together, and *really*, Tom was *very* good at sales, and they made this happen in those early years. There weren't very many employees, but Tom would take all of us on Friday afternoons out for a beer together. It was a great technique for building company loyalty.

Yost: Had they received outside funding?

Hardy: They had - from George Quist at Bank of America in September 1965.

Yost: At that point where was Tymshare located?

Hardy: Distel Drive in Los Altos. The computer went into a building on East Meadow Drive.

Yost: So it was just offices on Distel Drive?

Hardy: It was just offices on Distel Drive. We had some time on the Berkeley machine but everything was very small in those days and they were swapping to tape. You couldn't get very many people on the computer at the same time because they had to search back and forth on the tape for every file.

Yost: When you first arrived did you get a sense of what the business model was for Tymshare? What market it was targeting?

Hardy: Well, like I said earlier they clearly were not targeting people who wanted terminals at home. But yes, I think it was perfectly clear once I talked to them. They were going after the big engineering/aerospace companies that were around here at the

time, like Lockheed. There were a lot of those kinds of companies and they went after all of them. Tymshare did a good job for them with the on-line development and fast turn-around. Everybody else operated in a batch system where you put in your cards at night and got them back in the morning. If you made one mistake you had to wait for the next day.

Yost: So these were organizations that had computers but wanted to supplement that service.

Hardy: Yes, and we didn't go to the organization, we went to the engineering departments because they were the ones who weren't meeting their deadlines because they couldn't get enough computer time and the turnaround was so long. So we could go to the engineering departments, it didn't cost that much to lease a terminal and get some time and they could make enormous more progress using time-sharing.

Yost: When you arrived, had the decision been made to go with SDS [Scientific Data Systems]?

Hardy: SDS, yes.

Yost: But the computer hadn't been delivered?

Hardy: No. Berkeley took their 930 and modified it. Then, when Tymshare went to buy it SDS had to actually manufacture a new computer which they hadn't been doing before. When Dave and Tom started they planned to use GE.

Yost: Right.

Hardy: They left GE in July 1965 with the intent, I believe, of using the GE timesharing system. Then, GE turned them down at the last minute and that's how they ended up on the SDS/Berkeley system.

Yost: Do you happen to know if when they left to form Tymshare had GE already entered the time-sharing business or had they announced that they would be?

Hardy: I think that GE had entered the business, but not in a big way. Dave saw the model and just didn't think they were going to do as much with it as they could.

Yost: And this is the GEISCO Division?

Hardy: Yes.

Yost: So you joined the company and began working on developing the monitor/operating system?

Hardy: Yes.

Yost: Can you describe that project to me?

Hardy: Yes. Berkeley sent me a listing with one comment that said, "Read only." It was just a listing of all the code in the monitor, so what do you do? You start with the interrupts and follow through and figure out where everything goes and read the story from there.

Yost: Roughly how long did it take to do that programming?

Hardy: Well, things were much smaller in those days. We didn't get a computer – well we did a little on their computer in the summer and I certainly knew it by that time so it was a few months before I was really fluent in the monitor but not too long.

Yost: Were you using time-sharing to use the Berkley computer?

Hardy: Yes, we had terminals over at Distel to get on to the Berkeley computer but it was limited to say the least.

Yost: Can you expand on that a little?

Hardy: Well, you had swapping to tape, how fast can this be? You could do a little bit but it was extremely unreliable. You could get the sense of what it was going to be like but that's about it. You really couldn't do much with it.

Yost: I understand Verne Van Vlear was working on the exec?

Hardy: Yes, that's exactly right. I did the monitor, he did the exec.

Yost: Was Verne with the company for a long time?

Hardy: He was there before I was. He was really the only one that was there before I was. Neil and I came at about the same time.

Yost: Did he basically come at the founding?

Hardy: Verne came as soon as they got it organized and had any way to pay him at all. They did a demo in the fall of 1965, probably at the Fall Joint Computer Conference. They had a booth down there and Verne was the technical person there. He was really the only employee at the time. He was quite early.

Yost: Had they signed up any customers as a result of the demo?

Hardy: It was my understanding that they had Letters of Intent from a couple of large companies in 1965, but certainly they had signed up customers before the machine arrived.

Yost: And it was 1965 that they got the money from Bank of America?

Hardy: Yes, from Bank of America, that's my understanding.

Yost: I understand Lockheed was one of the first customers. Do you recall other early customers?

Hardy: We had Dial Data on the East coast and NCAR in Colorado, but I can't remember any others.

SDS delivered the computer without even a swapping device so we were really not operational. They brought in the Vermont Drum in September and then the engineer and I had to basically debug the installation of the drum and that took some interesting engineering. After that we had customers almost instantly. Of course that was good because we needed the revenue. But during those first few months I was not only writing the monitor I was also doing all the operations – keeping the machines running, switching the tapes, that kind of stuff.

Yost: Were you doing that alone or were there multiple people?

Hardy: Verne and I were the only two people in the computer center. However, only my code had to interface with the hardware so I managed all the operations.

Yost: Were you really the only two technical people?

Hardy: Yes.

Yost: Dave Schmidt?

Hardy: Dave Schmidt was wonderful. He was a great guy to work for and he certainly knew what he wanted but he didn't code or anything like that. He was very good manager.

Yost: And O'Rourke was chair and president of the company and Dave Schmidt ran the technical division?

Hardy: Yes.

Yost: Do you recall what efforts besides attending shows were made to market in those early days?

Hardy: We had salesmen. As soon as we were remotely reliable we had salesmen who called on customers like Lockheed and the Navy. And if you get to talk to John Jerrehian,

I'm sure John will remember the names of the other customers and maybe Dave will too. I don't remember the names of all the customers.
John was a good salesman. He was also out there bringing in a lot of business in those early days.

Yost: So was it 1966, later in the year, that the SDS arrived?

Hardy: The SDS 940 arrived in either August or September.

Yost: Were you ready to go at that point?

Hardy: As soon as they got all the parts working. It's like the original problem with the drum, which was a swapping drum, it was supposed to be fast. It would write a page and then it would have to do an entire revolution before it could write the next page. So we had to do some engineering to speed that up so that it could write consecutive pages without having to do a revolution in between. So there were a lot of little things like that but once that was fixed… SDS was very good. The engineers that they had up here were really good and they were really responsive to do follow-up. It didn't take all that long to get it up and running.

