Desktop Publishing Pioneer Meeting
Day 2 Session 9: Impact and future of Desktop Publishing

Moderators:
Burt Grad
David C. Brock

Editor:
Cheryl Baltes

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Desktop Publishing Pioneer Meeting:
Session 9: Impact and Future of Desktop Publishing

Conducted by Software Industry Special Interest Group

Abstract: Session 9 of the Desktop Publishing Pioneer Meeting explores how desktop publishing technological advances and the digital revolution have impacted file sharing, graphic design, and the publishing industry. The meeting participants round out their two days of discussion on the history of desktop publishing by speculating on the future of digital media and mass communication. Topics include where the industry is headed and the effects that is having and will have on our society. In particular, they discuss the dramatic impact desktop publishing has had on the publishing and graphic design industries: who is able to participate in creative work, what is produced, how it is distributed, and when and where it is viewed.

Participants:

Name	Affiliation
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

Burt Grad: Let's take some time to look ahead some. Some people may have to leave early, so I may ask them for their thoughts and concepts rather than just go around the table in the normal fashion. I'd like to discuss the impact of the printing industry and the economic effects as a result of your technologies. We've talked about some of that, and I'd like to hear about what you see. Many of your organizations made a change to our social fabric. That may be something you guys have either appreciated or have information about. For example, how is this related to word processing? I know that there's a level of what you can do that word processing can't, but is there an intermediate ground? And how has that changed over time?

We can also look ahead, beyond the 2001 timeframe to the effect of the Internet and the Web. What do you see happening in the next 10 years that will dramatically change the publishing industry or change the way the work is done? You can bring up your own topics. This is an open discussion.

Changes in Graphic Design

John Warnock: I'd like to ask Jonathan a question. In the 1983 timeframe, my count on the number of graphic artists in the U.S. was like 275,000, something like that. Do you know what the number was?

Jonathan Seybold: I don't know. That seems like a likely number, but I don't recall any independent verification of it.

Warnock: The Adobe creative suite currently has an installed base of what, eight million?

Grad: Worldwide.

Warnock: Yes.

Grad: Paying seats.

Grad: Who are they?

Warnock: Everybody.

<group laughter>

Grad: Give me some examples.

Warnock: Well, it turns out it turns out that the desktop publishing revolution has empowered ordinary mortals to be incredibly creative. In the old days, when the 275,000 number was there,

you had to be really good with a rapidograph pen. You had to be really good at a waxer. You had to have an intimate relationship with a typeset or service bureau. You had to cut out a lot of paper. You had to paste it on a lot of cardboard. That was the population who could do graphic arts.

Chuck Bigelow: You had to heal quickly from stabbing yourself accidentally with an X-Acto knife too.

<group laughter>

Grad: Did the X-Acto knife people go out of business as a result of you guys?

Warnock: No, but Letraset is a smaller mini press than it used to be. Press on letters used to be a booming business.

Electronic File Storage and Sharing

Grad: I'm going to be selfish. There are two people I want to ask to start with and then we'll just sort of go around the room. Chuck, I'd like to get your thoughts on any of these subjects about what's happened since 2000. What do you see happening in the future? You've got exactly three minutes.

Chuck Geschke: Oh my God. Well, I'm a business man. I can't tell you about the future because you might beat me there. I want to echo what Jon was just talking about. There are so many people today who feel like they can design something. They were never able to realize that before because they never really had the motor skills to do it. Having an idea for a design is very different than the ability to actually create it. That dynamic changed; many more people feel like they have the power to actually do the creation of it. As to where we go in the future, you know the world of information distribution and sharing has changed so much because of desktop publishing. The one technology that's made probably the most dramatic impact on that is Acrobat.

Grad: Adobe Acrobat.

Geschke: If you think about the amount of money and the amount of environmental damage you do to put everything on paper, if you think of what it costs to transport that paper, if you think about what it costs to store it, and if you think about what it costs to search it, you can see that this has had and will continue to have an even more dramatic impact on the world. The printing press had a tremendous impact sociologically, politically, in all sorts of ways. Now we are putting information at the fingertips of people in ways that we've never done before.

It's a combination of things including Google search. But it's also the way you can present the information, get access to it, and search it that has changed dramatically. I have a little Fujitsu scanner on my desk. I don't store paper at home anymore. I just throw it in this scanner. It converts it to a searchable PDF, and I throw it onto one of these gazillion terabyte disks that I have. My life is different, and my access and my ability to recover information is completely different.

I think we're just beginning to see what the impact of all of this is going to be. The way information is going to be created is going to be less and less static and more and more dynamic. You see what kids are doing today with mobile devices. They're creating movies. They're doing all sorts of things, and they can share them and distribute them and store them and keep them. That's changing things. That's the kind of change I expect to see continuing and that will continue to expand.

