



Desktop Publishing Pioneer Meeting Day 1 Session 1: Purpose and Introductions

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Desktop Publishing Workshop: Session 1: Purpose and Introduction

Conducted by Software Industry Special Interest Group

Abstract: The first session of the Desktop Publishing Pioneer Meeting includes short biographies from each of the meeting participants. Moderators Burton Grad and David Brock also give an overview of the meeting schedule and introduce the topic: the development of desktop publishing, from the 1960s to the 1990s. Day 1 will focus on the technology, and day 2 will look at the business side. The first day's meeting will include the work at Xerox PARC and elsewhere to create the technology needed to make Desktop Publishing feasible and eventually economically profitable. The second day will have each of the companies present tell the story of how their business was founded and grew and what happened eventually to the companies. Jonathan Seybold will talk about the publications and conferences he created which became the vehicles which popularized the products and their use. In the final session, the participants will explore what has changed in the industry since the 1990s.

Participants:

<u>Name</u>	<u>Affiliation</u>
David Brock	Moderator, CHM Center for Software History)
Burton Grad	Moderator, SI SIG
Chuck Bigelow	Typography
Paul Brainerd	Aldus
Liz Crews (nee Bond)	Xerox PARC and Adobe
Chuck Geschke	Xerox PARC and Adobe
Steve Kirsch	FrameMaker
Donald Knuth	TeX
Butler Lampson	Xerox PARC
Lee Lorenzen	Ventura
Martin Ruckert	TeX

John Scull	Apple laser printer
Jonathan Seybold	Rocappi, Seybold Newsletter and Conferences
John Shoch	Xerox PARC
Bob Sproull	Xerox PARC
Larry Tesler	Xerox PARC and Apple
John Warnock	Xerox PARC and Adobe
Richard Ying	Atex
Thomas Haigh	Historian, University of Wisconsin/ Milwaukee
Matthew Kirschenbaum	Historian, University of Maryland
Dave Walden	Historian
Ann Hardy	SI SIG
Mike Humphries	SI SIG
Doug Jerger	SI SIG
Ed LaHay	SI SIG
Hansen Hsu	CHM, Historian
John Markoff	CHM
Paul McJones	CHM, Software Preservation Group
Len Shustek	CHM, Chairman
Dag Spicer	CHM, historian
Marc Weber	CHM, Internet curator

Introduction

Burton Grad: This is the formal start of the Desktop Publishing Pioneer Meeting. It's May 22, 2017, and we're at the Computer History Museum in Mountain View, California. We appreciate all of you taking time from your very busy schedules to come here and join us. This pioneer meeting is cosponsored by the Software Industry Special Interest Group, of which Mike Humphries and Ann Hardy are the co-chairs, as well as by the Center for Software History, of which David Brock is the director. This meeting would not have been possible without the extensive advice and assistance from Jonathan Seybold. If Jonathan hadn't been willing to devote so much of his time and knowledge, I don't think we could have done the meeting; he's been of inestimable help. Ed LaHay did all the logistics and mechanics of working with the people here at the museum, and David Brock provided guidance on this lovely setup. Yesterday, this auditorium had about 250 chairs set up for a major Computer History Museum meeting. And yesterday afternoon, they broke that all down and set this up; the guys worked I don't know how late. They even took the time to ensure that each of your faces would show up properly on the cameras with the proper lighting. Terrific work.

Doug Jerger is also here to help us. He's been a long-time member of the Software Industry Special Interest Group. If you have materials to contribute, either now or later on, he's the gentleman to see. We'd like to collect whatever you've got before you throw it away. We've lost so much material because people said, "Oh, nobody would be interested." We're interested, trust me. Paper materials, artifacts, pictures, things like that. Pictures do have to have the names associated with them. Unidentified pictures are not very useful. We also have a couple of computer historians in attendance: Matthew Kirschenbaum is here now, and Thomas Haigh will also be joining us a bit later. And of course, David Brock and Hansen Hsu are both historians working at the museum. And there is even a pseudo-historian here, Dave Walden. He doesn't have a degree as an historian, but he works like one, and he cites as many references in his articles as any historian I've ever seen.

We're also hoping to produce a special issue of the *IEEE Annals of the History of Computing* based upon this meeting. Matthew Kirschenbaum has volunteered to lead that effort. We've done six special issues so far on our software subjects including ones on spreadsheets, word processing software, as well as database management systems and mainframe software. Dave Walden has volunteered to help us, as a long-time editorial board member of the *Annals*.

Of course, I'd be remiss if I didn't give special thanks to the Computer History Museum. They've not only been generous in hosting the meeting, but they've provided all the administrative and operational help needed. Poppy Haralson, who was out there greeting you and getting you signed in, has done so much to make everything work well. The museum is also doing the video recording. They are also hosting a special reception and dinner. All of you are invited to attend this evening, and I hope you'll be able to attend. The museum is also

hosting a reception and dinner this evening and the museum exhibits will be open, which they usually aren't on Monday nights, right?

David Brock: Correct.

Grad: The purpose of this meeting, as you can guess, is to get your recollections, as best you remember, of what happened. Historians say, this is not a bible, this is not a primary resource, but it leads them to others. There are already been two books and many articles written based upon the stuff we've collected over the last 15–16 years. What books will come out of this and who will do them, don't know. But what you say gives them leads. The pioneer meetings gather the interaction among you—you remember it one way, he remembers it a different way; you thought the other guy was cheating, he thought that you were. We had that when we were doing the Relational Database Meeting. Can you imagine the discussions between Oracle and Informix, and the signs they had up here in the Valley? It was wonderful to get that interaction! Same thing when we had the people with VisiCalc. The two people, Dan Fylstra and the guys who did the work, Dan Bricklin and Bob Frankston, were there, and they just said, "Hey, that's not the way it was." That's what you get with this kind of interaction. It's not a nice friendly panel discussion or an interview where it's just you, it's what you are saying to each other.

We've broken this topic down into two sections. Today is primarily technology: we're focusing on where the technology came from, where things were at the beginning, what changed, what the key elements were that made the change take place. Some of you were there in the 1960s and 1970s—you made that happen. Then in the 1980s, a great explosion of the technology took place. We want to explore that today in some depth.

Tomorrow, we're putting on business hats, which may be unusual for some of you. Some of you made a lot of money out of it; some of you couldn't care less. You worked in academia and things like that. But we're going to look through the businesses. How they were created, how they were financed, what they did, what their markets were, how they changed. And the companies, of course—Adobe and the Aldus and so forth—these are wonderful stories to tell. And Ventura and Frame—these are all good stories. That's what we'll do tomorrow.

On Tuesday, we're also going to do two other special things. One, we're going to give Jonathan Seybold a chance to talk a little bit about why he created the publications and the conferences. More importantly, we're going to ask you what effect they had on you. What was the impact? Were they as useful as he tells me they were, or were they just incidental to the growth of the industry? We'll be fascinated in that. He claims he was the glue that held you all together, but you know, I'm suspicious of those kinds of claims at times. <laughter> Oh, I may have lost him. That may be it.