Yost: By the end of that year?

Hardy: Yes. Before that actually.

Yost: How many simultaneous users could it serve?

Hardy: Well, I said it started out with two. I don't remember how fast we grew. We managed to get to eight pretty quickly. But we managed to end up getting it into up around 38 within six months or so. But it wasn't immediate that's for sure.

Yost: Was the sales staff bringing in enough customers?

Hardy: Yes. The business – I'm not sure how fast they thought the business was going to grow but it went very fast. They had to get out of East Meadow fairly quickly and move over to Bubb Road because they needed more space.

Yost: I understand Rick Crandall and his wife...

Hardy: Yes, his wife was really nice.

Yost: Is that Louise?

Hardy: Louise, yes.

Yost: I understand they came in the summer of 1966?

Hardy: Yes, but as I said it was limited to what you could actually do, you could get a feel for it but it was definitely limited. We tried to put apps up to make things easier for the users. You certainly got a feel for it but it was limited until the machine arrived.

Yost: And they were with the startup Comshare?

Hardy: Comshare, back in Michigan, right. Rick had started Comshare back there but of course they didn't have a computer either. So they came out and were here for the summer. You can imagine how limited it was if when they delivered it to us that was the first time they'd ever tried to swap pages to anything that was fast enough to respond within seconds. But it was better than batch processing.

Yost: Do you know how that connection was made between Rick and Tymshare?

Hardy: Rick and Tymshare? That was an early connection. I don't remember how that was made; I don't remember how that happened. I think that was part of an agreement that happened early on involving SDS, but I don't remember exactly what it was.

Yost: At that time, time-sharing was thought of as a local business wasn't it? Cooperating with a company in Michigan it didn't seem like they were necessarily a competitor.

Hardy: It did not seem like they were a competitor. There is an interesting story in case you ever get around to interviewing LaRoy Tymes. Do you have LaRoy on your list?

Yost: No, I noticed there was an extensive interview at the Computer History Museum with him.

Hardy: Yes. Interesting story is that when I started at Tymshare in 1966 I was friends with LaRoy from Livermore. And so we chatted about the time-sharing and all. We realized of course that you could make a network, but Tom and Dave, had never thought about that possibility. So LaRoy applied for a job with Dave in 1966 [and] said, 'why don't you let me come and build a network so you can expand to the world.' Dave turned him down. But then LaRoy fortunately came back in 1968 and joined sometime in the first quarter of 1968 and worked on the network. We ended up with TYMNET.

Yost: In 1966 when Dave turned that down, did you know the reasoning behind that? Was it seen as too ambitious, too expensive?

Hardy: I don't know. I don't know what Dave's reasoning was. I suspect Dave just hadn't thought about it. I'm sure LaRoy and Dave probably have better recollection. Tom and Dave had never planned for anything other than a very small company, a small local business.

Yost: In 1966 had any plans materialized to open centers in other geographical locations?

Hardy: They did open a center in Los Angeles which was probably in early 1967. Dave or Jerrehian probably knows when that was and Ray Wakeman ran that center. But again it was local. As soon as they opened the second center then it occurred to them that they were having to communicate so that's when it began to occur to them, 'Yes, we could do this better. Not just with the old technology.'

Yost: What were telecommunication charges like at that time and how did that factor in?

Hardy: I don't remember. I don't think the problem was as much telecom charges as it was having to build and operate centers with computers that could only be used locally.

Yost: Were telecom charges born directly by the customer or were those bundled in?

Hardy: They were bundled in. In fact, the original charging was $10 and hour. Later, we added a little bit for cycle time. At $10 and hour it didn't take people long to figure out that was very inexpensive for compute-intensive jobs. We tried to have local phone calls, which I think is probably the biggest motivation for hiring LaRoy. We sort of crept in to having TYMNET. The original Tymnet engines were just multiplexers. We used full-duplex communications so the first 'intelligent' Tymnet engines provided the echo.

Yost: Do you recall what the finances were like in these early years? When Tymshare was profitable for the first time?

Hardy: I don't remember, but it took a while to get profitable. I'm not sure it was not profitable until 1970 or somewhere around there, the early '70s.

Yost: I think I ran across that there was an operation on the east coast?

Hardy: Yes. And there was an operation in Paris and that must have happened – that happened in March 1970.

Yost: Long time ago.

Hardy: Yes, right. But it must have been 1970.

Yost: Because it would have been before TYMNET.

Hardy: Yes, this was before TYMNET, but after good multiplexing. Interesting.

Yost: Do you know if there was an effort to standardize how these different operations were run, to have a Tymshare quality control so that people were basically getting the same level of service in Los Angeles, in Paris, in Palo Alto?

Hardy: Yes, I think the operations were fairly standard and I was doing the monitor for all of our computers in those early years. They certainly did their best to do around the clock operations and hire good people. I don't know that they got any farther than that. And it was somewhere around – I can't wait to find out what these dates are – somewhere around when they had Los Angeles, New Jersey, Paris, – and I don't think they were even in that order – they realized that having sites, you know operations, in every market that they now could realize would be a good one for them, was going to be horrendously expensive and unnecessary. They knew that by 1968 when they hired LaRoy. They had already figured that out, that the market was much bigger than they had thought and they could expand into all these other cities, and that having actual computer operations there was not a preferable way to run the business. So that's when they hired LaRoy and began to consolidate.

Yost: So do you happen to know if, it wasn't necessarily a way to grow the business, but could one center using the original model be profitable?

Hardy: One center profitable? Maybe. Clearly one center could be profitable but it was way too expensive to start up centers because you had to go too long before it turned profitable.

Yost: Ok. How quickly did the staff of Tymshare grow between the time you arrived in 1966 and the decision to start TYMNET in 1968?

Hardy: It grew…it was quite a bit bigger in 1968. I can't remember exactly but it was quite a bit bigger in 1968. There was a lot more marketing support. We'd hired Dave Gardner to help with the monitor by that time. So it was quite a bit bigger and there were people writing applications by that time too, early kinds of spreadsheets and a SuperBasic compiler.

Yost: Do you know if that had been an idea or concept for the business from the start or did that emerge?

