"One for the History Books" Workshop

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Recorded: September 24, 2000
Palo Alto, California

CHM Reference number: X6351.2012

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Conducted by Software History Center

Abstract: On September 22 and 23, 2000, The Charles Babbage Institute sponsored a conference in Palo Alto, CA, on the impact of IBM's decision in 1969 to unbundle the price of software from the price of hardware on the emergence of companies selling software as a product. Many of the attendees at the conference were people who had founded software companies in the 1960s and early 1970s, so The Software History Center decided to take advantage of the congregation of so many people who had participated in the early software industry to organize a workshop for the following day. The purpose of the workshop was to ask people to recollect their experiences in founding their companies and especially to discuss factors other than unbundling which affected the early growth of their companies. Conference reporters were on hand to transcribe the conversations that took place.

Attendees:

Barbara Brizdle
Worked for Tymshare and IDC starting in the 1970s; President of Software Strategies, consulting to software companies, from 1984 to 1990

Martin Campbell-Kelly
Professor of Computer Science, University of Warwick, UK

Peter Cunningham
Founded INPUT, one of the first market research firms to focus on the software services and software products markets, in 1974

Phil Frana
Software History Project Manager, Charles Babbage Institute, University of Minnesota

George Glaser
President, The Charles Babbage Foundation

Marty Goetz

Co-founded Applied Data Research (ADR) in 1959; received the first software patent in 1968

Norma Goetz
Accompanying Marty Goetz

Burt Grad
One of the members of the IBM team which developed the plan for unbundling software from hardware in 1969

Peter Harris
Founded ADPAC Corporation in 1963

Niki Harris
Accompanying Peter Harris

Karol Hines
Responsible for software product design and development at Ross Systems in the 1970s

Doug Jerger
Co-founded Fortex, an early accounting software products company targeting large companies with mainframe computers, in 1970

Luanne Johnson
Founded Argonaut Information Systems to sell payroll and accounts payable software in 1971

Ken Kolence
Co-founded Boole & Babbage in 1967, the first systems software product company in Silicon Valley

Ed LaHay
Worked for a variety of software manufacturers and systems integrators including IBM, Pansophic, Forecross and Logica

Jan Phillips
Worked for DEC in the 1980s developing and managing software industry relationships

Joe Piscopo
Founded Pansophic Systems (1969) which sold the PANVALET tape library management system and EASYTRIEVE, a report writer and data retrieval product

Esther Roditti
Contracts counsel to ADAPSO[1]; headed the project to develop model licensing and services contracts starting in the late 1970s

Larry Schoenberg

[1] ADAPSO, The Computer Software and Services Industry Association, changed its name to the Information Technology Association of America (ITAA) in 1991.

Co-founder, in 1967, of AGS, a software professional services firm, which expanded into software products and distribution during the late 1970s and 1980s; served as Chair of ADAPSO in 1982

Larry Welke
Founded the *ICP* (International Computer Programs, Inc.) *Quarterly*, a catalog of software products, first published in January, 1967; served as Chair of ADAPSO in 1989
Nissey Welke
Accompanying Larry Welke

Duane Whitlow
Developed Syncsort in the late 1960s to compete with IBM's sort and other sort programs

Jeff Yost
Associate Director, Charles Babbage Institute, University of Minnesota

Origin of The Software History Center

Luanne Johnson: As most of you know, I've been interested in the history of the software industry and the lack of attention given to it for a long time. As has Burt Grad. We put up a Web site a couple of years ago to try to attract some attention to the need to preserve the history of the industry before it is lost. Our experience with the Web site led us to realize that we were not making enough progress with an informal approach. We really needed a formal organization that could raise money to make things happen.

Then, in November 1999, *Fortune* magazine published an article in which they they identified the top four businessmen of the century as Henry Ford, Alfred Sloan, Tom Watson, Jr. and Bill Gates. The article described the accomplishments of each of these people and they said about Bill Gates that the most important thing he did was form a new kind of company because prior to Microsoft there were no pure software companies. *[Laughter]*

My first reaction was to get mad. I wrote an a very angry letter to the editor of *Fortune*, which they published, in which I said that claim was preposterous.

But as I thought about it more, I realized that it validated what Burt and I had been harping on—the fact that there isn't any research being done on that era of the industry. So if you are a writer for *Fortune,* there's no place to go to get information about the mainframe software industry. And I was very gratified yesterday at the Charles Babbage Institute conference on software history when Martin Campbell-Kelly backed up what we've been saying. He's a professional historian with researchers working for him and they've been able to find very little information about the origins of the industry.

So, in February, 2000, Burt and I set up The Software History Center as a 501(c)(3) nonprofit tax-exempt organization to pursue the preservation of the history of the software industry. What

we're trying to do is create a central place where information can be accessed—we're talking about a Web site, not a physical location—on the assumption that if there is a place to go where that information can be found, then people will begin to research it and write about it, and we will begin to see greater awareness of the history of the industry. Software history is a huge topic given the tremendous growth of the industry over the past couple of decades but right now we're focusing on companies that were started before 1980 because those are the ones that are most vulnerable in terms of information being lost. And our focus is on the software business as opposed to software technology.

I'm going to talk about that focus a little more because there's a lot that's starting to happen for the first time in the history of the technology of software and the history of programming. The Charles Babbage Institute at the University of Minnesota has a new initiative on the history of software. And The Computer Museum History Center at Moffett Field in Mountain View, CA, is getting involved in the sense that they have a collection of old computers and they're interested in software that was run on those computers. There's a lot going on, but I want to emphasize that we're focused on the business issues and I want to define what I mean by software.

I'm going to do this in terms of a diagram. *[Draws on white board.]* On one side, we have digital devices and on the other we have applications or tasks. And in between we have know-how, this huge body of knowledge that's constantly expanding about how to use these devices to do these tasks. That know-how gets manifested as or expressed as software.

Of course, you have systems software on the side closest to the devices and pure applications software next to the tasks. But, in essence, this is what Peter Cunningham was saying in his talk at the CBI conference yesterday: software is a manifestation of knowledge, people's knowledge.

A lot of this know-how is deployed in internal IT departments. It's a function of providing banking services, it's a function of providing insurance services, a function of running an airline and so on. But there's a piece of it where the business is selling the know-how that's manifested in the software. So when I talk about the software industry, I'm talking about the business of selling this know-how.

So it's really shorthand for what, at ADAPSO, we called the computer software and services industry. And that, of course, has a lot of sectors: processing services, professional services, software products, turnkey systems, etc.

The work that I've done over the past several years is focused largely on the software products sector because that's the sector I came from, that's what I know most about. But The Software History Center is focusing on the broader scope where selling this know-how is the basis for the business.

A lot of our emphasis initially will be on the software products sector and the professional services sector because that's what's most accessible to us, but the processing services sector is also one that I really worry a lot about. That was a very vital, entrepreneurial industry that came and went.

Peter Cunningham: It hasn't "went".

Johnson: Well, right. But I'm talking about what was called the service bureau industry back in the 1960s.

Martin said in his speech yesterday that all the books he has about the software industry would fit on a shelf about four feet long. I'd say that all the available literature about the processing services industry in the 1960s would fit in his briefcase.

Cunningham: We've got about a shelf of reports at INPUT.

Johnson: Good. So there's one source. But there's not much.

Anyway, the point I'm trying to make is that we want to focus on the business practices, the business models, instead of the development of the technology. A very important field of study is tracing the history of the development of this body of knowledge over time; that's the task that The Babbage Institute is beginning to tackle. But what we want to be sure gets preserved and recognized is the innovation and creativity that went into issues such as intellectual property protection, contracts, etc. Very important business issues that an organization like ADAPSO spent a lot of time on—how to make a profitable business out of selling this know-how. That's what The Software History Center will focus on.

So the idea is to provide a place where there's information about how these business models developed. And there are two types of information we're focusing on. One is the business records from the individual businesses and from the organizations that served the industry. We want to try to identify where those records are, how to make them available, how to make sure they get preserved. Since so many of the companies are gone, in many cases the records of the individual companies are going to be in the personal files of the founders.

We have no intention of being an archive. We're not going to have a physical location. So we don't want people to send us stuff. Don't send us your boxes of stuff. What we want to provide is a directory that says: if this is your area of interest, here is where you can go to get information.

An example is the ICP directories of software products for sale. Larry Welke has donated his archives of the directories, catalogs and newsletters published by ICP over the years to CBI. So

somebody who is looking for a source of information about software products that were available in the 1960s and 1970s could look at our Web site and learn that the ICP materials are available at CBI. Another example would be Esther Roditti's archives of the *Computer Law and Tax Report* which she published for 20 years. She's probably going to give those to Harvard, which is her alma mater. What we will put on our Web site is a pointer that says if that's the kind of information you are looking for, here's where you can go to find it. It's at Harvard.

We learned yesterday that Peter Cunningham is going to give some of the older INPUT industry reports to CBI. Is that correct? *[Cunningham nods affimatively.]* That's great. We'll put a pointer that says that's where they are. Another example is Burt Grad's files.

Burt has said that he's not ready to get rid of his files yet. He wants to hang onto them but he is willing to make them available to serious researchers who will cover the expense of making copies. And he will take steps to ensure that eventually those materials will go into an archive somewhere. Burt has extensive files on unbundling and other industry issues. Do you think there is a historian someplace who would find that valuable?

Martin Campbell-Kelly: Sure, someplace. *[Laughter]*

Johnson: Anyway, that's the type of information we're looking for. Joe Piscopo has a lot of stuff on Pansophic. Ken Kolence has stuff on Boole and Babbage. I'm surprised how many people do have stuff in files.

Campbell-Kelly: One thing that's important. At the moment everyone here is hale and hearty, but sometime in the next ten years, things will start to happen. What often happens is that the widow or partner has no connection with the professional world in which that person was involved, nor do the children, if there are any. And so all papers simply become junk in somebody's attic and the stuff gets cleared out and destroyed.

What I've done over the last several years when people have just retired, is send them a letter saying put this letter with your papers or where your executor will find it asking them to contact me or The Charles Babbage Institute, and we've had two or three of these come back now. So papers have been saved that would otherwise have been destroyed. Every individual might like to think about that.

Marty Goetz: I'm going to put that with my living will.

Johnson: Good, Marty. Marty is another one with extensive files. So that's one type of information we're looking for. We're looking for information about where this stuff is exists so we can make that information available to people who would be interested in using it for research.

The other thing we're looking for is personal recollections. I've done a lot of interviews over the years asking people about their experiences in the early days of the industry. I have a lot of personal recollections on tape. We're going to continue to do that.

We want people to write memoirs. Marty has done a lot of writing about his experiences. We hope more people will do that. So personal recollections are one of the types of information we want to preserve.

And that's what this meeting is about today. We're going to try to record a bunch of memories, personal recollections from you today, and these ladies are going to take them down for us. And so we will preserve at least some part of this history.

In the last three years in California, we've been celebrating California's sesquicentennial. And though I hadn't paid much attention to California history before, I've gotten very interested in it because it's been so accessible. One thing I've learned is that most of what we know about the Gold Rush comes from personal recollections of people who were there at the time—letters, journals, articles they wrote. There was no government structure to keep records or statistics. There was no licensing, no regulations. There was barely enough government to keep people from killing each other, and it didn't do that very well.

That's true about the early software industry, too. It's only been very recently that the government started to measure the software industry and we're not convinced it's doing it very well. So the personal recollections are really important. And they supplement the other materials. They provide a context for the business materials.

So that's what this is about today. We're going to try to cover some specific topics. We'll get your recollections recorded and edited to help develop this body of information about the software industry.

I also want to mention what our fund-raising plans are. The goal for the first couple of years is to try to raise $200,000 from individual contributions via personal contacts. In the third year we'll be going out with a general fund-raising campaign where, as is typical of most nonprofits, we'll have a range of support levels, including a support level that's fairly low at the bottom end because we want people in the industry at all levels to feel that they can participate and identify with the heritage of the industry.

But we don't want to do that kind of fund-raising campaign until we have something we can show people, until we've got a product—this information resource—out there. And so we're going to be asking people for individual contributions to try to get that project in place.

Peter Harris: Is there an implication of age? That is, I don't find anybody from the Microsoft organization, all the new companies. Was there something in your mind that limited the focus?

Johnson: Yes, companies before 1980. That doesn't mean that we don't think the others are important. We're just trying to scale this to a manageable size and focus first on what we think is most vulnerable to loss. Hopefully in the long run we can cover a lot more.

Campbell-Kelly: Actually Microsoft was founded in 1975.

Johnson: That's true. I guess I'm really trying to say before the PC.

Cunningham: I think you're looking at corporate, not mass market stuff.

Johnson: Yes.

Strategies for Preserving Historical Materials

Goetz: What about trying to get ADAPSO or, rather, ITAA involved in this? They have a lot of information, especially on intellectual property.

Johnson: Yes, I'm working with them and they are being very cooperative. I spent several days with them a couple months ago when I learned that they were moving to a new office. They threw away a lot of stuff a few years ago when they downsized their office. So when I heard that they were moving, I asked them not to throw away anything more. If they want to get rid of it, we'll get a storage locker and just put it someplace for now until we can figure out what to do with it. As it turned out, they were moving to an office of comparable size so they didn't throw anything away.

However, materials are scattered throughout the ITAA organization. They don't, for instance, have a shelf where they have all the annual reports in one place but they're pretty sure they have them all somewhere. They are committed at this point to saving things and to letting me look at stuff before they throw it out.

Goetz: There are three or four organizations that I'm aware of that trying to do somewhat similar things. Is there any way for them to get together and coordinate their efforts? I mean, they do talk to each other and they are friendly, but CBI, for example, has a new charter to try and document the history of software.

Johnson: Yes, and we're working together on this. I want to make it very clear which space we're fitting into. The goal is not to overlap, not to duplicate, but to find the niche where we can

contribute. There's plenty of work for all of us to do and we want to make sure we don't duplicate efforts. CBI has resources that we don't have to do part of this.

Goetz: All of these efforts are going to require money. The other organization that's here in the San Francisco area, The Computer Museum History Center, has budgeted $100,000,000 for building a new building. And I think one issue is getting financial support and the next is to get people and the organization that can use it.

Johnson: That organization came from Gordon Bell's Computer Museum in Boston which has now been merged with the Boston Museum of Science. Over the years Gordon and the staff there had acquired a lot of old hardware. Stuff that really wasn't appropriate for the kind of public display that the Computer Museum had. So he had been storing all this old hardware in various places around the country. He consolidated that into this new museum, which is being designed as much for research purposes as for public display. It's at Moffett Field and, at the moment, you can't even easily get in there. You have to get clearance to get in. They are interested in software that was used on those computers because they want to make them operational.

Esther Roditti: I think their agenda is a little broader than that. I was talking yesterday to Leonard Shustek, who is Chairman of their Board, and told him that I have an archive of the issues of the *Computer Law and Tax Report* which was first published in 1974 and he was very interested in the possibility of having them donated to the museum. So he is interested in context. He is interested in something as slightly off-beat as legal developments so I think there's a broad range of interest.

George Glaser: I can tell you a little bit. Len Shustek was one of the founders of Network General. He's very visible and very prominent in Silicon Valley. Network General, as most of you know, was sold to McAfee Associates and the new enterprise is named Network Associates. Len is retired and I think probably reasonably well off and I think he gives most of his time to the museum. I've kept in touch with him, go to all their meetings, get e-mails from them and so on.