Paper versus Digital Information

Grad: Larry, I know that you might have some time issues. I'd like to ask you to be next if you don't mind.

Larry Tesler: The publishing industry was one of the first to be disrupted by the digital revolution. In a lot of ways, it maybe could be a model for some other industries as to what they should expect, hope for, fear, etc. I think today's publishing industry may be unrecognizable to somebody looking at it from 40 years ago. But a lot of the old traditions of aesthetics that several people have mentioned here as being very important have been preserved. That's something I think this group should be proud of.

Bigelow: I want to make a quick remark. Looking around at my colleagues here I see many of us have gray hair. One of the things I noticed when we sat down was you gave us a pad of paper and a pen. This is probably one of the last generations that can be expected to actually use handwriting to take notes at a conference. In 10 years, they'll have either voice or some other method. We might be among the last few who can still manipulate these writing instruments.

Grad: I still remember when Tom Haigh was coming to our meetings. The first thing he did was put his computer on the desk and start taking notes the entire time. If I wanted verbatim transcripts of what anyone had said, Tom had all of that information. That was shocking to me that someone would do that, but now it's common. If you're with a younger group, half or more will have a computer sitting on their desks in front of them.

Digital Fonts

Bigelow: I just want to say one other thing. In 1983 I published an article in *Scientific American* about digital typography. Here's the first of page it. I was asked by the editors, can you predict what the future will be? I thought, "Okay, I'll make a wild guess." In 1982, when I wrote the article, a commercial typesetting shop maybe had 200 to 300 photo fonts. A big one in New York City might have had 1,000, but that was it. We said in this article that there would be creative design coming, and there would be a synthetic system in which the type designer could interact rapidly with a computer and immediately see the effects of design on screen. There was no such system yet, we said, but one would be coming. When that was ready, there would surely be a flowering of new letter forms as the digital era, like the eras before it, entered its creative phase.

This turned out to be true, and several years later Adobe brought out the Adobe Originals and other firms followed suit. Now there are 100 times, 1,000 times more type designers than there were 30-some years ago. What I didn't say, and I'm glad I didn't say it, is that I thought there would be more original faces. If we had 300 to 500 in 1983, maybe we'd have 2,000 by the year 2000 or something. Today, the biggest type firm has somewhere between 50,000 and 100,000 fonts for sale. Some are copies and versions. but that is far beyond what I could have predicted 35 years ago.

Grad: Do you need so many? That's a punch line of a lot of jokes.

<group laughter>

Bigelow: Which we won't repeat now. Anyway, there's a lot of fonts. This has been due to not only the vastly expanded market, but there are much better tools that Adobe has used, and other companies have sprung up.

Grad: Are there some countries that have created a number of these kinds of type fonts? I'm thinking about the Chinese, the Japanese, or these other kinds of languages.

Warnock: Yes. There was no practical way for the font market in Japan and China to explode because there were no tools that you could use to produce them. I mean it's just too much. The Chinese alphabet has 20,000 characters.

Butler Lampson: China and Japan also have a much stronger tradition of calligraphy than we have in the west, a lot more motivation.

Grad: This is what I was getting at. I know in English we have the different letters, but are there 10 variations of each of the 20,000 that have different artistic quality?

Warnock: Absolutely. Now there are.

Grad: That's been another whole range.

Warnock: Yes.

Bigelow: And in Arabic. In fact, as you may have read, the city of Dubai has just commissioned its own font in an elegant Arabic style. All of that was almost unavailable in traditional metal typesetting.

Grad: What about Hebrew? Are they keeping up?

Bigelow: Hebrew also. Oh yes. There are several firms in Israel.

Grad: Incredible.

PDFs and Digital Archives

Lee Lorenzen: I have a question about PDF. I heard a stat probably 10 years ago that when a new version of PDF comes out on the Web, hundreds of millions of systems have to upgrade in something like 48 hours. Maybe it's billion of systems are upgraded. What's the number?

Warnock: It's billions.

Grad: Billions?

Lorenzen: When they update PDF, everyone needs to get the newest reader because the next document that comes down might have that format. You've got to pull down the new version.

Warnock: We've standardized it to an extent. If you're with the U.S. ISO standards of PDF, we have very meticulously kept forward and backward compatibility so that you can read the document. We have attempted to judiciously keep it so that it's both forward and backward compatible. A lot of the upgrades are for security reasons and for reasons of robustness and reasons of expression. It's taken incredibly seriously to keep it incredibly robust.

Lampson: You shouldn't be surprised that it's billions of updates because every digital device with a screen has PDF on it by default.

