**An Interview with Prof. JEFFREY R. YOST**

**CBI Oral History**


**Conducted by John Hanzhang Ye**

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**Charles Babbage Institute for Computing, Information and Culture, University of Minnesota, Minneapolis, Minnesota**

**Abstract**: CBI Director and Research Professor Jeffrey Yost, who previously served as CBI Associate Director, discusses his educational background and evolving early research interests from his BA at Macalester College through his MA and PhD at Case Western Reserve University in the History of Technology and Science. He discusses the history of the Babbage Institute and working with past Directors, and his strategic repositioning of the Institute to make it interdisciplinary computing and software studies under the new sub-title CBI for Computing, Information and Culture (rather than for the History of IT). He discusses how these changes permeated across the institute with major events "Just Code" and "Automation by Design," *Interfaces*, and other projects and initiatives, including CBI Archives collection development focal points shifting more toward social and cultural context to computing. The interview was originally conducted and translated the interviewer for publication in the Zhineng Shehui Yanjiu [*Journal of Intelligent Society*] in Mandarin, volume three: issue two March 2024 pp 196-215. The English version has been donated to CBI for its collections.

Ye:     Thank you so much for agreeing to this interview. Can you briefly introduce yourself and your work to the readers?

Yost:    My name is Jeffrey Yost. I was born and grew up in Lincoln, Nebraska and I went to college at Macalester College in St. Paul, Minnesota. And it was in college that I developed a real interest in history and in studying all different types of history. Toward the end of my major, I became increasingly interested in the history of technology. And I believe the first history of technology program was at Case Western Reserve University in terms of a PhD program. There was history of science programs before that. But specifically in technology, Case Western was the first. And it wasn't because it was the first, but because I had read the work of Carroll W. Purcell, and I wanted to work with him as my main advisor. And so, I moved to Cleveland in 1991, and started at a PhD program and I was interested in social, cultural and intellectual, business, and organizational history of technology and did a dissertation on the history of an aspect of automotive supply networks in the early automobile industry. So, in starting to do computer history, I was kind of broadening out from what had been done previously on the history of automobiles, and it was an organizational history, in both cases, with automobiles and computing. It had some labor history in it, and business history, of course. And upon completing my degree, I applied for, and I got the job of Associate Director at the Charles Babbage Institute (CBI). I had read a number of works including Bill Aspray and Martin Campbell-Kelly's book *Computer*, which I later was honored to become one of the authors in the 3rd edition. And now with Honghong Tinn, Con Díaz, and Nathan Ensmenger, the fourth edition of this book [Ensmenger, too, came on board with the 3rd edition], which will be coming out later this month. I believe, at the end of June.

And so, the job was of great interest to me and the combination of it being both administrative and managerial and also a research position appealed and fit my background and skill set. So, I came to CBI as the Associate Director in 1998 in the Fall. And I've been here ever since, and it's been a great joy to work at this archive and research center in the history and social study of computing. I really pushed it towards an interdisciplinary focus when I became the Director in 2018.

So, I don't consider it just a history institute, but also history and social study of computing and software. I work extensively not only with historians in the community, but also sociologists, anthropologists, media studies scholars, communication scholars. And that's been a real joy to kind of expand this vision and to create events that bring in interdisciplinary participants and audiences.

Ye: There are two points I will ask for clarification. You said you studied at Macalester?

Yost: Yes, I was a history major at Macalester.

Ye: And then you did a PhD thesis in automobile networks.

Yost: It really was application engineering and supply networks in the first thirty to forty years of the US automobile industry. It focused on a large number of the major supply companies. But I drilled down to do case studies of just several in depth to look at a lot of the engineering skill involved. Much of the engineering and business know-how to produce automobiles actually existed within these first-tier suppliers of components such as axles and tapered roller bearings and carburetors. So, contrary to what some people had written about Ford being very vertically integrated throughout its entire history of the automobile industry, it was more a network model than most people realized and technical skill and know-how in metallurgy in design existed within these companies that really had been ignored previously. I also focused on the interfirm standards and politics of standards. So that's what I tried to focus on with my dissertation.

Ye: Is it the beginning of your interest in the organization or business perspective?

Yost: Yes, it was. And actually, I got a consulting job which I helped research and write a book during graduate school called *Timken: From Missouri to Mars - A Century of Leadership in Manufacturing*. It was for a Cambridge, MA, consultancy called the Winthrop Group. That consultancy got the contract, and they did not want to spend a large amount of time in Ohio, where this client company was headquartered. And so, I did a lot of research for the book, archival research. I helped write background essays that helped produce the book. It was published by Harvard Business School Press in 1998, the year I completed my doctoral degree. But they let me use the

material I was finding, which was probably about one-third of what I drew for my dissertation. I did a lot of research in Detroit and in Columbus, Ohio, and I used some other collections besides the Timken Company records. But I had unique access to these Timken records that included correspondence with Henry Ford and Alfred P. Sloan and some unique resources. And so that's what got me into business and organizational history to kind of double up on what I was being paid to do as a consultant. I was also interested in, prior to that, in a dissertation on technology and privacy, so kind of full circle and back to that now with privacy and security, those have been long-term interests, with computing. But I'm glad it directed me more towards business history than I thought I'd ever go to, because through that study, I learned that there's interesting intersections between business history, social history, gender history, labor history, and that was a great project for me, and it also gave me some managerial experience. Working with the corporation made me a stronger candidate when I applied for the job here because it's in part managerial. Even as associate director, it was.

