Timesharing/Remote Processing Services Workshop: Session 2: Formation of TS/RPS companies

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Timesharing/Remote Processing Services
Session 2: Formation of TS/RPS Companies

Conducted by Software Industry SIG – Oral History Project

Abstract: The participants described the business opportunities seen by a number of entrepreneurs as a result of the development of technological capabilities for timesharing and remote processing services and the companies that were started to exploit these new computing paradigms. Each of the pioneers described how their company was formed and their initial business and technology vision. Topics covered include:

- The technology that they started with
- The markets they expected to serve
- The founders and key business and technical participants
- The platforms they selected and why
- Where the initial financing came from
- Their most serious obstacles and how were they overcome

The timeline for when each company represented was formed and early key events was constructed including filling in information for those significant companies not represented at the meeting.

Participants:

Name	Affiliation
Burt Grad	Moderator, SI SIG co-chair
Dick Bayles	National CSS
Frank Belvin	Interactive Data Corporation
Chris Brook	GE Information Services
Rick Crandall	Comshare
Ann Hardy	Tymshare
Norm Hardy	Tymshare
Mike Humphries	Tymshare

Paul McJones	Adobe, CHM volunteer
Gary Myers	Tymshare
Dick Orenstein	National CSS
Nick Rawlings	National CSS
Ken Ross	Ross Systems
Dave Schmidt	Tymshare
Jeffery Stein	Online Business Systems
Mike Wyman	Interactive Data Corporation
Thomas Haigh	Historian, Univ. of Wisconsin
Chris McDonald	Historian, Princeton University
Doug Jerger	SI SIG member
Luanne Johnson	SI SIG co-chair
Ed LaHay	SI SIG member

Introduction

Burt Grad: We normally start our pioneer meetings by having each of the participants talk about their companies, how they were formed, what their problems were, those kinds of basic things. In this meeting, we felt that, according to Ann Hardy and others, the technology was really the underpinning of this whole industry, and so we started there in our first session. We've left out a lot of the technology, and Butler Lampson and lots of other people have been left out of the story we are covering. But many of them have been covered already by the Computer History Museum which is heavily technically oriented, so a lot of these people have been interviewed and their oral histories are on file on the Computer History Museum website. We're focused more heavily on the business side. Who benefited and who made products and companies using these technologies.

Luanne Johnson's point has always been that if it weren't for that wonderful marriage of the technologies and the business people, we might still not have had PCs. It was the combination of the marketing skills and the finding of money to build these companies, going broke sometimes, that made it happen. So this second session is to talk about the formation of the companies who commercialized timesharing and remote processing services. We're going to go around the room and talk company by company, in no particular order other than the way you're sitting, as to how did the company start, what was the initial stimulus, what was the idea, the vision, who were the people involved, where did the money come from? And then we'll talk about how did you use the technology, but let’s not do it all at once. We'll sort of build this up in

a series of steps. So the first time-around, tell us when the company formed, how it formed, who formed it, what its purpose was. Dick, we'll start with you telling us about National CSS.

Formation of National CSS

Dick Orenstein: I had written a text editor at Perkin Elmer that was part of a timesharing program and one of the people who was trying it out either worked at ITT, or knew about ITT. I don't remember who it was, though. Anyway, we tried to sell this text editor to ITT, which had a timesharing service at the time. I went down to New Jersey – I mean, I was really completely inexperienced with this – and talked to them about it and when they described to me how difficult it would be to embed this text editor in their system, I came back, and talked to Bob Bernard about it. We decided it was probably going to cost about as much as we were going to charge for the text editor to spend the time to make it embeddable. So Bob and I drove down there a couple of weeks later – this was probably in the early spring of 1968 – and they said that they'd think about it, but we knew the answer was probably no. And literally, on the way back – I remember it as clear as a bell – we were talking about it and I said, "Well, if it's this hard to embed the text editor in their timesharing system, we probably ought to get CP [an IBM internal timesharing system developed at the IBM Cambridge Scientific Center], and do it ourselves." And he said, "Well, let's do it." That was a Friday afternoon. When we got back, I called the IBM salesman, who we knew at Perkin Elmer, and I said, I'd like to talk to you next week about ordering a 360/67.

Dick Bayles: It was Dick Glazer.

Orenstein: Dick Glazer later told me his side of the story which is that he immediately walked into the branch manager's office on that Friday afternoon and said, "I got a real laugh for you. You know Bob Bernard and Dick Orenstein, they want to talk about a 360 model 67, ha-ha-ha." And he went home for the weekend.

I guess it was the next week we got to talking about it and IBM was not as easy to deal with as SDS [Scientific Data Systems]. We would have to put up three months' rent, which at that time was about $150,000, for them to deliver the machine. But for reasons that are unclear, we didn't have to put the money up for them to *build* the machine. I guess they were comfortable enough to build it, which they did. We went after Dick Bayles as our first hire. He wound up being the fifth employee. He actually hired the fourth employee before he worked for us. And we assembled a bunch of people and went out and walked all over Wall Street, did just what everybody said you shouldn't do. We shopped that deal all over. We didn't know any other way to do it. Everybody said, "Don't shop the deal," but when somebody said no, we just went to somebody else. And we raised $600,000, $150,000 of which was going to IBM for a deposit on the machine. We got the money just days before the delivery which was Thanksgiving of 1968.

Grad: Dick, what was your business concept, what did you think you were going to do with the machine?

Orenstein: Our business plan was four pages, okay? We were going to sell batch processing at night to make up all the revenue that we needed and we were going to start to sell timesharing services during the day to large companies like First National Citibank, the oil companies…

Nick Rawlings: And to Perkin Elmer.

Grad: How did you know about CP/CMS?

Orenstein: I knew Dick Bayles. But I can't figure out where we met.

Bayles: It was at [Project] MAC [at MIT] at some point.

Orenstein: Neither of us can recall our first meeting but I remember going over to the [IBM Cambridge] Scientific Center, and having a tour, and seeing this thing [CP/CMS], and understanding how it worked.

Rawlings: I think it was Dick Glazer who took Dick and Bob and me to the Cambridge Scientific Center. I think it was Dick who said, "You guys should see this," because we were trying to figure out [how to do timesharing]**.**

Grad: This is while you were at Perkin Elmer.

Rawlings: Yes, when we were at Perkin Elmer.

Bayles: At the time, the order for the System 360/67 was the largest order out of the Bridgeport branch office, for the biggest machine IBM had.

Orenstein: We were really very much on the forefront.

Rawlings: Naïve.