Dave Walden: With PDF having become the standard by which we save everything, is there going to be an archival issue someday about readabilities of my PDF today?

Warnock: That's what we take really seriously.

Sproull: It's damn good. It's better than what libraries do. It's meant to be robust, and we didn't even attempt to approach the standards committees.

Walden: I would guess most people don't save an archival PDF. They just output whatever PDF is on their device.

Warnock: Most PDF files are really, really portable. We're probably more proud of that product than any other product.

Sproull: I think you should be. The software industry does not by and large build things for the future. And PDF is. For example, C is a standard because it changes slowly now. It didn't use to.

Lampson: Coverity, the company that sells software that analyzes C programs, wrote in a paper that one of the first things they learned when they started dealing with customers was that there's no such thing as C. Every major customer has their own slightly different C.

Multimedia-Enhanced Communication

Liz Crews: I want to add a comment following on what John said. I think what desktop publishing has done in the social context is given everybody a new voice, a voice that allowed them to present information in first black and white, then color, then images, etc. We've given people the ability to direct it to who they want to by customizing limited editions of things and producing art that they can sell or produce on the fly. I think we've just given the world a voice. Where is that voice going to go?

Warnock: I'm on the board of the Sundance Institute. Sundance's primary thing is to teach filmmakers how to make film, to support independent filmmakers. They have laboratories where they teach people how to make films. More and more of the Academy Awards are coming out of the Sundance Labs. The number of documentaries is exploding. My latest effort is to try to convince Sundance to say, "Gee, every teenager has a filmmaking machine." They should build online courses to upgrade and teach kids, teenagers, how to make film, how to write scripts, and how to film using their phones. Focus on 7-minute films or 30-second films or whatever. That's the next sort of phase in the communication in the world.

John Scull: Communication is changing because of the cloud and software being in the cloud. Increasingly, everything is multimedia because of the phone. Teenagers like my daughter are completely fluent in all things digital. They don't think about pieces of paper. They have iPads. They have smartphones. They have MacBooks. They don't think about just words even though they can be great writers. They think visually. It's a very interesting literacy. I think the tools need to evolve with their sensibilities and their skill sets. I think you'll see some transformative

things happening over the next 15 to 20 years in the ways people communicate and do some pretty compelling stuff.

Grad: On the screen, is there a different nature of how things should look? Is there a whole different graphics picture? Is there a whole different way in which we want to present things on screens?

Paul McJones: Last time I was sitting next to Charles Simony, who unfortunately isn't here today, he said something that really resonated with me and kind of links back to 49 years ago. One thing we don't have is a shared working surface. We've got all of these wonderful tools, but collaboration isn't nearly as easy. There are some screen-sharing apps, but they don't interoperate. There are ways for our teenagers and our younger kids to be creating all of this video and wonderful stuff, but it's getting locked into proprietary things like Facebook. It's all, "Meh." Charles would like to see, and I think he's right, what Doug Engelbart had in 1968: a way for people to work together, a shared surface for people who aren't in the same room to reach into that surface and create together.

Donald Knuth: I can't resist giving a plug for a talk I gave to sort of conclude the TeX project. It also represents my final paper. If you're interested, you can look it up on the Web under my name. It's called "An Earthshaking Announcement," and it's about a 25-minute video. I gave this talk in San Francisco right near where Steve Jobs would always make his announcements for the Macintosh. I announced the successor to TeX. It didn't only include things like 3D printing; it went way, way beyond that. It included Facebook, Mathematica, Google, and so on as a subset of the future successor of TeX.

Grad: This is fitting. With paper, we all had the same thing. Now we can see the same thing because of the PDF. But is it better, worse?

Unidentified Speaker: I couldn't live without it.

Screen-Based Design

Martin Ruckert: I think we talked about today how the LaserWriter and PostScript started desktop publishing because they let people get ink on paper in high quality. What we saw on screen was always an approximation of what we would get on paper. Even the LaserWriter was only an approximation of what we would get with a high-resolution Linotype machine, but the goal was paper.

Nowadays we have a lot of content that is produced. Content means text and images and videos and all of these things. It's not produced to be put on paper. In the end, it's produced to be seen on screen. PDF works pretty bad on these devices because it's too small for preformatted pages. HTML (Hypertext Markup Language) is a more flexible format. I heard

some negative words about HTML when we spoke about it because of the quality, because it was never designed as a language that presents high-quality output on mobile devices.

We are back to problems we had in the 1970s in terms of efficiency because space and time costs in terms of a battery lifetime. We have to be efficient again, and all of that growing memory costs battery. I think the next big step is getting publishing ready, not on the desktop but for the screen, which is a new problem. We have to solve it because that's what young people use to read. They don't read books. They read on a mobile device. We haven't solved it yet.

