

**CHARLES BABBAGE INSTITUTE**  
**CENTER FOR THE HISTORY OF INFORMATION TECHNOLOGY**

**NEWSLETTER**

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**Special 25th Anniversary Issue**

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# Charles Babbage Institute Newsletter

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# Twenty-Five Years of the Charles Babbage Institute

*By Arthur L. Norberg*

Twenty-six years ago, in November 1977, Erwin Tomash, acting with the advice of a group of friends in the computing industry, founded the International Charles Babbage Society, an organization that evolved over the next two years into the Charles Babbage Institute (CBI) and, its support arm, the Charles Babbage Foundation (CBF). In March 1978, Erwin and Adelle Tomash hired Paul Armer, an old friend, to become Executive Director of the fledging institute, and opened an office in Palo Alto, California. Armer was a notable pioneer computer professional who, among other things, had headed computer activities at the RAND Corporation and had served as president of the American Federation of Information Processing Societies (AFIPS). Armer set out to make CBI the “catalyst and a central point of focus for all the individuals and organizations who are working on, or interested in the history of information processing” by starting several programs over the next year in collecting archives, oral history, and outreach. Part of Armer’s effort was to find a permanent home for CBI, and after negotiation with several universities, CBF selected the University of Minnesota and the Institute moved to Minneapolis in September 1980. Thereafter, staff carried out the program adumbrated by Tomash and his advisors.

## The Program

CBI became:

an archival center whose principal objective is to promote and to develop national collections of historically significant materials in the history of information processing;

a clearinghouse for information about the location and contents of historical materials;

a historical research center that conducts and fosters research on various aspects of the history of information processing;

Over the next two decades the constituent activities of the CBI program were:

generating information files about the events, persons, and equipment important to the history of information processing;

developing strategies for effective collection and preservation of historically significant manuscripts and records collections;

soliciting historical materials for preservation at the Institute or at another appropriate archives;

advising individuals about the historical value in their papers and aiding them in selection of a repository;

building national collections of archival material and maintaining a database on holdings in all repositories;

advising institutions and corporations on records management, including isolation of historically relevant materials;

supporting, where feasible and appropriate, the work of others either through fellowships to individuals, such as the CBI/Tomash Fellowship, or direct support to organizations; and

conducting historical analyses of significant events, topics, and themes, and publishing books, articles, reports, and indexes to advance the field.

## *Historical Research*

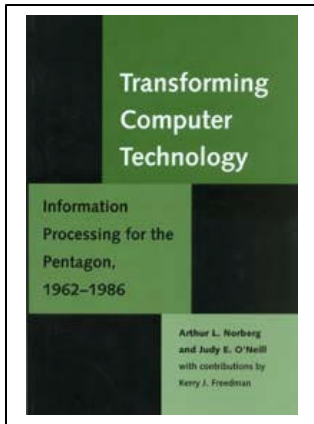
The historical research program of CBI has always contained a two-fold goal: First, it was intended to identify areas in which to collect archival materials. Second, it was intended to explicate and interpret major events and developments in the history of information processing. In CBI's early years, emphasis was

placed on the first goal, as we developed a collecting strategy and identified those people and organizations whose materials would contribute significantly to a CBI archives. As the decade of the 1980s proceeded and the archival staff became increasingly knowledgeable about the subdiscipline of computer history, historical research shifted more toward interpretation. In this section, we focus on that goal.



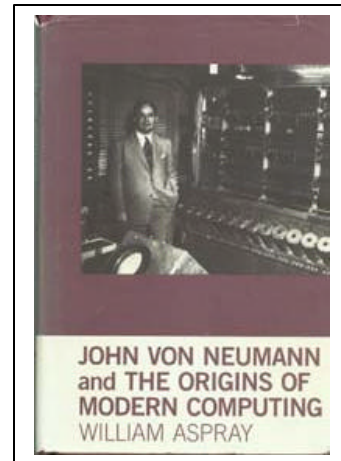
*CBI Director Arthur Norberg (left)  
with CBI Founder Erwin Tomash*