Orenstein: We were naïve. We ordered telephone lines from Southern New England Telephone and we told them we needed 200 phone lines. And they said, "How many employees?" We said we had 12 employees. <laughter> We finally convinced them about what

we were doing and they said we could only be located in a four- or five-block area of downtown Stamford, Connecticut. It was the only place they could do it, and we took virtually all the phone lines on the street. It was months before anybody else could get a phone line. The funny thing about it is, I never was able to find that four-page business plan, but we did in fact, for months, meet the revenue forecast….but for completely the wrong reasons. We never sold batch processing, it never happened. We sold services to Perkin Elmer and to lens designers. I don't know how many of you know the Vivitar Series 1 lens, but the guys who designed that lens for Vivitar were with Perkin Elmer. They left Perkin Elmer about the day we started our service and became very big customers of ours to design the lenses. First National Citibank, which is now Citibank, big oil companies, other banks, we had enormous accounts with these big banks.

Grad: That's an interesting and a very different start.

Rawlings: I hasten to point out that Perkin Elmer built the Hubble Telescope mirrors.

Grad: Is that right? The old ones or the new ones?

Rawlings: The old ones. <laughter>

Formation of Interactive Data Corporation

Grad: Mike, and Frank, can you tell us about IDC?

Mike Wyman: I personally think it would be useful if we both did. There were two origins. I was with one origin, Frank was with the other. I was with White Weld and Company, which is an investment banker on Wall Street. And around 1966, Joe Gal had the idea of offering timesharing services to White Weld's customers, primarily people who were doing brokerage business with White Weld, to do investment research. This was centered around what, for that time, was large scale financial databases, stock price information and company fundamentals information, plus a language to access that database and produce reports, and screen, find, and locate investment opportunities. The language was called First Financial Language. I believe around 1966, Joe Gal had acquired an SDS 940 on which to build this service and when I joined them, they had a version of a database and First Financial Language.

Grad: Did they develop the language themselves?

Wyman: We developed the language ourselves, as well as all the technology to load and maintain the databases, which was very tricky given the unreliability of the hardware back then. Then, in 1968, because of the limited capabilities of the SDS 940, we were looking around for a

larger machine on which to offer our services. I think one of the machines we were looking at was a CDC [Control Data Corporation] 6800 or something like that. That never went anyplace. To make a long story short, Joe Gal hooked up with Jack Arnow, who had formed Computer Communications Center, which I'll let Frank talk about. Joe's operation division was spun off from White Weld and merged with Jack Arnow's organization to form Interactive Data Corporation.

Grad: Did White Weld maintain an interest in that spinoff or not?

Wyman: I'm sure they did. I was just a plain computer programmer back then, so I was not privy to the business arrangements.

Grad: So the specific goal was to provide access to financial information, financial database information. Frank, do you want to pick up the story?

Frank Belvin: Actually, I'll predate it a little bit. He told about the White Weld side. I was at Lincoln Lab, working with Jack Arnow, who was the group leader. Jack was instrumental in getting IBM to think of developing TSS [Time Sharing System], and it was the response to a Lincoln Lab bid. And he was also instrumental in getting Norm Rasmussen to do CP-67, which we brought into the lab, because IBM had brought a whole bunch of people up from TSS to demonstrate the machine. They put a tape on to IPL [initial program load] TSS, and a half an hour later, Jack walked out of the room, because it hadn't IPLed yet. <laughter> Whereas, CP-67, it was up like that. And that was the day that we got rid of TSS, and brought CP-67/CMS within Lincoln Laboratory, and it became quite a successful system.

Now, I don't know whether Jack had an idea about going out with it, although it was certainly a successful enough system, because we didn't talk about it, until the opportunity presented itself, and it presented itself this way. There's a Catholic missionary group called the La Salettes, which originated in France 100 years ago. They have a big place in Attleboro, Massachusetts, and their Treasurer, Father Rene Sauvé, had $15 or $25 million that the missionaries wanted to see get a better return than it was getting. He also had a cousin, brother-in-law, or somebody, who was a financial person. Well, he ended up investing this $15 to $25 million into ten companies, one of which was Computer Communications Center, the company that Jack and I started. He came up with one and a half million dollars for Computer Communications Center, kind of interesting, because the intermediary was a friend of Jack's, Mel Shalick. The Board that was set up at Computer Communications Center was Mel Shalick, Larry Suttenberg, Arnold Cutler, Jack Arnow and Father Rene Sauvé; so we had four Jews and one Catholic. <laughter> The company was ultimately sold to Chase, and of the ten or so companies that Father Sauvé invested in, I think IDC was either the only one or one of the only two in which he got more money back than he put in. I think he was banished to someplace out in Cape Cod.

Bayles: From Attleboro to Cape Cod? That's a plus, not a minus.

Belvin: But anyway, that's how Computer Communications Center got started.

Grad: So give me a time frame.

Belvin: June of 1968. And we didn't have even a four-page business plan. We had, maybe the back of an envelope. We thought that we would go out into the Boston area and support businesses. In fact, we talked to a couple of businesses, and the one I remember most vividly was a meat packer, Colonial Provisions, in downtown Boston. I think it was a social relationship between Mel Shalick, the "macher" in this thing. I remember going out to Colonial Provisions, and talking to their data processing operation. I don't know what they were doing, figuring out what materials went into the sausages, I don't know. But they had some kind of a unit record data operation, and we were going to set up a business in which we would provide that service, put a 27 AD [a terminal] in their location…

Grad: So, a remote processing kind of thing.

Belvin: Remote processing for them, and we were going to do a whole bunch of these. Fortunately, Joe Gal, who was looking to relocate from Manhattan to the Boston area, where the computing intellectual capacity might have seemed a little more attractive, went to IBM and asked for a reference, and heard about Jack Arnow. So they met, and we had a whirlwind courtship, because Computer Communications Center started in June, 1968, and December the 18th of 1968, Interactive Data Corporation started.

Grad: How much money was there?

Belvin: The money was a one and a half million dollars from Father Sauvé, and one of the nice things about White Weld's Interactive Data Services was that the money that the customers paid was not actually green hard cash. This was the day of soft dollars. White Weld is an investment house and they made their money on commissions. If they could increase their commission business by giving away something else, you know, research or whatever, fine. So they sold Interactive Data Services services through soft dollars. And when Interactive Data Corporation started, our financial customers were paying in soft dollars.

Grad: What's a soft dollar? Explain.

Belvin: It's derived from the commissions on stock sales that the customer makes. White Weld does stock trading with Morgan Stanley, or whoever, somebody else. As part of

that deal, they charge a commission. That commission is credited to what brought that business in. And, in this case, it was the Interactive Data Corporation. Well at first, Interactive Data Services.

Grad: Was that real money, though, that came to you? You use the term soft dollar. Did real cash come into IDC from those transactions?

Belvin: Yes, from White Weld.

Grad: By way of White Weld, they came in to you.

Belvin: Right. And I don't remember over what period of time, maybe the first year. I don't remember how long the White Weld soft dollar commission deal went. We had to get into real dollars, probably within a year. But that's the genesis.

Grad: Any other key people involved in the formation of IDC that you haven't mentioned yet? You have an incredible memory for names. It's blowing my mind that you know the full names. You're going to have to spell them all out, you do understand that.