Larry Tesler: Designers have to think about what you are talking about, about how the screen size and proportions might change. The solution to that is a work in progress; they call it responsive design.

Sproull: Well, there are experiments in all of this, but nothing is approaching what's needed.

John Scull: What do you think of Canva? It's a desktop publishing app in the cloud. It's on the iPad. As far as I know, they are selling a lot now. It's really taken off.

There are like millions of users now. It's relatively inexpensive. It's a cloud SAS [[(SaaS) software as a service?]] model that you can get on your iPad or your iPhone. It's ideal on a Macintosh or a PC because it's web-based.

Seybold: I've got two thoughts here. Back to what Bob Sproull said: presentation does matter. Something on a screen is not the same as something on a paper; that's why when we really want to read something so many of us print it out and read it on paper. Something on a 27-inch monitor is not the same on your iPhone. That becomes an issue as everything is increasingly electronic. I think it's an issue we'll be with for a long time because we have such evolving and such varied methods of presentation. This is probably one of the fundamental technical problems we face. I'm not sure what the solution is, but we have to recognize the fact that it is different. Seeing something on your phone is different from seeing it on a piece of paper and different from seeing it in on a big screen.

Side Effects of Digital Freedom

Seybold: The other thing I wanted to say goes back to Liz's point about giving everyone a voice. I've got sort of mixed feelings about this. When I started out, I visualized where we were going in sort of general terms. I don't think I visualized how far we would have gone in the 50 years since that time, but this is the general idea of where I thought things were going. We have given everyone a voice. We have democratized information, and the implications are profound. We can find all kinds of examples of this. But in the process, we have introduced some problems that we started talking about in 1990 because we could see them coming. First, when

everybody is a publisher, we destroy the publishing industry. We destroy its economic foundations. We destroy the jobs of editors, checkers, and those who ensure the veracity of what's being published.

The second thing is that we have created online communities of people who have like thoughts and like ideas and so forth that we never could have had before. This is extremely powerful, but there's a downside to this that we really need to wrestle with. Very early on, probably 1991 or so, after we made a presentation on what was happening, Sid Sheinberg who was one of the two top people at Universal immediately said, "What you are talking about is a world in which I lose the mass audience." He was talking about trying to sell something to them, but it dawned on me that what he really also meant was that we lose the mass community, the common community that's the larger community that has a sort of a common view of the world. This is probably inevitable, but it's something we really need to wrestle with because there are dark sides to what we're doing as well as bright sides.

Natural-Language Processing and Voice Control

Lampson: I wanted to pick up on what Bob said. I absolutely agree that there are big unresolved problems. But in addition to that, many people have commented on the fact that a very important aspect, maybe the most important aspect of desktop publishing revolution, has been that now many more people who are not professionals can do it. I think we still have a long way to go into that regard though. There are a lot of things that are still fairly hard to do. I'm not a serious Photoshop user, for example, but I use it occasionally. I know that most of what Photoshop can do is a complete mystery to me.

Every now and then I want to do something that's not at the tip of my fingers, so I do Web searches and futz around. Maybe I find some buttons that I can push, and maybe I get the desired result and maybe I don't. It shouldn't be like that. I should be able to tell the system the effect that I want. Some combination of natural-language understanding and machine learning and it's having seen 50 million pictures that are similar to the one that I'm working on should make it possible to do my job much, much easier than it is today.

This isn't to say that there won't still be a role for professionals who are much more skilled at doing things. But I think it will become much easier for relatively naïve people to do things that now are far beyond their reach, just as producing a decent-looking four-page newsletter was beyond their reach in 1970.

Grad: Let me follow that with one more question. Voice. Primary mechanisms. Keyboards, drawings, things like that. Are any of the systems responsive today? I want grayscale. I want it to look this way; draw me a circle. I'm working on a spreadsheet. I want to put vertical lines and horizontal lines. I have to go through five or six steps to get that to happen. I'd like to just tell the machine do it for me. Anybody?

Sproull: Indeed, for simple cases…

Tesler: Knowledge Navigator.

<group laughter>

Tesler: Knowledge Navigator Apple in the 1980s?

Scull: In 1985 or 1986, we had a visionary video that was done by our creative service and advanced technology group to paint a picture of what we thought the world was going to look like at some point. We were actually pretty close to it.

Lampson: Where is it?

Scull: It's a pretty cool thought piece. It's called Knowledge Navigator.

John Schoch: I am intrigued by the statistic that there were 247,000 or whatever professional graphics people some time ago and there are 8 million today. There were 250,000 professionals making a living at it. Today we have eight million people who are users of Adobe's creative suite, but does that mean there's a lot fewer than 247,000 professionals who do it for a living?