Hardy: Well, it depends on who you ask, I think. Tom and Dave were trying to do something local and not too ambitious, not because they weren't capable of a lot more but just because they didn't want to exaggerate anything and they wanted to make sure they knew what they were doing. So I'm not sure they had planned all this. But there were other people who could see these opportunities. I mean once you saw time-sharing there were a lot of people who came from accounting, for example, or marketing or how do you keep track of your customers or your sales calls – all kinds of applications that just sort of grew up as they hired people.

Yost: In the pre-TYMNET days, was it programming all these new applications or was Tymshare also acquiring products?

Hardy: I don't think it acquired very many product in those very early days. There was no place to build them except on Tymshare. They did do an acquisition in that time

frame, 1966-1968. But it didn't take LaRoy very long – as I said he arrived first quarter 1968 – and it didn't take LaRoy very long to at least make it possible to have local phone calls. It wasn't very efficient but it was better than not having local phone calls.

Yost: When the system was first operable in the second half of 1966 were there any other enterprises in this area that were offering time-sharing?

Hardy: GE.

Yost: So GE had moved into this. And where was their facility?

Hardy: I don't know where they were located, but they were very restricted in what the customers could do because of their operating system. It turned out the Berkeley operating system had a very good design and it allowed for a lot more flexibility than what GE had.

Yost: Was that based on the Dartmouth time-sharing system?

Hardy: Berkeley's system was not based on the Dartmouth system.

Yost: The GEISCO time-sharing system?

Hardy: I don't know where GE's time-sharing system came from. Dave probably knows.

Yost: Anyone else besides GE at that time?

Hardy: That's the one we always talked about. I don't remember if there was somebody else. You know Tom and Dave had come from GE so they were very focused on GE. Beating GE was what was fun, I don't remember anybody else.

Yost: Was there a sense that GE chose this area just because of the potential customers or was it GE seeking to locate facilities in the different places that these time-share companies were emerging?

Hardy: I don't think GE was chasing us.

Yost: So they weren't trying to knock out the early competitor?

Hardy: I don't think they thought that we were real. They are GE and we were Tymshare? Tymshare was nothing. They probably didn't even know about us. You know the salesmen knew but how far up the ladder it went is unlikely, we were so small compared to GE.

Yost: You mentioned in 1966 Dave wasn't interested in LaRoy's proposal for the network. Was it LaRoy coming back to him a couple of years later to propose it to him again, or how did that idea reemerge?

Hardy: Well, we were still friends with LaRoy so he could see the progress that we were making and it was perfectly obvious that we were running into a huge problem setting up all these different sites and the communication between them was expensive and slow and had all kinds of difficulty. So LaRoy knew from us that the time was ripe to try again. And he probably was watching other things, not just us.

Yost: Were you and Norm and LaRoy aware of the ARPANET research?

Hardy: Oh yes, of course.

Yost: ARPA's Information Processing Techniques Office?

Hardy: In fact there was a lot of coordination – I don't know coordination may be too strong a word but there was certainly a lot of communication between Norm and LaRoy and the people on the ARPANET.

Yost: Ok, before TYMNET were you aware of any other companies that had begun or actually launched a network?

Hardy: No. Doesn't mean there weren't any.

Yost: Two, I'm not sure I can place them exactly, within the timeframe that I ran across, Computer Sciences Corporation with Infonet and University Computer Corporation, UCC, uses a network and I think those projects got started before 1970 but I'm not sure when they were actually offered.

Hardy: I don't know what their timing was exactly. For a lot of reasons TYMNET grew very rapidly. We had customers in all these locations so it was such a natural.

Yost: Did the company expand significantly just with that decision to build TYMNET?

Hardy: Yes, we just opened offices everywhere because we could. You know, if you had a computer this size, you know the network node that people could call into and you could stick that into an office and everything worked from there. So yes, they opened offices everywhere.

Yost: Can you discuss the technical side of that project? Did you work on it yourself?

Hardy: I didn't really work on it. It was Norm and LaRoy. Norm and LaRoy did virtually all the design, in our living room actually after work at night for months. I cooked dinner and they designed TYMNET. I had to change the monitor when the new hardware came in of course, but other than that I didn't have any major role in TYMNET.

Yost: And when you say new hardware came in?

Hardy: There was communications hardware delivered with the SDS you needed another hardware communications interface to go into TYMNET or any of the other, even the very earliest versions of the communications systems. That must have been in 1968.

Yost: I came across the fact that Tymshare acquired a company called Dial Data. Do you know if that was the first acquisition?

Hardy: I think that was their first acquisition. Sal Spinale and several other people from that organization came out. I still see Sal on a regular basis, a bunch of us old-timers get together. The president of that company was on the board for a while, but not forever.

Yost: Do you have an idea of what the rational was in acquiring Dial Data?

Hardy: I think faster growth. I mean they had a customer base. Tymshare ended up running around and acquiring quite a few of the 940 based businesses.

Yost: But that was a criteria that was true of all the companies they pursued?

Hardy: Was true of what?

Yost: True of all the companies they pursued, to require that they were using a SDS 940?

Hardy: No, because by 1970 we had added PDP-10s, and then we could acquire PDP-10 companies. We had sold our operating system to SDS in June of 1967. Do you have notes about that somewhere? Of all the versions of the Berkeley system, Tymshare's was the only one to pass the Harvard acceptance test. SDS required that before it would buy an operating system.

Yost: Yes, I came across that. And you went out to Harvard, didn't you?

Hardy: Yes.

Yost: I understand that they had tried with a number of potential vendors?

Hardy: Yes, they had tried virtually every other 940 vendor and then they ended up accepting ours so SDS bought it. I think that put us in a good position to buy all these other businesses. Because Tom and Dave were very focused on the customer, and the customer needs, Tymshare had to build an operating system that was both flexible and reliable.

Yost: You kind of anticipated my next question but why were you able to meet the specifications of Harvard while others couldn't?

Hardy: I think it probably depends on what you focus on and I personally am very focused on the customer and making sure they have a good experience, very focused on

getting the bugs out. And I think other people were just simply focused on more technically interesting things, like floating point. Those were interesting to me too but I think with the customer experience. That was what got Harvard. They had a little acceptance test that they wanted you to run. I just didn't run into – it didn't show up bugs in our system and it apparently showed up bugs in everybody else's. I think that's just what you're focused on.