So the relationship with CBI or, in my case, The Charles Babbage Foundation, is informal, but open and active. We don't view them as competitors. We view them as people who have a common interest with us in protecting the information in this field. As you have said, Luanne, there's so much of it and it's in such bad shape now in terms of accessibility and knowledge of where it's located that anything that we can do collectively is in the interest of everybody.

Harris: If I wanted to collect my materials and send them somewhere to be archived, how can I decide between the CBI and The Computer Museum History Center?

Campbell-Kelly: Let me talk about the difference between museums and university research centers. Museums find it relatively easy to raise funding. Because what they create is a physical presence—a building and exhibits. And people are quite happy to give money to that because it's creating a very tangible physical monument.

They tend to spend quite a lot of money, but their mission really is completely artifact-driven. So that the questions they're asking are focused on: what is the physical resemblance of this period of history? And they tend to ask questions about those artifacts and collect materials that are relevant to those artifacts. Whereas a history research center is really asking a completely different set of questions. It's not asking about how a particular computer was developed but about how an industry was created, for example, or how a particular technology diffused through society. So they are collecting different records. And the skills of the people who staff these centers are quite different. In the museum you have people whose talents are about making exhibits attractive to people who aren't computer experts, whereas the research center would typically be staffed by historians who are trained to ask the right questions and can provide the appropriate contacts.

Glaser: I think one difference is that The Computer Museum History Center will measure its success to some extent by the number of school buses full of children that visit. Whereas the appropriate guests for CBI would be people like Martin and professional historians like Jeff Yost and Phil Frana.

Jeff Yost: I'd just like to say that at CBI we service all different types of researchers. There are people from industry, lawyers, and genealogists as well as historians. One of the values is that all the different kinds of materials are together in one place for these researchers to use. We also have an extensive reference collection and, as Martin said, trained historians to assist people.

Johnson: Peter, what you would do is write a letter to CBI and ask for their interest in your materials. This is what happened with Larry Welke. Larry asked me what he should do with all the ICP materials he had and I suggested that he make an offer to CBI to see if they were interested. They said, "Yes. We're very interested." So he donated his files to them.

Harris: Most of you know Fred Gruenberger who was a great teacher in the industry. When he passed on, his wife told me that The Computer Museum History Center was interested in his materials. Somebody contacted him and he sent his materials there. His background was strictly in software, not hardware.

Burt Grad: I think the point we're after here is: keep the stuff you've got. Don't get rid of it. It's not a question of who you give it to, but that you give it to somebody. We don't care whether you give it to The Charles Babbage Institute, or to The Computer Museum History Center, or where you give it as long as it's captured and put somewhere. We have no preferred source.

Johnson: Some people, Peter, have told me that their preference is that their personal papers go to their alma mater. That's great. We just want to make sure they're someplace where they're going to be preserved properly and we know where they are so we can tell researchers where to go look for them.

Harris: In other words, it's a personal judgment call.

Glaser: The Englebart papers, for example, are in the possession of Stanford and that's great because they'll be protected at Stanford. The Apple Computer records are at Stanford or committed to Stanford. I think it comes down to this. The Charles Babbage Institute has storage, a large underground cavernous storage, where we have about 20,000 bankers boxes. Is that the number?

Yost: Yes.

Glaser: That would fill this room, guys, many times. And it's in an archival storage. The humidity is controlled, the temperature is controlled, there's a referencing system. It's all in neat boxes and so on. The stuff that goes to The Computer Museum History Center, the hardware, is going to be put into a new building, not yet built. And I think they're going to do a great job with preserving and displaying it.

But it isn't archival storage. Right now they're in some temporary buildings some of which, unfortunately, are within the fence of Moffett Field which means you have to go through military security to get there. Their new facility will be outside the fence but how extensive their archival facilities will be is a question.

Cunningham: Who is collecting copies of the software?

Johnson: That's a really good question. I heard there was a project at one point at the Smithsonian, funded in part by Microsoft, where they were trying to get a copy of every PC software product ever sold. I don't really know if they are still doing that. I don't know that anybody is doing that for mainframe software except to the extent that the people at The Computer Museum History Center are interested in software that would run on the old computers in their collection. If you've got source code in a deck of cards someplace, The Computer Museum History Center might be the only place where they would have the equipment that would be able to read it.

Harris: The problem is our stuff is on magnetic tape which is now 30, 40 years old.

Johnson: That's a big problem. That's an issue that's been floating around the computer history field for a long time and no one's come up with a good solution that I know of.

Goetz: I wrote down five items, and I think we should make sure we leave this meeting at least having a checklist. Starting with business records, which you mentioned, and then personal records, and then personal recollections, and then copies of code. But I added one which was industry issues. Subjects like intellectual property or taxation of software. I have a lot of stuff from ADAPSO when I was on committees. Esther may have stuff.

Roditti: I just threw it out two years ago.

Goetz: There's a lot of overlap, and ITAA must have 90% of it. I also want to mention Computer Associates relative to business records. Because for many of us who sold our companies to Computer Associates, whatever business records are left, are there.

Johnson: Computer Associates now has a commitment to save those materials. This is a very recent development and it's in conjunction with their 25th anniversary. They are planning on creating archives at their headquarters, pulling materials together from companies they've acquired. In some cases they've even found materials from companies that were acquired by the companies they acquired.

Goetz: Over the next few months, if not weeks, we should try to come up with a system so that things are going to the right place. Because I have a lot of ADAPSO records that other people might also have. And for those things to go in two different directions…

Yost: The Babbage Institute, and particularly our archivist, does try to keep track of what collections are at what institutions and play a coordinating role. And we're not seeking to compete for records. We're seeking to find the best home for them. In many cases, that is the archives at a university where a software developer spent his career, perhaps, or that he graduated from. But the important thing is to find a good home for them and know where they are so we can direct people.

Johnson: I think one of the important things that Marty is saying is that with an organization like ADAPSO, we could start from the top down and figure out what records should be there, and begin to fill in the gaps.

Goetz: For instance, determine whether CBI would be a good home for these materials and then we could tell other people that have ADAPSO materials to send them to CBI so we don't end up all going in different directions.

Grad: One thing we can do on our Web site is to include descriptions of each of the places in which different things are being held, what kinds of things are there. Not specific, but as categories. So when Peter and Marty are deciding what they want to do with their materials, they can at least understand who has what kind of information. I think we should avoid

spending too much time on the mechanics here, and get onto the substance of why we're here together.

Cunningham: I thought Marty's list was a very interesting list, actually, because it for the first time gave us some structure and I wrote down, let me see if I got it right, industry records, business records, personal records. It was like the three things. And then you had personal recollections, and code. Is that correct?

Goetz: Yes. The five that were mentioned.

Cunningham: The other one I thought we could add, maybe under industry records, would be things like writings about the industry, such as the handouts you had at meetings, and things like that. If we had a structure, that would be useful.

Goetz: My point is that rather than focus on the personal recollections of each individual here, since we have people from CBI here and we also have gotten certain insights from yesterday's meeting, that we might spend a little bit more time figuring out how to move this forward. Personal recollections are very important, but they don't have to be off the cuff.

Johnson: Well, Marty, the problem is that we've found the best way to get people's recollections is to sit them down and get them talking about their experiences. If we ask people to send us their recollections, that is, to write them down, most people won't do it. I know you will, because you've written a lot about your experiences. But most people won't. We can't count on everybody to sit down and share their thoughts by writing them down. So we wanted to take advantage of the opportunity of having this group together to collect what we can.

Goetz: We only have 5% or 2% or 1% of the people who have something to say. So it seems to me we should come up with a plan, and then go out and try to implement that so that we get all these other people that can make a contribution, including personal recollections.

Larry Welke: Just for the sake of the record, can you give us the URL for the Web site that you have so liberally referenced?

Johnson: Yes. It is www.softwarehistory.org.

Roditti: I'm going to make a very simple suggestion. Among the people who have been on the board or officers of ADAPSO/ITAA, you can identify practically everybody in the industry that you're interested in. Perhaps an informational letter might be sent out at some point to all of these people which tells about what you've done, what you're interested in doing and asks whether they have the kind of materials you're looking for.

Barbara Brizdle: And structures it for them so they know what to keep and what not to.

Roditti: And probably because people tend to throw things out when they move, it's important to do this soon because a lot of people are going to say they threw things out just six months ago.

Johnson: I'd like to point out that when Burt and I first started this project a couple of years ago, we did send out that kind of letter to a lot of people.

Larry Schoenberg: Yeah. I still have the letter.

Johnson: We got a response from three.

Schoenberg: I saved the letter.

Johnson: Joe responded, Marty responded.

Brizdle: Wait a second. But now you have a Web site, and now you have stories that make it compelling. So you're different.

Roditti: I also think this kind of letter is a repetitive process. It's a sales process. You don't send out one letter and expect everybody to jump.

Glaser: There is a countervailing force that I'm sure you're aware of, and that is that the legal profession is counseling their clients to burn everything. They are concerned about litigation of all sorts, and at the same time we're arguing that you should keep records. You should keep laboratory notebooks, for example, because of intellectual property considerations.

But the trial lawyers I talk to say get rid of that stuff. Don't leave it lying around. Memoranda about markets, market share, about pricing and so on. All big trouble, guys. Get rid of it.

Schoenberg: More to the point, George, I sit on a lot of boards and have sat on a lot of boards, and they don't say anything about throwing out all the documents you get because there are 60,000 copies of everything. What they want you to throw out are all the personal notes that you put on it, which of course is the only thing of real interest. *[Laughter]* So the basic documents aren't going to be destroyed, but everyone's interpretation and understanding of what they say is disappearing.

Glaser: But most of them counsel their clients in a very orderly manner on the disposition of their records and the time periods are very short from the point of view of an archivist.

Johnson: These are all good ideas: going about this in a much more structured manner and telling people exactly what we want and reaching out to a lot more people. But I want to come back to why we're doing this here today.

Back in the days when we had the ADAPSO Foundation, Burt came up with the term called strategic opportunism. When an opportunity presents itself, you take advantage of it. And this was an opportunity, because you people were coming to the CBI conference, to ask you to stay over one more day so that we could collect some of your personal recollections of the early days of the industry which is one of our objectives.

This discussion has been very good because it's helped to clarify some of the kinds of things we want to do and it's given you all an opportunity to tell us your ideas. But we really do want to take advantage of the fact that you all happened to be in the same city at the same time to try to get some of the stories about what things were like on some issues other than unbundling, which was discussed a lot yesterday.

So I'd like to shift gears and go into that. If it turns out that we find that there's just not that much to say or it doesn't work in this format, then we'll have lunch and go home.

Role of the Charles Babbage Institute in Software History Preservation

Goetz: Can I make one comment before we move on to the second subject? Can CBI take on the responsibility to try to come up with a list of areas that we should be covering, including personal recollections, and try to build a structure so that we get more than just the recollections? Because I know you have a software project underway; I read it in your newsletter.

I showed Walt Bauer a letter he sent to me—I was apparently on an ADAPSO committee called the Software History Committee. I think it was 1985. He wanted to fund something like this with ADAPSO and CBI and it never got off the ground.

So can CBI sort of move ahead? We can give you lots of names of people to contact, et cetera, including Computer Associates since they apparently want to get involved.

Johnson: You're looking for the list of the kinds of materials?

Goetz: Not just a list. A methodology on how you contact other people. I mean take the responsibility for capturing software history.

Glaser: Marty, knowing there are overlaps of interest, and perfectly legitimate ones, I can certainly carry that request back. And there's no reason why The Software History Center can't

create a similar list. And maybe if we put them together we find we cover some gaps that you didn't consider. I think I speak at least for the Foundation—do you all know what the difference between the Foundation and the Institute is?

Goetz: No.

Glaser: The institute is an entity of the University of Minnesota. The people who are on the staff there are paid by the University of Minnesota. They live there, work there. Arthur Norberg, who is the paid Executive Director of the Institute, is a tenured professor of computer science. He teaches 50%, 40%, whatever it is.

Yost: It's 40%.

Glaser: If I get this wrong, Jeff will correct me. Those of us at the Foundation are volunteers. We are essentially a 501(c)(3) organization which is a pipeline of funds and information to the Institute. We support the Institute. None of us are on salary, none of us get any expenses paid. We're purely in the service of the Institute, okay?

But back to the Institute. Can't we carry that request back to Arthur Norberg and say this would be very useful?

Yost: Yes. And we have played a coordinating role and promotional role in what types of records should be kept. I think it can be more formalized, and I think that's an excellent idea. The archivist at CBI, Beth Kaplan, is the specialist in this area, and she could coordinate that effort along with the help of the rest of the staff. We'd be glad to work with everyone here in terms of networking and contacts. It's much more difficult to get someone to agree to give their records to an organization that they don't know as opposed to their being approached by a friend that they've known for a long time.

Schoenberg: I'm trying to decide whether I should be the nudist in the emperor has no clothes or the person who comments on it. The question I'm asking myself is why we've gotten to this point with so little. And part of it is because we all have some kind of experience with giving data and spending time and not seeing sufficient feedback or results.

And I look around this room, and the room we were in yesterday, and what I see is a lot of old friends with a few other people added in. So, in essence, I came because I had faith and comfort with some people I had worked with for 25, 30 years. I think the way this is relevant is it's not enough to try and talk about how to get this data together. We have to find some way that there is positive feedback from it. And one of the things I'm concerned with a Web site is that it's a very passive model, especially for people like ourselves who have lived our lives in a very aggressive mode. The idea of putting things out there and praying that they get used is not

very enticing to someone like me. I really need to think about what we would get back as evidence that this data has been used.

If you said to me, "Larry, would you rather give $10,000 to gather this data or would you rather create a fund where we're going to solicit historians to write papers?", I'd rather pay for the latter, because I can see what the quid pro quo is. I can see how I'm going to get results.

Clearly you've triggered my thoughts as to who can provide information. And I have no problem with doing it. But I would rather have some program which is more proactive, even though it may be episodic, rather than a broader-based, very basic thing that may never fly.

Cunningham: They have to have something to work with. So you need both.

Schoenberg: Of course.

Campbell-Kelly: What you're saying is precisely the way CBI operates, it holds materials and issues fellowships.

Yost: Yes, for more than 20 years now we've given away a dissertation fellowship, now called the Tomash Fellowship. And if you look back at the past Tomash fellows, they are many of the historians who are leaders in the information processing area.

Schoenberg: The problem is—I was, and therefore still am, a founding trustee of The Babbage Institute—that The Babbage Institute made a very strong, implicit if not explicit statement that software was not their bag. I mean, that's one of the reasons we're here.

Glaser: I was chairman of a task force on software specifically, and that report, by the way, is on CBI's Web site for anyone.

Johnson: That's been in the last two years, though, George.

Glaser: You're right. This is in the last two years.

Johnson: I have a letter in my file from 1986 when Burt and I first proposed a software project to CBI. It was a rejection letter saying software wasn't really where they were putting their focus. I didn't see anything wrong with that, there's nothing wrong with sticking to your knitting. Now software is definitely a focus of CBI but it's taken a long time.

Cunningham: What is the proof of that?

Glaser: Yesterday's conference.

Brizdle: There will be some kind of writeup or documentation of yesterday's conference?