Unidentified Speaker: There are a lot more professionals making a living.

Schoch: That's good to know.

AI and Semantic Understanding

Schoch: This is a moment where I become a glass-half-empty person. The Knowledge Navigator video was a great myth. Over 20 years ago, we had a little startup with a couple of guys and a bunch of AI and a really cool system for natural-language processing and semantic understanding. It actually didn't do voice recognition, but you had some simple databases, and they would tie them together. You could ask questions like, "Who makes more than their boss and traveled to Paris between two and seven weeks ago?" It was a join across four different databases to give a reasonably semantic answer to this question. We talk a lot about document publishing, movies, and TV, but I was thinking Chuck is scanning all of his documents so he can search them. But he can't search for the semantic content. For example, come April 15, he needs to be able to ask, "How many of the documents that I've scanned should have been sent to my accountant but haven't?"

This is a really hard problem. This is so much harder than publishing. What the hell does the K1 look like? There's a lot of bullshit about AI right now. I do not believe the vast majority of the answers I get back when I ask Siri questions.

Warnock: You haven't asked an Alexa?

Schoch: All of them come back with what they find on the Web, and it's a keyword search. It's like, "I'm sorry. This is a semantic question that a six-year-old can understand."

Lampson: Well, your six-year-old is really something with K1.

<group laughter>

Schoch: I look at what I think of as a lack of progress for 20 years on semantic understanding of all of this information. We can look at Knowledge Navigator and dream about it, but I bet a very fancy dinner that we won't have much progress in the next 10 years.

Social Uses of Digital Media

Paul Brainerd: I was always proud of desktop publishing and that it extended the power of the press to a much larger audience. I believed fervently in that concept. When Boris Yeltsin, for example, took power in Russia, he used PageMaker to create a document on a Xerox copier and that was the driving force. We didn't get paid for that copy of PageMaker. Neither did we paid for the 20,000 or 25,000 copies that were in Russia.

Today though I'm scared. I really am scared of the social use of this media and this tool that we've given to this broad audience. I was schooled in journalism. I got a master's degree. My thesis advisor was a guy named Gilmore that was the press law professor. I was taught ethics, that the press had a responsibility to the public to tell the truth, to investigate, to ask good questions. Some of the things I'm getting in my email box these days just scare the hell out of me.

Fake news. Whatever you want to call it. I hate that term. People are using psychological profiling to target individuals with misinformation and to confuse the society and not serve the public but to serve their private or personal or political belief. That scares me right now. We're losing control of a lot of this technology. All of us around this table are in this little liberal bubble; this privileged few from a world that we did well with. But look at all the rest of the people that are believing this stuff. That scares me. I think we all have a personal responsibility to be thinking about that. We've created these tools. How are they being used now? What can we do to perhaps make a difference in that respect? I don't have the answer by any means, but I'm scared.

Beyond Screen- and Page-Based Displays

Marc Weber: I wonder about how design and publishing will move into the world around us. Basically, we've gone from the 8.5 × 11 inch page to the screen. Now we're going smaller and smaller. We're spending a lot of our lives looking at something the size of a business card. That may seem like that's just the way it's going, but there are people dreaming of giant e-paper wall screens, augmented reality, virtual reality, brain–computer interfaces, and even objects that are active and computer controlled. There's a number of possible ways that the visual world and other media are going to break out of the boundary of the screen and the page.

I think that's what we need to think about going forward. What happens when the rectangle is not the only frame for a lot of this? If you go to the Disney store in San Francisco, you'll see a system where they can control everything visual on every wall with projectors. If a kid comes in for Tinkerbell's birthday, she flies around and the letters come on and give the name. They use simple controls for the entire environment. And that's one example.

For the Web, — HTML was originally designed to be device independent. On a very, very simple text device, the heading level two might just be bolded on something with real fonts that would come out truly designed. For the deaf, it might simply speak more loudly than a heading level three. On some big visual display, maybe you would get a different way to emphasize it. That whole idea of device independence may be more important as the parameters get broader as to how we display things.

Grad: In a car or in a plane, they talk about projection with glasses or something. Is that something that's being worked on?

Lampson: Oh yes.

Warnock: Oh yes.

Grad: Where is it being done?

Unidentified Speaker: Many places.

Sproull: As an old fart whose eyesight is getting worse, the one advantage of glasses is it will largely get rid of the cellphone problem, mainly making the screen so small. You can make the retinal image anything you choose. The optics of the glasses may be intolerable for other reasons, but to compensate for all kinds of visual deficiencies, they could be a godsend.