Yost: Do you happen to know what the system was used for by Harvard? Was it for scientists?

Hardy: It was certainly a scientist that we were talking to but I don't remember the group. I knew at the time, too bad I didn't keep track.

Yost: Prior to TYMNET what did you see as the greatest challenges either technically or as a business?

Hardy: Well, as a business it was this expansion problem. You just couldn't start up computer centers all over the country, let alone all over the world.

Yost: It would take years to become profitable?

Hardy: It would take way too long to be profitable and not only that but it's hard to have, as you were mentioning earlier, the same level of professionalism in every location – if

you have a dozen centers or two dozen centers it's just hard to get the same level of professionalism whereas if you have three big ones you can monitor that a lot easier.

Yost: In those early years were certain key staff leaving to go address problems at various centers?

Hardy: Yes. Sales managers moved around a lot starting new offices. As for the operating system, I debugged everything remotely. I could call in to any place and debug remotely. One of the saddest moments was when they managed to bring up the center in Paris without my having to be there because I could debug it all remotely. The communications was so good that you couldn't tell from the response time whether the computer you were using was in Paris or the next room. We expect that now, but in those days it was amazing!

Yost: Once a decision was made to go forward with TYMNET what did you expect? How would Tymshare change as an organization?

Hardy: Well from my perspective, it meant we'd have fewer centers. And as I say, it's a lot easier to manage the operations, a lot easier to manage the reliability of the computers, if there's three sets of people to talk to about 'what did you see? What went wrong? What did you see go wrong?' You know I'm sitting off here trying to debug computers that are all over the world and the operators get better with experience about telling you actually what went wrong. We'd print out something on the operator's console and, well, it took

some training just to get people to read accurately everything on that piece of paper. It was just so much easier to have a limited number of sites. And we could grow the business. It was so much better, in so many ways.

Yost: You mentioned you weren't working on the development of TYMNET directly but are you aware of challenges that emerged in that development project? And if so, what were they?

Hardy: From my point of view the installation of TYMNET went amazingly smoothly. LaRoy did virtually all of the coding by himself. We would install the first version or subsequent versions, and for many years LaRoy was the only programmer. He could install new versions on a regular basis and there would never be a bug. Nothing would go wrong. He's amazing. Amazing that this guy was able to do that, because not very many people could write that complicated code and not have any bugs in it. I remember sitting in the office the night they switched over to the new TYMNET with a salesman who was drinking beer like crazy; he was a nervous wreck that they would never get another customer. But, next morning, it was all there.

Of course there were other challenges with AT&T, but I didn't usually deal with them directly. I remember one instance when I had to explain to an AT&T repair man what a data-set was and how it worked, but generally they were easy to work with.

Yost: What was the existing customer base's reaction to the news that TYMNET was coming? Was it something that they saw as an improvement or was there trepidation?

Hardy: I'm not sure the customers even thought about it.

Yost: That was just technical details? They were just buying a service?

Hardy: Yes, it was just a technical detail. They didn't have to do a long distance phone call anymore, that was cool. But, I don't think it was a big thing.

Yost: Do you happen to recall the prices that were being charged to customers in the early days?

Hardy: Ten dollars an hour connect time in 1966. And it was only on connect time. But I didn't have anything to do with it. Crazy, because it meant some people quickly learned to use our computers for the storage of huge amounts of data because it was all free. They eventually began charging for some of these other things. I have to admit that I did put into the operating system some small charges for some of these things like compute cycles and storage so that for customers who were over using relative to the other customers, the system actually got slowed down a little bit. Thus, those customers got charged a little bit more connect time. Because otherwise, how easy it is to just take up the whole computer and we had to do something to slow it down or everybody paid – that was definitely an issue that some of the customers figured out how to use it for very

compute intensive applications and slowed down everybody else. Fortunately, Tymshare officially started charging for compute time fairly quickly.

Yost: How long was it before you inserted –

Hardy: It didn't take me very long.

Yost: – so there weren't the free-riders very long so to speak.

Hardy: That's right. How often the monitor cycled among the various queues was arbitrary anyway. I just gave the compute intensive queue a lower priority. That pretty quickly slowed down the free-riders. It wasn't official but you couldn't do anything else. Otherwise it wasn't working, you had no other way of slowing them down.

Yost: Did the price schedule change with the introduction of TYMNET?

Hardy: The price schedule changed over time for a lot of reasons and I don't remember exactly when all those changes happened. They did start eventually charging for compute time and they did eventually start charging for storage. But I don't remember when exactly.

Yost: In the days before TYMNET, would you say Tymshare was able to differentiate itself other than price or were potential customers buying primarily the lowest cost provider in their particular area?

Hardy: I think we had a couple things going for us. Tom was a fantastic salesman and I think he hired some very amazing salespeople. And I have a number of friends who were former salesmen for Tymshare and they were all good. So I think we had really first-class salesmen and that helped. And then as I say, we had flexibility in our system that the competition didn't have. You could write in Assembly language – which of course nobody wants to do these days – but you weren't constrained to a limited kind of FORTRAN. We pretty quickly got BASIC up on the system. So for simple quick programs that you just wanted to try something, it was easy to get those up and running. And I think it was those tools that came along really pretty quickly that made our system much easier to use. You weren't just stuck with one language. We had a BASIC interpreter, very quickly, so you could actually see as you programmed what was going to happen so you could cut your bugs out while you were going and didn't have to wait for recompile. Now it didn't run very fast but it was really quick and easy to get the question answered which was what a lot of people were buying it for. So I think it was the tools combined with really good salesmen.

Yost: Okay. In the pre-TYMNET days, was computer security ever a consideration in those first years?

Hardy: Well, let me see – we got our computer up and running in probably late September, early October. Before the end of the year – we had sold time on it to some college for something – and before the end of the year they were attacking it and adding viruses and trying to crash the system. So from my point of view security was an issue very quickly. But it was nobody else's responsibility.

Yost: Was it students that –

Hardy: It was students. Just like now, the students having a good time, and seeing how things worked. I mean that's what students do. So from my point of view security was an issue very quickly. I don't think it was an issue to most anybody else.

Yost: So it wasn't something that came up with the customers asking?