Belvin: Okay, Joseph J. Gal, Jack A. Arnow. Actually, Butler Lampson appears in this, too, because he and Alan Dziejma, who worked at the White Weld component, sat down and developed FFL.

Grad: The language you used.

Belvin: Butler Lansing was instrumental in that. And we had Butler Lampson come up to Boston, to take a look at our CP-67, and give us some technical information.

Grad: So you swung over to the CP-67 side then, right away. There was talk about the SDS 940 as being the base.

Wyman: Our objective was to get off the 940.

Grad: Ah, so that wasn't a big battle.

Belvin: We actually moved the 940 to Waltham, as I recall, and operated it for some period of time, before we were able to get FFL running on the 360. There was a lot of conversion time, probably a year.

Grad: Did you have a problem ordering the 67 like National CSS had?

Belvin: I guess with the Catholic Church in back of us and White Weld, it wasn't a problem. <laughter>

Grad: So you had plenty of money to start with.

Belvin: Yes, and we ran through it very quickly, too.

Formation of Ross Systems

Grad: That seems to be standard for the field, doesn't it? That's part of the deal. Let me move ahead. I'm going to start around the other side of the table here. I think you're probably the latest one [into the industry], aren't you, Ken Ross? Why don't you tell us about the founding of your company?

Ken Ross: I came to the computing business in the early 1970s. I actually started my first company, Ross Systems, in 1972, but we were just doing consulting and programming and other random things. We did a project for a large financial institution here in San Francisco, called Itel that leased 360s. We used GE timesharing to develop budgeting and financial modeling, and I remember very distinctly how little we were paid, and how much money GE was making. You know, they were making it every month, and we had to work for our money. <laughter> It just seemed to me that we could develop applications on timesharing pretty easily. They didn't seem that complicated to me, and we could use minicomputers, which existed then. We looked at DEC, and we could capitalize on the technology, because then we didn't need to deal with any of the hardware or operating system. We could buy a packaged machine, all the communication protocols had been done, and we could focus our development resources on applications, and be in the timesharing business. And we did it. I mean we were actually able to write a financial modeling spreadsheet predecessor, whatever you want to call it, probably in about four or five months, and we rented outside computer time on a DEC PDP-11/45, and we actually had customers. We got our consulting customers up and running, so that we were sort of profitable by the time our machine came, and we got the first DEC 11/70 in the Bay Area.

Grad: Where did the timesharing system come from?

Ross: From DEC. It was their operating system. It was all, you know, turnkey.

Grad: So you used it as is. You didn't try to develop or modify it.

Ross: Right. In fact that was part of the key. You know, in retrospect, it was a great strategy. Back then, it was probably luck. We could focus our economic resources on applications and let DEC worry about all the operating system and technology issues.

Jeffery Stein: He built an absolutely fantastic accounting system, total division accounting, budgeting and everything. And that was a big keystone of your operation, too.

Ross: Well, that was the set. We did the budgeting language first, then we did a database language, and then, you know, the timesharing business boomed up until about 1980, 1981, when it started just cratering. But we were pretty successful competing against Tymshare and GE and then Rapidata, and a little bit against National CSS, and our economics were better. And of course, the big benefit we had, was that people always had the option. They weren't locked into us. They could buy a DEC computer, we would license our software, and they could run it on their own premises.

Grad: Let me go back to the previous two companies. Did you run CP, VM, what became VM/CMS, as is, or did you produce your own version?

Rawlings: We produced our own version. Very definitely. It wouldn't have worked as is.

Grad: And how about you, Frank?

Belvin: Our own.

Grad: You produced your own. We'll ask that same question as we go around, because Ken Ross just takes a vanilla version, and used it as is, which is a different investment situation.

Ross: Yes, our economics were good. I can't remember what the 11/70 cost. I remember very distinctly that the 88 megabyte disc cost $40,000, and the 11/70 was maybe $100,000. You know, the economics had really turned, and we could offer really the same kind of capabilities.

Grad: Were you self-financed at that point?

Ross: Yes, we were profitable, we were self-financed. We actually ended up raising some additional outside capital in 1982, but we did it because one of our guys was getting divorced and wanted to cash in. Over time, business got to be pretty tough, when we had to

transition. In 1982, 1983, we saw the writing on the wall, that the timesharing business was dying. It was a great turnkey thing and DEC had a great operating system.

Formation of Online Business Systems

Grad: Great. Jeffrey, you're on. Tell us about Online Business Systems.

Stein: Well, about the formation of Online Business Systems. Did you ever hear of a junket by IBM paying off? IBM had a junket. I was working for Greyhound Computer Corporation, as head of Research and Development, to try to figure out how to recycle all of their returned computers that came off lease, and put them in a data center. And so IBM had a junket in a private plane, prop plane, to fly us from San Francisco to Salem, Oregon, capital of Oregon. We went to the DMV Center, and there was a bunch of 360 computers running a data cell, and they had 70 2260 terminals just outside of the data center. It was separated by glass, and they were all running at once there and the data cell is flipping around. So this was the first online transaction-oriented DMV system running in the country.

Grad: When? Give me a year?

Stein: 1967. **I**t was late 1967, and they were doing real time, online transaction processing. One of the consultants had developed this multi-tasking program called Magic, and so that really stuck in my mind, the fact that they were really doing it. Because, when the System/360 came out in 1963, 1964, IBM showed these 2260 terminals, but no one was using them. But these people were using them.

We were in this brick building, on Howard and Spear Streets [in San Francisco]. We had our data center upstairs, and I had a staff of 25 people working with me. Downstairs on the third floor was this non-profit insurance company. The dentists had formed a corporation for dental insurance and corporations would pay these premiums, and you get insured. It was all a manual operation. The only thing that they did, from an automation standpoint, was to twice a month, print out the check that went to the dentists to pay the dentists for the insurance claims. Everything else was manual. They even had cards they would fill in – that molar was removed and this tooth was repaired – and then they would look up the benefits, and look up the rate for the dentist, and so on. So the Executive Director says, "Well, we're probably going to get some more business here, and we wonder if you could help us find a faster way to print the checks?" And I said, "Well why don't you just scrap the whole thing, and go online real time, like the DMV did in Salem, Oregon?" And he said, "Oh, no, we can't do that." I said, "Well, actually, you'll cut your back office costs enormously. You'll pay more in information processing, data processing, and you'll come out ahead, and actually, your reputation will be better." "No, we can't do that."

So I showed him some more information and all of that, and then he said, "Yes, I think you're right." He took it to the board. They all said he was crazy. I got my management to kick in $50,000, so for $75,000, we built an online real-time claims processing system. And I think they're still using the same software right now. <laughter>

Grad: Why should they be different from anybody else, right?

