Realizing the Concept: A History of the CBI Archives

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In this essay, CBI's former and current archivists reflect on the history and evolution of the CBI archives. Bruce H. Bruemmer, CBI's first professional archivist, served in that capacity from 1984 to 1997. Elisabeth Kaplan was appointed CBI archivist in July 1999.

Editor's note: *Bruce Bruemmer contributed the first portion—"The Bruemmer years"—of the article and provided first-person commentary on the photographs in Figures 1 through 5. Elisabeth Kaplan contributed the introduction to this article as well as the second half, "The Kaplan years."*

The much-quoted but anonymous Frenchman who first remarked that "plus ça change, plus c'est la même chose" was surely not thinking of the archives at the Charles Babbage Institute. Although, after almost two years as CBI archivist, I would be hard pressed to find a better example of the familiar proverb—"the more things change, the more things stay the same"—than the archives of the history of information technology. What, after all, should be more permanent and enduring than an archives? And is anything harder to keep pace with than the vicissitudes of information technology?[1]

If the CBI archives as a whole seems to embody this contradiction, one document in particular puts it in a nutshell. As so often happens in archives, I ran across it while hunting for something else. As also happens in archives, I was intrigued and stopped my work to read it to the end. The document, printed in a solid hand in black felt-tip pen—all caps—on 60 pages of white unlined paper, was neatly titled "Tomash File—'THE CONCEPT,' August 25, 1977."[2]

The manuscript is immediately striking for its peculiarly low-tech format. I suspect that, given its author, the choice of the simplest possible technology (even for the 1970s) was deliberate and not without a touch of irony. At age 24, the document oddly anticipates nothing so much as a PowerPoint presentation from a later era. (Incidentally, it also brings to mind the famous scene in the 1967 film, *Don't Look Back*, in which Bob Dylan performs his song "Subterranean Homesick Blues" while presenting oversized cue cards to the camera and tossing them aside as he works his way through the lyrics.)

Its arresting appearance aside, the document is remarkable for the foresight and clarity of its message. When Erwin Tomash prepared this presentation in the summer of 1977 to garner support for his brainchild, the "International Charles Babbage Society," as it was to be called, he established precepts that continue to guide and undergird the institution to this day. Although times have changed, the presentation still sounds remarkably relevant, even innovative. To examine it a quarter century later is fascinating and slightly eerie. From this vantage point, the issues he raised read like dramatic foreshadowing of the years to come.

Tomash recognized and articulated, for example, the potential—and at the same time, the fragility—of an emerging historical sensibility regarding information processing, and he seemed to foresee numerous challenges in documenting it in any useful and meaningful fashion. He recognized that the frantic pace of change in the subject area, with its increasing lack of definable boundaries in contemporary culture, would pose difficulties. He was convinced that emerging technologies held great potential for the dissemination of archival and historical information. Perhaps most important, he foresaw that this endeavor could only be realized and sustained by a special, unprecedented kind of collaboration. This essay traces these and other themes through the past two decades at the CBI archives and examines their implications for the future.

—Elisabeth Kaplan

The Bruemmer years

Every archivist has a favorite story about explaining the job of an archivist. Mine came shortly after joining the Charles Babbage Institute. I was standing in the food line at a friend's wedding, and one of her relatives in line in front of

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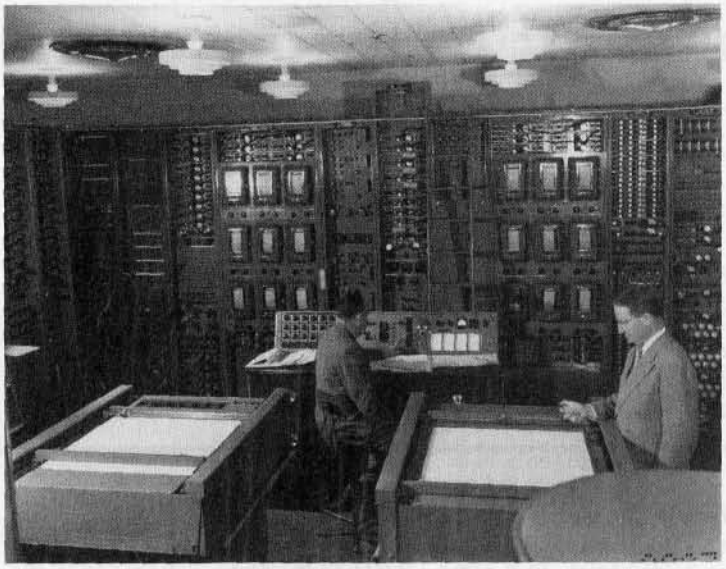

Figure 1. RCA Typhoon, 1950. Typhoon was an early, one-of-a-kind computer that I liked just for the look. I always suggested the image when someone wanted a picture that conveyed the massive size of a computer. It was the archetype of a 1950s computer that took a chunk of real estate and looked forebodingly military (as it actually was). Although it looked liked it alone gave birth to the digital age, it was actually an analog machine. (Photo courtesy Charles Babbage Institute, University of Minnesota, Minneapolis.)

me turned around and asked, "What do you do for a living?" I replied with the quick version: "Well, I'm an archivist for a small institute at the University of Minnesota that documents the history of information processing." She paused, looked a little angry, and replied, "Boy, that's a real conversation stopper." She turned away and would have nothing more to do with me.