Remember, we're mostly focusing on what happened in the 1960s, 1970s, 1980s, and 1990s. A lot has happened since then, but that's not our purpose. History has to be at least 15 years

old, I was told by my historian friends. In the last session we will ask, "What's happened since then? Where are we going? What are the changes? And where do you see things going in the future?" So there will be a chance for you to pontificate—is that an appropriate word? Mr. Trump isn't there, yet, but maybe we can pontificate a little today.

Your folders have just a couple of items, and you may want to open them up now. Just some odds and ends of rules as you look at them. One, these mics are very sensitive, so they're going to pick up any side talk, which will mess up our transcriptions. Remember, the idea here is to get good transcriptions so we have a record of what you said. Please, avoid the side talk. Two, something that David taught me from the last meeting we ran is that it is important not to interrupt. If you have something you want to say, and it's urgent, put your hand up. David will make a note of the fact that you want to talk, and we'll call on you next time. I can shut off any mic that I want to, so if some of you are going on too long, and it starts to bug me <laughter>, you're toast, just remember.

Can all of you hear okay? Any problems anywhere? Because we used this room a long time ago; they set it up this time with speakers coming that way, not just recording here, which has been very helpful. In your folders, we have a copy of the program, which you all have seen before in various emails we sent you. This is the latest version; we're going to follow it—I won't say religiously—but we'll follow it pretty much. If some topics are getting better, and we want to stay with them, we'll push back some times. If they're not getting anywhere, we may just shorten it up a little. We're flexible in that regard. We're not limited to what's here or what we ask. You guys bring in things. You ask questions, you bring in topics. Sometime we may say, "Hey, let's postpone that until a later session; don't jump ahead." We're going somewhat chronologically, so don't jump too far ahead.

I mentioned the oral recording, and we talked about the transcripts. Everything that's done here will be transcribed and edited to get rid of the "uhms" and "ers" and things that don't add to it, to make it readable. There'll be 12 sessions, and they'll all be posted on the Computer History Museum website at some time in the future. I can't guarantee how soon. It takes a lot of time and effort to do a reasonable job of editing. For the people on the outside, where the cameras won't see their names, you're more than entitled to participate, but please say your name before you start. There are mics on both ends on the outside for you to use when you talk. Please do.

To start, I'm going to go around the room and I'll ask you to give a very—and I mean a very—brief introduction. We do want to get done by around 10 a.m. We primarily want you to mention what your connection is to desktop publishing, to the technology or to the business side. Keep it in the two-minute range. For those of you who weren't involved, like me, it'll even be shorter. I'm starting with Chuck Bigelow for some reason and we'll give each of you a chance

I think many of you know each other, but there's some of you who don't. I overheard some of you saying, "Hmm, I've heard your name, but I've never actually met you." <laughter> The tent cards are there so you can see who people are.

Let me start with myself. I'm Burt Grad. I was co-chair of the Software Industry Special Industry Group, along with Luanne Johnson, who has been my partner in doing this over the last 16 years. We dropped out in 2015 as co-chairs, and Mike Humphries and Ann Hardy took over at that point. I've been in the computer software field since 1954, when I was with General Electric and worked on the Univac I in Louisville, Kentucky. It was the first commercial computer with a manufacturing control program. As I was just telling someone, it took me three months to write the program, and three months to debug it. <laughs> I had a whole computer to myself every evening from 5:00 p.m. until about 11 o'clock at night. I then spent 18 years with IBM in a variety of development roles, a whole range of software applications. I was a consultant to software companies from 1978 to 2008. Then I was fired by my clients, who all said I was too old because I didn't know anything about what they were doing anymore—and they were right. As you can see, I continue to collect software history, and I love doing it. Also, I work for my son, who has a life insurance agency in New York City. I'm his CFO. David, it's your turn!

Brock: Well, very briefly, I'm the director of the Center for Software History here at the museum. I'm a historian of technology. I've worked primarily in the history of the semiconductor industry. My move into the history of software is relatively new, and I've had some very able guides in that introduction, some of whom are sitting around the table. I guess I would describe my acquaintance with the topic of today as well-versed enough to know my ignorance about it. I am very much looking forward to the discussion.

Participant Introductions

Grad: Now we're going to start with the real participants. Chuck Bigelow.

Chuck Bigelow: Chuck Bigelow. For the sins of my youth, I was sentenced to 35 years as a college professor. Along the way, I was interested in typography, especially as it became digital. So I wrote a series of articles for the *Seybold Report*, which Jonathan Seybold edited, and he co-wrote the first one with me. That was a very exciting moment, because people were trying to understand how digital typography would affect traditional typography. Donald Knuth, who's here also, invited me to come to Stanford to be a professor of digital typography in the early 1980s. I was happy to work with him because I also had read his papers and met him at a conference organized by the Seybolds at Stanford in 1980, I think. It was a pleasure to be reunited with him. Later, early on, I was a typographic consultant, but not an employee, of Adobe when they were first starting out, so I see my colleagues over there. I taught at Stanford for several years and then made fonts commercially for Adobe, Microsoft, Apple, and other firms. After retiring, I was called back to be a professor again. I guess I misbehaved as a

retiree, so I ended my career at the Rochester Institute of Technology as a distinguished professor of graphic arts.

Grad: Okay, Chuck. Paul Brainerd.

Paul Brainerd: Paul Brainerd, from Seattle. My background actually comes out of the editorial on photography. I'm the fourth generation of photographers in my family. I got interested in journalism and publishing when I was editor of the high school yearbook. Then in college, I started to get involved with the production of the newspaper, so I think my start on this would be about 1968 or 1969, when I bought Compugraphic Equipment. Then I went to cold type and started working with the offset printing. I saw the whole transition between hot metal and composition and cold type on the production side. In 1984, we started Aldus Corporation. I got fired from my previous job at Atex, which Richard Ying will be accounting for later. <laughs> Eastman Kodak Company had purchased Atex, and they laid off all the engineers and all the advanced development and microcomputer technology in Redmond, Washington. So, I had my pick of 20 or so engineers, we started a new company called Aldus and coined the term "desktop publishing." Ten years later, we sold the company to Chuck Geschke and John Warnock, and I served on the Adobe

board for a couple years.

Grad: Thank you. Just a small thing. These mics are very sensitive. You do not have to sit forward. They're very comfortable when you sit back there. Next, she's known as Liz Bond to many of you, but it's now Liz Crews.

Liz Crews: Good morning. I want to thank Jonathan Seybold, particularly, for including me in this event, and David and Burt, too, for asking me to join you today. I'm Liz Crews. I live in Santa Fe, New Mexico, and I currently spend my retirement as a passionate advocate for five of the New Mexico History Museums and also with the International Folk Art Alliance. I work as a fiber artist. I'm a watercolor painter. And I'm trying to become a better bridge player. That's Liz Crews.