Glaser: Martin can answer that better than I.

Campbell-Kelly: Yes, there are plans to publish in *The IEEE Annals of the History of Computing* a digest of the presentations. Probably Steve Usselman's paper, probably my paper.

Yost: And the videotapes of the proceedings will be in The Babbage Institute archives. And I think we have all the permissions and we can reproduce those for people at the cost of reproduction.

Types of Materials to be Preserved

Harris: To summarize Larry's observation, we've been talking about collecting and archiving. We haven't yet talked about using the materials. And what we might try to do is have you formulate possible uses. Let me give you an example that came to my mind. One of the topics to discuss under personal recollections is funding problems, how did you cope. Supposing you had the history of fifty-five companies from the 1960s and how they got funded. If that could be summarized, it would be a basic book to be sent to every venture capitalist in North America because it really describes the environment of the problem and that's what they're focused on.

Brizdle: But they already know the answer. They're not going to want to read the book.

Harris: They think they know the answer. I'm just trying to give an example. If you could outline the possible uses, then that might lead to the type of research that Larry is indicating.

Johnson: I'm hesitant to—my view is the strength that I bring to this is the fact that I know so many people who have the kind of records we're looking for. I'm not a historian. And I would not presume to try to tell the historians what they should be pursuing and studying.

Harris: Somebody should. Somebody can.

Cunningham: Let's ask Martin.

Campbell-Kelly: History is kind of a peculiar thing. It's hard to predict how material is going to be used. One of the examples is telephone directories. Most of them were junked, but it just happens that some directories have survived from the turn of the century. Historians have

found those enormously useful. You can't imagine the kind of data and questions you can get from that information that people would never have conceived of in 1901. They've just turned out to be great historical resources because you can get the proximity of firms, you can understand how networks of firms operated, for example, that you can't get in any other way. Because in a sense they can be used as a geographical map. They have many other uses.

The same is true of census records. It looks like a bunch of facts, but once you get an extended series of census records in time, you can ask very interesting questions. And of course, we now have computers so you can ask many more interesting questions of census reports than you could ever have dreamed of when the reports were done.

Johnson: Let me use another Gold Rush analogy. There was a man named Hubert Bancroft who began collecting materials about 30 years after the Gold Rush. It's kind of a parallel situation since it's now about 30 years after the software industry began in the 1960s. He was a book seller, selling used and rare books, and he discovered he had a shelf full of things that had been published about the Gold Rush: journals, diaries, published articles and magazines. So he became a collector and began avidly collecting this material. He even traveled throughout Europe going to used bookstores looking for material written by people who had come California from Europe and gone back. He ended up with tens of thousands of documents on anything he could find that related to the California Gold Rush.

He didn't do it thinking that people doing research under grants funded by the California Sesquicentennial Committee in the late 1990s were going to use that material. He just kept amassing the data. That collection became the basis for the Bancroft Library at UC Berkeley. It is still today the primary place where people go to find out about what happened in the Gold Rush.

Cunningham: Luanne, I'd be quite interested from hearing from Martin what things or items he feels that we could contribute. Because I never thought of telephone books, for example. What would be useful for you, as an historian? Is that all right?

Johnson: As a matter of fact, a list that Martin gave us is posted on our Web site.

Campbell-Kelly: I wish I could remember it.

Johnson: I've got copies here. It's the last couple of pages of this printout. Let me just pass this out. *[Distributes the list.]*

Cunningham: Then we don't need to spend any time on that.

Glaser: While you're doing that, I'd like to ask Jeff, can we promise everyone in this room that if they're not already, they will be on the newsletter list for The Babbage Institute?

Yost: Definitely.

Goetz: George, the last CBI newsletter talks about the NSF grant for the software history project and mentions four components that you're planning to do over the next couple of years. One of them, for instance, says that you will be conducting an oral history initiative to interview pioneering software developers. That's like recollection. It sounds exactly like what Luanne is talked about doing.

Johnson: Yes, but they're talking about software developers, and we're talking about people talking about business issues. I think there are two—

Goetz: Is it different? That's what I'd like to find out.

Glaser: I personally would not make that distinction. I mean I think the developers and the business people at least in that era were one and the same.

Johnson: No, not necessarily.

Yost: I co-wrote the proposal and the focus of these interviews is on software development. We will cover what areas an individual's work has spanned. In our oral history program, we do extensive research before the interviews and really try to target themes so that they can fit together and be a very effective source for historians to gain knowledge in a particular area. The oral histories planned as part of this project are to focus on software development in the mainframe and mini computing era.

Johnson: For instance, you could have really important developers working in internal IT departments or the research labs of hardware companies, not for a software company. So their focus on software developers is really important because it captures people who have moved forward the technology regardless of whether they were in the software business or in a customer's IT department or a hardware vendor's research lab. But it doesn't address the question of, for example, how the heck did people come up with contracts that made it possible to make a profit in the professional services business. There was a lot of effort that went into that. A lot of very creative work went into that kind of business problem that doesn't get addressed in software development.

Harris: There's two items I'd like to add to your list. There's no reference to technical manuals. And I think they're important.

Campbell-Kelly: There's a very good reason for that.

Harris: The second item is—though it refers to sales brochures—it should also include advertising.

Campbell-Kelly: You mean press advertising. Yes, sure.

Johnson: Yes, that's a good addition.

Cunningham: Why aren't technical manuals on the list?

Campbell-Kelly: Because they come by the truck load without asking. It's interesting. There's an IBM catalog from 1980 which is 300 pages each line of which is a technical manual. I think at one time IBM constituted 10 percent of the U.S. printing industry which was all technical manuals.

Glaser: You're kidding.

Campbell-Kelly: Serious.

Cunningham: Biggest print shop in the world.

Schoenberg: Like McDonald's being the largest buyer of potatoes.

Campbell-Kelly: When you see one technical manual, you've seen them all. They are important but they should go with the artifacts with which they were used.

Yost: And The Babbage Institute collects that type of material.

Campbell-Kelly: There seems to be a tendency to keep technical manuals and it doesn't need to be emphasized. By all means add them to the list. My concern was that people think that the technical manuals ought to be the most important thing. Actually they're not. They're one of the less important things. They're kind of interesting because, if you look inside a technical manual it tells you how a particular piece of software works, but much more interesting is the annual report of a company or the board minutes because—

Cunningham: It explains why they developed it.

Campbell-Kelly: Exactly right.

*[**Joe Piscopo** passes around a technical manual on EASYTRIEVE, a software product sold by Pansophic.]*

Campbell-Kelly: EASYTRIEVE manuals from Pansophic would certainly be of interest.

Johnson: I would say, Joe, that when you write your letter to The Babbage Institute and say, "Here is what I have, what do you want?", don't leave the manuals off.

Yost: We definitely collect technical manuals.

Johnson: Larry asked how he was going to give us a list of what he has that makes any sense. Arthur Norberg told me that The Babbage Institute would send somebody to work with people that had significant collections to help them come up with a list of what should be archived and not.

Schoenberg: The issue goes a little bit beyond just what information there is. Obviously it's not quite our problem to figure out how to save it, but having dealt with this in other areas, this is a very serious problem. If I gave you 2,000 sheets of my notes from every board meeting, you'd have a hard time using them. And there's not just difficulty in reading them, and it's not even just difficulty understanding them, it's physical—how is knowledge put into an accessible, retrievable format. I'm thinking about my things which are probably not as well organized as Burt's. I'm famous for the fact that in 25 years I wrote three letters. But I wrote a lot of things, I just didn't write them in that form. So it's a question of how to convert that material to a usable set of documents.

Cunningham: Leave that to the historian. What's your alternative? Are you going to throw your stuff away?

Schoenberg: Well, no, but it may be more valuable to take a set of it and really understand how to get it to a usable form than it is to conglomerate stuff into a basement some place.

Cunningham: You're not going to know what's valuable in a thousand years' time.

Campbell-Kelly: Yes.

Welke: The task of the historian in this case is to know the difference between a princess and a talking frog.

Schoenberg: The problem is you might like either one. *[Laughter]*

Johnson: These guys would be thrilled if they found a set of written documents like that even from somebody who was no longer around to explain them. If it was relevant to what they were researching, they'd go through it. That's what they do.

Yost: Minutes of meetings are some of the most valuable resources for historians. And as Peter said, you don't know how they might be used and what questions might be asked 10, 20 years in the future. So it is important to collect all of them.

Welke: You have to keep in mind that historians have the mental set of those people who think accounting was too exciting. *[Laughter]*

Johnson: It's almost 11:00. Let's take a break. After we come back, I want to focus on some recollections of the early years of your companies. If you really don't want to participate in this, then don't. But let's take a 15-minute break and stretch and come back and relook at this.

[15-minute break]

Johnson: Okay. I've got two things I want to do. One is to give you this *[points to www.cbi.umn.edu on the white board]* which is the URL for the CBI Web site. They have a list of their archival collections. You can go out there and you can see, for example, that they have a collection of Charles Bachman's papers. And you can click on that and see pages and pages of lists of the material they're archiving from his personal papers. It will give you the idea of the kinds of materials they have for different people. So check that out and you can see what kind of kind of materials they have in the archives.

Harris: I'd like one more shot at Larry's question. I brought this along, a magazine with a full-page ad from 1974. My question is, when my wife as my heir is selecting materials to donate, if she'd like to keep this, can she send a Xerox copy of the ad?

Campbell-Kelly: Fine. And that's actually what the archive would want.

Harris: The archive isn't interested in the actual ad?

Campbell-Kelly: It's not that. In the particular case you've given, it's an advertisement in a periodical and the periodical will be in a library somewhere anyway, probably in the University of Minnesota. And you're eliminating 50 pages of things that are not relevant and sending the one page that is. So in general, things that are easy to find in the periodical literature, and if they consume a lot of space, are not particularly wanted.

Harris: Wait a minute, wait a minute. I don't get that. We're a software company. Presumably I'm sending records so they will be archived under ADPAC. Not under my name, but ADPAC.

And here's a description of this software company that was formed in 1963, and includes its whole history. Historians would want to look at that; okay? And I heard you just say you don't have to send us this because if historians were interested they could go to the 1974 issue of U.S. News and World Report and get it. But how would they even know—

Grad: He's saying you could send him a copy of the page. Now they know to go to the magazine.

Harris: I heard him say he wouldn't want a copy of the page.

Campbell-Kelly: No. I said I would want a copy of the page. Not the whole magazine.

Harris: Gotcha. So you can deal with Xerox copies of materials, not the originals.

Campbell-Kelly: I will make an exception. Press cutting files are incredibly useful. I know you mentioned you have a press cuttings file, Marty.

Harris: I do, too.

Campbell-Kelly: To get all those articles about an individual firm by searching through periodicals is very difficult.

Yost: And also press clippings show what an individual thought was important at the time and that can be very significant and historical.

Johnson: I'd like to get off this topic. If you have these questions, call Jeffrey. He'd love to hear from you.

Joe suggested that the list of topics I proposed for discussion is a little overwhelming. Let's just take a couple of the items on the list to talk about and get some personal recollections.

I heard a couple of interesting things at the CBI conference yesterday. I heard Duane Whitlow say he started a company, and then he went out to look for the right opportunity, and he found that in the IBM sort. I know Joe's experience is somewhat similar. He wanted to be an entrepreneur, founded a company and later figured out the right strategy. Other people did it differently. They saw an opportunity they weren't able to pursue where they were employed and formed a company as the only way to pursue it.

I want to ask you to talk about what your motivation was for starting a company. Was it the fact that you wanted to have your own company, wanted to be a entrepreneur, and went looking for

a product or service to sell? Or was it a case where you saw a need, an opportunity, and you knew that you had to start your own company in order to pursue it? And I think we'll start with Joe. Why don't you tell us your story, Joe.

Origins of Pansophic Systems

Piscopo: Why did I start a company? Okay. There's two sides to every coin. The bottom side of this coin is I was enrolled at graduate school at Southern Cal to get an MBA and that isn't what I wanted to do. So anything on the other side of the coin was attractive. *[Laughter]*

I was at a family affair of some kind, a wedding or something or other, and I sat down with an uncle of mine and we talked about what I was doing. I was at a small software company at that time—really small, about ten people. And he asked if there was anything to that business. And I said, "Yeah, there might be."

One thing led to another and over the next four weeks, I put together a flip chart presentation, which—I'm a computer scientist, by the way, so in 1969 flip chart presentations were not in my realm of experience. But I gave a dog-and-pony flip chart presentation to about 30 friends of my uncle and my dad and my family, and they either liked what I had to say or they had a lot of confidence in my uncle, because they left me with $150,000.

I listed 20 different items on that flip chart—timesharing, contract programming, consulting services, feasibility studies, all of the buzzwords. Item 13 was software packages.

Anyway, I got the $150,000, so I started a company with my college roommate who was a computer science graduate and had just gotten out of the Navy after being on a ship for two years and my younger brother who had just graduated from the University of Illinois with his computer science degree. After we got the money, we spent three days on a blackboard trying to come up with a name. Six months after I had the money and was already starting to spend it and had nothing in mind as yet, I decided we better find something to do.

So we hired a marketing person who didn't have a computer background. He was a bottle-cap inventor, experienced in marketing. We spent days on end on a blackboard trying to figure out which of the 20 items that I had in my original presentation made sense to pursue. After we were done with all 20, he says, "Let's go back to number 13." And we went back to number 13, and one thing led to another, and within a couple of days, we decided that we're going to make a software product. We had $150,000 disappearing quickly, and we decided to come up with a product.

Harris: How did you pick your name *[Pansophic Systems]*?

Piscopo: We took the U of I symbol, which is a Greek psi, PSI. My college roommate and I went to the University of Illinois. And we came up with "pan" and "sophic" as root words meaning universal wisdom. We wanted a name that would be distinctive and memorable rather than something like ABC Computer Company that nobody would ever remember.

Over the weekend we had to figure out what product to make and I finally came up with the idea of a library system. I had carried trays of punched cards in the back seat of my convertible from Montgomery Wards to the Midwest stock exchange on many occasions with the constant worry that I would drop them and get the cards out of sequence. So we decided there would be a market for a library system that would make it possible to store programs on tape. It turns out that the $150,000 was more than enough. We were down to $10,000 by the time we finished the product. But that was plenty. With $10,000, we could have gone three more months.

We had another stock offering at the end of the first year and that's when I bought stock. I didn't put up any money in the first place. But when we were down to $10,000, I bought some stock. But we only raised another $50,000, so that was it. $200,000 was the total investment. We never had a venture capitalist, or any other outside funding.

I knew, as soon as our product, PANVALET, was finished, that this was a winner, because it was something everybody needed. We were a ten-person company by this point and we had to figure out how to sell this to the world.

So I wrote five letters, and my marketing guy wrote one, to people in the industry. I have in my hands a file that belongs in an archive, the six letters that were sent out to the eminent companies of the day. The letters were sent to H. Ross Perot, president of EDS, Sam Wyly of University Computing, Ike Auerbach of Auerbach Corporation, James D. Harris, Vice President of Control Data and Fletcher Jones, President of Computer Science. The last two did not answer.

The last one was to IBM. My letters were very long saying, "Would your company be interested in this potentially powerhouse product that was going to be God's greatest gift to mankind?" These are dated December 18th, 1969, a mere eight months after we formed. The responses were very short. Here is the one from J. J. Messerschmidt, Vice President of the Data Division of EDS.