Luckily for CBI, an archives devoted to the computer's application and effect on society struck most people as an intriguing, if not entirely novel, concept. Its basis was that the computer was an important, even revolutionary, innovation. The imagery of the computer, which had little history, married with that of archives—long equated with manuscripts, letterpress books, and pen nibs—gave most people pause. Early visitors to CBI sometimes appeared disappointed not to see a new type of archivist at the console of a large computer directing bytes of information to some permanent, digital resting home.

On the contrary, the important documentation relating to computer applications between 1935 and 1985 was paper based, and the problem of preserving this information with the necessary archival tools did not differ significantly from other areas. Still, there were a number of characteristics that made computing more problematic.

At this point, there was virtually no written history that could guide archival collecting. The *Annals* had only begun publishing in 1979, and what synthesis was available was largely written either by practitioners (such as Lukoff's book and *Annals* articles) or journalists (for instance, *The Computer Establishment*).[3] Both were helpful but without any hints about what computer historiographers might find relevant. CBI itself was the source of some basic history tools; I found myself constantly referring back to writing such as Lutze's genealogy of the early computer industry. Complicating matters was the role that the military played in the early industry. Efforts to document computing during World War II invariably were hampered by national security restrictions in both the US and Britain, still much in effect during the 1980s.

The extant history at that time was greatly influenced by the early practitioners, many of whom were still active in the computer industry. This not only affected the perspective of historical writings of computing but also engendered a debate about the credentials of those doing history. At one CBI-organized roundtable to discuss computing's technical literature, much talk centered on who had the right to make selection decisions about records. Historians, uncomfortable with archivists making selections, preferred that everything relating to their research be saved. Archivists, on the other hand, asserted that not everything could be saved so selection would fall to them. Finally, computer scientists wanted to apply technology to the task of saving everything. CBI learned that, to be productive, these discussions required a common language and shared assumptions. Fortunately, CBI had access to a number of computing professionals who possessed insight and appreciation for the skills of archivists and historians.

The pace of change

Computing's other problematic characteristic was the pace of change in technology and industry. Nothing better illustrates this than CBI's own office technology. In 1984, CBI was a proud owner of one CPT word processor utilizing 8-inch floppy disks. Some years later, each staff member had an 8088 computer with 5.25-inch floppies, and some had hard-disk drives. By 1994, CBI had networked an array of machines, and we all had Bitnet accounts. All this change occurred within a 10-year time frame.

Change in the industry was equally dramatic. In 1984, the industry was still largely defined by IBM and most of computing's "seven dwarfs"

(Honeywell, Burroughs, Sperry Rand, Control Data [CDC], and NCR were still around; General Electric's computing department and RCA weren't). After 10 years, only IBM remained intact, and CBI—itself attracted to Minneapolis by the presence of Sperry Rand, CDC, and Cray Research—had acquired the extant records of two dwarfs (CDC and Burroughs). By the late 1990s, all those firms were either acquired or a piece of their former selves.

In this dynamic environment, documenting either the computer or the industry was an elusive goal. The task's magnitude shaped the archives' initial collecting goal: CBI would be a facilitator for archives but place collections elsewhere. This proved wishful thinking, because we could not facilitate that which did not exist. Few archives were collecting in this area, much less targeting it. Even before I joined CBI, various collections had arrived, most notably a collection of computer manuals, many stamped, "Lt. Commander Grace Murray Hopper." As collections were offered and acquired, their usefulness was sometimes obscured by their technology. Did the world need all iterations of the GE 220 computer system documentation? Were technical manuals informative at any level?[4] Could historians interpret Fortran standards proceedings? Would anyone be interested in the records of professional associations? Many of these appraisal questions were not unique to computing, but the more technical and voluminous the record, the less certain we were about their value to history.