You may remember me as Liz Bond. I think you will remember my time at Xerox and Adobe in the desktop publishing days. My connection to desktop publishing started in the late 1970s and the early 1980s, working in the Xerox Electro Optical Systems in Pasadena. I was assigned to introduce technology solutions to the Xerox Education Group companies. This included developing publishing systems for two other education publishing companies. Some of my PARC friends will remember that we took Alto-based computers and some of your PARC tools and developed publishing systems—for example, for University Microfilms Publishing on the dissertation abstracts international.

From EOS, I moved on to manage the Corporate Font Center for the Xerox printing systems division. When we talk about the first electronic printer's fonts, I have some real interesting stories to share with you about making 300 dpi [dots per inch] fonts for the first electronic printers, particularly regarding the insurance industry. As manager of the Xerox Corporate Font Center, I developed relationships with typographers and type foundries and type designers, and I grew a great appreciation for fine typography. Gertrude and Herman Zapf gave me a wonderful hand-printed piece with an alphabet and a quote that I believe is still true today, "Whence did come that beautiful magic art of painting speech and speaking to the eyes?"

The most memorable time for me in desktop publishing was when I joined Adobe. Through my relationship with Mergenthaler and Linotype, Monotype and ITC, we helped develop and negotiate the first font licensing agreements and contracts for Adobe. As director of the marketing and communication, I helped build their Graphic Arts Marketing Communication staff and the relationships with public relations in advertising for the company in the beginning years. As I look back, I remember two pieces of advice that I think impacted my role in bringing desktop publishing to market. From Aaron Burns, president of International Typeface Corporation, "You never have a second opportunity to make a first impression." And from John Warnock and Chuck Geschke, "If you're passionate about doing it, then just go do it!" So from desktop publishing newsletters in black and white and corporate marketing materials, we've really come a long way. As an example, a couple of years ago I produced and published a book on my desktop machine. It was all in color with an enormous number of color pictures, paying an awful lot of attention to its typographic setting, balancing its columns and things that one could probably never imagine we would when we first started doing desktop publishing. We've come a long way, baby!

Grad: Thank you, Liz. Dr. Donald Knuth.

Donald Knuth: I'm Donald Knuth. I guess I'm the other academic on this panel. In a way I have a little ink in my veins, because my father had a hobby where he actually did a lot of work in the Milwaukee area for churches and high schools and things like this. We had an offset printing machine in our basement by the time I was in high school. <laughter> I actually worked between my senior year in high school and my freshman year in college at a company in Milwaukee called Hasler Printing Company, which actually used mimeograph. I ran the Hasler Printing Company for three months. And I also had some experience with things like this with my high school newspaper.

Other than that, my experience with this came because I was writing books about computer science, so I read a lot of daily proofs. I guess it was in 1977; there was a crisis about my books. Namely, the printing industry had given up on hot metal type. My books had a lot of mathematics in it, and mathematics was not treated well by the printing industry. It was always considered penalty copy. So when they switched over from metal type to optical type, the mathematics got the shaft. There was no interest. The galley proofs that I got for the second

edition of my book on the algorithms looked so bad it made me want to quit. Stanford library has a copy of the galley proofs, and you can see why I was so despondent. <laughter>

In February 1977, I learned of the existence of a machine in Los Angeles that used digital devices, and something actually came out looking like a book. It wasn't just an imitation of a book, but it could actually do as well as a real printing press. Within a week, I scheduled a trip to Southern California to look at the machine. I was going to spend my sabbatical year in South America learning Spanish and writing more books. Instead, I stayed here and decided to write computer programs that would put my books into a form that I could accept. I figured it would take about a year. I developed this system that was originally going to be just for my secretary and myself for writing a book. Okay, well, I'm talking too long. So I took my sabbatical and went up Stanford's Artificial Intelligence Laboratory, and other people kept coming into my office and saying, "What are you doing, Don?" I showed them, and they got interested. Guy Steele ported my system to MIT early on, so I went through a period where I had one user of the system and then 10 users. Then I had 100 users and then I had a thousand users. Each time it had to change a little bit, and it took me more than a year.

Eventually as Chuck Bigelow said, I started a program at Stanford about digital typography. This was in the early 1980s. I'm not sure when it became official, 1980 or 1981. Chuck won the MacArthur Prize one week after he had accepted our offer. We had a bunch of excellent students who went on to distinguished careers, mostly at Adobe, I think. During this program, I brought a lot of the main people working in fonts to Stanford to work with the students. One of the things that I was thinking about at that time was that I'd seen a lot of cases where engineers would come and say, "Okay, computers are here now. It's a new world. Let's start from scratch, and redo everything right." By contrast, I wanted to look at everything that had been written about typography since Guttenberg; not throw it out, but see what there was in it that we could learn. Stanford has a wonderful library, and materials about fine books. That was one of the guiding points: I wanted to tie what I was doing to the past, and not throw it out like a lot of other people I knew.

Grad: Martin Ruckert, your turn.

Martin Ruckert: I'm here because I tinkered around with TeX in the early 1980s. I started when I was a student in Munich at the university there. Now I'm still—or again—tinkering around with TeX and I'm a professor in Munich. And Don Knuth thinks that I'm doing some interesting work. I used—or I plan to use—the TeX engine to do the rendering for eBooks. I think of an eBook as anything that changes its size and aspect ratio while you are looking at it, not like regular paper. That's the project that I'm on. Don hasn't actually seen very much of it, but he still thinks it's very interesting.

Grad: Was this on TeX at an earlier time, or is this a new experience for you?

Ruckert: No, I started using TeX in the early 1980s when I ported parts of it—namely, the mathematical typesetting—to an optoelectronic printing machine that they had in a Munich-based company that has not existed since the 1990s or so.

Grad: There was a 1980s connection beside what you're doing now?

Ruckert: Yeah, well, I didn't know Don at that time, except through his books. I got a hold of a magnetic tape with TeX on it, and I had it translated to Pascal. I worked with that Pascal code in the 1980s.

Grad: Now let's hear from one of our historians, Matthew Kirschenbaum.

Matthew Kirschenbaum: Yes, hello, I am one of your historians, and I'm very happy and privileged to be here. I work at the University of Maryland. As Burt mentioned, I am editing the IEEE special issue on desktop publishing. I volunteered, or was volunteered. It was a kind of a mutual process. So I'd be very interested in talking with any of you who have ideas, either for what ought to be in that issue or who ought to be in it. Don't be shy.

For my own work, I am an English professor by trade. My PhD is in literature. My work is really at the intersection of writing and technology. That's been my research for the last 20 years or so. Most recently, I published a book called *Track Changes of Literary History of Word Processing*, which several people in this room helped me with a great deal. I suspect that's the primary reason that I'm here, and I'm looking toward some future projects in desktop publishing in addition to the special issue. Thank you.

Grad: Thank you very much. Thomas Haigh has joined us. Now Steve Kirsch.