Ye:     And so, what brings you to the history of computing? It is very different from the automobile.

Yost:   I always considered myself interested in 20th-century technology and how it intersects with social history, business history, cultural history, and intellectual history. And so, I didn't see it as I'm always trying to necessarily focus on automobiles. I found the reading that I did, reading on computing in graduate school, the book *Computer,* the first edition, extremely interesting. I also read a book by David Bolter, a cultural and intellectual history called *Turing's Man* and I found this extremely interesting. I, in fact in high school, had done some papers on the history of mainframe computing, and I've just always kind of had a bit of interest in the history of how computers change the world. Being a historian of technology, the technologies that I found interesting were not from centuries ago, like the water wheel. They were the impactful technologies of the 20th century, the automobile, air travel and aerospace, and computing. So, it was kind of an easy transition for me. And I've enjoyed working in the area ever since, and it's kind of come full circle, because now with computer vision and work being done in AI, which is an area I am increasingly focused upon now, one of the most challenging tasks being

done in AI or attempted in AI is computer vision for self-driving. Tesla really has the lead so far. The computer vision and the AI systems for self-driving and so, computers and AI and automobiles coming together as one.

Ye:     Yes, it's a very interesting time for us to research what happens. Your two interests converged together.

Yost:     Yes, they did. And the digital convergences are so much a part our world. With the Internet of Things, that very few technologies don't have some aspect of computing associated with them today, either in their design, but often semiconductor chips and as part of them, embedded within them, from medical devices to refrigerators, smart refrigerators that tell you that you're out of milk.

Ye:     Speaking of that, now computers basically are everywhere. So how do you think understanding its past can help us understand the present, even the future? For social scientists and for the general public, what's good about knowing this complex history of computers, how this may help in your experience.

Yost:     I think technology has become a force of accelerating change. And people's lives are impacted greatly by technology and kind of the norms around technology. Studying its past can give a sense of how previous generations responded to technological change. And how at times it is exhilarating and at times it is somewhat scary and how younger-generation individuals often find it easier to adjust to rapid technological change, whereas some elderly people today have had more of a difficult adjustment to the arrival of ubiquitous computers, ubiquitous smartphones and applications. While some people adjusted well, others less so. So, it helps understanding how technology changes our world and how we develop policies and norms and laws surrounding technology. And I think, with law and information technology, there has been a real lag and there has been very little regulation, for instance, of social networking or artificial intelligence and these are huge challenges that we face moving forward.

Ye:     And with all these challenges, do you think we need to familiarize ourselves with the technology itself, only with that you can have a better understanding. Let me put it

in another way. Computers are very complex for the public. Do you think you need to have all that technical knowledge?

Yost:   It's an interesting question and certainly some of my colleagues who historians of computing are, such as Tom Haigh, were undergraduates in Computer Science, were CS majors. I was not. I've never taken a course in programming. I've never programed a computer. I've studied the technical side of computing extensively and mainly in preparation for oral histories I've done. I've done more than 280 oral histories and have done them in a lot of different areas. Probably two-thirds of them have been with scientists, computer scientists and engineers. In preparing for those, as I do for every oral history, I've learned quite a bit about programming languages, operating systems, computer security models, artificial intelligence, graphics but I don't have the expertise if I'd actually done an undergraduate major or an advanced degree in computer science. I consider myself a combination of business, social, cultural and intellectual historian of computing, and I study the technology to a degree that I am able to analyze the underlying tech to do the type of history I do. I think it's important not to treat technology as a black box, but it's also important to look at the social and cultural shaping of technology and our ideas about technology and how people bring different knowledge and skill sets, and so I learned a good deal about the underlying technology. But I consider reading and study of the history and sociology of labor, and gender, and race and ethnicity part of the toolkit that I bring to the history of computing, and I think those are, equally, if not more important.

Ye:   And can I say in this way that, given your interest in different perspectives, you are more in social perspective, historical perspective than an internal history?

Yost:   Definitely. I don't consider myself an internalist historian. I see history as an interpretive discipline that really is kind of the intersection of both the humanities and the social sciences. And part of what I have found of interest in the way I approach history is to also learn from the methods of sociologists, anthropologists and media study scholars, and what they bring to kinds of interpretive analysis.

Ye:   So, it's more about analytical.

Yost:     Yes, it's analytical, it's interpretive. Analytical can mean different things to different people, analytical to a scientist or engineer might have one meaning analytical to us, something different perhaps. Historians might have a bit of a different meaning with that. I think historians recognize that. That history is in part, something that's empirically based, but it's also in part an interpretive art and as such, it involves creativity and judgment and it's not always as clear cut as a scientific experiment might be. In fact, it rarely is.