"Dear Mr. Piscopo, thank you for your thoughtful letter of December 18th to Mr. Perot discussing the possible purchasing of rights to PANVALET. As you may have read, Mr. Perot has been out of the country since December 18th and thus the inability to answer. We deeply appreciate the opportunity to purchase this package; however, this is completely outside the normal business activities undertaken by EDS, and I regret to inform you that we will not be able to take advantage of your generous offer." *[Laughter]* "It appears that your proposal has a great deal

of merit, and I'm sure you'll be able to get the support you are seeking from a number of other sources."

I've got to read you the IBM reply from R. J. Bittner, Manager of External Submissions.

"The review of your PANVALET library system proposal which you kindly brought to our attention has been completed." This answer is eight months after the original letter because we had to do a nondisclosure agreement and all of that crap.

"Your thoughtfulness in giving us this opportunity to consider your offer is sincerely appreciated. I wish I could tell you that we were in a position to accept it; however, there are many factors within our own development and marketing programs which do not make it feasible for us to do so. Therefore, I am sorry to report after careful study of your proposal we have concluded we should not pursue this further with you. Although our response has not been favorable, I do thank you for giving…" bla-bla-bla.

Schoenberg: So you're lucky, Joe.

Piscopo: In a sense, yes. But in a sense, it dovetails on everything we talked about yesterday at the conference, which is that they didn't get it. None of them got it. And, you know, what we had to do is go on anyway, just like most of us have done. We had to plow forward and find how to do it and how to market it. And it would have been worth more than $100 million to any one of them.

Campbell-Kelly: Joe, what was the offer you were making them? You wanted them to be a distributor?

Piscopo: I wanted them to buy it.

Campbell-Kelly: You wanted to sell it outright.

Piscopo: I probably would have taken 5 million or 10 million. Unbundling had nothing to do with it, by the way, at Pansophic. Unbundling was irrelevant to everything that ever happened at Pansophic.

Origins of AGS Computers, Inc.

Johnson: Larry, I don't really know your story. Did you decide you wanted to start a company—?

Schoenberg: Well, I started a company before AGS, a professional services company started in 1963. I had worked at Programming Research at IBM and the way it worked in those days is that if you had an idea for a project, they sent you out to see their customers to see how it matched what they were doing. In the early '50s, I had been sent by them to Dupont which had what I guess was the earliest report writing program. It was a product. It was before there were any application products.

At any rate, what I was doing by 1963 at IBM was working as a consultant. Which was a very common way that people worked in the systems software area at the time. And as a result of doing that, I said, “You know, I'm already doing what I would be doing if I went out on my own.”

In fact, I talked to several people about starting a consulting company within IBM. Most of them liked the idea, but were not willing to take some risks. It took me about three years to discover that Programming Research was not the prime activity of the IBM Corporation. It's hard to believe I didn't understand that, but I didn't.

A fellow named Marty White, who ran a placement firm, introduced me to a man who was interested in setting up what we would now call a professional services firm, but at the time we just said we were doing consulting work and we started a company.

This company went public sooner than many of the other companies in the industry but after several years I left because I had some difficulties with them. Or they had some difficulties with me. Depends on which side you're on, I guess. They went bankrupt in an amazing way. It’s like a story from the late 1990s. They actually had too much business and they borrowed money to be repaid from a public offering. That second public offering never took place. They actually had the distribution rights for the Fujitsu computer which was an early IBM compatible computer.

The company's name was Automation Sciences. I wanted to create another consulting company, but as with many people who have what is effectively a partnership arrangement, you have cross-ownership terms. This was a big problem for me because I didn't want to give up my ownership in the old company because it was going public, and I had difficulty convincing people that they should essentially buy into what was likely to be a messy lawsuit.

So I had a neighbor who was a salesperson for Standard Register, the forms manufacturer, who was interested. Joe Abrams was a guy who simply wanted to go into business. He became my partner and we formed AGS Computers. He didn't have the alternatives that others would have so he wasn't as concerned about the lawsuit. We actually put up $4,000 each and we definitely didn't need any more money. Because in the consulting business all you had to do is go out and find a client and you were off and running. At that time most of the consulting work was for the computer manufacturers.

Johnson: What year was this?

Schoenberg: That was 1967. Well, unbundling radically changed the game and then, of course, there was a bad economic recession. Which is interesting in terms of Joe Piscopo's timing because 1970, to the best of my knowledge, is the only year where there was a downturn.

It's the only downturn ever that I know of in the computer services industry. So at any rate, we managed to expand at that time from doing work for the computer manufacturers to doing work for their customers as well. And, of course, coming from New York City, the bulk of our clients turned out to be the white collar industries which were naturally the biggest users of computers for those times.

We also got into software products because of a recognition that, at that time, professional services did not have the same aura as software products. So we wanted to find some means of capturing this higher perceived value. And we already knew, I guess, what didn't seem to become well known until years later— that for every dollar someone spent on a product, you could probably collect 10 dollars in professional services. Which is probably a conservative estimate. So, anyway, that's basically how we got started.

Johnson: It wasn't driven because you wanted to have your own company?

Schoenberg: Not in my case. My partner, Joe Abrams, did.

Grad: Where did the "G" in AGS come from?

Schoenberg: Joe had, unbeknownst to me, talked about starting a company with a college roommate of his named Peter Graf and so when we started we agreed to let Peter become a partner as well though he never was involved in the business. One of the things that's interesting about that is that we thought at the time that smaller companies would be a natural market and Peter controlled a CPA firm which had the right kind of clients. We had this theory that small companies were the market of the future. A theme which has resonated for 30 years and has been equally wrong every one of those 30 years since.

Origins of Applied Data Research (ADR)

Johnson: Marty, what about you?

Goetz: Well, I sort of fell into the computer field in 1954 having graduated from college and spent a year in the advertising field doing business statistics and analyzing Nielsen ratings. Sperry Rand—Remington Rand at that time—was looking to hire people and nobody in those

days had any experience with computers. I didn't know anything about computers, but they said I was qualified having graduated college. Period. And I spent four years at Sperry Rand.

I was very frustrated working for them, partly because it was a large company, but also because they were very unfocused for many years. At that point they had the UNIVAC 1 and UNIVAC 2 and they were really a very strong competitor against IBM.

In any event, I finally left and went from the frying pan into the fire. I went to IBM and got even more frustrated. And then I heard that some people from Sperry Rand and from companies that were Sperry Rand customers were forming a company, Applied Data Research. So I quickly left IBM and joined ADR. They considered me a founder, and I was actually the first employee. And I got founders' shares by putting in $2500, which each of the other six people also put in. It turned out one of the people was at LibraScope. He was actually a silent partner and didn't come in until a year later. LibraScope was selling computers to the FAA to do airplane conflict prediction. It was a very small computer about the size of about an IBM 650, and, obviously, it couldn't do it.

But in any event, they needed some software. And the silent partner said, "Why don't you form a company and then bid for this software that we really need—basic software, not for conflict prediction, but assemblers and other basic software." So I joined ADR and for a year or so worked on the FAA application.

Johnson: What year did you go public?

Goetz: We went public in 1965. About six years after we were formed. There were several public companies at the time. I think CEIR was public, and Computer Applications. Computer Sciences, which was formed about four months before we were formed, was public. So there were public companies.

Johnson: Were you able to fund yourself all the way through with public funds?

Goetz: Yes, through programming services. As a consulting services firm, it's not difficult.

Brizdle: Was there a lot of competition? When you were going out for projects at that time, were you aware of the others?

Goetz: Well, there were two primary competitors: Computer Applications and Computer Sciences. Most of the work was fixed price. We did some applications for a customer, but most of it was fixed-price, competitively bid for what was basically systems software.

Schoenberg: Competition was inhouse.

Brizdle: What I was questioning is whether you bumped into your competitors on each sale or did you get most of your contracts because you had a connection to that firm for some reason?

Goetz: Well, we had a little bit of a connection to RCA where we did a lot of work on Spectra, for instance, because we were in New Jersey, in Princeton. And the reason we were in Princeton was because the president said it was equally inconvenient to New York and Philadelphia. But basically the manufacturers came to us as one of several companies that might bid on system software to be built under contract.

Schoenberg: The main contact I had with you, and I assume most of us had with each other, was because the same places you might be doing a contract, with RCA, for example, other people had professional services contracts at the same time.

Goetz: Right.

Welke: Question, Marty. To what extent was it beneficial for you or ADR to be a member of the first software association?

Goetz: It was very beneficial. It was an association called AISC, Association of Independent Software Companies. Computer Science was in it and also that large company in Washington.

Johnson: PRC was in it.

Goetz: PRC—Planning Research Corporation—and Infomatics were in it. There were only about eight companies. We met in Washington and had no executive director or anything like that. And I think we were there until 1972, until we became part of ADAPSO and Larry Welke formed the software section in ADAPSO, the Software Industry Association.

Early Software Industry Failures

Johnson: Ed, I don't know your background. Do you have a startup story?

Ed LaHay: I have a software story but it's not a successful startup story.

Johnson: We're interested in that kind, too.

LaHay: It took me even longer than Larry Schoenberg to discover that IBM was not in the software business. Several other people and I were beating our heads against the wall trying to get some funding for a software lab in Toronto, and we lost all funding. So we said to IBM, "We'll show you; we'll do it ourselves." And we did. And we got an ICP million dollar award.

Johnson: What was the product?

LaHay: It was a screen painter called Act I. Probably one of the most creative things we did was our marketing strategy which was to send out a tape with a 30-day license on it. This was in the middle 1970s. It was a pretty creative strategy. But we kind of imploded because we decided that we didn't need the benefit of good, solid business controls, grew a lot of staff, and eventually got to the point where the debt load was just way too much.

Grad: What was the company name?

LaHay: Art Benjamin & Associates. Pansophic looked at buying our stuff. I think we formed it in 1976. About three or four years later, we weren't getting along very well, and I left in about 1980. The company went bankrupt in 1981.

Johnson: There are a lot of stories like that. I think historians will find those as interesting as the success stories.

Schoenberg: I personally think the most interesting one that went out of business is Computer Applications, a company no one talks about. But it was the first one that did work for end users that I know of. All the other companies here were in systems software. Computer Applications ultimately disappeared. They had a huge contract with NASA, as a matter of fact. A very interesting company. The founder of it was Charlie Cooper, and he lived in Marlborough, New Jersey. Somewhere around there.

Brizdle: Where was the company?

Schoenberg: New York City.

Campbell-Kelly: Is that CAI?

Brizdle: Yes, I can remember talking to them about a job.

Schoenberg: I believe it because they were the dominant commercial firm.

Campbell-Kelly: There was kind of a big five, wasn't there, in that period and it was one of the ones.

Schoenberg: I would call them the number one commercial software company.

Grad: CUC, CSI, CEIR, CAI, and there was one other that were the big—

Campbell-Kelly: That's right, the big five.

Origins of Fortex Data Systems

Johnson: There's a task for historians. How about Doug? Doug, tell us your story.

Doug Jerger: We're kind of small potatoes compared to everybody else.

Johnson: I haven't had my turn yet. *[Laughter]*

Jerger: But our credit/accounts receivables system continues to be used today by companies like Hershey, Pepperidge Farm, M & M Mars. And in two of those companies I know they decided not to use SAP for credit/accounts receivable, although they use it for other applications, because our product, which they acquired in the late 1970s, was superior. So that's kind of a joy.

Johnson: Who is supporting it?

Jerger: Their staff and a services company that we spun off to provide technical support. Some of the original creators, in fact, are still supporting that product.

Johnson: Get back to how you started, Doug.

Jerger: I was born in a log cabin—no, no. *[Laughter]*

My Northwestern major was accounting/finance, so I went to Arthur Andersen and in 1966 I ran a first-time-through audit. That means they've never been audited by a public accounting firm, and those audits are always hard. I had an assistant named Bob Forney, and it was a fascinating place.

We came across one situation where they had an asset on which they spent "X" thousand dollars and we said, “What is this thing?” And he said, “That's Sybil.” This is a fire extinguisher company. “What's Sybil?” “Sybil is the elephant. We put a big fire hat on her and use her in parades for advertising.” So we were trying to figure out the useful life for an elephant.

Another asset was a boat they bought to travel around the world. The boat, we found after lots of discussion, was at the bottom of Lake Michigan off the coast of Wisconsin, and they were trying to figure out how to raise it. And I could tell you lots of stories about how they tried to raise this boat from the bottom of Lake Michigan.

Bob was the best assistant I ever had, and we kept contact after that.

Andersen had a lot of big company clients who had computer systems—this was in the days when you went to the reception room and there was a glass wall and the computer was there, and you saw everything spinning. And generally they couldn't get crap out of them. At least if you tried to get it for audit purposes. So I thought that would be an interesting field. I didn't know much about computers but I knew they weren't being used very well.

In the fall of 1969, I got a call from Bob who said, "How would you like to go into the software business?" I said, "What?" He said, "I just got back from the Army, and I want to do this thing with software. You and I could do this thing with accounting software and we could put together a company." I said, "Bob, I don't know how to program." He said, "Forget it; I'll program." So I said, "Okay, I'll think about going into the business."

I talked to my wife. We had four children under the age of six, a dog, a cat, a big mortgage, no savings and no rich relatives. I said, "I'm going to work more hours than at Andersen." She said, "Well, that's not so great, but on the other hand if you don't try it, what happens if we're 60, 65 and look back and say we should have tried that one? If it fails, we'll know, but what if it works?" So we decided to go for it.

But then we said, "How do we get started?" No money. Bob says, "I'll go to Indianapolis, I'll get a contract job down there, and then you get one in Chicago." He lined up a contract for $3,000 doing something in credit card systems. We capitalized the company starting on April Fool's Day in 1970 for $500 each and this $3,000 job, and we scrambled like sons of guns after that. The company was called Data Power. Quickly we changed that by going through a dictionary and thesaurus and came up with Narthex, the nave in a church.

Schoenberg: Changed his name from Joe Schmuck to Don Schmuck.

Jerger: We actually changed the name to Fortex instead of Narthex and incorporated in Delaware. We never did get startup money.

The glue that kept us together was Welke. Bob at one point said, "Larry called. He said he's running a course on how do you sell software, and you ought to go take the course." I said, "We don't have any money for that." He said, "Larry needs to fill the room so he's giving it to us for free." So I went. And that was great and it helped us.

Another way he helped us—we never had financing, we were always running behind. At one point in 1973, I owed Larry tens of thousands of dollars for advertisements in his catalogs. I said, "Larry, you might have noticed we haven't paid you some money." He said, "Don't worry about it. You'll cover it."

Johnson: Somebody should do a story on how ICP's accounts receivable funded the software industry.

Jerger: We sold the company to Dun & Bradstreet in 1974 and bought it back in 1977 and sold it a second time to University Computing Company. And, actually, in 1985 there was a thought about buying it back again, but they wanted too much money so we couldn't do it.

Origins of International Computer Programs, Inc. (ICP)

Johnson: Larry, a lot of people have heard your story but I know some haven't. So let's hear it.

Welke: In 1966, I was with a bank in Indianapolis and attended the ABA Automation Conference. They had a swap room where, if you had a program that you wanted to sell or make available to other banks, you put the information on one wall, and if you were looking for something in that line, you put your name and what you wanted on the other wall.