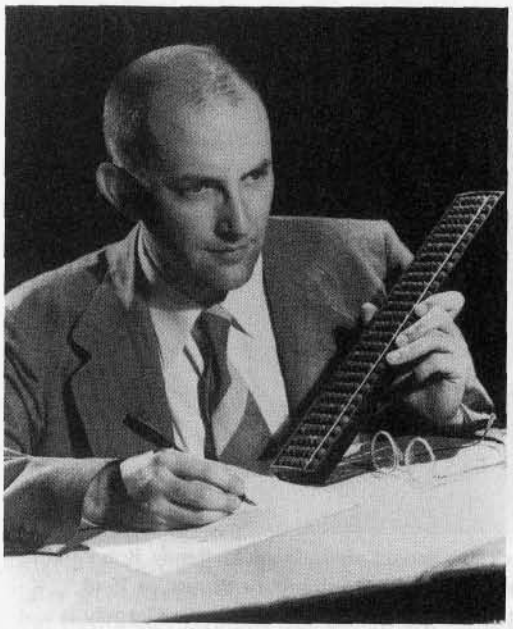

Figure 2. Edmund C. Berkeley, ca. 1949. Berkeley was a personal favorite of mine. Not only did he march to a different drummer, but he did it as a curmudgeon. He assured me that he had no records, yet after he died, I personally carried over 100 boxes out of his basement in Newton, Mass. His records reflect his personal quirks, such as his hatred of sleep because it interfered with his work. Still, his *Giant Brains, or Machines that Think* (1949) was undoubtedly the first major effort to attempt to explain digital computers to a lay audience. (Photo courtesy Charles Babbage Institute, University of Minnesota, Minneapolis.)

Fourfold strategy

While CBI was feeling its way around historical documentation, a fourfold strategy emerged for the archives. First, CBI would be an advocate for historical records in the archival community. Already, the JCAST (Joint Committee on Archives of Science and Technology) report had highlighted the reticence of archivists to collect in science and technology, and CBI was well positioned to raise awareness and develop archival tools.[5] Second, to best demonstrate CBI's intentions, CBI would work with archives on the collecting front. If CBI could not be a pure facilitator to other archives, it could promote itself as a partner. Third, the archives would promote the use of its own collections. At a minimum, research use would inform the archives of what researchers valued. At another level, CBI needed to establish a reputation in order to attract the donation of research-grade resources. The fourth and final strategic component was that the archives would favor work that paired archivists with historians, computer scientists, and records professionals. While communication between the groups was not always painless, it helped advance the cause of archives and CBI.

Before the archives could make any serious headway with this strategy, it needed basic archival controls. I developed a series of finding aids (detailed collection guides) for the collections already in the archives (fewer than 400 record center boxes) and then turned to the issue of cataloging. Conveniently, the archival profession had settled on a cataloging standard that would allow CBI to create access to archival holdings using library databases rather than the card catalogs still in use by all of the other special collections at the university. Although I was trained as a librarian, the catalogers at the University of Minnesota Libraries were wary about archival records polluting the university catalog, so they permitted me to add records to the Research Libraries Information Network (RLIN). In retrospect, the process was humorously inefficient. Cataloging resources

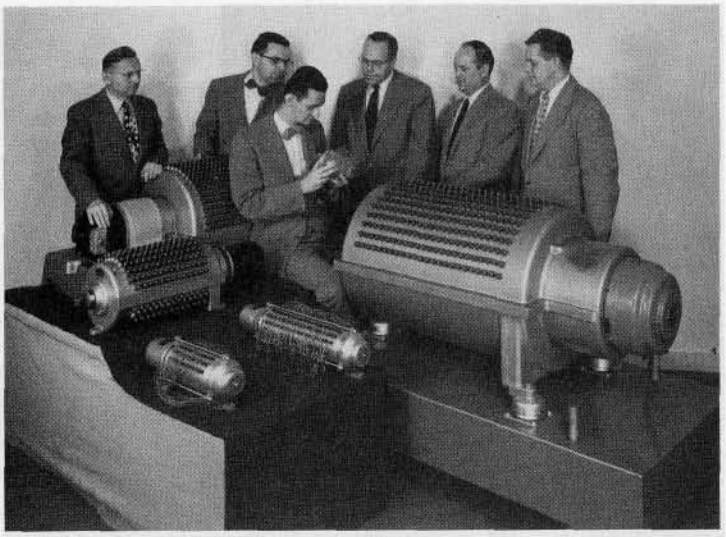

Figure 3. ERA clan (Jack Hill, Arnie Cohen, Frank Mullaney, Bob Perkins, Arnie Hendrickson, and Bill Keye) with magnetic drums, ca.1948. Magnetic storage in the heavy metal age. The drums are largely forgotten today, although their image is still used to represent data storage on flow charts. I still kick myself for not having a tape recorder handy when I watched Arnie Cohen, Jack Hill, and Sid Rubens inspect one of the first drums at an Engineering Research Associates anniversary. By the time I caught up with the engineers, Sid had already measured the size of the drum and calculated its rotations per minute. (Photo courtesy Charles Babbage Institute, University of Minnesota, Minneapolis.)

were all in printed form, so I had to travel across campus to check on name and subject listings. Then I had to find a spare, RLIN-dedicated terminal somewhere in the building and retype all the data (unassisted by any spell checker). Tedious as that was, it created for the first time national access to CBI's collection and represented the first Minnesota manuscript collection on RLIN. The CBI archives had finally entered the information age.

The other part of the archives that needed taming was the CBI Oral History Collection. Most interviews in the archives had little if any documentation about how they were created or if rights were assigned to CBI to make them available to research. We drafted oral history agreement forms and used them for interviews under production. We initiated a program to obtain agreements for past interviews and those that were donated from third parties. This effort was laborious and not completed until Kevin Corbitt, CBI's assistant archivist, finished the job nearly a decade later.