Ye:     I think it kind of goes back to the second question of how history could be useful.

Yost:     Yes, definitely, I think on a personal level that people having a sense of their own history, as well as broader histories of people and institutions, and governments around the world is really important. That's important to us as participants within democracy. It's important to managers and leaders for policy making and decision making.

Ye:     Do you mind sharing with us, some of your observation of the latest trend in the field? It's an emerging field in China. What do you see are the pressing questions in the field?

Yost:     Well, when I started in the field in 1998 specializing in the history of computing, the literature was still relatively small. There was a journal that started in, I believe, 1979, called *IEEE Annals of the History of Computing*, it was an AFIPS (American Federation of Information Processing Societies) journal at the start not IEEE. And in its early years, many of the articles were internalist and they were on firsts, the first digital computer, the first stored program. And I think it was important for the field to move beyond that and to look at computing in social, political, and organizational contexts. And that really was getting started in, I would say, a bit in the late 80s, but was only really starting to take hold by a group of scholars, me included, that started in the field in the 90s and especially the second-half of the 90s. I think that was a very important turn. And I think the focus on issues of inequality along the lines of race, class, and gender is super important. Those issues have become increasingly prevalent in my work and that of others. They're the kind of standard areas of social history. But the field of social history began really taking off in the 70s and kind of the new cultural history took hold. And I

think in the history of technology, as well as the history of computing, it lagged in its social history by a decade or so. So that was really getting going in the 90s. And it's really been the last 15 years that there's been a tremendous amount of really impressive works in the social history of computing, that area and approach has really gained momentum in the past 15 years. I've increasingly moved my work to be a part of that and be part of that conversation, both in terms of the research I do, but also the research that I facilitate, and that CBI facilitates. And that has to do with the events we have and the scholars we bring in to be part of symposia.

In 2020, I partnered with Gerardo Con Diaz [Con] for an event called "Just Code: Power Inequality in the Global Political Economy of IT." And that was an event that had over 800 people registered, over 340 attended virtually, which was one of the largest thematic events either virtual or physical, in history of science, technology and medicine, and it brought together anthropologists, sociologists, comm scholars, media studies scholars, historians. I thought it was a really engaging group and I am working on the revision of the papers of that event for an edited volume, for a book with Johns Hopkins University Press that will have the same title as the event, working on that right now with Con. And we followed that up early this year, 2023, with "Automation by Design: Politics, Culture and Landscape, and An Age of Machines that Learn." So, it was an event about machine learning, its social context, its business context, its political context and it continued this theme of studying how technology either fosters or hinders equality in society and knowing more about it, knowing more about how people use this powerful technology of computing, I think, is especially important to making better decisions about it, both on a personal level but also for policymakers and governments to make better decisions about the technology, and to regulate the technology appropriately.

Ye:     And as you mentioned, that may inform better decision making. But how do historians and social scientists in this field actually communicate with computer people and decision-makers?

Yost:    Some of my colleagues have testified before Congress. Alondra Nelson was appointed by President Biden to be a top advisor on issues of inequality with information technology. She's a scholar, a sociologist, at Princeton's Institute for

Advanced Study. A number of scholars in the area of AI and Large Language Models such as University of Washington, computational linguist Emily Bender, and former ethical AI scholar at Google, who now runs a center she co-founded called DAIR, Timnit Gebru have become major public figures and part of a policy debate. Even though not all historians have that access, we're part of a community that advances each other's understanding and certain leaders take that understanding to try and influence policies. So, I think it's been the critical work of some impressive individuals. Their work has usefully drawn on the wider community and a wider conversation and I think that's been very healthy. [Post interview note: In October 2023 I spoke on Capitol Hill on the history of AI and policy in a Congressional Briefing for the American Historical Association. That was televised on CSPAN. I did this along with esteemed colleagues Janet Abbate, Matt Jones, and Matt Connely. So, historians sometimes can be part of the conversation, I feel honored to have had that opportunity. Late in 2023 I also became a founding member of the Academic Alliance for AI Policy and made a trip to Capitol Hill for that as well].

At the same time, I think there's a major challenge in that corporations have a large amount of power. There's a lot of powerful lobbies within various companies, corporations, and industries. And it's difficult to regulate a technology that's changing so quickly because it in many ways is a moving target. And there really hasn't been much regulation on information technology in the United States with regard to social media, with regard to artificial intelligence, with regard to privacy. Europe has been somewhat better with that. But even in Europe there have been major challenges and there's often a lag. And these companies work around whatever regulations are in place as best they can and focus rather exclusively on maximizing shareholder's values and profits rather than the public good.

Ye:     So, what is your experience engaging the public? We talk a lot about within the academia. But I understand that you're also writing a blog for the public.

Yost:   Yes. I see outreach as very important. It was mainly academics that attended our symposia, "Just Code" and "Automation by Design." But there were also some members of the broader public. They were events that were free to register online. In 2020, the same year that we had "Just Code," Amanda Wick, the archivist and I

launched a combination of outreach, and a kind of popular academic short essays journal called *Interfaces: Essays, and Reviews in Computing and Culture*. And with that we intended to make it more like a highly readable kind of magazine of essays on technology. All of the articles are relatively short. They all contain numerous photographs and images, and we edit them to make sure they're highly readable to a broader public, that they aren't assuming a lot of the kind of knowledge that only scholars would have and, and that they're for the most part jargon free.