Hardy: It certainly…it did come up and that's one of the reasons they worked on GNOSIS because we would have customers… I mean one example was different divisions at General Motors. We'd have Ford and we'd have General Motors. GM didn't like it if Ford saw their design, but if the other group in General Motors happened to get a hold of their data, we heard from an angry customer.

Yost: They had a lot in their division or groups?

Hardy: Divisions were competing.

Yost: A common management strategy.

Hardy: Yes. So security was a big issue. They really *cared* that you didn't get people's data mixed up or that you couldn't read somebody else's data.

Yost: And how would you characterize the early Tymshare system in measures to try and prevent that from happening?

Hardy: Actually the one from Berkeley was pretty good. I mean could you crash it? Obviously you could because the students were crashing it, but not easily and not for long. But in terms of the security at the time, it was pretty good. We did what we could. All the systems at the time were crashable, just like all the systems that are out there today are crashable. We put a fair amount of effort into trying to make them secure. They wrote GNOSIS which they actually ran for a while on the 370s. It actually is secure but the world wasn't very interested in security at the time. If Tymshare had stuck around I think we would have converted much of our service to GNOSIS because it really did address all the security issues. But when McDonnell Douglas acquired Tymshare, it wasn't one of the things they were particularly concerned about so didn't use it.

Yost: In the 1966-68 timeframe, it seems to be only within the Department of Defense and associate organizations, like RAND with Willis Ware, that were beginning to write

about computer security. Did Tymshare have any significant business with federal agencies like the DoD that required special needs with their classification structure?

Hardy: Not in that timeframe. They did later, but not in that timeframe. We were still thinking of it as little local things.

Yost: Was the SPC12 the first minicomputer that was used with the network?

Hardy: In the network. I thought it was a Varian, but no you're probably right. I think Varian was second.

Yost: I just ran across that name. I'm aware of Varian, but not the SPC12?

Hardy: Now that you mention it I think you're right.

Yost: I'm not familiar with that system, do you know anything about it?

Hardy: No, but Norm will. They were little minicomputers of the day. But Norm will be able to tell you a lot more about that, the difference between those computers.

Yost: 1968 is the year the decision is made to move forward with TYMNET. It's also the year that the company goes public, isn't it?

Hardy: We did not go public in 1968. I don't think we went public until some time in the 1970s. Is that right? You think we went public in 1968?

Yost: I ran across something in one of the other interviews I think that was done. But maybe it wasn't a publically listed company but was there another round of financing.

Hardy: We might have had another round of financing in 1968. That I would agree with. But not public.

Yost: Okay. And when was TYMNET first operable?

Hardy: In 1968. Well it depends on what you want to call TYMNET.

Yost: Can you expand on that and what different iterations –

Hardy: You would be much better to ask Norm. You will get much better answers. He remembers that because he was really in the design so he remembers those details much better than I do.

Yost: Did TYMNET change thinking in terms of what types of other services might be offered in terms of applications?

Hardy: It changed everything, yes. By 1970 we had…I think they came in 1970, the PDP-10s came. And then a little later the IBM 360, IBM 370. And of course once you got the PDP-10s in, they were so much bigger. They were so small but they were so much bigger than 940s. You could do a lot more with them. So the combination of having – it was just a completely different way of looking at things. You could have different kinds of applications and you had consolidated centers and you could have people from all over the world. It just really didn't cost much to have operations everywhere. Alden Heintz who is still around. Do you know about Alden?

Yost: No. Please tell me.

Hardy: He was the person who was in charge of relationships between all the different countries. So he would travel, he got Germany, he got – well we had France but he certainly developed it, and Japan. He developed relationships in all these different countries which we could never have done without TYMNET. And then of course as the computers got bigger and faster you could do much more interaction.

Yost: When you say built relationships, customer bases in those markets?

Hardy: Customer bases. Yes, Alden's around. I'm sure he'd be happy to talk to you if you were here long enough. I think he worked with local companies who built the customer bases.

Yost: Well, I might be making a second trip out here.

Hardy: If you're interested in that international expansion, he'd be a good person to talk to.

Yost: I came across information that in 1970 Tymshare acquired a company out of Buffalo, New York, Graphic Control. Can you discuss what you know about that acquisition?

Hardy: I only remember some of the funny things about it. By that time we had acquired Dial Data, and maybe somebody else. Graphic Controls, I remember going back and interviewing Graphic Controls people. They had some really good people.

Yost: So this is another time-sharing company?

Hardy: Yes.

Yost: I thought from the name it might have been a graphics services firm.

Hardy: No, it's another time-sharing company. They had a good accounting system, which we didn't have. And so they pretty much took over the accounting software for Tymshare. The funny thing, which probably shouldn't be, is that when we were talking about Graphic Controls, there were a lot of women in management positions in Graphic

Controls. And the Tymshare management was debating about whether or not we should offer all those people jobs out here, because it was expensive to move them all. And the conclusion was, well, they are all women and their husbands won't let them move. So Tymshare offered them all jobs and every single one of them came. It was a good thing because they were really good people, and our accounting system, which had been marginal, was greatly improved.

Yost: That brings up a question, were you the first woman employee of Tymshare?

Hardy: Well, there was Barbara Mennell.

Yost: She was a secretary.

Hardy: Yes. And the only one for a long time.

Yost: How did you find the gender environment in the early days?

Hardy: Well, when you're a startup, you've got so many problems you don't have time to worry about the women. It's not until later when you're competing for positions which have some responsibility and authority that they begin to notice that you're a woman. But as long as you're just getting a job done, anybody will do.

Yost: How did you find Tymshare over time with regard to policies of promoting women to positions of authority?

Hardy: They were better than most of the other companies at the time. I called up GE once and asked them for a job. Tymshare had a hard time paying me as a woman, because they didn't think they should be paying a woman. It just had never occurred to them that a woman was doing something critical, it just didn't sit with their perceptions. Now they've all changed, all these guys who were like this in 1966 they are all different now.

Yost: The pay schedules for the type of work weren't necessarily the same in 1966.