The range of research projects and publication results in the 1980s clustered in the areas of the computer business, education and the growth of academic computer science programs, and the mathematical background to computing. Two specific projects were to study the Minnesota computing industry (conducted by Arthur Norberg, the first permanent director), and the role of John von Neumann in computing (conducted by William Aspray, the first associate director). The objectives of the Minnesota study involved both an investigation of the wellspring for the Minnesota computer industry and



a focused study of Engineering Research Associates, Inc. (ERA), which was the foundation of many computer companies in the area. The first objective led to the uncovering of many records about the early years and a timeline of the historical events related to the industry. Several publications about ERA and other companies and a major conference honoring the 40<sup>th</sup> anniversary of the founding of ERA emerged from this work. Concomitant to other projects, the investigation continued for more than a decade.

Seven historical issues were considered in the von Neumann study. These were: the change that arose in numerical methods in the period 1945-1957 to accommodate the computer; the evolving role of computation in the sciences as the punched card tabulator, the differential analyzer, and the desk calculator were replaced by the stored program computer; the changes in the scientific and the technological disciplines to which the computer was applied; the importance of the Institute for Advanced Study (IAS) at Princeton as an international center of scientific computation; the significance of the Institute and Princeton University as an educational leader for a new group of computer-oriented scientists and mathematicians; the role of von Neumann in scientific research on the IAS and other early computers; and the establishment of computing as a mathematical science. The book and articles resulting from this project provided an important new perspective on the range of United States activities in early computing and complemented the small body of existing literature on computer development projects and subsequent applications. Examination of these issues meshed with several other explorations of the period.



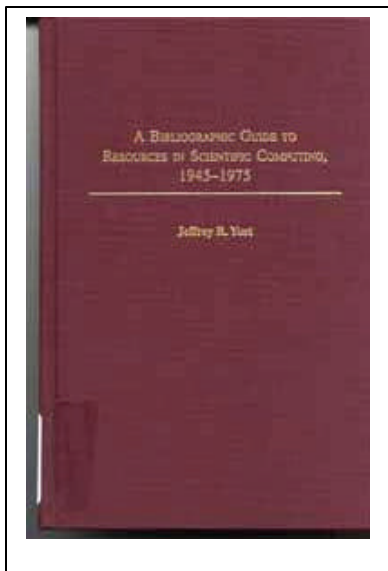
Many new oral history interviews were conducted on both projects, interviews that also complemented the many done in the earlier Smithsonian Institution/AFIPS Oral History Project led by Henry Tropp. Aspray looked into the transfer of information across national boundaries as a way of understanding the emergence of an international computer industry. In collaboration with Donald Beaver, he examined advertising as a way to understand changes in the computer field. Aspray had also engaged in a study of the work of members of the Princeton University Department of Mathematics, a good portion of their work constituted the mathematical background to several important areas of computing. A number of publications emerged from this work as well.

These historical research and publication projects were specifically chosen to add to and extend the literature already available and under study at the time, as well as to highlight the lacunae in the archival record. In these early years, CBI focused its research on the years 1935 to 1965. We believed this would ensure that the most significant historical

materials from this period, which were regarded to be at greater risk because of their age, would be unearthed and preserved. We used our scholarly publications about people and events to collect more materials, to illustrate the history of these years, and to provide us with the grist to write popular articles to bring these new interpretations, and the writing of others, to the general public.

Toward the end of the decade, Keith Uncapher, then of the Information Sciences Institute, brought CBI another opportunity: a contract with DARPA to study the support programs funded by the Information Processing Techniques Office (IPTO) of DARPA in the years 1962 to 1986. In this way, we pushed our research activities, and hence our collecting, into the next important period for computing change. This study was designed to be an analysis of the programs and management style of IPTO. To understand the importance of IPTO for the community, we examined a number of projects IPTO supported and their results in four technical areas: time-sharing, networking, artificial intelligence, and graphics. Specifically, we studied the work of a number of academic institutions supported by IPTO and looked into the specific subject areas. Norberg and Aspray designed and initiated this study, and Norberg and Judy O'Neill, who became associate director after Aspray, completed the project.