Steve Kirsch: Sure, I'm Steve Kirsch. I was the founder and CEO of Frame Technology Corporation, which created FrameMaker. We created it on Sun Workstations. I had developed an optical mouse, and Sun Microsystems was one of my first customers. I met John Gage there. John Gage introduced me to Charles Corfield. Corfield had gotten a free Sun Workstation and wanted to do something interesting and created a kind of a prototype desktop publishing application. Interleaf was all the rage at the time on the Sun Workstations. We had this ambition that we could actually compete against this extremely well-funded company, and we did amazingly well. The company was started in July 1986. It went public and then was acquired by Adobe for about \$500 million or so at the time. There are some connections that people may not know. I mean, I know a lot of people in the room, of course. But Charles Ying, Richard's brother, was an investor in—I'm not sure which company, it might have been Frame. But I used to go to Charles' ski cabin, so I would say that's kind of an interesting connection I just wanted to point out. Also David Fuchs was one of the early employees at Frame. David had worked on TeX so bringing that into our system was helpful, too. And Don Knuth, thank you for the dollar. I found a

bug in one of Don's books, and you know, he used to write checks if you found a problem in one of his books. Of course, none of those checks ever got cashed. <laughs> They were always kept. I still have my check from *The Art of Computer Programming* and the bug on page—I forget which page it was.

Knuth: Thursday morning I wrote 17 checks. <laughter>

Kirsch: Oh wow! That's one of the things I keep as a souvenir of those days. It's really an honor to be here and to reconnect with people I haven't seen in many, many years.

Grad: Thanks Steve. Lee Lorenzen. Let's keep moving along.

Lee Lorenzen: Okay, I'm Lee Lorenzen. It is also an honor as well to be here. My connection to all of this I guess starts in two different forms. One is that I worked for Xerox; my first job out of college was actually working at Xerox Office Products Division. I walked into this like fifth floor, whatever it was, ninth floor in Mockingbird Towers, and I saw an Alto, and I saw a Xerox 8010, and I was like, "Oh, my gosh! It's like I'm on another planet!" It was just like, "How can I do some of these things more in the personal computer side of the world?" I'd worked in a computer store in 1980, with Apple II and Commodore PED, XE Sorcerer.

Ultimately, I went to Digital Research. There we worked on an early graphical operating system called Gem. It was based on something I did at Xerox called Lonestar, which was cloning the Star on an 8086 PC. Got to visit PARC on the basis of the video around that. It was a chance to meet some of my heroes there. Basically, after we'd done Gem, we wanted to do an application on top of that. We looked around and all this, I think it'd come out with PageMaker, and we viewed it as kind of a short document publishing system. We wanted to build a long document publishing system, so we copied Scribe,—I think Interleaf was based on Scribe, too. It's a batch formatting system that they had at Digital Research. So we started at Ventura, and ultimately we turned around and licensed it. Four of us started the company: myself, John Meyer, Don Heiskell, and then John Grant, along with a secretary. That was the entire company. We actually licensed it back to Xerox and they did everything else, so we just got to do the software engineering. That's what brought me here, I guess. Thanks!

Grad: Since we have time, we're going to explore in-depth every one of these things, so don't give away too many of the secrets. You have to have something to say tomorrow. Chuck Geschke.

Chuck Geschke: Hi, I'm absolutely delighted to be here, and thank you, David and Burt, for putting this together. It's going to be a lot of fun, I can tell. Well, my father and grandfather were letterpress photo engravers and my dad had two pieces of advice for me: "Don't you ever go into the printing business. And don't play the stock market." <laughter> I sort of obeyed him, but

not quite. The reason he didn't want me to go in the printing business is that if you had ever been in a photoengraving shop, you saw a very toxic environment. Most photoengravers didn't make it past the age of 50. I was lucky; my dad lived to be almost 99.

I got a PhD in computer science, and I got a job at the Xerox Research Center pretty early on; it was like the second year that it was in operation. I started working on a variety of different things. Not directly on anything to do with printing. Eventually, I got the chance to start a new laboratory focused on printing and graphics, and I made one of the two great hiring decisions of my life. I hired John Warnock to be the chief scientist in the lab, and we worked together on a variety of different things, including at the request of Xerox Development people. We designed a protocol called Interpress that would allow computers to talk directly to laser printers and eventually typesetting equipment in order to print out high-quality material. That involved Butler Lampson, who's also here, and a couple of other people. The entire project was actually conducted on the early Internet email systems, because we weren't physically all located in the same place. John and I got frustrated because we weren't able to see how Xerox was going to get this technology to the market, so we decided to go off and start a business on our own. That was financed by a venture firm, headed by Bill Hambrick of Hambrick and Quist. We opened our doors and here we are 35 years later. We've had a sort of wonderful experience, not only in the meeting that was set up with John Scull, and John and myself and Paul Brainerd, where the concept of desktop publishing was brought out as a marketing term—that market, frankly, saved Apple in the late 1980s. Lots more to say. Looking forward to this. Thank you for the invitation.

Grad: He hired you, so you had to look up to him, is that part of the requirement of the job?
John Warnock.

John Warnock: Always. I'm John Warnock. I am from Utah, and the reason I got involved with all of this is in 1966, David Evans, who was head of computers at Berkeley for a while, came to Utah to start a Computer Science Department. It was about man-machine communication, and it was financed by ARPA. You will find there's a thread in everything that has to do with PARC about ARPA. All of the people in the ARPA centers around the country knew each other. We were focused on graphics. At Utah, we have had some very distinguished graduates. There were Alan Kay, Jim Clark, Ed Catmull, who started Pixar, William Neuman, Martin Newell, and Bob Feigel, who also worked at PARC. A lot of people were associated with graphics.

In 1978, I was working for Evans and Sutherland, and they wanted me to move back to Utah, but I didn't want to do that. So I met with Chuck Geschke, and he hired me to come to Xerox PARC. My goal at Xerox PARC was to make device-independent graphics. All of the graphics at PARC, or a majority of the graphics at PARC, were concerned with bitmaps—how you manipulate bitmaps, how you move them around very rapidly. Except with Patrick Baudelaire, there was very little work done on any sort of analytic graphics, where you're using math equations to define them. My job was to make the graphics move from device to device with different resolutions. As Chuck mentioned, we worked on Interpress, and although I'd only been

at Xerox for four years, it became very, very clear to me that Xerox was never going to capitalize on the work that was done at PARC. I went into Chuck and said, "Look, this is the world's greatest sandbox." And it was. Xerox PARC was probably the best job any computer scientist could ever have—the most talented, brightest people in the world. But we felt that there was a lot of opportunity, so we left and started Adobe. And it's done okay. Thank you.

Grad: Butler Lampson is next.

Butler Lampson: I'm Butler Lampson. I worked on my high school newspaper, which was printed on an old-fashioned printing press, and I got to visit the printer and see the Linotype machines—I think that's what they were—and watch the metal flow and all that. I guess very shortly after that I started to get into computers, and early in college I said to myself, "There's got to be a better way." Ever since then, I've had some amount of interest in publishing. When I was at Berkeley I had various machines for photographically setting type, but they all had been designed for pretty specialized purposes. We could never quite see how to hook one of them up to the kinds of computer systems that we worked with and make a complete system that would be worth the effort.