Hardy: Yes, nobody had ever seen a woman do these things in 1966 and so they just sort of didn't believe it. I talked to somebody recently who said, 'Norm wrote the operating system.' And I said, 'What makes you think that?' 'Well, a woman didn't – you couldn't have written it.' 'No, Norm had a full time job somewhere else actually.' It's just the whole thing, it was a memory from 1966 and not re-examined in recent years and so this sort of came out and obviously didn't make sense. But aside from the fact that they didn't like paying women, they were as good as any place. I called GE once and asked them for a job because they had advertised in the paper they needed somebody with certain experience. I sent them my resume, called them up and talked to the woman in personnel. And she said, 'Well, you do have the best resume, but we don't hire women for technical positions. And we certainly wouldn't let you be a manger because then men

would have to work for you and the men in GE won't work for women.' So that was the end of that.

Yost: Okay. Being one of the earliest employees of Tymshare, in those days were offering employees shares in the company, was that done?

Hardy: That was done except that it went along the same thing, I didn't get nearly as much. I got a small fraction of what any of the men got even if they were working for me. Because they didn't believe it would be morally and ethically correct to give women stock options. That is what they told me.

Yost: Do you recall when Tymshare became involved with ADAPSO?

Hardy: I don't recall when that was. Tom became very active, president. I don't recall exactly when they finally realized that they were a big company. They'd been focused on expansion and all the sudden they were a big company. It was interesting to hear them talk but I just can't remember when it was.

Yost: Do you have an idea of how Tymshare benefited from being a member of ADAPSO in the early years, if at all?

Hardy: I think Tymshare benefited. I don't know that I could point to it exactly except that just getting out there and being with other companies was good for management's perspective. It changes the way you look at the work and that was a good thing.

Yost: There wasn't any smaller trade association just focused on time-sharing in those early days, was there?

Hardy: I don't think so.

Yost: I haven't run across anything.

Hardy: I don't think so. A good question to ask Ralph.

Yost: I ran across something that said that Tymshare acquired the SRI international's Augmentation Research Center, a very famous center looking back in history, Engelbart Center.

Hardy: Right, right. Doug Engelbart.

Yost: Do you know anything about that acquisition and what it meant to Tymshare?

Hardy: Why it went to Tymshare?

Yost: Why it went to Tymshare, what the interest and rational was for acquiring it, and were there any specific benefits?

Hardy: Well, we had Doug Engelbart. That was Laszlo's acquisition. I think he realized what enormous contributions Doug had made and just having that kind of creativity around was enormously beneficial to the company and I think it was.

Yost: Did it result in new applications or an increased focus on graphics or any of the things that Doug Engelbart came to be known as a pioneer of?

Hardy: Well, I think it certainly did and certainly Doug worked on some of those things. I don't know how much it really changed the company at that point, except that just talking to Doug, for anybody who is inventing anything, talking to Doug is helpful.

Yost: What specifically, was he given the opportunity to do research and inventing?

Hardy: He was pretty much, yes.

Yost: So he was kind of like a research scientist?

Hardy: Yes, right. Doug was doing that. It was a reasonable thing to be doing in Laszlo's group.

Yost: And who is Laszlo?

Hardy: Laszlo Rakoczi … From the early 70s until it was acquired by McDonnell-Douglas, Laz managed the technical division. You don't have Laszlo on your list?

Yost: No, I'd say the information on Tymshare as you get further into the 70s is much more spotty.

Hardy: Oh really? Oh, because Laszlo is probably still around too. He had run a business in southern California and he came up as V.P. of technology and stayed there. He was a very creative guy and very aware of the world, very aware of what was going on and willing to back projects that might have been a little far out for other people.

Yost: Any examples?

Hardy: Well, he backed GNOSIS which was the development of a secure operating system. In that period of time, we were doing things like online airline reservations, online banking – these things are *way out* in the 70s. Nobody else had ever heard of being able to sit at your computer and make a plane reservation. We did it all the time. Seemed normal to us. And this is Laszlo, I think very much Laszlo.

Yost: And can you speak a bit about the business opportunities that arose from those ideas?

Hardy: Oh well, there were lots of business opportunities from those ideas. I mean we worked with the major airlines, for example, on a travel agent system and with ASTA. They got together to explore this, so there was a lot of money coming from the airlines to explore how you do online reservations. It was fascinating to be working with the airlines in those days. Some of them were ready to jump on these ideas and automate and others wanted to stick with their airplanes – it was just very interesting. And the same thing with the banking community, a little later the banking community was wanting to figure out – how much can you do online, can you write checks, is there a better way to do things? Banks take time to change, but eventually our early research with them became commercial.

Yost: So these were more, they involved networking, but in many respects were a broader range of computer services.

Hardy: You had to have both. You had to have the network; you had to have good communication from all the little towns all over. It didn't do any good to have online banking if people couldn't get there. So you had to have TYMNET. On the other hand, you had to have good computers and good computer security. It all went together.

Yost: Were there Tymshare employees writing or coding the applications for unique, custom projects for customers?

Hardy: We participated in writing the applications in all these areas.

Yost: And you were charging for the work?

Hardy: Right.

Yost: Did you do any of that yourself?

Hardy: Did I write the code? No. By that time I was managing the group. I was a VP and managing a lot of these different things.

Yost: What year did you become a VP?

Hardy: About 1978.

Yost: As other time-sharing companies develop networks, was there a sense that there was greater differentiation between the companies than in the early days?

Hardy: Yes. By that time, Tymshare really had good technology, good communications, good hardware, and good computer mainframes. We made changes to all the systems, the PDP-10s and the IBM 370s and I think made a lot of improvements in all of those to just make it a superior service. And I do think we had a good service compared to most of the others in the business at the time.

And we had an international network. It's really powerful to walk into an international company and say, 'You may think you're a local engineering department, but…' And it doesn't take them very long to figure out, 'yes, it might be really handy if we could talk to those guys in Japan or something.'

Yost: Were there competitors that also had international networks?

Hardy: I'm sure there were, but I think we just were so much bigger than the rest of them. Warren Prince is the guy that's going to know about that because he was selling that. Warren ended up president of TYMNET.

Yost: And TYMNET was a wholly owned subsidiary?

Hardy: Right.

Yost: When was that set up as a wholly owned subsidiary?

Hardy: I knew you were going to ask me that. I don't know. Late 70s early 80s. 80s plus or minus. It probably wasn't after 1980; it was probably right around there.

Yost: And do you know what the reasons were?