We've been very pleased with the response to that journal, both by the academic community but also by broader communities. You mentioned my blog. I became interested in the fact that there was a lot of hype around cryptocurrency. And by 2020, there were hundreds of millions of people, a couple hundred million people that held Bitcoin or other cryptocurrencies. And because I had an interest in and background through a prior NSF (National Science Foundation) project in cryptography, and we also have a current one on privacy and security, that was of great interest to me. I did a project from 2012 to 2015 with Tom Misa on the history of computer security. So, I was interested in cryptography and its real-world applications, and I was interested in issues of privacy going all the way back to my first dissertation idea in graduate school. Another thing that was fascinating to me about blockchain is that Bitcoin was started by a group that has been termed the cypherpunks and even though the identity of the person or person that created Bitcoin isn't known. He, she, or they are anonymous. There's a lot of speculation, but it largely came out of a group of people that had a libertarian-right political orientation which is something I very much am opposed to. And yet you have a number of people with various blockchain projects that focus on its decentralized aspects and kind of blockchain for social good, blockchain on the left. And so, this dichotomy was what kind of drew me to it. And I started a blog in which I have primarily looked at doing essays that focus on the social history and the sociology of blockchain technology. So, I've done essays that focus on race, that focus on gender, that focus on political economy. And it's been really interesting. And there's been a good response to it. And I have had members of the public outside of the academia that have found it interesting. And then it's also been used by a number of my colleagues to assign to their undergraduates for courses. So that's

been rewarding. I wanted to be freer to express political opinions and not have it on a university server. So, I decided to do it on my own site rather than the University of Minnesota and the CBI site.

Ye: As we also talk about part of what CBI has done. I think we can change the subject to CBI itself. But before that, do you have anything you want to add that you think is important, that we didn't talk about?

Yost: In 2017, I published a book called *Making IT Work: History of the Computer Services Industry*. That's an example of my interest in the kind of the business and industry side. But it's also very much covering of the labor and gender sides of the industry. And then, with the events I mentioned, we will do a book with *Just Code*. We will do either a book or a journal special issue with *Automation by Design*. So, it's rewarding to work with a number of different scholars. I know that I mentioned *Interfaces* and doing that with Amanda Wick here. I have many collaborations these days. Gerardo Con Diaz and I edit a Johns Hopkins University press book series, that is entitled *Studies in Computing and Culture*. It's interdisciplinary and the orientation is history. It includes authors from different disciplines doing history, including anthropology and sociology. And we are really excited about that, and we have published some great books already in that series and have more in process.

We published Janet Abatte and Stephanie Dick edited volume *Abstractions and Embodiments*. And that's a really well executed edited volume. We will soon be publishing. Andrew Lea's *Digitizing Diagnosis* that comes out later this month, which will be a landmark work in the history of medicine and its intersection with the history of computing. And we've got a lot of great authors working in AI, the social study of AI and other fields, large language models, pattern recognition, race, class, and gender. I am just really excited about the series and one of the joys I have had in being at CBI is the opportunity to meet so many people coming through, to help advise them on their work, to learn from them, and to work with authors, as I did that as an Editor in Chief of *IEEE Annals in the History of Computing*. I do that with *Interfaces*, I do that with the Johns Hopkins University Press, our Computing and Culture book series. And so, I really enjoy being an editorial leader and I serve on three professional journal editorial boards. That's an

important part of my work and this is kind of a segue to CBI. I have really viewed my career as doing my own research, but also enabling the research of many other people, and using the Institute as best as I can to do that and using my own work at best I can to do that. I meet with nearly all scholars coming through to use the archives, in addition to our events, I also meet with many remotely advising on collections, methods, and the like, and learning much along the way.

Ye: As you mentioned, the CBI is an institute, not just for you, but also for many scholars interested in the field. Can you give us an introduction to this Institute to our readers?

Yost: So, the Charles Babbage Institute was formed as an idea a few years before it became a reality, an idea in California, some retired individuals from the computer industry including our main founders, Erwin Tomash and Adele Tomash, founded the Institute. Working with some of their friends from industry as well as being advised by some academics and some curators. And they were advised that if they really want to have an impact on the history of computing, which really hadn't been done to that point, to form a center at a university and have two primary components to that center. And this came as advice by historians from Ivy League schools and the Smithsonian and some other places that Erwin Tomash made contacts. And he took that advice and there was a national competition. CBI is located at the University of Minnesota, after winning that competition. And the primary factors were a strong history of science and technology program, a strong research library, and the interest of and the commitment of the PhD program and the college what's now the College of Science and Engineering. Back then it was called the Institute of Technology. The library's commitment was important too. This is a top fifteen research library in the United States and in terms of archives and special collections, it's probably top ten if not pushing for top five. In terms of facilities, I think we're probably top five. So, we have a dedicated special collections library building that we're in right now.