Even though archival information could be carried in library databases, researchers were not necessarily looking there (and only academics had access to RLIN). In 1986, CBI produced its research guide to oral histories, a compilation of abstracts to more than 140 interviews.[6] The guide carried CBI's philosophy about conducting oral history, which stated that CBI would conduct interviews only within the context of projects and inaccessible documentation. The professional staff all had a love–hate relationship with oral history; even if it wasn't always great history, it was good promotion and sometimes opened the door to other resources.

Shortly after producing the oral history guide, we embarked on a project to assess the state of archival documentation for information processing. This resulted in the 1987 publication of *Resources for the History of Computing: A Guide to U.S. and Canadian Records*,[7] which was developed to let researchers know what was available. But the guide also enabled the archives to advocate the acquisition of more archival collections, informally contact other archivists, and assess the overall state of documentation. In some cases, I visited other university archives just to plow through certain records already in their custody. The guide demonstrated CBI's good intentions to institutional archivists who might otherwise have perceived CBI as a competitor. Now, even after many years removed from CBI, I still get reports from some archival colleagues on their collecting in the history of computing when they see me.

Also in 1987, CBI received a grant from the National Historical Publications and Records Commission to document industrial activity for the history of computing. This was a result of CBI's keen interest in the records of computer companies. CBI had tried to work with Sperry Rand to uncover Engineering Research Associates' records, but we were naive about the extent that a company wanted academics to poke around in its business concerns. Luckily, CBI had established a good reputation with some CDC executives, and we were given an extraordinary amount of access to company records. Sheldon Hochheiser, a historian, and I used the opportunity to work on site at CDC's headquarters to give others, working with similar businesses, a snapshot of historically valuable records.

Our work resulted in the 1989 publication of *The High-Technology Company: A Historical Research and Archival Guide*.[8] The publication was significant for being one of the first works that tried to describe the corpus of business records by examining the business functions of a technology-oriented firm. In its simple form, it suggested types of records likely to exist and which ones would be helpful to historical endeavors. Also, the guide was designed to help archivists navigate the appraisal process for

determining historical value. It even proposed methodology to help archivists quickly gain an understanding of a company's key functions during the process of appraising records.

Unique opportunity to collaborate

For CBI, the 1989 guide exemplified the type of work it was best positioned to undertake: historians and archivists faced with a unique opportunity to collaborate in producing a work that would benefit both camps. In retrospect, the rarity of such an opportunity is sobering. The funding circumstances, the staff availability, CDC's circumstances, the company location, and the attitude of corporate executives all created a narrow window of opportunity. Within a year, CDC's changing fortunes would have made it impossible to conduct the project. Its timing, as well as other historical endeavors with the industry, was fragile indeed.

This relationship with the industry represented a paradox for the CBI archives and CBI itself. Archival projects like the *High-Technology Company* relied on trust built over time with specific businesses and executives. But the mortality rate of computer businesses was relatively high, and it would climb higher in the era of e-commerce. Ultimately, such relationships paid off in unforeseen ways, such as the donation of the Burroughs (1991) and CDC (1994) records, two of CBI's largest and most robust collections.

Yet these relationships often blew up in our face. I recall celebrating the achievement of finally locating a corporate attorney at Cray Research who was interested in shaping a partnership with CBI over records. Within a month of that meeting, Silicon Graphics acquired Cray and the high-placed attorney left the company. The door always swung closed much faster than it opened.

Another paradox lay in the ability of the CBI archives staff to absorb special projects like the *High-Technology Company*. The more successful we became, the greater the burden of maintaining the archives. This was precisely what CBI wanted to avoid by becoming a facilitator of archives. Yet by 1989, CBI was receiving some serious research collections. Over the next five years, CBI would acquire records from Edmund Berkeley, Jean Sammet, Burroughs, DPMA, and CDC, each of which represents at least 100 cubic feet of records. The ARPA project, which demanded CBI historians' time for most of those five years, produced a set of oral histories that coincided with the media's interest in the Internet's origins and was fabulously popular.

Caring for CBI's collections took me in unexpected directions. A problem with the Minnesota Data Practices Act and CBI's collection donation contracts prompted me to work on a bill in the state legislature. The difficulty we had in cataloging CBI's oral histories prompted my involvement on a committee to develop and publish the first set of conventions for oral history description. These activities were personally satisfying but took away from time for other projects.

Like other archives on university campuses, CBI creatively recruited additional staff through grants, graduate students, and eventually, permanent positions. Graduate students were often assigned to special projects with the archives, and CBI was fortunate to employ some excellent grads. When the cost to CBI to employ graduate students changed significantly, we had to rely on student employees, and many proved excellent. One CBI Tomash Fellow, Pat Hemmis, later served as interim archivist after I left CBI. Pat Hennessey brought welcomed skills to the first assistant archivist position. Susan Stepka, hired on a Unisys grant, and Lynn Leite, who worked as an intern, both continue to work as archivists. By far, the best find was Kevin Corbitt, hired as assistant archivist in 1991. Kevin quickly took over duties relating to the description and cataloging of archival collections and oral histories, and he maintained an impressively high ethic of reference service and helped shape the archives.