Repercussions of Mass Media, Print and Online

Lorenzen: One of the things on your paragraph summary here is the connection to the Internet and the Web. When we worked on Ventura Publisher, we were putting tags back in the document. Looking back, I said, "Wow, that looks a lot like HTML." What I've been thinking about is how we missed this because we knew about hypertext from the stuff that Xerox was doing. How did we miss just creating a link between one of our documents and another one of our documents? How did we miss the sort of opportunity that the Internet provides? That's essentially publishing for the Internet.

In a way, document publishing with Facebook is self-publishing. Basically, when you put your profile into Facebook, when you tell all of your likes and dislikes, you're essentially treating yourself and everything about you as a document. Now that's published to the Web for everyone to see and search and target for advertising. —

When Facebook was first coming out, I was looking at the ad manager inside of Facebook. — It'd blow your mind to really go into "create an ad" inside of Facebook and look at all of the demographic slices that they can do. Let's say people in Dubai, 18 to 20. When I was testing this, I went all the way down education level, likes the Beatles, hates gardening, all of these things basically you can narrow down. That's so amazing. There's 1.8 billion people on Facebook. Pick women, and then it's down to 900 million. Pick those who live Pacific Grove, California and are 18 to 25: now you're down to 13,000. Likes the Beatles: you're down to 140. They tell you the exact counts of these people down to these levels. They took this out of the system, but when it first came out you could also select sexual preference, so you could look for people in Saudi Arabia that were male with a male sexual preference. I was thinking, "Oh my gosh." If you were the secret service of Saudi Arabia, you could run ads saying, "For free laptops or whatever, click here." You could extract out of the population people that thought they were safe because they were just on Facebook interacting with my friends. Yet, you're targeted down because you essentially self-published your life. There're huge dangers here. I have a lot of faith in the folks at Facebook. Both of my sons work at Facebook now, so I definitely pay attention to what they're doing, but we're putting a lot of trust in what people do with our entire life picture.

Richard Ying: I have a glass-is-more-than-half-full answer. I want to direct you to the 1400s, 600 years ago. When Gutenberg came out with the press, there was a big uproar: "Now we are going to have books that are not the Bible? That is going to corrupt everybody's morals."

Unidentified Speaker: It did.

Ying: And it did. We had Shakespeare and Dickens. We have all of these riffraff publishing books that would not have been published without the printing press. So I'm an optimist. I've been around long enough. I believe that Moore's law is more than just transistor count. It's about all of us. It is our creativity. Yes, we do dumb stupid things, and I speak for myself. But by

and large, as a species we tend to grow exponentially. Every generation will grow faster than the others, no matter how dumb we are, including our president. Sooner or later, we will cover our tracks and the next generation will do something better.

Scull: Your hypothesis is that we now have the ability to try a lot of things because of its democratized. But we also can fail and people can see it. We can self-correct. We can iterate. It is a process. Now more quality will evolve, and you believe that will lead to a more positive outcome.

Ying: Right.

Scull: I like that thinking. I share it, so I fundamentally like it.

Ying: Your exhibition down there is called Evolution. Right? I'm an optimist. I want to put that to you guys.

Bigelow: In the first 50 years of printing after Gutenberg, until roughly 1500, some people accused the Gutenberg Bibles of being witchcraft because they were identical and, as you said, they corrupted our morals. Roughly 12 million copies of the Bible were printed in those 50 years, which is more than all of the manuscripts hand-copied in the previous two or three centuries. That was one of the great explosions of information.

Ying: We are accelerating that explosion right here.

Bigelow: A few years ago, we did an analysis not of the number of books published, but of the number of authors who publish. This was 2009 in *Seed* magazine. We plotted all of this stuff. Of course, it's not quite exponential but it's a very steep climb. People said we extrapolated a little too far because it would become the entire population of the Earth. Really, it's bottoming out at about two or three billion with Facebook, Twitter, and so forth, so we're not there yet. But even presidents can be elected by becoming authors on Twitter.

Inflection Points in the History of Desktop Publishing

Grad: Tom, you haven't said anything yet. You always have thoughts on every subject?

Thomas Haigh: As a historian I spend a lot of time reading old stuff, and as a historian of computing, the old stuff I'm reading is often predictions about the future. I see how terrible everybody is at it, so I'm reluctant to do that. But I could ask a question about how the present could have been different.