And Andersen Library, where we are now, was built in the late 1990s and opened in the year 2000. Two-thirds of the building is underground. It has climate-controlled caverns, multiple football field sized caverns of rows of paper records

and photographs and for both CBI and for other archival units like University Archives. So, there's tremendous infrastructure here at CBI. We benefit from the synergies of the research program and the archives. From the start of CBI, the historians, Arthur Norberg and Bill Aspray, were conducting oral histories. They were presenting and publishing and making a lot of contacts. And that's something that I do as well. And it sets up a lot of collection development opportunities. The fact that we have a very active research program, and that we have a very active oral history program has had tremendous positive impacts on our contacts and connections to collect some of the most important materials in the world, on the history of computing, software and networking. And we've done that, people before me did that from the start of CBI when it came here in 1980, and I continued that working with a couple of different directors, Arthur Norberg and then Tom Misa. And I'm continuing to do that now as Director.

The one change that I have made is I have been more explicit and intentional in broadening our mission to interdisciplinary studies of computing, software and networking. And that has further opened up opportunities. I have used social networking as never before to promote CBI. There was some of that prior but I greatly expanded and accelerated the use of social networking to promote our publications and our programs and our resources, to do important outreach. That includes the publications that I edit, promoting other people's work, our events, and I think that's been really useful and it's helped me connect to many people outside of history because I'm mainly going to history conferences, but through Twitter, Mastodon, LinkedIn, Threads, and BlueSky, I'm connected to social scientists in many different fields.

Ye:     Can you also share a little bit about the collection that CBI has? It's very unique.

Yost:    Sure. As I mentioned, CBI collected from basically its first year. We have over 300 collections. They range from a single box to 800 boxes. We have two major corporate collections. They're not our only corporate collections, but we have two really large ones, Burroughs Adding Machine Company, which started as American Arithometer, from the 1880s that moved into computing in in the 1950s, became Burroughs Corporation, and the records span the whole history of the company from the 1880s to the 1980s. And the Control Data Corporation, which

started in 1957 here in Minneapolis. It existed as Control Data until 1992, when it ran into financial troubles and went into receivership and was split apart and one of the pieces survived as Ceridian, the other part did not survive very long. In terms of securing these huge corporate records, shakeups and dissolutions often offer opportunities. Corporations generally want to maintain and control their own records and Burroughs merged with Sperry Univac to form Unisys in the 1980s. And that was when we got the Burroughs collection because it was a newly emerged company that had a new name, and was trying to forge its own identity, and it's expensive to maintain a corporate archive. So, they were willing to release the Burroughs materials spanning an entire century to us as a gift. And they were processed and that's an 800-box collection.

Control Data is nearly that large and we got that collection when the company essentially went under. So that's a situation when organizations are often willing to part with their records when there's either a merger or there's a dissolution of the company in its current form, but that's not always the case. We've got the Association for Computing Machinery Records, the ACM Records. The ACM is a thriving professional organization of about 100,000 computer professionals and computer scientists. And I would say in general, it's more likely that if it's a non-profit that they're willing to donate their records while the organization still exists. That's unusual for corporations. However, some do it with a lag. I mentioned early in my career as a graduate student, I studied automobiles. The Ford Motor Company donates to the Henry Ford Museum and Greenfield Village Library, on a 50-years lag. Or at least they used to, I think they still do. And everything that's fifty years or older goes to the archives on a rolling basis. That's one method that has been used so that proprietary information or private information is not made public that the company might not see as in their interest. But we have so many different types of collections, we've got a lot of gray literature. Some reports that weren't widely circulated in our National Bureau of Standards collection, tens of thousands of gray literatures report we've got in NBS. Collections of trade associations, so organizations that helped industries develop like the software and services industry, ADAPSO, their records and the market research records they commissioned on these two major IT industries. The papers of famed computer scientists, like Alan Perlis, Edmund Berkeley, Jean Sammet, and Willis Ware.

There are a bunch of different types of collections. And we have made a concerted effort, especially under Amanda Wick's tenure and my tenure as the Director, to collect records that enhance people's ability to do social history. So, there's a Social Issues in Computing Collection. That collects materials on labor history on gender on unions on automation on LGBTQIA communities, and so Social Issues, that's been a focus. And some of our older collections have opportunities to study social history as well like Burroughs and Control Data.

Ye:    So, in the case of Burroughs and Control Data, these companies were either merged into another one or went down. But cases like ACM are still alive. So, do you know if they just donate what they see fit?

Yost:    Are you asking if they just selectively give a portion?

Ye:    Yes.

Yost:    Well, I think that most of the records dealing with the organizational office of the ACM were donated to us. There's also a volunteer structure. There are about 30 different special interest groups, and so there's a lot of portions of ACM on the volunteer leadership side that are not part of that collection. I think it's a fairly complete collection and Amanda would know better than I, but I think there is an agreement to periodically make additions to the collection. I think when they donate, it probably did not have materials from, say the last five years or so, because they were still actively using those records. But I think there is the plan that they will continue to make supplemental donations of materials, and it's certainly not anything like the Ford Motor Company with a 50-year lag. It might be more like a 10-year lag.