In early 1989, CBI received a National Science Foundation (NSF) contract, with Aspray as Principal Investigator, to prepare a history of NSF computing. With this contract, CBI was preparing studies of the two most significant sources of funds for computing research in the United States—NSF and DARPA. After Aspray left CBI to become director of the IEEE History Center, he and Bernard Williams completed the study there.



In July 1994, Robert Seidel assumed the directorship and instituted another phase in historical research at CBI. One area he believed to be of great significance was the role of the national weapons laboratories in the rise and development of computer equipment and techniques. He initiated a project to study these laboratories, and to couple it with additional analysis of an earlier research area at CBI, namely the impact of the computer in scientific research. For this latter work, he engaged two collaborators, Joel Hagen, of Radford University, and Stephen Johnson, then associate director of CBI. Several articles appeared from this project. Jeffrey Yost, the current associate director of the Institute (who joined the Institute in 1998) participated in the latter half of this project and prepared an extensive annotated bibliographic book on primary and secondary sources on the history of scientific computing.

During this period, the Charles Babbage Foundation Board proposed a more intense historical study of software. Software had been intermittently studied over the years, beginning with Aspray's chronology of events and a bibliography assembled in the mid-

1980s. But from CBF's perspective, insufficient attention had been given to software. A CBF Task Force studied the matter and made a number of suggestions to CBI. Jeffrey Yost and Robert Seidel fashioned some of these suggestions into a project that could stimulate new historical research and archival collecting with respect to software. The NSF awarded a grant to CBI, and Yost has served as the project director/principal investigator for a three-part study devoted to software development and the software industry. The project, benefiting from the addition of fulltime postdoctoral fellow and project manager Philip L. Frana, involves working with the software communities in both industry and academe to produce and disseminate infrastructure resources (a software history dictionary, a series of oral histories, and a scholarly journal) for the study of software history on the CBI Web site. CBI has engaged in other collaborative projects with groups outside CBI, but never one of this magnitude. This effort within CBI spawned a range of other activities related to the history of software, including new collecting initiatives and several conferences.

As the 20<sup>th</sup> century drew to a close, an international group of scholars began a program of conferences and publications called Mapping the History of Computing. This program sought to define and implement research agendas on an international scale. CBI received an invitation to join this group, which led among other things to joint sponsorship by CBI of the Conference "Mapping the History of Computing: Software Issues" in April 2000, convened at the Heinz Nixdorf MuseumsForum in Paderborn, Germany. Participation in historical conferences of this kind over the past two decades is indicative of the CBI staff's role in the international historical community.

Throughout the history of CBI, historical research has played a strong role in guiding the collecting strategy of CBI. Historians and archivists have joined in the identification of historically significant materials through analysis of the field's history. The acquisition of new materials by the archivists opened new avenues for investigation, which suggested yet more materials to acquire for the legacy of information processing. To fully appreciate this interplay, we turn now to a description of the CBI archival program.

### *Archival Program*

The CBI archival program began with a modest oral history activity led by Paul Armer, with the cooperation of Henry Tropp, Pamela McCorduck, and Nancy Stern, all experienced in oral history of computing. In 1983, CBI began the search for archival collections in earnest, even as we sought to hire an archivist to oversee the collecting program. The activity was still paper based, so many of the traditional archival methods were employed. At the time, there was little written history of information processing that could guide collecting. CBI engaged in historical research to inform collecting and supported research outside the Institute that would aid the process as well. Computing's other problematic characteristic was the pace of change in technology and industry, both dramatic. The task's magnitude shaped the archives' early collecting goals.

By the time Bruce Bruemmer joined CBI, the archives could be described in several major categories: manuscripts and records, near print materials (not published), oral

histories, and photographs. But this is merely a bare bones description and reveals none of the depth of the collection. The near print materials, which continue to be a major source of information for visitors to the archives, contained product literature, technical manuals and reports, educational reports, U.S. Government computing items, reports on international computing, and reports of consulting organizations. As Bruemmer noted, “our task now was to identify the records related to this near-print material and make available information about them that will provide a context for understanding their primary use and historical value.” He was also concerned about ephemera, such as the newsletters of professional groups. Ordinarily, these do not get cataloged by libraries and therefore often do not survive. This section of the collection grew over the next decade due to the industriousness of the archives staff and the generosity of many donors who responded to their call for materials.