The popularity of that room exceeded the bar which, for a banker's convention, is unbelievable. I mean it was crowded. So two of the guys from the bank and I said, “You know, a swap room is a lousy way to bring buyers and sellers together. Why don't we start a catalog and send it to all the banks that we know?”

About six months later we came out with the first issue. I forget if it was 49 programs that we sent to 100 people or the other way around. We were charging $25 a year for a subscription and we were going to publish it every 90 days. It wasn't a catalog as much as it was a list. And we got a few subscriptions. But if you take 49 or 100 times $25 we were not getting rich.

Brizdle: But you didn't charge for programs to be included on the list.

Welke: No, it was free. We figured banking just wasn't a big enough market, but we thought we could get other industries to do the same thing. Not necessarily true. What made software products attractive for banks—we called them programming products to begin with and then it became software products—was the regulation that meant demand deposit accounting in Portland, Oregon was the same thing as it was in Portland, Maine. That wasn't true of other industries. That’s a whole subject that wasn’t discussed at the conference yesterday which affected the development of the applications software marketplace and made it different from the systems software market. I ran the company out of my dining room for a year and a half to two years.

Goetz: You didn't have a garage?

Welke: Didn't have a garage, no.

Brizdle: Had you left the bank?

Welke: I was still at the bank, doing this part-time and evenings. Not making much. My two friends dropped out because we had not become millionaires by the following Thursday. And I was doing this just to see what would happen.

Johnson: The Directory itself was subscriber-based and those of us in the software business could list our products for free.

Welke: Yes.

Johnson: You also sold advertising. When did you really start selling advertising in the Directory?

Welke: The company was formed in the summer of 1966 and in 1968 I was mentioned in the Kiplinger Washington letter. And inside of three days I got 500 orders for $25 a piece and I thought I was in pig heaven. Absolutely incredible.

I figured this was a new way of life. I quit the bank and the bank president said, "Why do you want to form a company? What the hell do you know about running a company?"

A friend of mine at American Fletcher got five different people in town—doctors, dentists, etc.—to invest $5,000 dollars apiece. With $25,000, we went out and did all the things that you have to do. By 1970/71 I had gone through all of the money and had built up a huge debt—a smarter man would have thrown the keys away and gone out to get a job.

Johnson: We're glad you didn't.

Welke: But it was at that point that I was having lunch with a fellow named Sam something or other who worked for Computer Sciences and I told him that I have this huge debt of something like $12,000. Which was twice my annual salary so that was pretty big.

And I said, “I've got to be able to advertise the Directory only there's so much to say to describe the Directory that I can't get it on a one-page brochure. And I don't know where to get the money in order to do a two-page brochure.” So he says, "What you're promoting is the stuff that's in the catalog. Why don't you just charge people to include their listing on the mailing that you're going to do to promote the catalog?" Just circular thinking, which I'm very good at to begin with.

So that was the start of what we called The Skinny. And that was the version of the catalog that software companies paid to be listed in. It was also my introduction to selling advertising to

people who didn't even know how to spell it let alone know what it meant to them. And that publication also spawned all of the magazines that we published later.

Impact of ICP on the Emerging Software Industry

Johnson: That's a great story. Yesterday Steve Usselman was talking about the counterfactual approach to history. Asking the question: what if some event had not occurred? One question in my mind is what if Larry Welke had not gone to that bankers' convention, what impact would that have had on the software products industry?

With my small company, 80 percent of our sales came from the leads we got from the ICP Directory because they had already decided that our payroll system might fit their needs because they had reviewed the features listed in the Directory. They were, by definition, pre-qualified prospects.

Harris: Did you ever had a serious competitor?

Welke: Very late in the game Ziff Davis got involved.

Goetz: Didn't Auerbach try it for a time?

Welke: Auerbach and Data Sources, which was the spinoff from Auerbach, did reviews or analysis of software. They were making money by doing the analysis. Or they would ask the software company to write the analysis then they would print up 100 copies and sell it to the guys who wrote the analysis to begin with who in turn would pass it out as independent opinion on what a great product they had. I thought it was sort of a bullshit way of going about building an industry.

Glaser: Larry, what was your reaction to Lee Keet's comments yesterday when he said that there was no software industry until ICP came along and defined it? Didn't he say that?

Schoenberg: Yes, he said something very similar. Software products industry.

Glaser: Did you define the software product industry in the sense that until that time there were people writing software products, but you, in fact, bounded it so people could talk about it and then it took on an identity as a result of what you did? I don't mean to overstate what Lee said. He's not here to defend himself.

Welke: I think what he was referring to was when you wind up with 400 or 500 different products you have to categorize them or structure them somehow. You can't just list them alphabetically. So we spent an incredible amount of time and effort in trying to define the

taxonomy of this industry. We hired Burt Grad at one point to look over everything we had done. Maybe from that standpoint.

And maybe the other thing—I don't want to brag about anything—was the Million Dollar Awards and the starting of the Software Industry Association. In 1970 or so I was able to pull 25 software product vendors together to a meeting in Denver, most of whom either disliked or didn't know the other 24. And for the first time they got together and said, "Well, son-of-a-bitch, the guy was human, didn't have horns or anything, you know."

Jerger: There were three things. There were lots of little guys like us who would not have survived without the Directory. All our clients were big companies where the data processing managers would read through that stuff.

Another thing was that you could call him and he'd say, "Your product is good, you're going to be able to sell it to lots of people, get rich." He'd encourage you to keep on when things got tough.

And the third is that the ICP Million Dollar Awards was something people looked forward to. That black tie banquet every year was a big production. You worked hard to get that first Million Dollar Award. And it was fantastic. Companies would celebrate. It was wonderful. So that's the glue that made it into an indusry, at least from my perspective.

Grad: George, I've talked with Lee and I think part of what he meant is this. Remember that the industry had no geographic locus. In the 1967-1969 period before IBM legitimized the software product industry by unbundling, this provided a home for where the products were. You were listed with 100, 200, 300 other products and your customers could find you. And I think Lee was saying that, regardless of the taxonomy, putting it in that listing and getting it out to people who are interested in buying gave a locus to the industry. The people like Larry Schoenberg who were providing a service did the bulk of their work locally because they had to work closely with their customers, usually on their site. But the markets for the products vendors were national or even international and this provided a way for the buyers to find them.

Jerger: It legitimized us. A guy with a big company in Connecticut, or wherever, had never heard of the Fortex Company in Chicago with 4 people. But he got this nice document that looked good and we were one of the companies listed. So they were able to find us and learn what our products were.

Brizdle: Didn't it also give the feeling to the vendors themselves that if you went to the Million Dollar Award you were a member of the club?

Jerger: Absolutely.

Campbell-Kelly: I have a question. I showed a slide yesterday which showed that in 1974 there were two and a half thousand products on the list. Do you believe that was 100 percent of the products that were then available or do you think you missed some?

Welke: We probably missed some, yeah.

Campbell-Kelly: How did you find the products? Or was it that people, by then, were approaching you?

Welke: There was a time when people were very definitely approaching us, but we also spent a lot of time and effort tracking down anybody that was in the business.

Johnson: In the first couple of years he traveled around and called on all of us.

Goetz: And it was free, so it was easy. Big or small, free to get your product listed.

Brizdle: Why would you call on them?

Welke: Why would I call on them? Because I found their name in a telephone book.

Brizdle: Calling on them was your way of checking they did exist? That there was something there?

Welke: Yes.

Piscopo: He wanted us to list in his book.

Jerger: He wanted to be the Bible of listings.

Johnson: He came out and met with everybody.

Schoenberg: Actually, Larry, if I remember right, you had listings for people who were not software companies. If they were selling a software product, they were in there.

Welke: Yes.

Schoenberg: So you could have had a user company that wanted to sell software they had developed inhouse. I know we had a listing in there at the very earliest time because we happened to have a product. It wasn't, obviously, a major part of our business, but my recollection is you had user companies.

Welke: Another aspect of the entire industry, in the beginning, in the late 1960s as well as even into the early 1970s, there were an incredible number of Fortune 500 corporations who were in the software business, and established a division specifically to be in the software business.

Piscopo: We killed them all, but they were there.

Glaser: The same is true of data centers. Standard Oil did that here in town.

Origins of Boole & Babbage

Johnson: I want to move on. I want to hear Ken's story about starting Boole & Babbage.

Ken Kolence: David Katch and I co-founded of Boole & Babbage in 1967. We worked together in Los Angeles at North American Aviation (which later became Rockwell International) from 1961 through February of 1964, when I came to Palo Alto to work for Control Data Corporation. I'd been a manager of computer operations and also systems programming before coming to North American, where I was responsible for business applications programming. I had been in the Navy and believed very much in trying out every different aspect of computing at that point in time, so I decided to try working for a mainframe company. I had a good job offer from IBM in Poughkeepsie, but decided I wanted to stay on the West Coast. Dave Katch also had ties to the SF Bay Area, and he joined me at CDC within a year.

I was very interested in two things. One was software engineering and the other was measurement tools for determining how to improve the speed of programs and configuring hardware properly. To my mind, the two things were closely linked. By the way, I think I may have invented the term "software engineering, or at least I did so independently of others who may have used it. In 1962, when I was at North American Aviation, I went out to Edwards Air Force Base and watched the first take-off of a new airplane. And I said to myself, "My God, that pilot is trusting his life to the aircraft engineers. I'd never trust my life to software." That's exactly the thought that went through my mind. And then the thought "We need to have a software engineering discipline." popped into my mind. From that time on, I have basically dedicated my career to helping develop a software engineering discipline. Obviously, the discipline doesn't exist yet, but we're making some progress these days.

When I started working at Control Data Corporation I quickly found out that they were pretty much back-of-the-envelope software writers. It was about a month after I started that IBM announced the System 360 and I seriously considered quitting and going back to LA, because it was clear that CDC could never design and develop such an integrated system. As it turned out, neither could IBM. But I liked Palo Alto quite a bit, so I decided to stay. CDC didn't quite know what to do with me at first, so they asked me to design a report writer. I put together a preliminary design for one and submitted it. However, they selected somebody else's design

and I was extremely peeved. I felt the reason mine wasn't selected was that there wasn't any formal planning or decision-making rules or organization. So I went to the boss, Clair Miller, and I said, "I want to get this place organized." He said okay and gave me a small organization to get things started. Later I found out that Clair had really hired me originally to help get the organization straightened out.

We formalized the decision-making process and the planning process for CDC software. After about a year and a half, we were routinely meeting our release dates, all documentation was ready when the software was ready to be released, and in general we were what would have passed then as being at CMM level 3 or 4.

At that point, the powers that be back in CDC's Minneapolis headquarters said they wanted me to go back there and do the same thing for hardware. In fact, they decided to move all of the software development back to Minneapolis. Well, the job offer was tempting, but my wife and I just didn't want to move from Palo Alto. And so there wasn't much of a choice. The choice was either to start up our own company or get another job someplace else. I didn't want just another job at that point in time.

David Katch, who was working with me, was very eager to start his own business. And he was a good salesman. The primary thing that we had worked on together at Control Data Corporation was the design methodology and the management methodology that went with it. It integrated product engineering and management. So David got us a big consulting job over at Fairchild Semiconductors with Robert Noyce and we started a company. Everybody at CDC told us we were crazy. They just couldn't believe that you'd quit a job and go work for yourself.

Brizdle: Excuse me; what year was this?

Kolence: It was May of 1967 when I quit. We went into consulting. But we quickly realized we wanted to push our design/management methodology. We tried to sell the design methodology idea, and went to Zellerbach Paper Company, Chevron and a lot of other businesses in the San Francisco Bay Area. But Zellerbach was the place that clued me in that the approach was way too early, because I said to the IS manager there, "You really need to have a design methodology so you can control the development of your applications." The guy there said, "I don't understand. What do I need a design methodology for? I've got COBOL." I'm quoting him exactly. And I walked out of that place and said, " Wrong approach!!! They're not ready for it."

I realized that we needed to develop the field and that we needed instrumentation, means to make measurements. That I knew I could do. At North American Aviation, we had done performance sampling on the 1401 by sitting at the console and just stopping the execution 100 times and writing down the address where it stopped until we found peaks where a lot of time was spent in one little area. We didn't have timer interrupts. We had to do it by hand. We did

that for every program we had maintenance changes to implement, so we fixed both the logic and the performance by re-coding just that code that was hogging the cpu.

The Control Data 3000 had timer interrupts and we had run through a whole series of experiments to develop randomized ways to measure performance. So what Dave and I wanted to do was develop measurement products for System 360. We needed money because we were paying for it out of our own pockets and, believe me, both of us were nervous as could be.

So we had to go get venture capital, and that's where Pitch Johnson and his venture company came in. He was the first person to invest money in a system software product house in Silicon Valley. And I know that because we *were* the first system software product house in Silicon Valley.

Johnson: And that was when?

Kolence: 1967.

Grad: The first year you started you got money from Pitch?

Kolence: Yes.

Grad: How much money?

Kolence: Well, as I recall ,he and the other VC's he had brought in on the deal bought 90% of the company for about $50,000 plus a guarantee of a $100,000 loan if we needed it. And we paid for our own stock, too. No free founders' stock. Both of us had to ante up and we could each only buy 5% of the stock.

So we went ahead and built the product. We built it pretty quickly because we had experience building it for Control Data. The only problem was that we had to learn the System 360 OS. They were still using the basic OS called PCP, for Primary Control Partition, and were just getting ready to release a multi-tasking version when we began building the two sampling monitors. These were called PPE for "Problem Program Evaluator" and CUE for "Configuration Utilization Evaluator". By "we" I don't mean either David or me. We had hired Dave Morley by then, and Dave had implemented the prototypes at Control Data. In addition we hired Andy Chapman because he had a tremendous knowledge of the guts of the OS. He and Gary Holtwick did the sampling monitor code, which was a very elegant piece of work.

Grad: Did you become Boole & Babbage sometime in 1967?

Kolence: Yes, October first to be exact. While we were consulting, we just called ourselves K & K Associates. We were going to be Pacific Computing or something like that but I decided it wasn't a very distinctive name. David agreed. I said "How about Babbage Systems, or Boolean Systems, or something like that?" David said, "How about Babbage & Boole?" I said, "I like that, but Boole & Babbage sounds better."

Johnson: It's a good name.

Kolence: It was a great name for marketing because when we would go somewhere and say, "I'm with Boole & Babbage", the head guy would say, "You know, I remember those names." *[Laughter]*

We used to get all this mail for Booze & Baggage. *[Laughter]* And we had a whole bulletin board full of these things, Mr. Boole and His Baggage, all kinds of stuff.

Origins of ADPAC

Johnson: Okay, Peter. Your turn.

Harris: I started at United Aircraft in 1951 and was there until '59. Several other people and I always wanted to quit and start our own computing business. Roy Nutt sat at the next desk to me and we programmed until 2:00 in the morning, plugging wire boards and so forth.

He and I and another friend went to the IBM business office in downtown Hartford. Y. P. Dawkins was the branch manager. He ended up as the General Manager at IBM San Jose. And he said, "No way. You guys should never be in business. You'd lose your shirt. You couldn't do it." He kept saying that. So we went back and decided to stay at United Aircraft at least for a little longer. And in March, 1959, Roy left and joined Fletcher Jones in starting CSC. He asked me to join them because I was the applications expert and he was the systems expert. I turned him down.