Then I came to PARC and the charter for PARC was, "Invent the office of the future." Nobody had any idea what that meant. The reason PARC got created was that the senior management—Joe Wilson, in particular, I think, was the head of Xerox—saw quite clearly that the halcyon period that Xerox was going through, when they had a monopoly on copiers, was not going to last forever. Patents were drawn out. Competitors would come in, and they would have to have something else new and exciting, or their wonderful growth story would come to an end. Something having to do with offices seemed like a good idea, so they started PARC and said, "Invent the office of the future." That didn't give us unlimited license to do anything we wanted, but it gave us pretty broad license. We were also very fortunate to have Barry Starkweather come from Xerox Rochester with his ideas for laser printing. Most of us in the computer part of PARC had been very interested in interactive computing, and it seemed very natural to go into graphics and build word processors like Bravo and so forth. In addition to that, we had the laser printers, but laser printers in those days were fairly large, clunky, expensive devices. So we also got to invent client-server computing because you had to share the printer among many, many users.

I don't think desktop publishing was ever a focus at PARC, per se. We were into offices. Later, to some extent, we were into computer printing because Xerox went into the computer printing business at the high end in a fairly big way. That is quite a bit different than what you do in offices. But there are many aspects of publishing that we just never got into. I think it's probably for the same reason that we never got into spreadsheets. We didn't really have any use for it. We were perfectly happy laying things out on 8.5 × 11 sheets of paper and publishing tech reports that were bound in the standard way and stapled along the spine. That was just fine. The other issue, I guess, was we had the laser printers, but they were actually not wonderful

devices for publishing, and John and Chuck probably know in detail technically why this is. The character shapes that were made on the 500 dpi original laser printer didn't reproduce very well. The original looked fine, but they didn't reproduce very well. If you photographed it, and reproduced it, that didn't work very well either. So it wasn't really a very good vehicle for publishing. Most of what you're going to hear about in this meeting, I think, is going to be things that happened after that.

Grad: Which is great, but we're going to hear also what happened then, as well. Bob Sproull.

Bob Sproull: I hope so! That's my job <laughter>, as far as I see it. So I'm a failed physicist. I got lured into the computer business as an undergraduate at Harvard. When I got an opportunity to take Ivan Sutherland's course, he had just come there as an associate professor and a bunch of us traipsed down and interviewed to get in. He had a PDP-1 that he had snared from the Air Force, which was all ours. We had it day and night, just as you had your Univac I. It was a very large personal computer, but quite marvelous. We also had William Neumann, who was a fresh PhD from England and came with his thing called the Reaction Handler. We were working primarily on interactive graphics things, but Ivan had a research project to build a head-mounted display with real-time perspective line drawings. Don't even think raster yet, please; these were all line drawings. He hired me to work several summers and goodness knows how many hours to help design the hardware and build some software. There was a happy little band doing that. And I must say, that secured my future in computing.

In addition to that, I also was interested in topography and publishing. I had set hot and cold type for a school newspaper, including dropping my first tray of Linotype slugs, much to the consternation of the real printers. I never did that again, because I don't think I ever touched another tray of Linotype slugs again. As Butler said, "There had to be a better way!" I think that's what you said. Also, for example, even on the PDP-1, we didn't use it for any graphics in producing the college yearbook, but we did use it for that annoying part in the senior's section where they list all the clubs they're a part of—some poor soul had to typeset that. I took pity on them, and wrote the obvious computer program to work from a bunch of coded data and essentially a database to produce an MT/ST type so that cold type could produce that. It didn't need to be any better. Anyway, this is background, and I then wrote an early device independent graphics package, got interested in scan conversion because of the Utah work. Various graduate student visitors, including Alan Kay, came to visit Ivan and got interested in Curve representations, again, being done by the Utah guys.

I arrived at PARC around Christmas 1972 and was part of a happy little band called the Graphics Group—Bob Flegal, Patrick Baudelaire, Dick Shoup, and a bunch of others. It was clear, as Butler said, we weren't building desktop publishing systems; we were building an experimental office automation system, or office information system. The key there wasn't so much depth, as breadth, to try to explore the various systems questions about putting together a large and somewhat varied system to do the various things that we imagined an automated

office might want to do. As a result, the issue was to kind of populate the space with experimental hardware and software that would teach us something. One of the things we did early on, fairly early, about 1974 or 1975, was design a thing called Press, which was the precursor to Interpress. It was device independent, but as John Warnock pointed out, we didn't have a clue how to do a good job of rendering it on many devices. But it proved a very good research vehicle for both producing the software that created such files and producing some software that printed such files and manipulated them. It was a page description language.

Anyway, there'll be plenty of opportunity to hear more about that, but I notice that everybody likes a little story, so I'll tell you the little story. We did some fonts. We had Helvetica, Times Roman; we knew that if Xerox was going to do products, we had to do some experiments. Even years later, bicycling around Palo Alto, I would see pieces of paper tacked up on telephone poles, and I could tell that it had slipped out of our control, because the lower case "r" in Helvetica Bold had a serious width error. You could see it at 100 feet away. <laughter> So no claims to beauty should ever be ascribed to the stuff we did. I must say one other connection, since we're into connections: I left PARC in 1977 and went to Carnegie Mellon as a faculty member. I was actually the last man standing as Brian Reid's thesis supervisor on Scribe. At the time, the Carnegie Mellon Computer Science Department didn't think very highly of either graphics or page layout, but we got it through.

Grad: Thank you, Bob. Dave Walden is next.

Dave Walden: Hi. I've been interested in printing since my mother, an elementary school teacher, used ditto masters and I loved their smell. <laughter> Then I spent my four years of college supporting myself working as an unskilled laborer around a four-color giant Miehle Lithograph. I then spent 30 years in the computer communications systems business, starting with the Arpanet. When I was retired from BB&N about 20 years ago, I got involved in computing history, writing books and self-publishing books. I think I'm here because I'm on the editorial board of the *Annals*, and I've been involved in several special issues, so if I can be of aide in that, I'm ready. For the past 10 years, probably, my area of research in computer history has tended to be the history of digital typography. And, one last thing. I'm planning to write an Events and Sightings piece about this meeting to go in the *Annals* issue right after this, sort of forecasting that there will eventually, hopefully, be a special issue.

Grad: Thank you very much. Dave was of a tremendous assistance to us in planning this meeting, and he did an incredible job of taking over as the editor in chief of the *Annals* when they had some problems with the then current editor. He rebuilt up the whole backlog of stuff; they had terrific issues because of him. Thomas Haigh!

Thomas Haigh: I'm a historian of computing at the University of Wisconsin, Milwaukee. I started out in computer science, but I made a slightly perverse career decision and my PhD switched over to history. I have worked on many aspects of the history of computing, history of

databases, history of business use, management of computing, etc. You have most likely seen my name on the Historical Reflections columns in the *Communications of the ACM* that I've been writing for about five years now. I was chair for many years of the group SIGCIS for historians of computing and information technology. That's grown into a nice vibrant community, so if any of you have a more general interest in the history of computing, you can sign up for that. We have an active listserv and a number of resources online. That's www.sigcis.org. I recently published the book, *ENIAC in Action*, that's a study of older time periods. Unfortunately, those people aren't still around, so it's nice to have this kind of shift of gears, and see you all still lively and very much alive. <laughter> No, you look good to me! <laughter> And I've been working on Burt's various events for, it must be more than 15 years now.