CBI was not alone in trying to understand two of the central issues of archival collecting for the 20<sup>th</sup> century. First, the volume is enormous, and decisions about collecting have to be made judiciously. Many other archivists and historians were also grappling with the extensive materials generated by 20<sup>th</sup> century organizations. And second, the records generated by scientific and engineering organizations were viewed as a separate sub-set of the first problem. In the late 1970s, when a joint group of the Society of American Archivists and the History of Science Society investigated the problems of science and technology records, they did not delve into corporate records but rather called for studies on a case-by-case basis.

Due to CBI’s special mission to preserve historical corporate records, it was clearly necessary to extend the work of the Joint Committee in this area. The survey previously conducted by CBI indicated the nature and scope of the problem. For example, in the Spring 1984 *CBI Newsletter*, we pointed out that IBM alone had over 2 million linear feet of sorted records—sorted records! To formulate practical steps that CBI and companies could take became a special goal of the CBI archival program.

CBI then organized a four-pronged archival effort. (1) Bruemmer engaged in a very wide collecting activity so as not to miss anything important while we considered how to address the issues noted above. (2) We accepted the call of the Joint Committee that case studies be developed on a firm-by-firm basis. Bruemmer and Aspray developed a proposal to cooperate with the Control Data Corporation in a study of their records production and materials available. The effort was supported by the National Historical Records and Publications Commission (NHRPC). (3) A question arose about the nature of technical documents generated as part of corporate business and their relation to corporate functions and to subsequent historical research. CBI, in cooperation with the Computer Museum (then in Boston) and with support of the National Endowment for the Humanities (NEH), arranged to assemble at CBI a group of archivists, historians, and computer scientists to discuss this problem and make recommendations for its solution. (4) And arrayed with all this information about available archives and a better understanding of what to save, CBI set out to generate a national collecting strategy for the history of information processing. Armed with a strategy, CBI and other archives could scour the country, and aid organizations in other countries, to obtain records and



add them to the appropriate repositories. Support for this effort came from the American Telephone & Telegraph Company, the Andrew W. Mellon Foundation, and the IBM Corporation. Over much of the next five years, CBI's focused on these activities.

The conference involving archivists, historians, and computer professionals addressed five issues concerning technical documents: the inventive process in the development of computers, the nature of the records generated in the inventive process, the similarities and differences of these records from records of earlier technological developments, historical issues in computing that are similar to historical issues involving other technical developments, and the problems with accessibility to the records. Participants did not confine their attention to the questions placed before them. Instead, they broadened the context of discussion and spent most of the time discussing whether everything available related to computing should be saved or not, and if not, who is most suited to make selections. Two examples of topics in appraisal were (1) a discussion about the possibility of using computing machine categories as a way of setting priorities for collecting documents, and (2) appraisal guidelines for collecting business project records that would go beyond an emphasis on technical documents and include related business records as well. The results of this discussion later played an important part in CBI's study of Control Data records.

CBI staff learned two important things from this conference, which they kept uppermost in mind as they pursued other parts of the archival program. We believed before the meeting that there would be no disagreement among participants about who is served by the preservation of these records and who is the audience for historical writing. To our surprise, there proved to be much disagreement and much time was spent in this conference transferring information from one group to another. CBI concluded that this education process would have to go on continuously as it pursued its archival mission—and indeed it has and does.

Second, there was no consensus possible about what corporate records to collect because corporations differ greatly. Even if a credible plan with adequate guidelines were to become available, access to corporate records depends on attitudes within and policies of the individual company. CBI encountered this situation repeatedly over the next decade and a half. We have come to recognize that these attitudes and policies can only be understood after careful historical investigation, which in turn aids in the identification and selection of appropriate historic records of the firm to preserve. Accordingly, CBI has had to modify its practices to effectively identify and acquire corporate records collections. The idea also became a fundamental concept in CBI's corporate records study pursued at CDC beginning in 1987.