Ross: The DMV is probably using it, too. <laughter>

Stein: And they now are the largest dental insurance company in the world called Delta Dental. It used to be called California Dental Services. So, anyway, I became a hero overnight, and my staff, of course, made it all happen, and it became, like, the future of Greyhound Computer. I went to Chicago five times to sell it to each new CEO that was the head of Greyhound Corporation. In 1969, I was getting married in a few days and I got a call from the Senior Vice President in Chicago. He wanted me to come to Chicago immediately, and I said, "Well, I'm getting married, you know, in two days." And he said, "Well, could you just come for the day, the afternoon, you know?" <laughter> So I went there, and they wanted me to move to Chicago and really go big time with this whole thing. So I said, "Yes, I'll probably do that for a while." I came back, we went on our honeymoon. My wife said, "Why do you want to bother with that and go to Chicago? Why don't you just start your own company?" So I went from $30,000 a year, down to zero for two years. We started this company and became a provider of online processing, and then moved on from there.

Grad: What did you use in the way of technology?

Stein: We used our own, but then toward the end of my stay at Greyhound, IBM came out with CICS, Customer Information and Control System. We heavily modified it because we were going to be multi-organization, rather than one organization. Our first user was Princess Cruises, an online passenger reservation system. I could go on for hours.

Grad: But you were running MVS then, or OS?

Stein: We were using MVS. That's really bringing it way back.

Grad: What database system were you using in conjunction with CICS?

Stein: Basically what we did is that we used BDAM. We took the key – the key of the record, not the key of the information, like the account number of something like that – and we

ran it through a formula that we developed, and that was the direct address, where the record was. We skipped going to an index file to go to the record itself.

Grad: So you weren't using one of the DBMSs then, at that point.

Stein: No, we just used BDAM with our record look up, and then we created a couple of inverted files.

Grad: Where did you get your money to start the company?

Stein: Basically it was my wife working, and like, no money. We had no money for years.

Grad: So how did you get your hardware?

Stein: We tried to raise money and when I quit my job, the market went down and it was very difficult to raise money. So we said, screw it, and we just started in business. I found a financial services company that was going down, you know, the sales were going down, the profits were going down, and they had a lot of excess computer time. So we came in and managed their data center in return for allowing us to run our customers on it. And then, in 1977, we got a 370-158.

Grad: But you made money from the beginning, other than your salary?

Stein: We made money every year, but we didn't make a lot, because we ploughed so much money back into the company. We created our equity to put it back in the company.

Grad: But you were primarily remote processing services or online transaction services?

Stein: We started out with transaction services, and then we sold computer time, and then we did RJE [remote job entry]. We did a lot of systems development, we sold software. The venture capital arm that we eventually had later actually ended up being our most profitable.

Grad: But you did not use a timesharing system at that time.

Stein: Well, with the capabilities that were in the IBM operating system, there was timesharing available.

Grad: Is that TSO?

Stein: TSO, and also we had WYLBUR, which we licensed from Stanford, and we resold WYLBUR.

Grad: Okay, so you did have some timesharing capability.

Stein: Yes, right, and a lot of RJE, too.

Formation of Comshare

Grad: Okay. Rick, I'm going to have you talk about Comshare. I'm saving Tymshare for last, you know that.

Rick Crandall: The genesis was, when I was a student at the university, I took the first and only computer course, because there was no computer sciences department. After I was finished with that, I got fairly depressed that there weren't any more, and I thought I was going to forget what I had learned by the time I graduated college. I was thinking about that in the third semester when I was sitting in a mechanical engineering course headed by a professor named Westervelt, who was one of the key professors at the university computer center, along with [Bernie] Galler and others. He saw me looking very perplexed said, "What's the problem?" I told him, and he said, "Well, show up at the computer center this afternoon at three o'clock," which I did. And I was the only student that actually got a job at the computer center, from this little interaction.

He immediately put me on some consulting assignments that he had developed. He had sort of a side business that he wasn't supposed to have. The use of the 7090 at the computer center was supposed to be just for educational purposes. I guess the university had an educational discount for that. We were developing some software and I was working for Rapistan, which was a company designing conveyor belts, and Lear Siegler, doing rocket ship trajectories, and White Weld, with Joe Gal, so he's a little bit part of Comshare, too. The program that Westervelt had developed for his doctoral thesis was a non-linear regression with learning that he developed on the 7090, with this huge card deck, which I had taken over. Joe wanted me to use this to predict stock prices. And so that became a financial relationship between us.

We were producing some money with these different applications, which was not right, and a sales rep from Scientific Data Systems came popping into the computer center, trying to sell a 930 to become a 940 to the university, which nobody was interested in, except me. That's when I set up a demo back to U Cal Berkeley, which SDS had told me about, and that was very impressive to everybody. That eventually resulted in an offer by SDS that if I went out and worked with Tymshare, which they had been interacting with, that they would build a 940 for us, and give us the first six months free.

Grad: Who's us?

Crandall: Sorry, there was another guy at the computer center, much older. His name was Bob Guise and he was a civil engineer, doing some consulting, and had some kind of relationship with the computer center. So he and I formed a partnership that became Comshare. We incorporated Comshare in February of 1966.

Grad: That was the part that you left out. Thank you.

Crandall: I invested $1,500 because that's all I had, and then I immediately took it out as expenses, so I could afford to travel to California. That was our capital. <laughter> He ran around town and raised money from the local hairdresser and a bank teller and, you know, just scrabbling around at first. We then ran into the Weyerhaeuser family, which made a significant investment. It was in the area of a million dollars, which was unbelievable. By the way, that was a few months later in 1967. We went public in November of 1968, which was a great time. That was before that aerospace recession hit in 1970, I think it was. So we had this little bubble in the market that our stock participated in. That's the only reason why we went public. In the public offering, we raised another three and a half million, which was a huge amount of capital in those days. One of our first customers was the Oak Ridge National Labs when we finally went commercial, in approximately September, October of 1966.

In August and September, the 940 got delivered and we were able to bring it up and actually get usage. A few months after that, one of the early customers was Oak Ridge National Labs, which is in Tennessee, and we were extremely impressed that somebody was willing to pay the long distance phone charges to dial in all the way from Tennessee. It was long distance, there was no networking. We scratched our heads on that one and said, "There's got to be a better way of doing this."

So one of our guys developed a hardware multiplexer in his basement, and we had a couple of guys, ex-GE, actually – Bob Snavely, who was in King of Prussia, Pennsylvania, was one – so we decided to try to make that a remote satellite. We ordered up some phone lines in King of

Prussia, from Bell of PA, and we had this box. When the guy came out to install whatever it was, five or ten phone lines, he said, "What am I hooking it to here?" And we said, "This multiplexer thing." And he said, "Can't do that. If you did that, you'd be reselling telephone services." And so we said, "But we've got phone lines hooked to our computer in Ann Arbor, why can't we hook it to this?" He said, "Well, because that's a computer, and this isn't." <laughter> So we said, "What's a computer?" And he said, "Oh, I've got to go back to the company on that one." <laughter> We actually got a letter and I wish I still had it, but I don't. We got a letter from Bell of PA that said a computer is a device that, when the bits come in, it stores them, and then it brings them back out and sends them on, or does something to them, or whatever, but the key element of the definition was storing it and then pulling it out of storage.