Grad: Just as an aside, Tom was over here going to the University of Pennsylvania—he's a Brit, as you can tell by his accent—and he wanted to stay, but he was on a Fulbright Scholarship, if I have it correctly. The rules of the Fulbright is you go back to where you came from, but we didn't want him to go back. So we talked to senators, and a variety of other people. We kept him, and we gave him a job one summer doing work for us at the Charles Babbage Institute, I believe. You went there in Minnesota. Fortunately, we were able to swing it, and he's been here at the University of Wisconsin at Milwaukee. He's the most prolific writer I have ever, ever seen! And what's even more important is it's readable, understandable, and very well-researched and supported. So that's my encomium for Dr. Haigh.

Haigh: Thanks, Burton. My most direct connection with this academically is an earlier event on the history of word processing. I wrote the article for that special issue, "Remembering the Office of the Future," I was kind of stealing the Xerox line, and that has turned out to be one of my more widely cited pieces. Strangely, it's also connected me with media theorists in Germany, which led me to a second job at the University of Siegen. It's kind strange the twists that careers take. On a personal level, I grew up liking writing as well as computers. So I was always producing various kinds of magazines. I couldn't afford any Apple things as a teenager, so I was working on an Atari ST. Then a little bit later, I used an early version of PageMaker on Windows in 1990 and CorelDraw. Adobe Type Manager was an amazing thing when that came out. Later on as a student, I was using FrameMaker on Sun to edit the departmental magazine. So these events have now been going on long enough that the history is actually catching up for the first time with the things that I can remember personally.

Grad: John Scull is next.

John Scull: I'm John Scull. First, thanks, Burt, Dave, Jonathan. This is great! It's great to see everybody. I come to this from my experience at Apple Computer. This was a very interesting early part of my working career, so it's great to be here. I started at Apple, part of the Mac team, prior to the launch of the Macintosh. You know, Steve Jobs was my boss' boss. There are others here who also worked at Apple. But as you know, Steve left the company in 1985 and the Mac Division was dissolved. They asked me to look at how we could kind of revive and kind of

get the laser writer heading in the right direction. It had started off reasonably well, but it pretty much plummeted to almost no sales about six months after it was launched, and it was kind of a pretty dire time at Apple. Besides the situation with Steve leaving, morale at Apple was terrible. You know, the Macintosh wasn't selling very well. The Mac Office, which was kind of our new marketing thing, was not doing well. It was a pretty dire time! So because of some of the discussions that I had with some of the people here, you know, Paul, Jonathan, Chuck, and John and then later Liz, I went around and talked to a bunch of people. We can talk about it more tomorrow, but it became pretty clear that Apple could not do it just the old way we had been doing it, which was sell personal computers. We had this unique opportunity; I thought it was going to be massive. It took about six weeks, looking, talking to people, and it became pretty apparent to me that it was ja jewel that just needed to be brought into the world. I liked doing stuff like that, so just right place, right time. We can talk more about that later, but I became the original Desktop Publishing Marketing Manager at Apple, and I ran that for about three or three-and-a-half years until it was a pretty sizable part of Apple's business. I'm sure we'll talk about that more, but that's my connection here.

Grad: Thank you, John. Larry Tesler.

Larry Tesler: I'm Larry Tesler. I got into this publishing thing in the early days, around 1968. I was pasting up a magazine for an organization, nonprofit, I was involved with. I noticed that we kept repeating this operation, taking an X-ACTO knife and cutting a little course description for our catalog. The process of using glue to stick it to the paper was going to be made obsolete by stuff like SpaceWar, where you get it up on the screen and interact with it. I told this to a fellow who was doing paste-up with me—his name was Jim Warren. He was a math teacher at a local high school, but he didn't really know anything about computers. I brought him up to the AI lab to see them, and that got him into computing. He later started the West Coast Computer Fair and a magazine, and got a lot going on that side of the business.

At the Stanford AI lab, I was getting skeptical that AI was going to go anywhere in the next 50 years, so I thought I should do something that people are actually going to use. I had a discussion with Les Earnest, who was a typesetting buff, and we went into the business a few years later. He wanted me to develop a formatting program that he called the Document Compiler that was basically a markup language to implement a lot of FrameMaker type of features—building indexes, numbering cross references automatically, and stuff like that. I worked on a project at the Stanford AI lab called PUB, and in just a few months, I had something going that used Sail, an ALGOL-like language that was popular. So PUB was kind of a subset of Sail that worked with text instead of numbers. It started getting used by people around the Arpanet, particularly grad students doing their PhD theses. For a lot of people, it was an adequate solution. Up to that time, I was doing application software for people in the Palo Alto area. I was known for making easy-to-use software, and I was very proud of it.

In the middle of my PUB development, I was visited by a fellow from Berkeley who said he'd heard about the project, and he wanted to convince me to change the names of all the commands to the ones that were in his program. I said, "I don't want to do that. They're not parsimonious." I mean, you would have a command that turns on indentation and then the opposite of it turns off indentation. It ought to be something that implies that it's the opposite of the thing with indentation. He said, "Oh, I'm in real trouble on this product. It's almost done. It's important that there be a standard set of terms, and you know, you're coming along here and you might screw everything up." He put a lot of pressure on me, and I was convinced to change all my names to these unmemorable names.

There are a few here, I think, who've used PUB and know that it turned into a not very good user experience. But the weaknesses of it inspired people. Rich Johnson at Carnegie Mellon created Scribe, which was a usable version of PUB, and then of course, Don created TeX. Those became important, and for various reasons, PUB faded away. But it helped me get a job at PARC, and at PARC, I got to work on publishing with Ginn & Company, a publishing subsidiary, a textbook publisher of Xerox. Then at Apple, I got to work as a tool supplier to the developers of Compugraphic's Personal Composition System called Lisa. Again, that failed immediately upon coming to market <laughter>, but my toolset got used and ported to the Mac and was used in Photoshop. So I got involved in little bits along the way in the different aspects of publishing. Particularly, memorably, modeless text editing and the cut/copy/paste model of modeless editing.

Grad: Larry, thank you very much. Paul McJones.

Paul McJones: Hi, I'm Paul McJones. In 1961 in junior high, I learned the California job case and handset the Gettysburg Address. That was my main exposure to real printing. In college, I took operating system classes from Butler Lampson and worked with him briefly on a timesharing system. Then in the mid-1970s, 1976, when I jumped at an opportunity to go to work at Xerox, which is where Butler was, and worked on the operating system for 8010 Xerox Star. That wasn't printing, but I was exposed. I was using Bravo as if it were FrameMaker or Ventura Publisher to create things like large technical publishing. I think the reason I'm here is I'm a friend of Burt, and for about 14 years I've been trying to collect historic software source code for the museum—things like the Xerox Alto software, which Xerox very kindly made available to the museum. The museum's Al Kossow managed to do a whole bunch of rescue work years ago. While I was at Adobe for a few years, I actually put together an archive—it's internal to Adobe—of historic software for many of the earliest versions of Postscript, Photoshop, Illustrator—well, not so much Illustrator—and a few of the other apps. I hope maybe someday John and Chuck will be able to donate Postscript 1.0 to the museum.