Changes in tools

When Kevin and I gained access to Internet resources, we quickly recognized its potential for increasing access to CBI's collections. In 1994, we took all of the archival finding aids and converted them to an Internet Gopher listing. Shortly after, we decided to rework the style of CBI's finding aids and make them compatible with the simple HTML style. While work was emerging on an archival SGML descriptive definition, we decided to forego work with the format until browsers could support consistent SGML encoding.

CBI's Web site was rich in content, although a little weak in graphic design (the archivists preferred it that way). Its effect on reference service was dramatic, far greater than we experienced by putting archival information in library catalogs. More and more researchers appeared at CBI with a list of box and folder numbers instead of a vague idea about collections at CBI. In extending this effort to oral histories and some of CBI's considerable visual resources, we knew that the era of paper archival guides was over.

Although the CBI archives had successfully

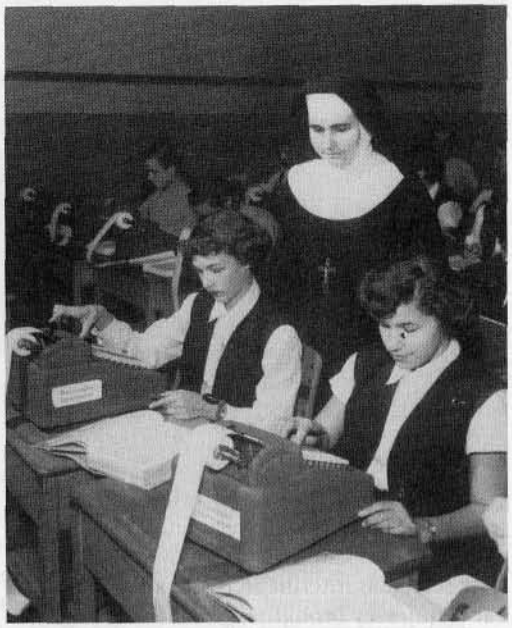

Figure 4. Sister Mary Justine trains high school students in use of the Burroughs "Instructor" adding machine, Milwaukee, 1954. The Burroughs Photograph Collection is one of CBI's visually richest, and I still get a kick out of the pictures of nuns beating proper calculating machine procedures into their students. (Photo courtesy Charles Babbage Institute, University of Minnesota, Minneapolis.)

harnessed much of the available technology, there were many areas where technology continued to confound. We had accessioned some material in "machine-readable" form, for example, but adequate tools for preserving, migrating, and describing such records did not exist. Also, there was outside interest in having the archives hold software manuals and programs, but collecting this material seemed like charting a course to an iceberg.

Even in reference, technology challenged accepted approaches. The joint proposal by the Hagley Museum and Library in Delaware, the archives at the University of Pennsylvania, and the CBI to microfilm the ENIAC trial records was almost rejected because of reviewers' criticism that microfilm was obsolete.[9] (On the contrary, it was the only accepted archival medium at the time, and the records were becoming illegible.) It was not only the imagery of archives and the computer that was in tension in this environment but the polarity between a conservative, cautious approach and a change-driven, pioneering mind-set.

This schizophrenia was the source of creative unease in the archives, and on a bad day an archivist could easily feel like a mainframe historian in a world of microcomputers. Yet I was fortunate for the opportunity to have rubbed elbows with computing's real pioneers. Some looked to the archives to stake a claim in history. Others couldn't be bothered because they were still working on the future. Most were genuinely surprised that anyone cared. The best would spend some time with you to convey the excitement of the times and their luck to be a part of it. And, on a good day, they might have actually saved some records to give to the archives.

The Kaplan year(s)

Where is the CBI archives in 2001? Well, plus ça change.... In 1988, Michael Mahoney described the "daunting complexity" facing the historian of computing—"a subject that has grown exponentially in size and variety, a subject which looks not so much like an uncharted ocean as like a trackless jungle."[10] The view from the archives now is not nearly so uncharted or trackless, but vast and complex it remains, and while not exactly daunting, it is certainly challenging. Our challenge at the CBI archives is to craft appropriate and creative programmatic responses to that growth in size and variety, and to remain flexible while doing so.

Abundance, not scarcity, drives many of our decisions. A 1981 acquisitions policy statement in the CBI archives cautions that future collecting decisions with regard to corporate records be made with care because "firms active in the computing field number in the hundreds."[11] In 2001, it is no longer possible to estimate the number of firms active in computing or even necessarily to agree on how to define them. Faced with that abundance, CBI archivists—and most of our colleagues who work with modern records, for that matter—must balance competing interests in allocating our resources. This means that we face tough decisions. We cannot responsibly take in what we cannot preserve, store, organize, index, and provide access to. The upshot is that, as one archivist wrote about the records of modern businesses, collecting and preserving decisions must be made "selectively rather than compulsively."[12]

Fortunately, we do not make these decisions in isolation. As Bruce notes, the active participation of a great number and wide range of people has made CBI what it is today. These collaborative relationships provide many of the suggestions and contacts and much of the subject matter expertise, which maintain our currency and vitality.