So of course, we added a whatever, <laughter> an 8-bit puffer, right? And then we went back about a month or two later, ordered the phone lines again, and a guy came out to install it. We went through the whole routine with him we showed him the letter. We said, "Look, this thing is not a multiplexer, it's a store-and-forward device." <laughter> I don't know if we invented that phrase, because it became a descriptive phrase, but I know we sure used it. We thought we invented it. When I was a kid, I thought I invented peanut butter and jelly sandwiches, too. So they went through and hooked it up, and that, for us, was the beginning of networking that changed our whole economic model.

Grad: What kind of services were you offering, primarily timesharing, or remote processing?

Crandall: All timesharing with two engineers, at first, who really appreciated the user productivity elements. Also, our documentation wasn't great, but they could figure it out, so they were a great start-up community. But they disappeared in 1970. That was an engineering recession. And that's when we changed our whole concept toward business applications.

Grad: So you were able to raise quite a bit of money.

Crandall: We were. We did.

Grad: Was it Weyerhaeuser, were they a customer of yours, or just an investor?

Crandall: No, it was a guy in Detroit, who was one of the members of the family. We ran into him. He was an angel [investor]. It's a very rich family, and he just decided he liked the idea. And we also put him on the board. He served on the board for many years.

Grad: Did you maintain and change the 940 timesharing system yourself? Did that become your own system that you maintained?

Crandall: Well, yes. I mean, I was part of the team that created it.

Grad: I understand, but from that point on.

Crandall: Dramatically. We had a very large R&D team, with significant developments. And in fact, eventually transitioned and developed a follow-on operating system for the Sigma series.

Grad: Okay, so that was the whole picture. Okay, GEIS is up next.

Thomas Haigh: I'd like to say in reference to that, that I published a biography of Rick, in [*The*] Annals [*of the History of Computing*], in 2004, coming from the ADAPSO reunion [in 2002], for people who are interested in that story. Also, you had a short recollection in *Annals* in 2002, on the founding, and there is Paul Ceruzzi's oral history interview of you.

Grad: His oral history is on file at Charles Babbage Institute, and he still looks reasonably good for a man his age. He was 12 years old when he graduated. That's quite a story.

Formation of GE Information Services

Chris Brook: Yes, I feel kind of let down here, because we had an angel from the start in General Electric. It's tough to match these stories here, so about this time, when we came out of the Dartmouth era, we took that product and called it Mark I. It was a 235 with a DATANET-30 front end for communication, with the same issue, trying to spread the wealth around to get more users into the same system. That obviously didn't work too well. It didn't have enough power for commercial usage, as far as we were concerned. We were part of the computer division then, so we were able to get free hardware, which is very nice. So they used the GE 435 and took Multics, with variations on it for the timesharing part of it. That became called Mark II, which had the same communication front end, so it used a DATANET-30.

Grad: You started with the Dartmouth timesharing thing.

Brook: Yes.

Grad: Where does Multics come in?

Brook: There wasn't enough power in the 235, which was the timesharing system being used for what we called Mark I. At that time, the computer division, down in Phoenix, had gone up the scale to 400s and 600s, and they said, "Why don't you take whatever you want?" So we said, "What's the biggest you've got?" which was the 600 series, so they took the 635, and essentially moved the Multics stuff with some variations.

Grad: I'm sorry, I'm missing the connection. Where does Multics come in, versus Dartmouth?

Brook: Oh, GE had deals with everybody. GE provided the hardware, the 635s for Multics to run on. I'm sorry, this is terribly incestuous.

Grad: That's okay.

Brook: GE was trying to get into the computer business, so they were giving computers away to any school that wanted it, pretty much. So they provided 600s with some extra help.

Grad: To MIT.

Brook: To MIT, who created Multics, so the quid pro quo was GE kind of took it back again, and said, "Okay, we need an upgraded timesharing system."

Grad: So you shifted off of the Dartmouth thing, and now you're onto the Multics system. Okay.

Brook: Well, yes, it was Multics 3, by the time it finished up. It started with Multics, and I'm not sure who actually did all the work, whether it was MIT, or partly GE. GE brought in a whole bunch of people from Huntsville, in the space division, and they started working. They were the core technology and operational people for what was called, IND, the information network division. We now converted. We had the base of the timesharing system that came later, Mark III. It was called Mark II then, so we had the old communication front end, which really was half of the problem, or three quarters of the problem, but a brand spanking new, very large mainframe computing system.

Grad: What kind of work were you doing, remote processing, transaction processing, timesharing? What were you doing?

Brook: They were selling power. It was the same as everybody else was doing. They were selling timesharing systems to everybody, mainly people wrote programs in Basic, and just ran them on this. It was all interactive stuff.

Grad: Okay.

Brook: There was no remote processing at all, so all timesharing pure and simple.

Grad: Thank you.

Brook: So that was about 1966, 1967, I guess, and they started to transition over to Mark II, as they called it. It was pretty obvious the DATANET-30 wasn't going anywhere as the communication front end. Again, it was very old technology, pretty beat up; it only had 30 users or something in 1964, it wasn't very powerful. At the time I came in, they decided to transition to a whole new network, or a whole new communication front end.

Grad: When does this become GE Information Services [GEIS]?

Brook: Oh, much, much, much later.

Grad: Much later, not in this time-period.

Brook: This was R&D at the time. This was when George Feeney was brought in to run it, and he was kind of the guy that really fathered this whole thing, intellectually and otherwise, so that was switched over and they called it Mark II AX. What we did was create the network that was running as a slave initially, to the 600 system, the main timesharing system. Again, it's nice to have all the resources. They took a process control machine from GE Process Control Division down in Phoenix, and made that what we called the central concentrator. So that had an interface too into the 600 series. It was a very powerful process control machine, a very nice box for communication. It had fantastic bit manipulation and all this kind of stuff that you need for good communication stuff. And that was plugged into the memory interface of the 600 directly, so it was very fast.

Grad: You were in the technical side, I know, for years, but did you have any information or concept of how successful that business was as a business, who were their customers, any of those kind of things?

Brook: Yes, sure. We were very successful in business. We were kind of a cash cow for GE for quite some time. Our costs were very low, the people costs, essentially. We'd buy the

machines from Honeywell, or GE, at low cost. They got amortized in five to ten years, then they were free. And everything worked that way pretty much.

Grad: So it was a profitable operation, then, within GE.

Brook: Well, we were rolling in 30 percent.

Grad: That's not bad. That's interesting. Because GE computers didn't make it as an independent business.

Brook: No, GE got out of the computer business, sold it to Honeywell, so all that did, we just changed our vendor.