I'm working at the moment with Paul Ceruzzi on a third edition of his book *A History of Modern Computing*. That involves trying to tell the whole history of computing in a single book, which is

probably going to have one to two paragraphs on desktop publishing. In trying to pick and choose which topics to focus on, I think one of the things we're trying to do is get the sense of the key areas. For example, if a particular product hadn't succeeded or someone had never been born, would we basically have got to exactly the same point in the evolution of technology and markets and users, except maybe a different person would have a private jet? On the other end, which are the ones where you can say if someone hadn't had this idea at this point, maybe this completely different approach would have taken hold? We heard one of those mentioned earlier: people might have picked up on the collaborative working part of the Engelbart demo and that could have been baked into technologies along. Then maybe we'd be in a completely different kind of world.

I would be interested to hear if anyone here can nominate something they think is one of those turning points. If they or someone else had made a different design decision, had succeeded in something that they failed at, or failed at something they succeeded at, we would have not just taken a different path to get where we are now but actually have finished up in a different place.

Seybold: Let's go back to the question I asked earlier, for the Apple guys. I would contend that if it were not for desktop publishing, Apple would not have survived the 1980s. I would contend that our computing world would be very different now if that had happened. If we had been left without Apple, Microsoft may have been the dominant one.

Ying: No smartphone.

Seybold: Where would we be right now?

Lampson: Where we are.

Seybold: That's my view.

Scull: I think a lot about what would have happened if Steve had stayed versus if Steve had left and what effect that had. It's kind of like the commencement speech he gave at Stanford; you really never know about your life until you look back and see that, in fact, your history is what allowed you to get where you are. You can't always plan things.

I think a lot of that also applies here in that maybe the iPhone, which was transformative, may not have happened the way it did if Steve hadn't gotten kicked out, done NeXT and failed, and then come back having learned a lot and grown personally. It's interesting; it would make a good movie.

Seybold: Yes.

Lampson: Charles Fort said it long ago. He was kind of a kook, but he said some sensible things. One of them was, "You'll get railroads when it's time to railroad." For the most part, at least in the kind of society that we're accustomed to living in, things show up when the underlying technology or whatever makes it possible for them to show up. If Bob Taylor hadn't been there at PARC, the whole world of graphical distributive personal computing would have been delayed maybe by five years, but certainly not by 20 years. And I believe that's true for absolutely everything.

Grad: You don't think that things take a different direction?

Lampson: Not dramatically different. No.

Grad: So if Hitler had not come into power, you don't think that would have changed the world?

Haigh: Let's not talk about that one.

<group laughter>

David Brock: I think we're shifting topics.

Grad: I'll back off. Excuse me.

Ying: Look at it from a 100-year perspective. Look at Germany today. We covered all of our mistakes. We all die. We die with our mistakes. The next generation will pick up, and hopefully, they will do the right thing.

Lorenzen: I like Richard's world a lot. I'd like to live in that world.

Grad: It's a world I'd love to think about.

Lorenzen: That means there's time to fix mistakes. If you don't get to them, maybe your grandchildren will, or something like that.

Ying: Yes. When you get to be 70, you say, "Why the hell didn't I see this 50 years ago? I'd be rich.

Unidentified Speaker: Maybe not with global warming.

Ying: If you think 100 years from now, there will be no global warming. We have enough power, solar energy coming down to reverse any CO_2 that we can generate if we can figure out how to capture that.

Lampson: When people tell me that the world is coming to an end because of *X* or *Y*, I tell them that they should go read the "Strategic Bombing Survey," which was commissioned by the U.S. and U.K. air forces after World War II to find out whether the strategic bombing program that dropped a lot of bombs over Germany during World War II, killed hundreds of thousands of people, and destroyed a lot of infrastructure was successful. The goal was to cripple the German war material producing economy, and it failed. The reason it failed is that the systems are much more resilient than anyone understands, never mind the doomsayers. The doomsayers say there's some relatively minor perturbation going on here, and they can construct a scenario in which it will amplify and terrible things will happen. That's not what actually happens. People compensate in one way or the other. The compensation might be very painful, but it's going to happen. The world has is not going to come to an end.

Grad: I have one last question before we break up here. Is it really desktop publishing anymore? Is it some other form of communication—we're calling it a railroad when we should be calling it a transportation system? Isn't this now a communication system?

Lampson: It's totally appropriate to call it publishing.

Warnock: Desktop publishing was a great term when John Scholl [Scull?] was helping Apple. It's no longer relevant.

Grad: Is it limiting? That's really what I want to get to.

Warnock: No. It's no longer relevant.

Lampson: It's not limiting.

Grad: You still call yourself that.

Warnock: No.

Unidentified Speaker: It's all about communication.

Ruckert: Publishing also means making something public. It's not about private communication. It's making communication tools of public publishing. And it's still publishing.

Seybold: The whole thing here is democratizing publishing, taking publishing in a broad sense and making information public.