In September, I left and started my own company with nothing. I went for six months with no money. I finally earned my first $75. I got a contract to produce punched paper tapes on a Bendix computer or a GE computer.

So I was getting nowhere, and I met a gentleman from Connecticut and I told him what I was doing. By this time I had a proposal in to the State of Connecticut Motor Vehicle Department to convert a million and a quarter Address-O-Graph plates to punch cards. And I told him the story, and he said, "Meet me out at the West Hartford Country Club."

I came in to breakfast in the morning and said, "Is there a Larry Vineburg here?" They said, "He's having breakfast. Go on in." I went in there.

"Oh, Pete, come on over here." And he said, "This is this genius programmer I met…" da-da-da. He said, "I'd like you to meet Abe." It was Abe Ribikoff. Larry was *very* well-connected. And to make a long story short, he managed to arrange a lunch for me with the head of the Motor Vehicle Department and his staff. I spent my last 90 bucks on lunch downtown at the hotel.

I had my wall charts with the whole design of the new motor vehicle system and in two months we got the contract. And Larry joined the company. I became the technical vice president. Larry became the president. And we started moving forward.

The company was called Data Tech. The contract was to convert a million and a quarter Address-O-Graph plates to punch cards. And my proposal went up against Stat Tab and IBM who were going to keypunch it, and my proposal was to do optical scanning if they gave me clean impressions. At the lunch the Vice President of Marketing for Scandex Corporation said, “Yes, we will do it.”

Right after the contract was signed, I took a million and a quarter of Address-O-Graph impressions down to Scandex to be optically scanned. I asked for the President and said, "I have a million of these things to scan." And he said, "What are you talking about?" *[Laughter]*

I said, "Well, your VP Wentworth up in Boston said you could do this.” And this is his exact sentence, "I told those bastards I would never scan Address-O-Graph plates." I said, "What are you talking about?" He said, "Yeah, I'm not going to do it."

So I came back and told Larry that he wasn’t going to do it. And the Motor Vehicle Department Commissioner had already advertised all over the country that he was converting because all motor vehicle departments were on Address-O-Graph plates. He said, "You are going to scan some Address-O-Graph plates."

But Larry was a smart businessman and I wasn't. He built into the contract that for anything that wasn't scanned for any reason, unreadable, for any reason, we got $125 a thousand. And IBM's bid was $100 and Stat Tab's was $85 a thousand. So I spent the next six months—

Campbell-Kelly: Keypunching.

Harris: I had every keypunch service in Long Island keypunching. But the Motor Vehicle department insisted that some of them had to be scanned. So Scandex finally broke down and scanned 150,000 plates. Did a good job. Put them on punched paper tape.

I had a million cards, two million cards, and I couldn't get local computer time. So I had to go to Washington DC to the RCA Data Center. I found the manager standing by a computer talking to his partner and I overheard his conversation. He said, "There's some kid coming down here with a million cards they're going to put on tape and sort." And he says, "Have we ever sorted a million cards?" *[Laughter]* "And furthermore, I know we can't read a million punch cards."

I'm standing there listening to this. And I said, "Just a minute, guys. I'm the kid with the cards and we've got to do something because I've got a deadline." And somehow or other we got it done. The system was very successful. They accused my partner of political influence, but we not only converted it, we put it on the computer and ran it. After the conversion, we got a $2 million contract to run the facility, and I did that for a year.

After a year of running the company as a service operation, it was sold to CEIR. They asked me to come to San Francisco because they wanted to get into commercial data processing. So I came out here in December. It was snowing cats and dogs in Connecticut. I had a nice house in Connecticut. My backyard backed up to the chairman of the board of Aetna, so it was a nice neighborhood. Beautiful suburban Hartford. And I loved it.

The plane circled San Francisco. It landed. I left my coat on the rack, kicked my galoshes off and never went home. I fell in love with it. I stayed out here and called home and said, "Sell the house we're staying." I left CEIR at the end of my employment contract and started Applied Data Systems.

My first customer was Fuller Paint. I realized that the key to being successful in the service business was efficiency of programming. So I developed the language which later was called ADPAC and a fellow who came to work for me from IBM said, "Why don't you sell this to Southern Pacific?" I said that we would never sell a language because that's the thing that's going to make me competitive. If everybody had the language, how could I build a service business based on my lightning-fast compiler? He said, "Come try it." and introduced me to the head of their technical services, Frank Arnerich who thought it was pretty interesting and asked "Would you sell it?" I said that I wasn't really keen on selling it, but I might work out something with him. And he said, "Give us a price."

I had no idea what to do but he said they were looking at a similar programming product that was selling for $11,000. So we went back and said, "All right. You can license it for $15,000 the first year and $100 a year thereafter." So they did. And they had another division that bought it within three months and then Matsun Navigation, which was right next door, bought it. So we had sold three or four copies of this thing really without even trying. That's how we got into the software business. That was in 1963 and 1964 when we started selling the language itself.

Schoenberg: Luanne, listening to some of the names and realizing all the connections that I hadn't really known about reminds me that sometime in the early 1960s when some of these firms started to disappear I started to write up a genealogy chart of the companies and the people in them. And I found that every company that I knew of derived from the same three or four companies. And I guarantee you that if we could do that with 100 companies or 500 companies we could find the actual parentage and it would be a very unusual insight that would be very different than any other kind of insight.

Johnson: Yes.

Schoenberg: I don't doubt I could find what I did.

Campbell-Kelly: What were the three or four companies?

Schoenberg: It was CAI, CUC, CEIR—

Grad: What companies came out of ACT in New York? There must have been 20 different professional service companies that came out of that company.

Schoenberg: There were direct connections between all these companies and it wouldn't be difficult to find them. Well, I shouldn't say it wouldn't be difficult to find it, but once you found it, you would have a real understanding of the business model because there would be a consistent pattern.

Origins of Argonaut Information Systems, Inc.

Johnson: I'm going to tell my story because I think it's kind of an interesting story about the way you can end up running a company almost in spite of yourself. In 1969, I had been a programmer for about five years and I went to work for a software products company that was basically a very talented programmer who had a really good payroll system. He had a couple of his buddies working for him installing the payroll system for customers around the U.S. and he hired me to develop an accounts payable system to add to the product line because I had been working on a payables system at my previous job.

He was a great programmer and a pretty good salesman but a lousy businessman. After a couple of months, I became aware that his finances were a mess. He wouldn't get around to invoicing customers so we had people calling up begging us to send them an invoice so that they could pay for the payroll system in the period that they had it budgeted. He also didn't get around to paying people what he owed them so he had some substantial tax liabilities, several collection agencies after him and two ex-wives threatening to take him to court. So he decided to pack it all in and leave the country.

I had never thought about starting my own company but I had become convinced that I had finally found a career that I really liked in the software products business, so I decided to form a new company and negotiate an agreement with him that I could go on selling the payroll and payables systems. I figured if I ran the company I could decide how much I wanted to work—hey, I could even work part-time and spend more time with my family. So I contacted a lawyer I had worked for in my days as a legal secretary and talked him into helping me draw up the papers to form a new company.

The problem was that I had difficulty coming up with a name that wasn't already registered with the California Secretary of State's office so our applications to reserve a name keep getting rejected and time was passing and the guy with whom I'm negotiating the agreement for the rights to his products is packing up to move to Canada. Finally one day when we were down to the wire, I was walking from the office at Fourth and Market in San Francisco to my car which I parked at one of the cheap lots on Mission Street and I passed the Argonaut Pawn Shop on Fifth St. I called the attorney and said, "We're going to call it Argonaut Information Systems." The attorney's secretary drove up to Sacramento to expedite the filing of the incorporation papers and I ended up standing at the curb with the agreement assigning me the rights to the software products so the guy could sign them in his car on his way out of town. I've never regretted the decision—but it was approximately 25 years before I ever worked part-time.

Grad: How did you get funded?

Johnson: You know, at the time I didn't even think about needing cash to do this. When we finally got everything squared away, I went through the various scraps of paper I found on his desk and started calling people who had left messages for him. And they'd say, "We've been trying to get you for weeks, please send us a contract for the payroll system." So I had this backlog of people who had already been sold. I sold a bunch of payroll systems very fast and that brought enough initial cash in.

Grad: Did you have to borrow money?

Johnson: At one point, I borrowed some money from the attorney to make the payroll but it was paid back in a couple weeks.

Grad: So were you self-funded.

Johnson: Self-funded all the way through. But it was the usual thing, stretching out the payables and pressuring receivables.

We've got lunch out here. Let's take a half an hour lunch break, and then get back together. If there are other topics that you feel would be useful to pursue, we'll take suggestions from the

floor. Maybe there's something Martin would like to talk about or the guys from The Babbage Institute. I think this has been great. I think we've got some great stuff.

Campbell-Kelly: What will you do with the transcript?

Johnson: We're going to edit it and post excerpts on the Web site.

[Lunch break, 12:57 p.m.]

Charles Babbage Institute's Software History Project

Johnson: Our friends from CBI here have requested an opportunity to tell you about their software history program. This is a new project for them with some new funding that they have, and they asked for an opportunity to tell you what this project is all about.

Yost: I'd just like to say a few words and I'll turn it over to Phil who is our new software project manager.

Last fall we were awarded a $488,000, three-year NSF grant to build resources to advance the history of software. Arthur Norberg, Beth Kaplan, Bob Seidel and myself are the principal investigators on the grant and we put together the proposal. Two of the fundamental components of the grant came from the Software Task Force that George Glaser chaired. I'd also like to acknowledge the other committee members: Keith Uncapher, Henry Lowood, Lee Keet, and Bill Coleman. And they're not only responsible for providing some great ideas on how to move forward with this project but also the impetus to initiate a major project in software history. So we're very grateful. And I'm turning it over to Phil.

Phil Frana: I'm Phil Frana, the new software history project manager for this three-year project which is going to become a major program at CBI in the long term. So it's not just a three-year project and then we'll go back to hardware. Our job is really, as we see it, to play a coordinating, facilitating, networking, editing role amongst people who really do know the history. And the first thing that we're creating is something called an electronic knowledge network of people who have an interest, meaning historians, computer scientists, people in business and industry. Eventually they all will presumably be hearing from us if we do a good job.

And from that knowledge network, we're beginning to create committees. The committees, to give you an idea of some of the ones that have been proposed, include things like operating systems, graphics, database management systems, networks, programming languages, programming techniques, software engineering, networks, that kind of thing. And once we establish these knowledge networks and committees, the idea is to springboard from that into

part two of the project as we described it in the NSF grant which is a software history dictionary. That's a bit misleading. It's more like a cross between an encyclopedia and a dictionary.

It will be composed of about 1200 entries on all topics related to software, particularly in those committee designations that I've described here, though some of these may change. Applications is one I didn't mention that's on our list that you may be more interested in than some of the others. And the idea is that in three years we'll have 1200 one-page entries available for anyone to access on the CBI Web page. And the purpose of this is to create a resource for people who are going write software history, because as Martin said, there just ain't that much. You can fit it on a single shelf in your library.

But if we create this dictionary resource, presumably people will know what things, what topics, which concepts are there to be pursued. Unbundling may be an entry for all we know. We're letting computer scientists and the business people that we've engaged decide what's important and what's not. And that will be the raw material to launch part three of the project, which will be an online electronic journal called something like CBI Electronic Journal of Software History, or something like that. Maybe just CBI Software History.

And that's where the fruits of our labors really will pay off because the idea is the dictionary will provide the groundwork for historians like Martin Campbell-Kelly, who will graciously submit articles, though he doesn't know this yet, to this electronic journal that will be free for anyone to access. It will be available continuously, available to everyone for free, and will essentially create two disciplines, or at least facilitate future growth in one and actually create another one. First to create a profession for software historians, or create that discipline, and to also give computer scientists and people in business and industry a focus that they don’t have now, to provide a place for these people to talk to each other in a way that they haven't before.

The part that's most rewarding for me is that, through the dictionary project, we're helping people in business, in industry, in academia, actually figure out what it is that makes them what they are, what their identity is. The lexicon is going to be very important in doing that. And, of course, CBI is going to continue doing oral histories. We have plans to do 32 over the course of this project. We've done a couple already. That will accelerate as we move along. And those will all be with software pioneers. So we haven't abandoned one of the traditional missions of the project.

And, of course, there's an archival component as well. Before we left, Beth Kaplan was talking to us about some of the Y2K oversight associations that are no more. We're trying to collect some papers from these organizations that were desperately concerned about Y2K last year. That's software history. And that archival collecting will continue as well.

Norma Goetz: We were discussing that at lunch. So you consider history anything earlier than that?

Frana: Luanne, I think, also sees it this way. We're going to start with mainframe and minicomputer software and then the personal computing software will follow. It just gives us somewhere to start so we can breathe. If we were to start with PC software, I don't think we'd ever get back to mainframe and mini. So we've picked a place in time where things seem to start.

NGoetz: And before you lose some of that information.

Frana: Right.

Glaser: He mentioned that there are 32 interviews, and this will join some 300 oral interviews already in the archives.

Grad: Are those listed on the Web site? The 300 that have been done are listed on the Web site?

Yost: There's abstracts of each of them, and many of them are available electronically to be transferred electronically. The rest can be photocopied and sent out.

Glaser: I'd like to tie this back to the archive and the archival questions that we were talking about earlier this morning. If we have a structure of the software industry, a lexicon, if you will, then these guys will be able to say there are very few records in a particular area, okay? Not only does CBI not have it, but we don't know what it is or if it even exists. So this would be a guide to a more proactive search for where these records are. Are they in Marty's garage, or in a dump somewhere?

NGoetz: In the basement.

Glaser: I think this is an outcome which will be very helpful in identifying missing pieces of our history.

Brizdle: But the list that you read off was about software technology, not about the business of making and marketing software. And that is a world of difference.

Schoenberg: More than that. You listed 15 categories of systems software and then you lumped applications into one huge batch. This is a noticeable bias that keeps coming up.

Frana: There's only one committee operating at this point. Bernie Galler has offered to chair the operating systems committee. And we've just proposed this as a list to get us started. And committee by committee, the people who are engaged in the committee will determine what's important.

Brizdle: But even if you took a list of cross-industry and functional user applications, and you exploded it to 20 different components, you're still not talking about support, maintenance, marketing, funding, hiring, staffing, training, any of the business issues. And maybe that's not in your purview. I mean, that may not be something you're the least bit interested in.

Yost: It's something I'm interested in and something that's very important. But we are somewhat limited in how much we can do in three years and one project.

Campbell-Kelly: I thought you did say this morning that it was about software development rather than the software industry, or did I mishear you?

Yost: Yes, the journal will be broadly based and will include scholarship and…

Brizdle: Okay. But I think this is a very important decision, a distinction here. Because you would be less interested in the function of building and manufacturing and bringing to market software than someone who was a business school professor.

Grad: We've got an interesting difference. First of all, I don't know who is going to put together a framework for talking about software. Such as, is it done within a company for its own use or for sale to customers? The whole breakdown between scientific, business, and embedded software. I'm looking for a framework that holds together the different kinds of software that's been done.

Step two, which is another way of frameworking the thing, has to do separately with the technical aspects, the components, and simply with the business. There are more people working on the business aspects of producing and marketing software than ever worked on development. A typical business has a ratio of four or five to one. I don't see the picture being drawn that way.