Luanne Johnson: Rick gave me an article from the New York Times in 1969. I'm trying to get it online to look at it. It's an Auerbach report and they said that GE had 40 percent of the timesharing business in 1968.

Grad: [Reading the article] GE had 40 percent of the market in 1968, of a total market of $70 million. GE's Information Services Department, 40 percent, IBM's Service Bureau Corporation, 19 percent, Call-A-Computer – how many remember Call-A-Computer? – 7 percent, Comshare, 6 percent, Tymshare, 5 percent, Allen-Babcock, 3 percent, and all the others were ITT Data Services, Keydata, Adams Associates, 16 vendors. I didn't see National CSS in there.

Rawlings: Well, we sold a dollar or more in December of 1968. Maybe a dollar. <laughter>

Orenstein: We didn't collect, though.

Rawlings: We probably didn't bill it till January

Orenstein: Oh, that's true, we didn't bill it till January.

Crandall: For the record, that was from the Auerbach report. We always suspected, at the time, that they had flipped the numbers between Comshare and Tymshare, because I thought that Tymshare was at first a little bit bigger, and then it got a lot bigger.

Johnson: If I may interrupt if Chris doesn't mind, I did the oral history of Warner Sinback, who was very involved in the initial plan for GEIS, for our corporate history project. Having GE

as your angel was a mixed blessing because what also happened was that there was a competition between the hardware salesmen and the timesharing salesmen, because the timesharing people were going in and saying, "You know, you don't have to buy a computer, because you can use our timesharing service." One of the examples of that is that Sandy Kurtzig, who later founded ASK Computer Systems, sold timesharing services for GE and they pulled her out of some of the accounts because she was doing too good a job selling timesharing services, and they couldn't sell upgrades to the computers. When GE got out of the computer business, it gave GEIS the opportunity to grow.

Brook: And they were running it on GCOS, which was like some of the IBM stuff. It wasn't the best operating system for timesharing.

Ross: Before I was at Ross Systems, I was at a company called Arcata, and Sandy was my GE timesharing sales woman. We were one of the biggest users of commercial GE timesharing in the country, and there was a payroll system that somebody had written on GE timesharing, this was 1970. It was phenomenal, and we had 20 offices around the country and we were actually running payroll on it.

Formation of Tymshare

Grad: Okay, we've got two more to do. Okay, GE is done, let's do Tymshare at this point. Who wants to tell the story?

David Schmidt: Well, I can tell you how it got started, and then we can take it a few steps beyond that. And then I think probably some of the other people could contribute to some of the later periods. Initially, I was working for the GE computer lab and I had always wanted to be in my own business. And so I told my wife that, and she said, "Look, stop talking about it, and do it." So I said, "Gee, okay, you mean that?"

So I quit GE, and by this time, I had learned quite a little bit about the Dartmouth system, and I was totally fascinated by the idea. I thought it was just the best thing I had ever seen, and this is after working for IBM and Burroughs and GE up to that point. So I went out and started trying to raise some interest in forming a company to sell timesharing services on the Dartmouth system. The last job I had with GE was working for Lockheed to design a small operating system whose purpose was to displace IBM 1401s, because in those days, you used to use the IBM 1401 to transfer media from cards to tape, and things like that, and then take the tapes over to the mainframe and run it. So GE wanted to encroach on the market. We put a GE 435 computer into Lockheed and we were able to run as many transfers on that machine as IBM could do with

a whole room full of 1401s, and this is just an interrupt driven data transfer, a pretty simple system.

The reason I bring it up is that's how I got to know Tom O'Rourke pretty well, who was the other founder of Tymshare. He didn't know me from Adam, but when we started selling 435s and 235s to replace 1401s, we began to get to know each other. I was trying to find a salesman to join me in Tymshare, and I couldn't, so I talked to Tom and he said, "Well, why don't I get in there with you, and we'll do something?" And I said, "Well, gee, that sounds great." Because I'm, you know, a mediocre technician, but he was a really good salesman. So we did that, and we started out by selling shares in the company to family and friends. And I want to tell you, this was small, small investments at a time, and that we went about nine months without having any income and then we got that income, and that got us going.

But in the meantime, Tom had been working on George Quist, of Hambrecht and Quist, if any of you remember them. Bill Hambrecht is still around, but George is not. He was working for Bank of America and they decided to split their company off and become an investment banker. So basically George put in the original capital, and we went from there. And we eventually sold Burnham and Company and some other companies who invested as venture capitalists.

Grad: So you had significant VC type investment from the beginning, is that correct?

Schmidt: Yes, VC all the way. Except for that little infusion of family and friends at the beginning, it was all venture capital.

Grad: Did you retain a major share of the company yourselves?

Schmidt: I had a pretty good piece of it. Not as much as I thought I should have had, but I had a pretty good piece of it.

Grad: Were there any other people who had shares besides the VCs and yourself and Tom?

Schmidt: Gee, you know, I think so, but off hand, I can't remember.

Gary Myers: I know you offered me equity to stay.

Schmidt: Did we?

Myers: Yes.

Schmidt: I'm not surprised. I don't remember a lot of the technical details. The business details were more interesting to me.

Grad: I'm looking for the business things. Who were the customers, what did you do?

Schmidt: Well, interestingly enough, one of our very first customers was the place that I wrote the operating system for replacing 1401s, and their engineers bought it, and so they were one of the very early customers.

Grad: Were your customers primarily technical or scientific? Was it mostly companies?

Schmidt: It was mostly just engineers. At the beginning, I thought, "God, if we only had some applications for this thing, it would be wonderful." But we didn't; we just had a couple of languages, Fortran and Basic.

Grad: Did you implement those right away? Was that one of your first things you did, provide an interactive capability with Fortran?

Schmidt: Yes, that's where we started out, and that was our emphasis until I left the company, and even beyond, so yes.

Grad: Some of the others want to pick up the story here, Ann, or Norm?

Ann Hardy: I think David and Tom demonstrated the system in the fall of 1965.

Schmidt: Was it at the Cow Palace?

A. Hardy: Yes, and then I joined the company in February of 1966, and the machines came a little bit later with the disc, but, as I said earlier, no drums, nothing to really swap out. Rick came out and we worked on the system for most of the summer. You couldn't do a whole lot, but we did get the discs running. Because Berkeley hadn't had any discs so, of course, none of that disc driving stuff was done. After Rick went back, and took what we had, the drums were delivered in September, I think, of that year, 1966, and so we had to add all the swapping, and then we started our first customer in October or November.

Grad: Of 1966.

A. Hardy: Of 1966, yes.

Grad: You continued to develop the timesharing system after that.

A. Hardy: Yes, before it was finished, we had essentially replaced all of the Berkeley code.

Grad: Again, you had that investment responsibility into all that timesharing system.

A. Hardy: The Berkeley code, well, it just didn't have enough hardware to work with, so…

Grad: And you stayed with the 940s?

Schmidt: No, we went into the PDP-10 after that.