Hardy: Well, because I think the main reason was that there was *so* much TYMNET business, that so many companies wanted to use TYMNET and they needed to run it – it's just much easier to run it as a separate business when we weren't the only company wanting to use its services. Of course that created some problems because they wanted us to pay competitive rates for TYMNET at that point and it was always an issue of 'do Tymshare's applications get a break or not?'

Yost: Did they?

Hardy: It depends; sometimes, sometimes not. But I think it made good business sense. I think it was a sensible business decision.

Yost: And had the network and capacity become far larger than what Tymshare's needs were for it?

Hardy: Well, it was so easy to expand. There's nothing to expanding TYMNET.

Yost: It could grow as big as it needs to be.

Hardy: You just could, yes. Eventually, LaRoy had to rewrite the Supervisor on a faster machine, but that went smoothly – in LaRoy's usual style.

Yost: And this would have been, I assume, before but perhaps in some ways a precursor to that decision, but in the mid-70s and maybe it was the later 70s, there was a deal with TRW to basically copy TYMNET to create TRWnet?

Hardy: Right.

Yost: Was that done with other companies as well? Or was the technology actually licensed out?

Hardy: Better ask Warren. I don't know if we actually…. TRW was the first, the biggest and whether we did that again in exactly the same way I don't know. You'd better ask Warren.

Yost: In the mid-70s Tymshare acquired United Data Center. Was that one of the larger acquisitions?

Hardy: Yes. And that was – I should have looked at my notes. Yes. That led to big changes in the company, UDC.

Yost: Can you expand on that?

Hardy: They had a different kind of application from what we had been doing in the past. And they were more, definitely batch applications so that changed the character of our market. Bernie Goldstein?

Yost: Yes, Bernie Goldstein.

Hardy: And his buddy, Al Eisenstat. Bernie was completely different from Tom O'Rourke. Bernie liked the game of manipulating corporations and he was the initiator of an enormous number of acquisitions. He wasn't there very long before he realized that if he could expand Tymshare and grow the revenue, he could sell the company for a lot of money. He was one of these guys who likes to buy and sell companies. That's just what he likes to do.

Yost: He basically became the M&A specialist for Tymshare.

Hardy: The M&A specialist. And he was amazingly good. I got to work with him for a while and he was very, very good.

Yost: When this operation occurred with spinning off TYMNET, what were the relative sizes of the two companies?

Hardy: I don't really know. I don't remember.

Yost: Any idea on which was the larger of the two?

Hardy: I think you should ask Warren. He'll know. How he managed to do that. I mean that was another one of those things, Warren did a very good job of negotiating that and so exactly how he managed to do that would be a good thing to ask Warren.

Yost: Moving back a little bit, the 1968 and especially 1969 period was a time of really rapid growth with time-sharing and the valuations of companies and profits. And then that was stalled by a fairly severe contraction in 1970. Can you discuss how that impacted Tymshare?

Hardy: Well, that's why I think we didn't go public. I think we were going to go public in 1970 and then everything crashed. So we had to get more financing again because we had to wait for the public offering for another year. I forget exactly when but I think that was going on in 1970. In 1970 there was a major cutback, a lot of guys lost their jobs. We really did cut way back in 1970 and that was…whether it was 1969, 1970 right in the crash in there, it was really sad.

Yost: How many employees roughly were at Tymshare before and after?

Hardy: I don't know, but…

Yost: Any rough guesses?

Hardy: No, I can't even guess. But I know a lot of friends left.

Yost: Okay. I did come across this, it says 1979 was the date of the spin-off.

Hardy: 1979 was the date of the spin-off. Well, I wasn't very far off, was I?

Yost: Nope. And I came across a reference to TYMNET II, when did that come out and how was that different from the first iteration of TYMNET?

Hardy: How is the…

Yost: TYMNET II

Hardy: TYMNET II, how is that different from the first iteration of TYMNET? You should ask Norm and LaRoy about that because from a user's point of view, it was invisible. Essentially invisible.

Yost: So just the technology behind it.

Hardy: It was the technology behind it, right. And it was a big change but you should ask one of them.

Yost: So with Bernie Goldstein on board, did the pace of acquisitions increase?

Hardy: Yes. And they went into a wide variety of acquisitions. We acquired companies that were doing online banking; we acquired companies that were in the travel business. And we took their little markets and expanded them. We acquired lots of companies, we acquired all kinds of different things.

Yost: So, software products firms?

Hardy: Yes, software product kinds of companies.

Yost: Traditional computer services companies?

Hardy: Yes. And I don't know that they were all necessarily a very good idea, that they really in the long run benefited Tymshare, but –

Yost: With most of these acquisitions, was it acquiring a technology or did the personnel come too?

Hardy: Mostly the personnel came too. It was not just the technology, the personnel came too.

Yost: Did that pose challenges with integration and how did that change the culture of Tymshare?

Hardy: Actually, most of them were pretty good guys and they just came over. Some of them we really integrated and some of them we left running pretty much as standalone businesses reporting into some VP, Laszlo or someone.

Yost: And can you discuss the circumstances with the sale of Tymshare to McDonnell Douglas? And TYMNET, what happened to TYMNET?

Hardy: TYMNET went.

Yost: TYMNET went, okay.

Hardy: I think TYMNET went to McDonnell Douglas who then promptly sold it off to British Telecom. I think it all went to McDonnell Douglas; Warren would know. TYMNET has had a long history of being sold to one company after another and it's fun to get together with these TYMNET guys periodically and we talk about all the companies that they worked for as it's passed around here and there.

Yost: Kind of like the Sperry-Univac in the Twin Cities, these people are now part of Lockheed but they've been part of different companies, but they associate themselves strictly as Univac.

Hardy: And a lot of these guys followed TYMNET through all these iterations so it is fun to talk to them. And if you really want to know about all those iterations, you should talk to one of those guys not me because I just sit around and have a good time with them. But I didn't have to experience all of them. So, yes I think Bernie was more the mover on that than anybody else and could see how that was a good time to make a lot of money off of Tymshare and then he went into the M&A business. You know Bernie's history right?

Yost: Yes, I've read an oral history. I think at one of the meetings that Burt Grad put on I had a chance to meet him.

Hardy: Good. I would think it would be interesting to talk to Bernie about what he did after that, because I think he was moving into this M&A world and he got a lot of experience at Tymshare doing that. And then became a real leader in the M&A world for quite a few years.