This collaborative network fuels and validates our function as a resource for reliable,

accurate information on, and research in, the history of computing. CBI archivists are well aware that in this era of rapid change, our continued success, and ultimately our relevance, depends in large part on the participation of stakeholders in the history of information technology. These stakeholders hail from the corporate and academic worlds as well as the information professions, including archivists, librarians, museum curators, and records managers—in other words, the same cast of characters identified in Erwin Tomash's 1977 proposal.

Users of the CBI archives—an international group that cuts across all these categories—are a critically important part of that mutually beneficial network. We strive to foster information exchange with our researchers, particularly where collection development is concerned. We depend on our researchers to test and, we hope, to confirm our collecting instincts. This process is something of an exercise in delayed gratification, but once in a while, the results can be dramatic. This past May, for example, a sociologist researching reactions to technological disaster contacted us. He hoped to focus his research on a comparison of Y2K readiness across nations, he told us, if he could locate and gain access to the necessary data. He found exactly what he was hoping for in survey response data in records of the International Y2K Cooperation Center—a collection we had acquired just weeks before he called.

Defining initiatives

Conversations with our researchers and with peer repositories also help us define and focus new collecting initiatives. We are currently pursuing an initiative to solicit material reflecting market research and industry data from the 1980s and 1990s—obviously, these are critical years in the development of the World Wide Web. The CBI archives holds significant collections of market research and industry data (the records of Auerbach Associates is one such collection). Coverage of the past two decades, however, is almost nonexistent; while these older materials are extremely valuable, there is no analogous data for the 1980s and 1990s. Recent reference requests and interactions with our users indicate that important, innovative research now being conducted depends on the availability of this material. The research of Rhodes Scholar Rachel Yould, CBI's 2001–2002 Tomash Fellow, provides a good case in point: Her work analyzes the development and application of Internet technologies in the US and Japan from the inception of the Web to the present. (For descriptions of research by past and present Tomash Fellows, see the article by Jeffrey Yost in this issue.)

Equally important, researchers open our eyes to new ways of approaching the collections that have been in our care for some time, many of which have been used to prepare traditional corporate histories or histories of computing. While virtually all sectors of contemporary culture have become increasingly saturated with information technology (as demonstrated by the two research topics described earlier), historiography itself has changed dramatically. Historians today are asking different questions than they did 10 or 20 years ago. Consequently, some of CBI's earliest collections are being used in new and different ways, not only by historians but scholars from a widening array of disciplines, including those not typically associated with the history of information technology.

Former Tomash Fellow Pat Hemmis, for example, whose background is in design history and theory, sought to explore the metaphoric visual conceptualizations of the early electronic digital computer and the relationships between humans and human-built technology. Accordingly, she tapped several of CBI's older collections, including product literature from the 1940s–1960s, corporate identity studies and advertising from the Burroughs records, and a wide range of materials from the Margaret Fox papers. A sensitive ear to researcher needs and interests, then, is a critical part of our strategy.

While the archives exist primarily to serve academic researchers, it is important to note the variety of users who regularly contact the CBI archives for information and direction. Frequently, we get calls from primary and secondary school students. For example, an 11-year-old Ohio girl competed in the National History Day finals with a project on the history of transistors based on materials from CBI's collections. Journalists rely on CBI for accurate historical information about topics of the day; recently, the origins of the Y2K phenomenon and the development of the Internet have been areas of major interest. Film and television producers regularly seek material from CBI's audiovisual collection, and because most are unable to visit the archives, they depend heavily on the reference staff to respond to their needs. Patent attorneys seeking prior art are major users of the product manuals and product literature collections, as are researchers seeking technical specifications for machines, software, and systems. Computer enthusiasts and collectors seeking information about vintage machines provide a steady stream of reference requests. Archivists, librarians, and museum professionals often seek

out the CBI archives staff with specific questions about the history of information technology, about locating resources in the subject area, about cataloging standards, appraisal, and formatting concerns. Representatives from businesses often contact CBI for advice in setting up a corporate archives program.

The fruitfulness of CBI's growing network of contacts is demonstrated by our recent acquisitions. A few especially notable acquisitions from 2000 and 2001 include the following:

- corporate records of Applied Data Research's Software Products Division,
- personal and professional papers of software industry pioneer Marty Goetz,
- market research files of information technology industry analyst Curt Monash,
- personal papers of Gertrude Blanch, who has been called the last of the "human computers,"
- hard-to-find publications such as the ICP Software Quarterly,
- the papers of William C. Norris, founder of Control Data Corporation, and
- the papers of information security expert Donn Parker.

Donations expected in the next year will strengthen our holdings in areas including networking and computer graphics. These new additions both enrich and are enriched by CBI's existing collections.