A. Hardy: Tymshare kept operating 940s, I mean, we had several 940s. Do you remember how many?

Norm Hardy: Twenty-seven.

A. Hardy: Twenty-seven 940s. But then, as we got more customers, we added PDP-10s, and then 370s.

Grad: Did you have to rewrite the whole program to run on the PDP-10s?

N. Hardy: We acquired Computer Center Corporation from Seattle that began with TOPS-10 from DEC earlier, and at that time, Bill Weir came, and continued the development that Computer Center Corporation had begun, and he worked on that for a number of years, enhancing the PDP-10 system. And that's before we adopted the VM/370.

Grad: You eventually swung over to the VM/370.

A. Hardy: We kept running everything.

Grad: You ran all of these?

A. Hardy: We had all three running all the time, right up till the end.

N. Hardy: Without much migration between them. One customer would seldom move from one machine to another. They were separate markets, nearly.

Grad: One of the things we're going to talk about later is that many of you set up many multiple centers around the world. As well as multiple centers in one location. But we're going to come to that point of multiple centers later.

Crandall: Burt, I almost feel like I was part of Tymshare during the start up.

A. Hardy: The first few months, yes, we were so close.

Crandall: That disc that Ann was talking about that was so dramatic in changing the architecture of the system, was a Data Products disc. It had plates the width of this table and was 16 megabytes in total. And we thought it was riches beyond the dreams of avarice.

A. Hardy: that's right.

Grad: That's a wonderful story.

A. Hardy: It was so hot they had to keep an air conditioner outside just to keep the room at a reasonable temperature. It was a crazy machine.

Brook: But the same disc was, for the GE 200, called the DSU 204. It sounds like the same thing you're talking about.

A. Hardy: Probably the same disc.

Brook: They were big discs, but every so often, they'd just go pfft and fly out through the glass across the room, and you had to pray nobody was in the way.

Crandall: Watch the heads the size of your arm floating above it, and you knew you had to dive in at some point.

A. Hardy: Yes.

N. Hardy: And all the heads were individually activated.

Brook: Right.

Other timesharing companies in the 1960s and 1970s

Grad: All separate arms on each one. Here's where I'd like to spend the next few minutes before our lunch, to work up an appetite. I want you to talk about who were the competitors, the companies who aren't represented here, so you can say anything you want to about them. But we have a list of some of the companies. I'm sure you'll mention others. Service Bureau Corporation, UCC, Sam Wyly's company, Rapidata, Keydata, are some of the ones. We have a number of others, but let's start with Service Bureau. Did any of you run across them as a competitor, were they a factor?

Belvin: We hired from them.

Grad: That's not what I said.

Belvin: I know.

Grad: Were they a significant competitor to you? They had a thing called QUIKTRAN that they started running in the late 1960s. Was that a factor to any of you? It was developed in DPD [Data Products Division] but SBC started marketing it. We couldn't do it in DPD, we weren't allowed to by the rules of the game. DPD couldn't sell online services; that was SBC's business. The rules were clear.

Ross: SBC was a serious competitor to us.

Grad: Tell me why.

Ross: Well, you know, it was IBM. Back then, it was, like, you got fired for not buying IBM and we were not competing in the technology market, more the application market.

Grad: But by the 1970s, when you were in the business, there is no more SBC. It was part of Control Data.

Ross: No, they were there, way into the late 1970s, for sure.

Grad: They were Control Data by 1972.

Mike Humphries: Ownership changed, but the image of who they were didn’t change.

Ross: Oh, okay. I distinctly remember they were a big competitor. Rapidata was a big competitor. I'll say bad things about Rapidata.

Grad: You're allowed to.

Ross: They competed very heavily in a lot of areas, potentially unethically, I thought.

Grad: What do you consider unethical?

Ross: I think that they promised something, and didn't deliver. We were very earnest competitors.

Crandall: But, you know, it's true. The other part of it was, they were the only competitor we ran up against that ran a negative campaign.

Ross: Yes, I sort of remember that.

Crandall: They would dump on us.

Grad: You felt that they were negative against their competitors. They said bad things about you.

Crandall: Yes, we thought untrue things.

Ross: Yes, I'm left with a relatively negative feeling about Rapidata, but I competed, you know, against Tymshare, and NCSS. I always remember competing against Tymshare on Express. You know, there would be these people that were just Express bigots, and you just couldn't compete against them.

Grad: How about you, Jeffrey, who did you compete against?

Stein: Well, it depends, really, which stage of our company.

Grad: I'm talking early 1970s.

Stein: In the 1970s, basically it was against doing something in-house, and because we didn't have a computer center and we were a very undercapitalized company. But we got

customers because we made the buyer a hero. We got more buyers of our services promoted and moved to other companies because they became heroes.

Grad: How did they become heroes, because of price?

Stein: Because we did something very different. To have an online transaction processing system for such a small business was unbelievable.

Grad: Did you target small businesses primarily, as your clients?

Stein: Well, yes, because the big businesses, like an S&P, or PG&E, or Bank of America, could afford to put that huge system in.

Ross: That was pretty unusual back in those days.

Stein: Yes, we took a wall covering a distributor company in Oakland that was spending $5,000 a month for a total online real time distribution system, and in eight years, they became the largest wall covering distributor operation in the entire United States, and we were billing them $75,000 a month.

Grad: Wow, impressive. Who were your competitors, IDC, who did you run into? But your services were all in the financial services field.

Wyman: Like a lot of the companies, initially, we were anything that anyone would pay us for. I mean, we weren't limited strictly to the financial industry, though that contributed a fairly significant part of our revenue. But we were also trying to do all sorts of general timesharing, which had us head on with NCSS. Tymshare, Comshare, I don't know we ran into significantly.

Grad: Did you run into Tymshare, Comshare much?

Bayles: The Tymshare VM/370 product was way later.

Grad: Why was that a factor to you? I mean, timesharing is timesharing, regardless what platform you're using.

Rawlings: Well, people were developing COBOL programs that, once they had them debugged, they would move them in-house. They couldn't do that on a 940.

Grad: Why not?

Rawlings: Because there wasn't a COBOL system that was identical. Yes, there was CODASYL, but there were the grey pages that weren't really ANSI COBOL, but that anybody wrote in. They wrote in the IBM extensions, and they also wanted ISAM and all sorts of other things that only we were supplying in a virtual way.

Grad: So you had an IBM world, in a sense.

Rawlings: So you could develop your program and then run it in-house, and you knew it was exactly the same. The same also with Fortran. They had developed maybe a Fortran program at their own place, but they could enhance it, run it, and then plan on moving it back in-house, and in many cases, they continued to run it on our system, and that's where we got most of our revenue.

Bayles: And the fact is that IBM, at the time, was enormous from an overall percentage of the computing market business. Compatibility was what we were selling.

Haigh: Would I be correct, that that was coming, not just from using IBM equipment, but because you had this virtual machine capability?