Takeaways and Farewells

Grad: I've been holding something back. I always do that. We have a lot of material that we didn't give you ahead of time because I knew that you would look at it, and we prefer to have you involved in the discussion. We did show you some pictures, and I finally gave Jonathan the chance to explain what those were, but now we've given you some folders to take home. Let me just mention what they are. Hopefully, you'll look at some of them before you throw them in the waste paper basket. Remember to recycle.

First, Jonathan prepared a draft of a short history of the industry. He would like to expand that, and I would like him to very much so we can use it as part of the record for this and for some future work. So please take the time to read that over. Send him your thoughts and comments so he can add them on. He's put it in PDF form so that none of us can touch it, change it, modify it. It drove me up the wall. I wanted to edit in Word. Of course, it wouldn't let me edit the darn thing. There're still typos in there but I didn't want to mention that.

Lampson: The current version of Word does a pretty good job of reading in PDF and turning it into a Word document as long as the formatting is not too complex.

Grad: His format is more complex than it can handle. Second, please think about what you can donate. Don't die with the stuff lying there for your kids to take care of. We've had too many cases of that happening. Don't throw it away because you think no one cares about it. Please, see what you have. If you want to help with that, we can find people that will help you organize your material and take care of it.

Walden: I volunteer.

Grad: Next, there's a simple description of the Computer History Museum. We really hope you'll take a look at their website. For those of you who are in the area, come visit. Those who aren't in the area, make a special trip. It's worthwhile, and it's always fun. They have something new every year.

There is also an article by a friend of mine that was in the *Annals* some years ago about Mergenthaler going into the newspaper business. It's an interesting project management story. He was hired as a consultant to use a Mergenthaler from 1976 and until 1982 by *The Daily News*, which was then the largest newspaper in the United States. He did stuff in Australia. A brilliant technical guy , a fellow named George Trimble [???], worked with him. It's fun to read how somebody who knew nothing about the newspaper business was able to help make some of these newspapers automated. His stories about the union are fairly difficult at that place.

You also have John Seybold's assessment of the Apple versus Adobe contretemps.

Seybold: That was something that I wrote off top of my head in like five minutes in a discussion forum that my sister then published. I haven't shown this to John and Chuck because I thought that John would object to it. Having talked to John and Chuck about some of this stuff, I think that there are serious errors in it.

Grad: Okay, then John has an opportunity to fix it.

Seybold: It's not something I want to leave on the record. By the way, the origin of that basically was Burt called me, and the first thing I did was try to write down for myself how the stuff fits together. That was done for my own use and to organize thoughts. I made some changes to it to include some things that were being put on this program, but it was done off the top of my head. I want to revise it now based upon a lot of stuff we've heard here, but it may serve as a skeleton with which we could built a more complete short history. By "short" I mean we're just trying to get the highlights and not all of the details. I would really appreciate comments, suggestions, and arguments so we could try to make that. I will circulate that back to anybody who wants to see it so we can try to maybe put something on the record that does show in some way how this stuff ties together.

Grad: Make sure it gets to David at that point. Next, we have the Software Industry SIG. We would hope that some of you might be interested in the broader subject of collecting software history, not just necessarily in your own areas but in some of the others. I can tell you a little bit about what we've done over the last 16 years and about the use of the *Annals* and the articles that are in there. Not just for this special issue, but I hope some of you might have some ideas for articles you'd like to write for the *Annals* so your ideas are available forever.

Next up we have *Core Magazine*, which is a once a year publication. It's very high quality now. I won't speak about the graphics and stuff because that's not skilled but take a look. There's some interesting things and a good description.

Finally, in 1980 Jonathan Seybold forecast what he thought the future of the world was going to be. It was a whole article, and he just extracted two pages, which are very poorly copied with PDF, but they're there. Take a look at it. That's something to laugh about and have fun looking at.

Seybold: Those pages are from a book my father wrote when he summarized the thing. That's why it's just a photocopy of stuff out of the book. It gets back to what Butler was saying; basically, that is where the graphic arts industry and the publishing industry were going before desktop publishing. This was written in 1980 before the PC, before anybody knew about Star. It says, basically, we're going to graphic terminals. We're going to interact. We're going to WYSIWYG. We're doing all of this stuff. We're doing the network stuff. We're going to 16-bit computers. We're going to networking. The point here is that this is where the industry was heading. Because the industry was already thinking and heading that way, I believe the ground

was fertile for the desktop. People understood this is going to be the future. And here suddenly was that future in a small affordable box.

Grad: I want to close by thanking Jonathan for the tremendous amount of help he gave at the start of this. I think many of you would not have been here if only I had written you a note. You're all here because Jonathan Seybold was on board. I thank you all.

Unidentified Speaker: Thank you to Burt for getting us together.