Grad: Thank you, Paul. Paul's been a big help to us in a lot of areas, including helping to plan for this meeting. For some of our other activities, he has been a real contributor to the museum. Jonathan Seybold, please keep this brief, remember.

Jonathan Seybold: My roots in publishing come from the fact that my father was Director of the Printing Industries in Philadelphia, later Delaware Valley, as I was growing up. I had all this stuff coursing through all the time. My first exposure to computers was during my senior year in college, 1963/1964. My thesis required that I use a computer. I used a computer at two o'clock in the morning at the RCA facility in New Jersey. I went to graduate school the next year. While I was doing that, my father founded a company called ROCAPPI, which we'll talk about later, that was the first commercial typesetting company.

It had dawned on me during my first year in graduate school that economics was going in a direction I didn't want to, that I felt very uncomfortable with. I began looking around and realized that the thing that made a huge difference for both democracy and a free economy was the exchange of information. At that time, this meant publishing, print, video, or something of this sort, which was expensive, time-consuming, and used all these craft industries, all this mess we've talked about, and it was in the hands of relatively few companies. There was this high barrier to communication. I realized that we had the chance to use computer technology to help people communicate and get rid of all this crap. I had a really strong feeling that computers were going to get better and better and better. We could start with text, but we were going to get to images, we were going to get to pictures, motion pictures, the whole lot. So here was a chance to stop what I was doing, change course, and be part of a really significant revolution. That was compelling to me, so that's what I did! First at ROCAPPI, then at Seybold, then Seybold Seminars. We'll talk about that later, but in June 1965 I set out with a sort of a vision that I could be part of something, and I spent the next 30–35 years doing exactly that.

Grad: Thank you, Jonathan. Richard Ying.

Richard Ying: I think I'm older than you, Burt, in the sense that what we did at Atex, I think, before this program, was not desktop publishing. So in a way, I'm sort of a pre-history, if this is the history of desktop publishing. So that is very old. Atex was three of us; my brother, Charles, Doug Drane, and I formed the company. We didn't have anything better to do when we got out of school, so we said, "We'll build a company." Of course, I'm the most important to the company for two reasons. One is that the other two are not here to defend themselves, and the second one was that I was doing software. You guys know, of course, that is the hardest part. For that reason, they keep me in the backroom, and they did the visionary thing. As a business, Doug could see what the whole society was going toward. He had grand visions, and he has spent the last 30–40 years doing very strange things that I don't understand. I won't go into that. But one of the things he saw was that computers could be used by normal human beings, instead of typing professionals. Typists, composers, or whatever were sort of like the word computers. Twenty years before that, "computers" used to refer to a group of people who sat in the backroom and did math, as we now know from popular movies. Back in the old pre-history days, typists were professionals who did nothing but type on typewriters.

Doug said that human beings could do that. Of course, I disagreed, but then, who am I? He said to do it, and we did that. In a way, the biggest significance of Atex was that we did the pioneering work to get journalists to use computer terminals to type to type their stories which could then go into the system, which was used to output the type. I remember our first newspaper installation at the Long Island—what was that paper called?

Seybold: *Newsday*.

Ying: *Newsday*, right. Thank you. At *Newsday*, an editor came up to me and said, "The last time they did automation on us," pointing to his colleagues' automated system, "See that? Those computers?" It was the IBM Selectric. He pointed to his computer, his terminal, which was the Remington. I threw it out the window. By then we had installed our system, and he was threatening to throw our computer terminal out the window. So I picked up the keyboard, unplugged it from the back, and threw it out the window. He didn't know that it was just a keyboard, that it was mechanical and wouldn't break. I went back down, pulled it up, stuck it into the terminal, and said, "Go ahead! You can do that all day!" <laughter> A few weeks later after we got the system up and running, I saw him typing away on that. So, I think that was right. Human beings can type directly into computers. I think that was the connection, the significant contribution we made.

Grad: This was in our sessions on the 1970s, because Atex is a bridge. The newspaper work that went on in the 1970s used some of the same concepts, structures, and technologies. One of the decisions we made with Jonathan's help was that there's a whole pre-history in the 1960s and 1970s that set the stage for what, in a sense, technologically happened later.

Ying: Another story I'd like to relate. Jonathan's dad, John, came up to visit us after we tried to sell our first initial system. My partners, Doug Drane, my brother, Charles, and I wanted to convince *U.S. News and World Report* that we actually knew how to do these things. So we had a monitor and a keyboard that we borrowed; it didn't look like much, because if you know the old monitors, they were a tube with electronics. We had no housing around it, so I put a cardboard box around it, spray painted it, and put the name Atex on the side. The senior editor of production from *U.S. News and World Report* came up, and he looked at it and said, "Richard! That's a cardboard box!" <laughter> "That's our mockup! The real one will look great!" Of course, we didn't make too big an impression, but John Seybold stood up and said, "Yes, these guys can actually build that system." I scratched my head and said, "How do you know?"

Grad: But he did!

Ying: And we did. John Seybold had the confidence in us that really got us started. So, thank you.

Grad: Thank you, Richard. We are, obviously, running a little behind schedule, but this is for record purposes. You guys know some of this. But we will have a record of this for people to read; they will know who you are, even 50 years from now. That's fine. I won't even be around then, in spite of what people are afraid of. <laughter> I'm going to ask the people around the outside of the table to go to the mic over there, please. Let's start with you, Doug Jerger.

Doug Jerger: I'm Doug Jerger. I started in this business on April Fools' Day 1970. We had \$300 between three us, and we decided we were going to make mainframe IBM software for financial applications. Eventually, we actually did. You guys are not excited about it necessarily, but it was online real-time systems, IMSDBDC. This was in the mid-1970s. Our customers were companies like Exxon Chemical, Roman Haas, Hershey Chocolate, Nestlé's, and Mars. In fact, the five largest sellers of candy bars in the world were product acquirers. We sold that product for about \$200,000, which was a tough sell back then, because folks weren't quite sure what software was. Standard Oil of Ohio also bought it.

That's where I got into the business, which eventually involved lots of things. I ran into Burt at Adapso in the trade association business and got involved with the history project that he is part of with a couple of other folks here in the late 1990s, early 2000s. As he mentioned before, if you have materials you'd like share with the historians and future generations, let me know. We'll see if we can get some information, get it together, and get it to the museum.

Grad: Doug has been a tremendous help over the years. He's been part of the Software Industry SIG and been a good friend for quite a long time. Thank you for helping out with this. Who have we got back there? John Shoch.