Bayles: The users didn't care about virtual machines.

Grad: No interest?

Rawlings: Well, no, but you're right that what we were providing was a virtual machine that was a 360 that was compatible with the box on their floor. Their floor was running a real machine, while we were providing a virtual machine that was identical.

Haigh: And that's what gives them the opportunity to take the applications that were developed in the timesharing system.

Rawlings: They could take the object code.

Ross: I was a user of that service. Back in 1968, 1969, I was at a company called Raychem in the IT department. Back then, you know, you had your deck of cards that you submitted overnight, they ran it, you got your output. If you saw a bug, the turnaround was a

day, and when we got an NCSS terminal, it was unbelievable that you could do it instantaneously online.

Bayles: The key point here was not the fact that underneath it all was a virtual machine. What the issue was, at least with respect to program development, was the IBM COBOL and IBM Fortran. You could literally take the object code and run it on your own machine.

Grad: Let me point that same question at Tymshare, who were your competitors?

Schmidt: Well, to be honest with you, up through 1968, we were competing, not against other timesharing companies, but in-house methodologies, bias toward a particular computer, things that weren't really direct timesharing service competitions.

Grad: Rick, how about yourself?

Crandall: Well our early competitor was GE, and I remember an ad that we ran frequently at that time that said, "We don't make light bulbs, our customers prefer it that way." <laughter> I'm sure I still have that ad, actually.

Grad: Chris, do you have any feeling about what GE was competing against?

Brook: Yes, back in the early days, Tymshare and Comshare were the only companies I remember ever coming across. A lot of it was still Mark I, then, with the revenue.

Grad: Mike?

Humphries: Besides SBC becoming Control Data, Control Data had its own timesharing services as well. Was that Cybernet, do you guys remember?

A. Hardy: Infonet? …

[Editor's note: According to the Control Data Corporation historical timeline archived at the Charles Babbage Institute (http://www.cbi.umn.edu/collections/cdc/histtimeline.html), CDC established the Cybernet communications network in 1968, the same year they filed an antitrust suit against IBM. According to the history of Computer Sciences Corporation on the CSC website (http://www.csc.com/about_us/ds/40546/40550-five_decades_of_success), CSC developed Infonet in the late 1960s.]

Humphries: So whatever the name was, what I remember is that Control Data also had sales guys that were selling stuff on big honking CDC machines, and they were a competitor, too, because I first sold in Silicon Valley, and we had a lot of engineering firms. And those guys were easily convinced that these big gigantic number crunching machines were the way they needed to go. And somehow that got left out, as we were planning this, I think, that CDC had that capability.

Grad: Their machines did, but I only thought they got it through SBC.

Humphries: No, they had a second group.

Grad: Question, UCC [University Computing Corporation] hasn't been mentioned. Any of you run across them?

Humphries: Yes.

Grad: As a competitor, and where were you?

Humphries: It wasn't significant. I was always with Tymshare. There were probably 30 or 40 timesharing companies at that time.

Grad: I'm trying to mention the ones that were of good size. UCC was a good sized company by the late 1960s.

Crandall: On Univacs, right?

Grad: Yes.

Bayles: They were kind of a big RJE shop, I think.

Grad: Yes, more RJE than the other, but they were a big shop doing RJE. Did any of you get significant RJE work?

Brook: Later, it was all much later. At this point, it was all interactive.

Rawlings: We did provide a capability where our online users could direct large volume output to their system. I remember that we had two customers. One of them was Texaco, and the other one was Shell Oil. Texaco output a 100-page report with really sensitive data, and it

arrived on the Shell machine. Shell copied it and delivered it to Texaco, and we lost them both as customers. <laughter> But it was a remote print out, that we could deliver, and we also provided some remote entry of cards.

Computer Timesharing Services Association and ADAPSO

Grad: Let me close this session with Rick. [The precursor to] RPSS [Remote Processing Services Section, a section of ADAPSO] was formed as an independent organization, 1967-ish, or so.

[Editor's Note: According to the Comshare timeline in the Corporate Histories database at the Computer History Museum (http://corphist.computerhistory.org/corphist/index.php), Comshare was a founding member of the Computer Timesharing Services Association which merged with ADAPSO in 1969.]

Crandall: Right.

Grad: And it consisted of both timesharing and remote processing services companies.

Crandall: Yes.

Grad: And sometime in 1968 or so, it joined ADAPSO.

Crandall: Correct.

Grad: Who were some of the companies that were in there beside the timesharing companies?

Crandall: Well I can't remember exactly. You know, we haven't mentioned Allen-Babcock, they were floating around.

Bayles: ADP?

Crandall: Yes, ADP, right. Cyphernetics before ADP acquired them. Yes, they were another Ann Arbor company.

Humphries: McDonnell Douglas.

Rawlings: All the aerospace guys got into it. I mean, they were all in computer services. Boeing Computer Services, Grumman Data Systems.

Grad: What was the purpose of the Computer Timesharing Services Association?

Crandall: In the beginning, it was very focused on the issue of telecommunications, and the involvement of the FCC. The telephone companies were really trying to fight down our industry at that point.

Humphries: So was IBM.

Crandall: Yes, but I mean, but more from a telecom standpoint. So CTSA became a thorn in ADAPSO's side, because it was raising so much money and spending so much money on a law firm. What was the name of Herb Marks's firm? Wilkinson, Cragun and Barker, right?

Johnson: Squires, Sanders and Dempsey was where Herb Marks and Joe Markoski were from. There may have been an earlier one, but that's the one that represented the group when they were in ADAPSO.

Crandall: Yes, I think it was earlier. And so we spent almost all of our budget and even allocations from ADAPSO in those days, on the whole issue about our rights to network.

Grad: So that was the key issue to you.

Crandall: Yes.

Grad: And you all shared that concern, because you weren't competitive in that aspect, is that correct?

Crandall: Well, we were competitors, but we were all dependent upon the need to network. Because prior to that, you had to have computer centers everywhere, and it was not economically a good idea.

Grad: By 1970, you were setting up in multiple locations, all of you?

Crandall: Yes.

Grad: And therefore all of you needed communications for your customers by that time.

Crandall: Which resulted in eventual contraction of centers, not necessarily into one, but to strategically located centers, not in every state where you wanted to provide service.

A. Hardy: By 1970, we were contracting data centers just having strategic data centers.

Grad: Well, had the pricing of communication come down enough to make that economic?

A. Hardy: We built our own network by that time.

Crandall: The key issue was multiplexing.

Brook: First of all, we went downwards, and went out with multiplexers. We had two layers of multiplexing. We concentrated the multiplexers and then we went up the other way and built switches, which connected all the main concentrators together. So then we had this huge network, and you just plugged data processors which were timesharing systems together.

Grad: So AT&T wasn't blocking you on doing that.

Brook: No, they were customers.

Grad: End of this session, we have lunch served. We'll come back here at 12:50. So you're free until then. Eat, enjoy.