Ye:    Do you know if CBI reaches out to them, or they reach out to CBI?

Yost:    Staff members have been on the ACM History committee. Past archivists have been on that, Amanda Wick, our current archivist, has until very recently been on the ACM History Committee. And I, for a number of years, led the other professional organization, History Committee of the IEEE Computer Society. But when I became Director, I thought it would be better to serve on the ACM History

Committee. And so, I resigned from that post, and I guess I've been added back to it just as a regular member rather than chair, which I did for six years. But I'm on the ACM History Committee, which is very active and advises the ACM on historical matters. The fact that we've always had, from the very beginning of the ACM History Committee, there's been someone on the CBI staff, either on the library side or the history side, or both on that committee. That's how we made contact and became the obvious choice to be the recipient and repository of their records.

Ye:     So, there has been a long-term collaboration.

Yost:    Yes. And I'll add that volunteer roles on committees, both leadership roles on editorial boards and committee roles of outside organizations have been key to CBI and CBI's outreach. I'm currently doing a project that involves both an event and a couple of publications with the National Academy of Engineering. So, this volunteer leadership out in the community is something that is really important for outreach and building connections and learning about collection opportunities, learning about research opportunities. Networking is extremely valuable to the Institute and it's something I also enjoy and find professionally rewarding.

Ye:     We talked about the history of the Institute and also the connection, and its connection with outside organization. CBI has hosted lots of scholars to be here to work on the collection or work on their own projects. Can you share your experience with them, the visiting scholars?

Yost:    I mentioned some things that have been around at CBI from the very start, and one is oral history. One is collection development. Doing research, publishing research. There is something else that very insightfully was started from the beginning. It is a fellowship program, the Tomash Fellowship program, and it initially was just referred to as the CBI Fellowship. It became the Tomash fellowship. And we refer to everyone that has received it as Tomash fellows. And so that's been awarded each and every year. And we now have about 44 past Tomash Fellows and many of them like Bill Aspray, Janet Abbate, Mar Hicks, Andy Russell, Tom Haigh, Nathan Ensmenger, Jacob Gaboury, Con Diaz, Eden Medina are leaders in the field today. It's been very helpful to the recipients both in helping fund their graduate research

and writing the dissertation. Many of them have spent extensive time here using the collections. There's also is the mentoring from directors and associate directors. And I've done a lot of that in my career. And we benefit immensely from what they go out and achieve and so it's an honor to have worked with them. It's an honor for us. And it's been a very successful program I've really pushed the university's IDF (Interdisciplinary Doctoral Fellows) program and in my time as the Director, and we've been very successful at getting IDF Fellows, which is a $25,000 fellowship for someone outside of the primary field of the center. It's a highly competitive program. Generally, it funds about 1/4 of applicants, and we've had about an 70% funding rate. I've worked closely with the applicants so that I can help them put in the best possible application. And I see that as really critical to our interdisciplinary mission. We have now had about a half dozen IDF fellows in the past half decade. And then we have visiting international fellows, which are unpaid fellows, but we have had scholars come from the Czech Republic, from Japan, from Germany, and that's been a wonderful thing to work with and learn from and also help these scholars from overseas.

Ye:     Can you share with us your most impressive moment or memory of visiting scholars?

Yost:    Oh, I don't want to single out one.

Ye:     Yes.

Yost:    I would say that working with the interdisciplinary fellows has been very rewarding, the Tomash fellows as well. I have enjoyed and learned so much from so many of our fellows. I guess in some ways the most rewarding long-term collaboration is one of our fellows I've come to partner with on many different projects since they were a Tomash fellow. I've done that with a number of our Fellows. But more with one Fellow than any other. And it's a very close colleague and friend Gerardo Con Diaz. And we just work very well together and have kind of a similar dedication to the social history and interdisciplinary social study of computing. I have partnered with him in multiple events and with the book series, and he spent probably more time here than any Tomash Fellows, and that was kind of the start of our having many meetings and close collaboration. And it evolved to a scholarly partnership that has just been wonderful and has been so helpful to CBI in many ways. And

there was a restructuring with CBI when I became Director, so there wasn't an Associate Director position anymore. But I'm full time as a Director. I don't have undergraduate teaching responsibilities, so that helps. But it's important to have more than one person involved with events and projects. I've partnered with Colette Perold and Honghong Tinn, along with Con on the recent event "Automation by Design", but Con and many different projects. And that's Gerardo Con Diaz as he goes by the name Con.

Ye:     Do you still have contact with other visiting scholars?

Yost:    Yes, I have frequent contact with most of them during my time, I mean some of them. Because they were and are leaders in the field, they were mentors to me when I started, like Bill Aspray. I've known him my whole professional historian of computing career. And he's been a terrific mentor to me in my early years and then we've partnered on projects in the most recent two decades. In addition to Bill and some people that like Paul Ceruzzi that proceeded my time, they were Fellows before I became part of CBI. But I got to know these scholars soon after I came to CBI. I have managed the Tomash Fellowship program as the Associate Director from the start of my time here and continue that now as Director. I've done that for 25 years. And since then, all 25 of those Fellows I know well and have stayed in touch with, and they've been very helpful to CBI and they've helped me in my career. I've helped them with theirs and it's been terrific.