Yost: Are there any topics that I haven't asked any questions about that you think are important? What am I missing about Tymshare?

Hardy: I think you've done a better job of remembering all this than I have.

Yost: Do you have any other interesting stories?

Hardy: No.

Yost: About the company or its culture?

Hardy: I can't emphasize enough how it started off as just a small business with no intention of becoming a Fortune 500 company. Tom stayed in this area because Marge, his wife, didn't want to move again and GE was going to move them again. So he and Dave just started something so they could stay here and they thought they could make enough money just right here without doing anything else and expanding or anything. So right in the beginning it was a very – we were over there in a little offices in Distal Drive and we'd go out for a beer on Friday nights.

Yost: I ran across something that said the bathroom in Distal Drive actually didn't have roof?

Hardy: Yes, right.

Yost: So if it was raining…

Hardy: Yes, right. This was very primitive. Yes, you couldn't tell…well I guess other people started in garages so we were one up from being in a garage is about all you can

say. It was very friendly, very small. I have an org chart I got out the other night. Why don't I get that?

Yost: Okay. May I have a copy of it?

Hardy: Do you have a copy of one of the 1966 org charts?

Yost: I have a 1971.

Hardy: Oh, let me go back and see if I can get the other one. I also have a copy of the bylaws. Do you have a copy of the bylaws? From those earliest bylaws from January 18th, 1966?

Yost: No, I don't.

Hardy: Just how you put companies together back in those days. It's not like this anymore. So you might want to look at this if you don't have a copy of it. And let me see if I look at this old, old org chart if I can remember anything else. In January of 1968 we already had southern California and eastern division going. John Jerrehian was VP up here.

My gosh, we didn't…Here we are in January 1968 and we still have, I mean Dave Brallier was the computer operations manager but this was nothing like the sophistication

that we ended up with later. Burt Novak who was managing in southern California brought in a lot more professionalism than we had up here.

Interesting. You want a look at who was who way back in those days? 1970, that's kind of late. Ah, Lou Clapp was the Dial Data President. And this org chart is from October 1970 and Dr. Sassenfeld was still there as VP of Advanced Research. Although Ray Wakeman had taken over for the technical division. Interesting timing.

And this is – well you can answer some of your questions. This is a February 1967 org chart. What's the date on yours?

Yost: It's January 1968. Well, your other one is January 1968, I just have one from 1971.

Hardy: So you can kind of see how the staff was growing. They certainly give good pictures of how things were changing.

Little informal memos about who we'd hired and who all the new employees were. You know, if you've always worked in big companies you don't realize how small a company can be. Everybody's phone number from who was in the company in 1967 is on this sheet of paper.

Yost: I also ran across this, if it jogs any memories.

Hardy: Oh, yes.

Yost: It's a reference manual you co-wrote in 1967.

Hardy: We probably wrote this up for SDS because they were buying a system for Harvard. And because that was in June of 1967 that we went there. Oh my! This is great. Yes, I bet that's why we wrote this. Where did you get this?

Yost: I found it on the Web.

Hardy: You found it on the Web?

Yost: You can have it.

Hardy: Do you mind?

Yost: No.

Hardy: You can print it out again, right? Oh that's cute.

Yost: Right. Can you give me the titles?

Would it be possible to get photocopies of those early org charts?

Hardy: Sure. Which ones do you want?

Yost: The 1967 and 1968.

Hardy: Sure I can just copy them now for you if you want. Or I wonder about scanning them in and putting them in pdf files.

Yost: Oh that is fine.

Hardy: Why don't I do that and just email them to you.

Yost: Okay, and you've got my email.

Hardy: I have your email. Okay. I'd be happy to do that.

Yost: Well thank you so much, this has been extremely helpful.

Hardy: Well, there's a lot of questions for everybody else I left you.

Yost: But that's the process, go to each person and get their memories. And then fit it into a narrative.

Hardy: And then you have to figure out who remembers it correctly.

Yost: That's true, it's kind of a triangulation.

Hardy: Because I'm sure we will all have different things we remember. But there were *a lot* of good people. You know I told you, I get together with a lot of the TYMNET guys every once and a while. We all remember it. And sometimes with the sales guys from back in those times. We all think back and think, 'That was the best company we ever worked for.' You know we've all been all over since then. But there was something about the way O'Rourke ran that business that was just really good. It was just really a good place to work and Dave Schmidt for as long as he was there, he was a wonderful guy.

Yost: And you were there until the acquisition?

Hardy: I was there until the acquisition.

Yost: And then did you start a consulting firm?

Hardy: After the acquisition, I took the GNOSIS technology and the guys who'd been working on the GNOSIS technology and – it was up and running on the 360s/370s by that time – and we were doing credit card authorization services and it was running the accounting for credit card authorization so that we could be sure of the security. We took that technology – they kept it for that operation but we took the technology and spun out

and started another company, Key Logic, to see if anybody else was interested in actually having a secure system. But it was at that time before anybody was on a network and nobody thought secure systems were really very important. There was a brief period where we did really well and had big sales. And then we had a crash in 1989 and security wasn't then and isn't until about now, a major factor in a lot of people's thinking. Although I guess it's going to start being. I think the vulnerability of the systems out there, the vulnerability of the United States, when we are so dependent on networks is really scary.

Yost: I don't know if I mentioned it in one of my emails but we actually got a National Science Foundation sponsored project very recently to study the history of computer security so that's one of the other projects I'm working on.

Hardy: Oh great!

Yost: Basically we are going to conduct oral histories with the first generation of computer security pioneers from the 1960s, 1970s, and 1980s.

Hardy: When we were at Key Logic, there was the NCSC that did the evaluations and we got a very high, the highest they could give us since we didn't write it in a secure room, evaluation. Nothing but glowing, glowing reports about how secure it was and it ran underneath CMS. So that you could have all the functionality that IBM was offering but in an environment that was actually secure. But it was kind of ahead of its time in a

lot of ways. Fortunately the company did really well for a while, but then everybody thought, ‘oh no, we’re not going to use anymore mainframes, we’re going to PCs.’ And it just wasn’t a good market for a while there. But it’s too bad because now of course we get viruses everyday and this garbage on my PC. I keep thinking I knew how to stop this years ago why do I have to mess with it now.

Yost: Well, thanks again.

Hardy: Okay, well thank you.