Then we have the whole breakdown between the mainframe, minis, micros, we have international, U.S. The dimensions of the business are mammoth. I've tried in my mind to use the automobile business as an analogy because it was the best thing. You're talking about the motor and the gear shifts, and the tires and the transmission and on and on, which is an engineer's view of the world.

Brizdle: That's not a car.

Grad: It's not the automobile business. To hell with the car, even.

Goetz: Software is more like transportation which is much bigger than cars.

Grad: Exactly. My point is that the information processing business is what we're talking about. These are elements within it. And I don't see the signs yet that CBI is looking at it with that world view.

Johnson: What they're doing is really important because it has not been done.

Grad: It's critical. If they didn't exist, we'd be screaming here how the hell can we create them.

Glaser: Burt, let me tell you, the Software Task Force, which included two Stanford professors—

Grad: That is not a plus to me. You do understand that.

Glaser: You view that as a negative. Depends on where they are in Stanford. But anyway, they're not all in the computer science department. Neither one of these guys is in the computer science department. But the fact is that we looked at the ACM Computing Reviews taxonomy, which goes down, down, down into such things as the computing milieu . And we elected not to improve that. We determined that worked pretty well, and it's a structure that's in place and the industry knows it.

Grad: The academic computing world knows it.

Glaser: But that's where a lot of stuff is published.

Grad: We understand that. And that's the problem. That is just the thing that we're concerned about.

Most of the industry publications, the history where the records are, is academically pushed. Of all the government language work, of all the 625 different kinds of compilers, five of them were significant from a business standpoint; the other 620 were done in academic worlds. Pascal is probably one of the very few that came out of the academic world with real broad commercial use.

The concern we have is that unless you look at it from a business point of view, you get a totally different view of the automobile business. Alfred P. Sloane wrote about how to manage an automobile company. There is nothing available about the business aspect to speak of except for the personal histories that a few people have written.

Yost: The dictionary is one of the components of the project. I would say it is fair to characterize it as focused on the technology. That is not entirely true with the oral histories we will be doing.

Grad: That's great.

Yost: And it definitely is not true with the journal. I'm both a historian of technology and a business historian and I wrote a dissertation on the automobile industry. So I do agree that's very important and it doesn't limit the work that can be done alongside this dictionary project.

Grad: Look, frankly, we're trying to be gadflies to some extent. Luanne and I were there early on and we've met an awful lot of the key players in the business of software, including professional services and the processing services along with the software products. I don't believe that the current view of CBI is that view. I don't say that's good or bad. Does that mean we should try and encourage CBI to expand that? Should we be looking for other people who will take other pieces of it that are not of primary interest here? I have no clue.

What we've been concerned about is that we are going to lose the records and we are going to lose key people. 30 years, 35 years have gone by and time is running out and what I'm looking for is how do we not lose what's there, not lose the information on the business side. I think there are technical records. You can find the manuals about the products, even keep the tapes if you want. There's all kinds of things available to reconstruct the technology, but what's happened on the business side is going.

Yost: The dictionary is in no way representative of our collection development strategy which definitely includes business records.

Grad: But you haven't gone out and looked for it.

Frana: As we've gone forward with this, you won't be surprised to discover that academics are much more willing to help us than people in business and industry who are very, very busy running their own businesses. So one of the things we really need to know is how do we engage those people? How do we get them to come and care about what we're doing?

Grad: It's a marketing problem. How do we market to these people and convince them of the importance of saving it, of giving it to an archive. We want professional archivists who will know what to do with material that's offered; we're not competent to do that. We don't have the skills. I guess I'm looking for some way that we can help market the importance of this, engage the right people on the business side and help to get this material found and then put someplace where it's going to be safe, secure and accessible.

Brizdle: Give it a label in your list of things. Call it I don't know, profiting from software, call it the business of software, call it bringing software to market. Call it something so that it has a label and then you will be able to attract more of the business information because we'll see there's a place that this goes.

Yost: I think that's an excellent idea. I'll talk to the archivists.

Glaser: One of the things we're consciously trying to do is include among the trustees those who have more of a business interest. Ted Worthington is a new—do you know Ted Worthington?

Grad: I know Ted, but I don't think of him as a businessman.

Glaser: Another is a venture capitalist you may not know, who has been around a long time by the name of Bob Brueck.

Campbell-Kelly: Sure. MRI.

Glaser: One of the oldest companies. We have Lee Keet who is very active in all the deliberations. Lee is very much of an entrepreneur himself.

Brizdle: You could say that.

Grad: We agree with you.

Glaser: Ed Feigenbaum of artificial intelligence. Donn Parker, the guy who writes all the books on computers and crime.

Goetz: How about Walter Bauer? Is he still active?

Glaser: Still a trustee.

Goetz: He's a business person if there ever was one.

Johnson: I'm going to take over because there's something I want to say. I've been working on the need to preserve software history for about fifteen years but started getting really serious about it four years ago. I talked to a number of people I know in the industry about my concerns and they all told me that CBI is doing something about it. I talked to Bernie Goldstein, who is one of your trustees, and said that we need to do something. He told me that CBI is already doing it. I talked to Lee Keet and he said that CBI is already doing it. So I spent a lot of time getting familiar with what CBI is doing and learning who the other players are and what their emphasis is. What I found is that there is a lot of good work being done on computer history, much of it related to the software that was intrinsic to the operation of various models of computers. But with the exception of the work that Martin is doing in England, nobody was focusing on how the software industry developed and the role of the entrepreneurs and

business people in the dispersion of the technology out of the laboratories and into the hands of users.

I began to feel more and more that time was running out. When I heard that CBF had a task force on software history, I said, "Thank God, these guys are finally going to do something about it." But then I saw what CBI proposed to do and I realized that they're still not dealing with the business issues. The emphasis is still on the technology. So I decided it was time to go out and get some money to get this done because nobody else is going to do it.

I think CBI is a great organization and the work they're undertaking is really important. But after years of waiting for someone to take the lead on preserving the records of how the software businesses were created and run, I still didn't see it happening so decided to take it on myself.

Burt and I have had lots and lots of conversations about this. Both aspects of the history are really, really important. We've said all along, we're going to be working closely with people who are working on the history of the technology because you can't separate the two. You can't have the business without the technology. But the technology is useless without the business to proliferate it.

Grad: We're going to be lobbyists, to put it bluntly. Lobby you and whoever else we can get our hands on to get this stuff.

Johnson: That's why we're here.

Yost: I think the suggestion that these are the types of records that we want for our collection is very important. It's something we can follow through on, and it has been part of our collection development strategy for a long time, but how we market that could be enhanced, I think.

Approaches to Structuring the Software Industry

Johnson: What I agreed to do earlier is, if you people feel it's worthwhile to collect some more personal recollections, we'd pick some topic you want to talk about. Martin said he'd love to hear people talk about what precipitated the end of the company. We talked about the beginning of it.

Grad: What's end mean? What do you mean by end?

Campbell-Kelly: When they ceased to exist.

Grad: Nothing ever ceases to exist.

Campbell-Kelly: When the company was taken over. The software is still out there. It never dies.

Grad: There are really just a few places where all of these companies ended up in the software products world. I think that's probably been similar in the professional services one, though there are still a lot more individual companies there, I believe. The suggestion was made that we create some kind of a genealogy, some kind of schematic of who did we start with, where did they go. Larry Welke's files would give us a basis for the starting points. I guess the question is how does one go about building that type of genealogy?

Schoenberg: One person at a time. It's simple.

Grad: No, no. Who? Who will do the work? Who will build the tree? You have to have somebody who builds the tree. That's my question. Who? George? Sam? Max? Who? Does it take $100,000 to build a decent tree?

Campbell-Kelly: I'd do it for $100,000.

Grad: Martin, how about $10,000?

Yost: I'd do it for $90,000.

Glaser: How about a small tree?

Grad: Let me ask a specific question. Is that something that CBI would find within its purview? Does it have the management energy to deal with that problem? Does it require a research-student type of person? Or is it a very highly skilled historian like Martin? What do you need to do that sort of thing?

Johnson: Is there a model that's been done in other industries?

Campbell-Kelly: Yes. It has been done for the semiconductor industry.

Brizdle: Do you have a list of the companies that joined ADAPSO when it started? Is there such a list?

Goetz: I'm sure ADAPSO has it or some of the early presidents.

Grad: I'm not worried about methodology. I'm worried about who physically will take the responsibility of finding the information and building the genealogy, building the tree. Physically. You didn't do it for your book. Is that a correct statement?

Campbell-Kelly: Yes.

Grad: You haven't done it to this point in time. You've identified 300 people you've interviewed. I'm looking for a framework. It's people and companies. I would probably start with companies and work to people, but I don't have enough knowledge about the methodology. I think we will generate and identify so much material that people will get interested if we try and build that kind of a tree.

Goetz: But first you need the interviews, which they're doing.

Grad: First you need the list of who the people are and who the companies are.

Goetz: Right.

Brizdle: Then they can interview those people.

Goetz: That's right. And then you can extrapolate from the data.

Yost: There's definitely research that goes into determining who is interviewed for the various projects. Most of the oral histories at CBI have been done in relation to a funded project. For example, Arthur Norberg's project on DARPA and the origins of the ARPAnet.

Brizdle: Is this the kind of project that a graduate student could do?

Yost: I think it is, if trained.

Grad: Do you agree, Martin?

Campbell-Kelly: If you send that research proposal to NEH, they would reject it. NEH, National Endowment for the Humanities.

Johnson: Or NSF.

Brizdle: But it wouldn't be a thesis.

Campbell-Kelly: There's no reason why it shouldn't be perhaps a master's thesis or something like that, but I think the questions historians always ask is what they call the "what if" question. And they would say, what is the purpose of what you're doing? What insights would it give? So it's kind of attractive in the sense that it's kind of nice to have that information ordered, in a way. It would be nice to know, but what would be the purpose of it?

Brizdle: It's sort of like understanding the royal family.

Campbell-Kelly: Exactly. Now, that would get turned down as well. *[Laughter]*

Grad: It provides you with an economic history. And the fact that Joe merged with Sam isn't the key. This much money was involved, this is what occurred, and you follow the chain down to see how this trillion dollar industry has been built now. It's been built by acquisition.

Campbell-Kelly: But they want to know what the research questions were. For example, one of the research questions might be that you were interested in the clustering of firms or why they weren't clustered. And this would be a way of addressing that topic. They would expect to see half a dozen substantive reasons.

Goetz: The question isn't right now how to fund it. It's how to get it organized, who might do it. CBI does have funding.

Grad: Not for this.

Goetz: They are looking for additional contributions. They are looking to build up the capability. The question is how do you go about doing it because once you start trying to do it as a research project and you ask for funding, you're going to wait for a year before you even find the—

Campbell-Kelly: I wasn't really proposing that you should. I was saying that in any research project you have to take into account what peer review would say about it.

Goetz: The question is, is it important? Will it help us basically get the kinds of information we want? I agree with Larry. I think you start with the people and make sure you have a good base in terms of the people in the industry and the companies in the industry and work from there up. It would be a good thing to get the data.

Glaser: Let me suggest something, Burt. Do you think that you with a couple of colleagues would be willing to write a prospectus, a one-pager that says here are the kinds of issues we'd like to address and why we think they're important?

Grad: The key problem is with the issues because I don't understand the issues from a historian's standpoint. That's a skill that I don't have. I believe this might be valuable in terms of the economic history of a very significant industry, but I don't know what the questions are that the historians would ask.

Glaser: I'm thinking of a letter that would be the opening round of a very friendly negotiation between you and the people who share your point of view. And let's say The Babbage Institute or a few trustees who support this argue the point and say here's what we have in mind. And these letters need to go back and forth a few times so everybody fully comprehends.

Grad: Without being able to define it for a grant, let's suppose we found an angel, somebody who would provide $25,000 to produce a genealogy. We'll put some fences around it, say software products companies that started between 1960 to 1990, or those that existed before a certain date up to now. And not just names of what companies were bought by what companies, but the economics of what occurred, what companies were sold for, and who were key players. That would be a project. If the money were there, is that something you would do?

Yost: I don't think, at this time, we would be able to take it on with our staff, but we could manage it, I think. And I think, properly trained, graduate students at the University of Minnesota in the history of technology program could do the research.

Brizdle: That's what I was asking. If it is within the skill set of a well-supervised graduate student, then we know what the work is. Then we can figure out perhaps how long it would take. And then you can go out and find funding for it. If you believe that it's germane, Burt, that other things come from this, that this is the first step…

Grad: Yes.

Glaser: But I think we have to be very careful here. The executive director of the institute is the guy who sets the research agenda, with the advice and consent of his trustees. But basically it's an academic decision. And I think we have to be awfully careful before we make anything that sounds like a promise here. The promise is that we'll carry it forward and say we heard the arguments and it makes good sense and ask how do we fit this in?

Yost: That's all I meant. Arthur does have a background, as do I, in business history.

Schoenberg: I'd like to ask Martin a question. You really damned the suggestion in what I would call very English terms…

Campbell-Kelly: I didn't mean to.

Schoenberg: Let me tell you how you damned it. You said it might make a decent bit of work for a master's thesis. I read that as very damning.

Grad: Very low level when you say master's thesis.

Campbell-Kelly: Right. Let me explain—

Schoenberg: I heard what you said before, but I'm trying to understand a little better. Because it's not easy for me to see why this would lead to less insight than many other things I mean, I would have turned down in a flash the CBI proposal because it is so narrow, really, when you think about it, that they could interview 32 people and be done.

In fact, they wouldn't have to waste their time with most people. I could tell them right where to go, who to talk to and they'd never have to look at anybody else. And here I'm saying to myself, I think I can create an absolute pyramid of interest and exposure, but I can't get there if I can't convince someone as to where this would head. And yet we all agreed before, we don't know where some of these things lead. So I don't intuitively understand what makes this a less obvious kind of academic review project.

Campbell-Kelly: It's simply that the project, as Burt defined it, was essentially an information gathering task and that's quite typical of a master's project. They have the right kind of skill set. However, if you wanted to address lots of different questions, such as what was the impact of government funding on the creation of the software industry? What constituted a barrier to entry to the software industry? How was it impacted by the creation of the venture capital industry? A master's student couldn't do this.

Brizdle: You couldn't do that until you had the first.

Campbell-Kelly: No, because one would guide the other. These things go in tandem. So when I say it's a $25,000 master's project, it's essentially a data-gathering task. And that's a kind of mechanical thing in a way. It's about 10K reports and all that sort of thing. But to do the interpretation, you'd need a short lifetime in doing history in order to be able to ask the right kinds of questions of the data. And that would be a fairly reasonable Ph.D. dissertation.

Grad: I was asked about eight years ago by an organization in Japan to produce an analysis as to what were the things in the U.S. economy that permitted the growth of the software industry in the United States and precluded a package software industry in Japan. We produced a report of a hundred pages or so, looking at various aspects of the industry. They were assuming it was the result of a some kind of tax structure or regulatory environment. Basically what we we told them was that the difference is that there were entrepreneurs here.

Schoenberg: My response is we don't do business for people with needs, we do business for people with money. *[Laughter]*

Grad: My question is this. The kinds of questions that historians ask, would this be a piece of the study one did to help answer those kinds of questions?