Walking the line

Our decisions in the archives are also driven by technology. We constantly negotiate the fine line between conservative and risk-taking approaches. While we continue to experiment with the potential of many newly available technologies for archives, as we did with the Gopher, online catalogs, the Web, and now digitized texts and images, with other technologies we decide to hang back and wait while others work out the kinks. Ironically, as information technology becomes inextricably entwined with everyday life and tools become widely available, popular expectations become less—not more—realistic. This certainly plays out in the CBI archives, where it seems only logical to make records about information technology accessible by using information technology. It is not uncommon for the casual researcher to express surprise that CBI's archival collections are not all digitized and available on the Web, that materials that originate in digital formats—email and Web sites, for example—are not routinely preserved, easily accessed, and readily available for research.

These expectations, given the climate of rapid change, are not surprising. We are committed to meeting our users' expectations where possible and where it makes archival sense. To that end, several recent initiatives have effectively used new opportunities offered by emerging information technology standards to make information about the collections more readily accessible and, where appropriate, to provide access to the collections themselves.

Perhaps the most dramatic of recent examples was the 2000 redesign of the CBI Web site. In 1994, as Bruce noted, CBI was one of the first archives to make extensive use of the Web. By 2000, it was time for a serious overhaul. The Web's ubiquity, the changes in information-seeking behavior, and the rise in user sophistication and expectations mean that CBI's Web site is not just the point of entry to the archives' resources as it was in the past; it is the public face of the Institute as a whole. We know now that information presentation, via good graphic design, is crucial to the perception of information, and that current Web design principles help users navigate through CBI's resources while they shape general perceptions of the Institute.

Other technology-driven initiatives include the implementation, beginning in 2000, of Encoded Archival Description. EAD is a new international standard based on XML (Extensible Markup Language) that lets researchers locate information in our finding aids in increasingly sophisticated modes. In time, it will also let researchers simultaneously search the holdings of multiple repositories.

As of summer 2001, visitors to the CBI Web site can browse or search among over 500 digitized photographs from the Burroughs collection. Full text of more than 150 of CBI's oral histories went online in October 2001, fully indexed and cross-referenced to complementary sources. Other text digitization projects are in the planning phase.

The opportunity to make CBI's resources available in these ways would have been almost unimaginable just a few years ago. Wonderful as they are, though, they require a significant investment in up-front costs and long-term maintenance, which means we must balance competing demands for resources. Bruce observed that much of the important documentation relating to computing between 1935 and 1985 was paper based. This is still the case and is amply demonstrated by the collections listed above, all of which are paper based. The CBI archives will, of course, continue to collect and provide access to paper records; at the same time, we must consider the challenges and opportunities of born-digital materials. The

1981 CBI collection policy noted that "one ... area of difference in this field from most other areas is the presence of machine-readable materials in various forms and conditions." While this problem is far from solved, at least it is now common to all archives, and in large institutions and government, it is becoming more the rule than the exception.

As a result, the entire archival profession is convulsed with discussion over how to manage electronic records. Clearly, information technology can offer archives extraordinary opportunities, particularly in terms of use and access. It is equally clear that extraordinary opportunities will demand extraordinary resources in funding, expertise, and innovation. Currently, much of the debate is over custodial and postcustodial roles. Traditionally, archives fill the custodial role, in which archives take possession of records that have outlived their administrative usefulness. Postcustodialism is a new paradigm for electronic records. In it, a centralized archives (such as CBI) is truly an archives of last resort. Because of the high and continuing costs of maintaining electronic records, an archives would urge records creators—individuals or institutions—to take part in caring for (preserving and migrating) their own records. The hope is that records creators could be persuaded to do so. When information is recognized and treated as an asset, to be managed like any other, then records creators will start to treat archives as a benefit, rather than a cost center.

Current initiatives, such as an ongoing collaboration between the National Archives and the San Diego Supercomputer Center, are beginning to look promising but at the moment, no practical model exists for either the custodial or postcustodial approach to electronic records. No repository the size of CBI has managed any significant collections of electronic records outside of a variety of small digitization projects. The expenses and level associated with managing and sustaining quantities of digital information on a routine basis are currently beyond the capacity of a small-scale archives such as CBI's—and beyond most large archives at this point as well. Once again we will look to the partnerships and collaborations that will allow us to define and implement manageable, workable strategies.

Plus ça change ...

Erwin Tomash had it right. Technology is even more significant than when he wrote his proposal in the late 1970s. Economically, culturally, socially—it is the touchstone of almost all activities and, during the late 1990s, the