Ye:     Mutual beneficial.

Yost:    Yes, very much so.

Ye:     We mentioned that CBI has a wonderful collection of oral history. Can you share with us how it started? And do you have any suggestions on how to engage scientists? Because I think for social scientists and historians, we kind of have a different way of thinking about the world from scientists and engineers. And we are kind of on the frontier of engaging them.

Yost:    Sure.

Yost:    I mentioned things that were at CBI from the start, and Arthur Norberg, the founding Director, is to be commended for having the insight to launch historical research collecting and oral history programs from the start. He did oral histories for the Bancroft Library at the University of California, Berkeley. Prior to coming to CBI, he had experience with oral history. And that was of great benefit to CBI. He hired Associate Director Bill Aspray, who was very involved with oral history and then Director Tom Misa and me as Associate Director and then Director have been very, very involved in our oral history and I've done nearly 300 oral histories.

Oral history is a tool that is important to historians, but historians are very cautious with it because oral history by its very nature is the subjective remembrance and opinion of the interviewees. And it's also shaped by the questions that are asked by the interviewer, which also are subjective. There's a dynamic and so it's a useful tool. Generally, historians like to rely most on archival research, and they use oral history to supplement or to do projects that would not be possible without oral history because there aren't sufficient records. Some of my work has been on gender in computing, for instance, work on gender and the computer services industry. And there were no records left behind, or there were few records left behind. To do that history, it was critical to interview women who were leaders in the computer services industry. I feel very fortunate that I had a network and some contacts that I was able to interview a number of women professionals and entrepreneurs in computer services. So, it can be a very important tool for social history and to capturing stories of forgotten voices and marginalized individuals in computing. It's very important for that reason. But you know many of our oral histories are with some of the most prominent computer scientists, Turing Award winners, so they really range, there are different purposes for oral history. One important technique when doing oral history is getting multiple perspectives if possible, so triangulation to have the highest degree of confidence in the information that's being gathered. One thing about oral history at CBI is that it's usually tied to a research project and often a sponsored research project, and that's something I haven't discussed, but it's been essential to CBI, both our finances and to the prestige of the Institute and its program. And we have had great success with getting funded, especially by the National Science Foundation. I've been fortunate enough to be a principal investigator on six National Science Foundation projects.

These tend to be 3-year projects and have generally been in the $200,000 to $500,000 range. They've offered opportunities to bring in a HSTM graduate student research assistant or several with each project. Generally, oral history has been a major component. But one important thing with oral history is doing them as part of projects. So that preparation, unique in some ways for each individual, builds upon past interviews in an area and developing expertise in an area. The fact that I've led or co-lead projects on the history of software, the history of computer security, the history of NSF, and its cyber infrastructure with *Fast Lane*, with Tom Misa. And now another project with security and privacy is, I as a historian, am developing expertise, and that builds upon each and every interview, and it results in higher quality interviews overall to do them on a project basis rather than one offs. If I were just to in an unconnected way interview this person on computer architecture and now I'm going to interview this person on programing languages. That, to me, would be less useful and it less efficient.

Ye: Did you do the interview mostly by yourself or hire someone to do it?

Yost: I have done almost all the oral histories or a large portion of them on the projects I've been on, the exception would be the first project I led, was on the history of software and I probably did a quarter of the oral histories, maybe a third of the oral histories. But we hired a postdoc who is now a professor at James Madison University. His name is Philip Frana, and he did probably two-thirds of the oral histories on that project, did a fantastic job. That is the only project in CBI's history, where the majority of the oral histories were not done by the Associate Director or the Director. We also have had some oral histories donated to us and we're always happy to consider donation offers. They are generally done by colleagues who are excellent historians, and so they meet our high standards of oral history methods. That's terrific that people are willing to donate oral histories. And that's good for them too, because if you share the oral histories you do in research for a book, it lends credibility to your research that you're making those interviews available to other researchers.

Ye: That must be lots of work for you to do all those oral histories.

Yost:   It has been a lot of work and I would say one of the greatest challenges in the past is, prior to COVID, all our oral histories were in person and that was accepted as the standard that if you're going to have a high-quality top-notch oral history program that you do interviews in person, not over the phone. And in the more distant past, video conferencing was far less common in general. But with the pandemic, a number of programs, leading programs, started doing oral histories through video conferencing, and I have found it works pretty well and I feel it's far more efficient. I will continue to occasionally do oral histories in person. But for most part, I think CBI will primarily do oral histories over Zoom and that makes things a whole lot easier, and me not having to travel so much. And when I was Associate Director, there were two of us here. So, if one of us was around, there was still someone that was here to meet with researchers at CBI. But with me as the lone historian. It's advantageous that I can do these by Zoom so that I can meet with researchers when they come in and even though I do work from home some and more than in the past. I always come in when there's meetings that can be beneficial to researchers and so not traveling as much has been very helpful. I did enjoy going to Silicon Valley many times, traveling all over the place, but many trips to California in my first 15 years at CBI. But I'm glad to be traveling a whole lot less and I think that oral histories really don't suffer much during the live video conference.