Campbell-Kelly: Certainly, yes.

Brizdle: You could make it very straightforward. You could take a hundred companies that match some criteria and find out their genealogy, where do they come from, who were the people, and then take those same hundred companies and go forward in time as to what happened to them, who bought them, who were they sold to, how much. And you can figure 15 pieces of data you had on each going up the line and down the line from which you could then begin to ask your Ph.D. questions.

Schoenberg: The issue is trying to come up with the right set of questions, not with what is the nature of the data you're collecting.

Goetz: It's both.

Schoenberg: Okay. I haven't heard what the use is of this other project either.

Grad: They got their grant, they don't need to tell us.

Schoenberg: No, they do need to tell us because in fact that tells us what someone really thought. And then my question is did they really know, understand what they were doing. I don't know the answer to that question.

Yost: We worked to develop the proposal based on many of the ideas in the Software Task Force's report. We were developing it for a particular division called Knowledge and Distributive Intelligence within the NSF and we geared it towards science and technology. The NSF does not generally fund what they see as business.

Campbell-Kelly: These are people with money, not needs, you see.

Schoenberg: That's a good answer.

Welke: I would submit that the idea of getting the initial genealogy is not as big as what some people might consider it to be. I'll offer as evidence the first ADAPSO meeting I attended in the spring of 1967. Twenty-four people made up the entire meeting. I mean there were not that

many companies in existence. If you start as Larry said, far enough back, there's a limited number of people that were involved.

Brizdle: And then find out what happened to them. Did they get bought out, did they disappear, did they, you know…

Welke: A guy like Bernie Goldstein took a year and a half to tour the country doing nothing other than buying up service bureaus, consolidating the industry. ADP went around and bought up 250 companies all doing payroll processing.

Future Strategies for Preserving Software History

Johnson: I think that we've got an action item to pursue.

Regardless of how you feel, I'm too tired to go on moderating yet another topic here so I think we'll give people a chance to make your last final comments and then let's wrap it up.

Glaser: Thank you, Luanne, for bringing us together and giving us a chance to talk to one another and learn from one another. Thank you very much.

Johnson: You're very welcome. I've had a ball the last couple of days

Grad: Thank you, CBI, for doing this. We really appreciate the fact that CBI provided yesterday's conference for us to piggyback on.

Johnson: We also really appreciate the participation of the CBI people today. It would have been very different meeting if you had not been here. I think it's very important to have that kind of exchange.

Yost: Thank you for inviting us.

Glaser: Those of you who enjoyed yesterday, thought it was worthwhile, Arthur gets the credit for it. He had staff helping him and competent staff as that, but Arthur was clearly the driving force. If you think that he ought to do if again, but a little differently or with a different focus, tell him that because I can almost guarantee that there will be more. And now's a good time for you to get your licks in and say, for example, "Let's do that again, but next time focus on applications."

Grad: Are there some topics that you all would like to raise in our remaining few minutes here? Unbundling was a specific topic.

I think, interestingly enough, where I've been a proponent that unbundling was vital to the growth of the industry, from the comments yesterday, my guess is there would have been a significant software industry and IBM would have had to join in it even if there hadn't been the pressures from the government. But the timing might have been different. So that gave me a somewhat different insight.

Campbell-Kelly: I think that the most important outcome of the conference, in a sense, is that we've answered a very important research question that people have never been sure about. So I think that's been a great success.

If I can just say a couple of words. I've attended a number of CBI conferences, and those of lots of other organizations, where they've tried to put academics together with people from industry. And I must say I've been to some real bummers in my time, actually. *[Laughter]*

You'd be surprised how often these things descend into a sort of technological squabble between a group of people who say "I invented this first," or "Oh, we did it in 18 bits." And this has been a high-level conference. A lot of that obviously goes down to you. You've picked the right set of people who are thinking at the right kind of level.

Johnson: If I'm going to take credit for any part of it, I will take credit for the mailing list. I do have a good mailing list, people who know how to have a good discussion and enjoy it in even in the midst of controversy.

Campbell-Kelly: So I think it has worked extremely well.

Grad: Help me here. Computer science comes up a lot as a focus. And yet our view is that the computer scientists didn't make a lot of difference in the industry, very bluntly. If you listen to Duane Whitlow , he never read the literature.

Schoenberg: That's a little extreme.

Grad: The point is business people made this happen. They had technical skills but they were business people. And that's why in some sense the computer science departments are not the right departments in a university for us to deal with. We need to be dealing with the business schools, management schools, and I don't know how to make that bridge.

Campbell-Kelly: You're not really dealing with the computer science department in the case of CBI. You're really dealing with the history of science and technology. And I think that's why there's a technology focus because that's where their skill set is, talking about technology. I suspect if they put in a proposal for a business history of the software industry, it probably would have stood less chance of success because it would have been said that they don't really have

the skill set to deal with that. It wouldn't have been a particularly strong proposal because the referees would have said that these people don't know very much about business history. The people who should do this should be at Harvard.

Grad: When there's a Ph.D. candidate looking for a paper, looking for a thesis, if he's in the computer science department, he's not going to study business history. If he's in the business administration area, then maybe the history of the software industry would be an appropriate topic.

Campbell-Kelly: Yes, but not many of the CBI fellows are computer scientists at all. I mean, a serious minority, two or three out of the 20.

Yost: Nearly all of them have come out of the history field.

Grad: My question is: do we have access? Are there other departments that we should connect to? If I were a business student I might want to study this industry, how it spread and then consolidated. To my mind that would be a very interesting Ph.D. paper for a business school person, not for a historian at this stage.

Campbell-Kelly: Student of business history.

Grad: A Ph.D. who doesn't think of himself as a historian. He's going to do a Ph.D. because he's going to get his Ph.D. in business or in economics or in something of that sort.

Yost: I would agree with economics. There aren't that many people in business getting Ph.D. degrees.

Grad: Economics is more appropriate.

Yost: But Arthur has a strong background in business history. Both he and I regularly attend the business history conference—and Martin has as well— which brings together historians of business, historians of technology, as well as economists and management theorists and they are looking at these types of issues of development of industries. I know in some industries, the automobile industry, for instance, there has been this type of genealogical work.

Brizdle: Why wouldn't Sloan or Harvard or Wharton or Warwick in England be interested in that type of a topic? You've got 50 years of history of an industry that's created more billionaires than any other industry in the world. Now maybe it wouldn't be the history you want, Burt, but it would certainly be an interesting study.

Grad: I don't care what I want, it's what is useful to build this foundation. Until we start to put some of this stuff to use, the stuff is just there. I'm looking for ways to make it useful. Larry's comment was a very interesting one, people give money when they can see a result. To just say collect it, it's hard to turn them on.

Schoenberg: That's why I kept asking what the problem was. Of course, if I wanted to fund it, I could fund it, but I've got to feel that when I'm done that there is something that's coming back.

Campbell-Kelly: That's why I say museums are so much easier to fund than archives.

Schoenberg: George, my thoughts are much more directed to the Foundation than to the Institute itself because it seems to me that what we're interested in matches more closely with the interests of the Foundation than the historians at the Institute. It seems to me that the Foundation could get the greatest positive influence by finding out how to reach more of the people who were and are today major factors in the industry. If I had to pick the one person that I think would have added the most to this discussion, I would have picked Rick Crandall because he is in the most unusual position of influence in terms of getting the 50 CEOs of the largest software companies in the world today to participate. Here you've been talking to all the people who, in a sense, don't count anymore.

It's sad but true. Certainly we're much more on the periphery. Whether we count or not doesn't matter. But there are people who really do count. And there are people who, we know, in ten years, just as they're ready to start to giving money, will start to have a sense of mortality. And that sense of mortality is what you want to appeal to.

And in a sense, we are all trying to create a sense of immortality.

Grad: Larry, the Foundation is an arm, a funding arm, for the Institute. It's directly connected. And that's the problem.

Schoenberg: It doesn't have a vision of itself.

Glaser: We do have some influence over the directions taken by CBI, or we respond to requests from CBI, such as, "Would you guys go look at software and see what we should do." Which we did. As I said earlier, though, it is an academic institution. It has an Executive Director. One of his jobs as well as his right is to define the initiatives for the institute.

I'm not sure legally it's an advise and consent role but certainly it wouldn't be wise for CBI to go counter to the wishes of the Foundation. So we can say if there is a need, is there some way for the Institute to address it? And not as a threat to them—if you don't do this, we won't raise any money for you—because clearly we're not going to do that. We have to support these

guys. We want to support these guys. We love what they do. We still can bring them something new and say, “How about this? What do you think about that?”

Schoenberg: All organizations have a tremendous tendency to visualize their own perpetuation. So I was visualizing it from the perpetuation of the Foundation, not of the Institute.

Grad: Before we break up, I want to ask these guys. We had a mixed meeting today. We spent the first hour or something on form and why bother, and where are you going to go, that kind of thing. The second hour and a half, which got recorded here, was some great stories about less than a dozen companies.

Is this something that we should try to do through our Software History Center to have more of these meetings in different geographic areas, invite other people? There's a list of people that we would like to have here that's about triple or quadruple the number that actually came.

Johnson: Yes. We didn't have much lead time on scheduling this.

Grad: And it's a weekend. It's a number of things. And whether the people would come or not, I don't know. But one of the things we'd like to ask you to think about, should we do more of these? Should we do different locations? Should we tie them in with something that CBI might do so we get a double barrel hit on the thing? I don't know the answers to those questions.

Brizdle: Is it more or less important than the genealogy?

Grad: No, it's not one or the other.

Goetz: It's different.

Grad: There are multiple objectives.

Brizdle: I understand, but when you have only so much resource, what should you do first? Where does collecting the personal stories sit in the priority?

Grad: Two issues. One, as far as our resource, you're looking at it. That's Luanne. That's the resource we have in The Software History Center. That's all.

And as far as money is concerned, if we have money, we will pay people to do things. We're trying to be an organizing force. Different people have different objectives. If you're going to get them interested in supporting the organization here and our working with others, you've got to find out what they want to do, what they are interested in putting money to back.

So I do know that getting together like this has stimulated a lot of thinking. I can see Larry's head, things spinning around as he sits there. It did for me, a lot of things. I think that's one way of getting people involved, seeing each other. Doing it remotely doesn't seem to have the same impact for most of us. We're doers.

Johnson: It's the interaction, hearing other people's thoughts and comments triggers something in your own.

Grad: Something to push us. So I guess we're looking for feedback from all of you as to what kinds of things will people do. Most of you are not willing to sit down and write. Luanne has been trying to get anecdotes from people—

Brizdle: But wait. If you put the audio of some of these stories on your Web site, well edited, and I hear them and I might say, "Oh, sure, press this button to give your story."

Grad: The people that we're talking about don't use the Web that way. That's just not what they do. I don't. I'm not going to go there and listen to a story. Never happen.

Johnson: Let me ask a different question on that subject, then. I've got lots of tapes. I've got taped interviews with 40-some people and, if I had the money, I could put audio clips of those tapes on our Web site. We're already saying Burt is not going listen to that and most people in our group are not, but what about the historians? Would the historians say, “Wow, this is wonderful? Would they go look at it?”

Campbell-Kelly: No, we couldn't use it, actually, because historians tend to produce written outputs so you really need written inputs. And I, personally, would find it too time consuming.

Johnson: If there were excerpts, like the excerpts we get from this today, would that be helpful?

Campbell-Kelly: Text would be more useful.

Johnson: It would. Okay. So even if these guys never go back and look what's on the Web, somebody might find what's out there useful for historical purposes.

Campbell-Kelly: To a degree.

Brizdle: Could you actually use it for research?

Campbell-Kelly: Yeah, but maybe there are only six researchers in the world, you know? Let me just digress slightly. There's a sense coming across to me that you're thinking it's an awful shame if we have this material and don't use it because it's important to use it. But, you know, in the British library, they have 120,000 Babylonian clay tablets, okay? 10% of those have been looked at, and that's in the last 150 years or so.

Now, you might think, my goodness, they should never have collected so many clay tablets. But, you know, forever is a long time. And the British library is going to be there for another 5,000 years, and gradually people will work their way through those remaining clay tablets and they will derive all sorts of things.

Now, there's fascinating things on those clay tablets that are not yet discovered. For example, people have found the equivalent of shopping lists and mathematical tables and inventories, and it turns out to be a whole picture of Babylonian society. Historians can draw the most amazing things from it. It looks like a heap of rocks and it's been taking up a lot of space for the last 150 years or so.

You should think the same about collecting these software materials. You need to be somewhat discriminating. You can't save everything. That's a ground rule, really. But just because they don't get made use of in the next two or three years, you shouldn't worry. Because there aren't many historians around in society, society won't pay for more than a small percentage of its population to be historians. I'm one historian but maybe there are only six people in the world who are actually working on software history. And it's going to take us a long time to get through these meters and meters of materials. But people will carry on looking at these materials in 100, 200 years' time.

Johnson: Yes. That was my point with that Bancroft collection, too.

Campbell-Kelly: Yes, exactly. So for me personally, I would say collecting material is perhaps the most important thing. And in a fairly discriminating way. I think it would be great as sort of a cherry on top of the cake if you could also, if it was possible, fund some sort of studies to use that material. That would be great, too.

But funded research is very difficult. Probably 90% of funded research is corporate histories where it's the monument thing—where the firm wants, in a sense, a monument to itself and for it to find a permanent place in history, and that's a useful thing.

It's more difficult but certainly a lot of historical institutes do commissioned histories. They typically cost a half a million pounds or $750,000. That would be the kind of amount, because you're talking probably five person-years' work with overhead. So that's doing history in a funded kind of way.

So to take your particular project, if you wanted it to be done, it certainly could be done, and the way to do it would be done by negotiation with a business school or The Babbage Institute or whoever you thought would be the best organization. And in a sense, like anything else, you can get contract research to do precisely what you say, but you probably would want to have a negotiation and they would say what would make it a better value and so forth.

Grad: You're speaking of company research. You mean of a single company?

Campbell-Kelly: That's the most common thing, yes. The research I'm doing, which is about multiple companies, I actually got funded. Mine is funded through the BRSC, that's the British Research Council. I put in other proposals that they didn't think were economically interesting, but they funded this one because they thought it was economically interesting.

To get back to your Web site, you shouldn't get too disappointed if there aren't too many hits because there are only six of us around the world who are actively looking for a history Web site that we would use in that way.

Grad: That's interesting.

Johnson: You've been a great contributor, Martin. We really appreciate your being here and everything you've added to this.

Grad: Have you all asked for advanced copies of the book?

Johnson: Martin's book?

Grad: It will be out next year.

Johnson: You've got a solid 20 sales, you know.

Grad: Easy, easy.

Johnson: We're looking forward to it.

Grad: His recent book on computer history, if you haven't read it, is very well done. It talks principally about the hardware, but hey, you can't have everything. Thank you all.

Johnson: Thanks to everyone for your participation. This has been great, absolutely great. And I think we've gotten some good materials, some good ideas, and some work to do to decide what to do next.

[Applause] [2:54 p.m.]

Acknowledgements

Many thanks to the following people whose financial support made this meeting possible: Marty and Norma Goetz, Burt Grad, Peter and Niki Harris, Joe Piscopo, Ken Ross, and Larry Schoenberg and Barbara Brizdle.