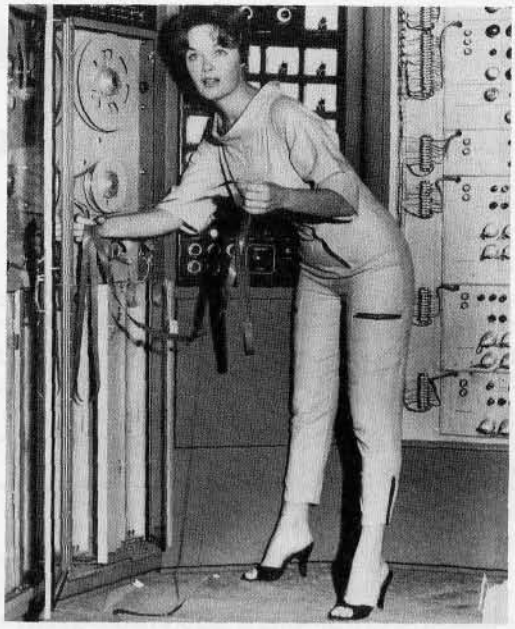

Figure 5. Woman changing magnetic tape in spike heels, (no date). This photograph was used in a text on data processing, and after finding it I created a folder, "Women in Computing—Sexism." This one is probably the least objectionable. I once used one of these images to encourage the Association of Women in Computing to broaden their documentation at CBI. It was unsubtle, but it worked. The images still serve to remind us of gender roles in early computing and the accomplishments of a few women who were able to rise above it all and make significant contributions. (Photo courtesy Charles Babbage Institute, University of Minnesota, Minneapolis.)

philosopher's stone, too. This is gratifying and confirms the value of CBI's accomplishments.

It will probably always be the case that tension and contradiction are inherent to our mission. We are trying to "push the envelope" while the archival enterprise is by nature conservative. Progress in such an atmosphere is not always easy to see, especially without hindsight, but this is a productive tension, and its result—the collections and projects and partnerships described—is unique to CBI. From this perspective, CBI has clearly fulfilled Tomash's vision of a clearinghouse—preserving, serving, and exchanging information with a broad range of users and records creators with a wide variety of needs and interests.

From the start, archivists at CBI faced a variety of complex and often vexing problems. Yet, the archives have excelled in their 20-year history. Researchers are pleased and excited to find us,

as are the donors of records and interviewees of oral histories. Archivists are at ease in approaching CBI for help or information, and even simple encouragement from the archives staff has motivated others involved in the history of computing. Bruce recalls that at one CBI board meeting, Jeffrey Chuan Chu summarized CBI's mission as being ultimately about the people in the profession. He had it exactly right.

Information about the CBI archives and its collections is available at http://www.cbi.umn.edu.

References and notes

1. Tracing CBI's name changes is an interesting exercise and indicative of the field's evolution. Proposed originally as the International Charles Babbage Society for the History of Computers and Computation, it was incorporated as the Charles Babbage Institute for the History of Information Processing. Correspondence in the CBI archives, however, demonstrates that over the years, it has been called, variously, the Center for the History of Computing, Center for the History of Computer Science, Center for the History of Information Science, and perhaps others. In 2001, the name was changed again. CBI is now the Center for the History of Information Technology. (Internal records of the Charles Babbage Institute, CBI 73, Charles Babbage Inst., Univ. of Minnesota, Minneapolis, hereafter cited as CBI archives, CBI 73.)
2. CBI archives, CBI 73.
3. H. Lukoff, *From Dits to Bits: A Personal History of the Electronic Computer*, Robotics Press, Portland, Ore., 1979; K.D. Fishman, *The Computer Establishment*, Harper & Row, New York, 1981; S.C. Lutze, *The Formation of the International Computer Industry, 1945–1960*, master's thesis, Univ. of California, Santa Barbara, 1979.
4. One of my favorite comments came from Harry Huskey, who after examining a user manual of a computer that he helped design, commented that he could explain why certain features appeared in the manual, but no one would be able to use the manual to better understand the real design process.
5. Joint Committee on Archives of Science and Technology, Clark A. Elliott, ed., *Understanding Progress as Process: Documentation of the History of Postwar Science and Technology in the United States*, Society of American Archivists, Chicago, 1983.
6. W. Aspray and B.H. Bruemmer, eds., *Guide to the Oral History Collection of the Charles Babbage Institute*, Charles Babbage Inst., Center for the History of Information Processing, Minneapolis, Minn., 1986.
7. B.H. Bruemmer, *Resources for the History of Computing: A Guide to U.S. and Canadian Records*, Charles Babbage Inst., Center for the History of Information Processing, Minneapolis, Minn., 1987.
8. B.H. Bruemmer and S. Hochheiser, *The High-Technology Company: A Historical Research and Archival Guide*, Charles Babbage Inst., Center for the History of Information Processing, Minneapolis, Minn., 1989.
9. Each of these three institutions held incomplete records of the Honeywell vs. Sperry Rand trial. With the support of a grant from the National Historic Publications and Records Commission, the records were integrated and microfilmed as one series following the original order assigned by the court and the parties to the suit. Each institution now holds a microfilm copy of the complete collection. A guide to the collection is available at http://www.cbi.umn.edu/collections/inv/cbi00145.html.
10. M.S. Mahoney, "The History of Computing the History of Technology," *Annals of the History of Computing*, vol. 10, no. 2, Apr.–June 1988, pp. 113-125.
11 CBI archives, CBI 73.
12. M.A. Greene, "From Village Smithy to Superior Vacuum Technology: Modern Small Business Records and the Collecting Repository," *Proc. Ann. Conf.*, Business Archives Council, London, 1997, p. 213.

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