Ye:     I think it's another example of how computers change academia.

Yost:   Yes.

Ye:     And now we have talked a lot, and I want to express my greatest appreciation here, but I have one final question. It's more like a hypothetical question that if someone asks you how to start such an institution, what kind of suggestion would you give to this person?

Yost:   If someone were starting an institute, I would say, CBI's model has proven itself very effective and there are great benefits from a collaboration between a research program and the library. And I believe oral history is also a great element to have as part of the program. Both as resources in themselves, but also to help set up collection development opportunities. The research helps set up collection development opportunities. And my advice would be for an institute to have that

partnership, because expertise in library and information science is something I don't have. And the expertise in history is something Amanda doesn't have, but the two of us working together can advance research programs and the archives in very complementary and synergistic ways. I also think having visiting fellows is immensely important. I personally really favor an interdisciplinary model because I think sociologists and anthropologists and comm and media studies scholars, scholars from geography and other fields too add tremendously. Many of them are incorporating history into their projects and it enriches their projects. Their methods enrich the work historians do. And I think also it's easier to network with and participate in a conversation with people in ways that can have a policy influence. If you're interdisciplinary it helps, because often times, sociologists and those in other fields have the ear of political leaders more than historians, but we're in conversation with those people, so there's still an influence.

Ye:     Thank you so much. And before we end the interview, is there anything you want to add about CBI or about yourself, about academia, about the field, about or anything you want to say to the readers?

Yost:   Well, thank you for doing this interview, and I'm honored to be included. I have been very privileged in my career to work with some incredible people, to learn from incredible mentors, like Tom Misa, Mike Mahoney, Bill Aspray as well as others. Working with Con Diaz and senior research fellows like Jen Light, David Nye, Bill, and Jim Cortada has been wonderful. Working with them and getting their advice has been a joy and a privilege. I will be expanding the great interdisciplinary scholars who serve as CBI Research Fellows, it is so beneficial to the Institute, and it honors some amazing scholars. It's been wonderful to be part of the History of Science, Technology and Medicine program and to work with a number of graduate students here as well as to work with many graduate students coming through here doing dissertation research from all over the world, and I have really enjoyed being on committees of students here, but also have served on dissertation committees at Princeton and other schools. And that's been really rewarding to work with many talented students and just very grateful for the opportunities I have had, and to be part of an infrastructure that is helpful to

people. It's a very rewarding type of job and I feel very privileged to have been here for 25 years.

Ye:     The very last question, for a beginner like who wants to read about the history of computing? What books do you think would be helpful for them?

Yost:   I learned greatly from Martin-Campbell Kelly and Bill Aspray's *Computer* when I read it in 1997. It was published a year prior in 1996. And in 2014, I was lucky to become a part of it with Nathan Ensmenger, the four of us. And we wrote that revision and the original book was written with the idea of being an introductory text, and it's been translated into Mandarin, into Japanese, into Italian, Korean, and I think a few other languages. It's been used in many courses and so I think it's an excellent introductory text and if it were just my book. I would be more humble than to recommend it, but because it really had its origin with two pioneering scholars that I respect so much, in Bill and Martin, I feel comfortable recommending it. And because I had the opportunity to work with such terrific colleagues on the 3rd edition that included Nathan, and on the 4th, two wonderful colleagues, Honghong Tinn and Gerardo Con Diaz. I feel that collectively we brought a lot to it. And the latest eddition, I'm really excited about it because it takes things up to the near present, but it also focuses to a greater degree than any of the past editions on social contexts of computing and there was some of that in earlier editions. There was more of it than in the third than the second, but we together as three, relatively new authors compared to Bill and Martin, focused our attention on expanding it in a way that we thought would be useful to the next generation of scholars with the fourth edition.

Some other works that I highly recommend would be our past fellow Eden Medina's *Cybernetic Revolutionaries: Technology and Politics in Allende's Chile*. It's an incredibly rich book and has won multiple book awards. I am also a big fan of our past fellow Janet Abatte's two books, *Recoding Gender* and her first book, *Inventing the Internet*. And then, some work by those outside the field of history and issues of inequality of Sofia Nobles, *Algorithms of Oppression*. I think is a wonderful book. So is Ruha Benjamin's *Race after Technology*. And our senior research fellow Jen Light did an incredible book called *From Warfare to Welfare*, that is on largely the Rand Corporation and kind of a changing mission of the Rand

Corporation how the military and militaristic model was employed with social issues in urban environments in a very detrimental way, and that has been one of my favorite books and most influential books in my career. So those are some of my favorite books, Ya-wen Lei's work, her book *The Contentious Public Sphere*, a sociologist at Harvard, her work on China has been incredible. She presented it in Just Code and has a chapter in our book *Just Code*. So those would be some of the books I would recommend. I also really like Anita Say Chan's amazing *Networking Peripheries* and would highly recommend that book.

Ye:     Thank you so much.

Yost:    Sure. Thank you.