John Shoch: Good morning. I'm John Shoch. Very briefly, it's often said a lot of computer people overlap with music, but I think in this audience, it's clear that the computer people overlap with their college newspapers. I started out working on the *Stanford Daily* with long nights on the MTST editing, cutting, pasting, and sending proofs off. You learn very quickly that that's not a very great thing to do. The other thing that happened at Stanford is I took a class from a guy named Alan Kay. I was a bit of a wise guy, and at the end of it, Alan was giving me a hard time about something, or I was giving him a hard time, and he said, "By the way, what are you doing this summer?" I said, "I don't have any plans," and he said, "Well, Xerox is starting a Research Lab, do you want a summer job?" I stayed at Xerox for 14 years. I worked with Alan and got to work on Ethernet worm programs, many different things. My thesis was done on Bravo—thank you all who made that possible. It was printed on Dover with a little bit of a battle with Stanford. They told me it had to be in a fixed pitch font, and it had to look like Courier. I said I didn't think that was a sensible thing to do.

I later went to the business side, and I ended at Corporate Headquarters. I was President of the Office Systems Division, so I oversaw the first-generation Xerox Star, the second generation Xerox 85, publishing systems, office systems, and Japanese document systems. As I left, there

was an effort to go down market into the desktop publishing business with a single workstation and with a single small laser printer. It was sort of too little, too late from my point of view. I got fed up, as we all did eventually, and got frustrated and left.

I tell people I have a long career and a very short resume. A third of my career was at Xerox, and two-thirds of it was in the venture capital business. One of the first things I did in the venture capital business was visit a guy named Steve Kirsch in his apartment. He showed me a prototype of a Sun-based word processing, document processing system. I had so much scar tissue from Xerox. I remember I asked—you don't remember this, I'm sure, Steve—I asked him if he had leader dots yet. I was testing to see how deep the program was because I knew how complicated the problems were. Some of you know what leader dots are. He looked at me and said, "What's a leader dot?" I said, "I'm not investing in this company." It was one of many mistakes I've made in my life. <laughter> I'm also on the board of the Computer History Museum and thank you all for coming.

Grad: John, thank you so much.

Shoch: We got a standing ovation when we announced leader dots at a user group. I mean, that's crazy!

Grad: Was Dave Kearns the president at that point in time? Chairman?

Shoch: Yes, he was. I worked for Dave.

Grad: Dave was my boss at IBM about three levels removed. Next, we're going to go around there. John Markoff.

John Markoff: So my career as a journalist has crossed all of the inflection points in the presentation of text. I worked at my college newspaper in Whitman in 1968. I would take the copy to the *Walla Walla U Bulletin* and the guys who handled hot lead would mark it up. I went away and I became the editor of that paper, and when I came back in the fall, all of the printers were gone. They'd been sold off to a little paper in Oregon and been replaced by women who were working at IBM Selectric typewriters, probably, in offset printing.

My current project is a biography of Stewart Brand, who I think is sort of in the thread here. *The Whole Earth Catalog* was an important step in publishing at a certain point in the late 1960s. He was also the first person to use the term "personal computing" in the modern sense of the word in his book, *The Two Cybernetic Frontiers*. I'm looking forward to that project.

Grad: John, thanks for joining us. Hansen Hsu.

Hansen Hsu: Hi, my name is Hansen Hsu. I'm a curator here at the museum in the Center for Software History. I am one of the younger people in the room. I got into computers through the Macintosh. I have been a Mac fan ever since I got a first Mac Plus. I was really into fonts, so thank you all for getting me into this field. Because of that, I got an EECS [Electrical Engineering and Computer Science] degree at Berkeley and I joined Apple, testing the Mac OS-10, for six years. I left Apple in 2005 to study history. I got my master's at Stonybrook and then went on to Cornell to study sociology and the history of technology, where I finished my dissertation on third-party Apple software developers two years ago. Thank you.

Grad: Hansen works with David Brock and is part of the Center for Software History, which has become a new organization within the Computer History Museum in the last year and a half or so. It's just a tremendous thing! The focus here at the museum is not just boxes and equipment—I think Len Shustek has had this in the back of his mind for a long, long time. We now are talking about paper and people and software! Not just the physical software, but also the stories about it, which we just love.

Let's keep going. Ann Hardy. Ann Hardy is the co-chair of the Software Industry's Special Interest Group now.

Ann Hardy: Thank you for the introduction, Burt. I am not an expert in the field that you all are experts in, but I did get into computers back at IBM in 1956. I've been at this for a while. I started with IBM 704, 705, and eventually Stretch, where I was on the team that wrote the Fortran compiler. Then I moved over to Livermore, where I wrote the Fortran compiler all over again for Livermore. Then I came over here to work on timesharing, which was 1966. I was the one who adapted the Berkeley operating system to timeshare in the SDS 940. I spent many years there, doing a variety of projects including things like online airplane reservations in the 1970s and online banking in the late 1970s, early 1980s. We used to travel around a lot. As early as the late 1970s, we could make our own plane reservations wherever we were, so we could come home whenever we wanted to. This was with no intervention from travel agents, just directly to the airlines. Timesharing was interesting, pioneering work.

After that, I did a lot of work with secure systems and privacy. I ran a company that worked with Sun on several different contracts, including the financial services electronic check program—again, much emphasis on privacy in transactions in the industry.

Grad: Thank you, Ann. Ed LaHay has been another very active member of the Software Industry Special Interest Group. Ed has been in the computer software field for almost as long as I have.

Ed LaHay: Hello, my name is Ed LaHay. I have the pretentious title of being project manager for this conference. That translates into doing whatever Burt thinks I should do. <laughter> My background is in computer software, mostly in the applications area and tools to build

applications. But I've done everything you can do. I've built it, broken it, fixed it, sold it, and installed it, and I've managed projects and people that do that. I'm impressed with being in such an august company of people.

Grad: Thank you, Ed. He has been a big help for all of us for many years and particularly for this meeting. Last, but very much not least, Len Shustek, chairman of the Computer History Museum.

Len Shustek: You'll hear more from me later, so I'm actually not going to say very much now. Burt has me talking over lunch, so I'll do that. My connection to this field was, one, I never worked on my school newspaper, so I'm an outlier. The closest product that I was involved in, actually a non-product, was when I was a graduate student at Stanford under Forest Baskett. I designed and built a low-cost, high-resolution, at the time, 640 × 480, video graphics terminal. It was quite successful, except we weren't able to make it a product, because neither Forest nor I knew anything about making products and starting companies at the time. This was about 1974. My officemate couple of years later, Andy Bechtolsheim, actually did manage to do something similar with better hardware and better software and make a successful company out of it. He was a role model for me, but you'll hear more from me later. Thank you, Burt and David for organizing this great panel, and all of the rest of you for participating.

Grad: Let's not let him off quite that easy. He's been the chairman of the Computer History Museum here since the beginning. He's the one who brought all 17 truckloads of equipment from Boston to the Moffatt Field here. Was it 1997?

Shustek: 1996!

Grad: That just shows how my memory's going. That's it. Len has guided the museum all of these years. It's an incredible institution. For those of you who don't know it, get to know it. They've done an unbelievable job here, and it's become the focal point for so much of what's happened in the history of the computer industry.

This is the end of Session 1.