CBI's study of corporate records, while designed immediately after this conference, did not begin until after the development of our national collecting strategy and a second conference of historians and archivists sponsored by CBI was held in Philadelphia, both in 1987. The CBI national collecting strategy built on the work of several other institutions engaged in preserving the records of science and technology. We noted at the time that "any successful collections program must be based on a knowledge of events,

personalities, projects, the functional modes within projects, and the organizations and institutions in which the projects were performed. Only after this knowledge is attained and tested, can an appropriate strategy for developing a national collection be crafted by all interested parties.” This comment averred the assertions of the AIP Center for the History of Physics, which proposed this as their justification of the study of national laboratories and inter-institutional projects. It further illustrates the importance of historical study to effective archival activity. The strategy developed at the time is broad enough that it still guides CBI collecting, even as new topics are added to our search list.

The second meeting of archivists and historians generated a list of some of the “greatest immediate needs” for the history of computing. Among the items were: preservation of the archives of professional societies; a thesaurus providing a standard set of descriptors for the field; broadening the community of scholars, especially historians, involved in the history of computing; better appraisal techniques for the history of computing; a collection of overview data held by the consulting houses on the computer industry made available for historical research; a series of historical studies on the impact of computers on the sciences. A careful reading of CBI holdings on the CBI web site illustrates that some of these needs have been attended to, while others are still being pursued.

The foundation for CBI’s company case study of CDC was an analysis of selected activities of the corporation, namely, the development of the 1604 computer, the development of the PLATO computer-based education system, and the acquisition of C-E-I-R, Inc., an early computer service bureau company. The foremost goal of the study was the development of appraisal criteria transferable to other high-technology business-related collections. A second goal of the study was to determine the value of alternative sources of historical information when corporate records are unavailable. The third goal was to assess the effectiveness in an industrial environment of documentary probes, an appraisal technique developed elsewhere. With the endorsement and support of CDC, Bruemmer, as principal investigator, and Sheldon Hochheiser (now of Bell Laboratories), as project historian, worked almost daily for months at the company. Their findings and recommendations appeared in a CBI publication *The High-Technology Company: A Historical Research and Archival Guide* (distributed by the Society of American Archivists), which once again showed the value in the collaboration of archivists and historians. The guide presented a generic description of industrial activity in the high-technology environment, and endorsed the documentary probes technique for obtaining general historical and documentary information about these companies.



Before the archives could make any serious headway, it needed basic archival controls. Bruemmer developed a series of finding aids (detailed collection guides) for the collections already in the archives and then turned to the issue of cataloging. He placed the archival records of CBI collections on the Research Libraries Information Network (RLIN), which created national access to CBI's collection. And with the arrival of the Internet, CBI could provide even greater access to CBI's collection.

In 1994, Bruemmer took all of the archival finding aids and converted them to an Internet Gopher listing. Shortly thereafter, he reworked the style of CBI's finding aids and made them compatible with HTML style. CBI's new Web site was rich in content and its effect on reference service was dramatic. More and more researchers appeared at CBI with a list of box and folder numbers instead of a vague idea about collections at the Institute.

In 1999 Elisabeth Kaplan succeeded Bruce Bruemmer as archivist. She has led efforts to further enhance the search capabilities and content of the CBI Web site. Collection development work has continued, adding to CBI's world class resources for studying the history of information processing.

In short, since the founding of CBI, it has pursued a tightly woven range of projects in historical investigations and archives development. The achievements and influence of CBI resulted from its carefully circumscribed mission. The historical and archives projects were inextricably woven together to reinforce each other. The CBI archives has grown (see the description of the CBI archives elsewhere in this issue) in quality and depth as a result of this interaction. Through this collecting effort, the University of Minnesota Libraries has benefited greatly from the presence of historians and archivists in CBI.

In February 2000, the University of Minnesota opened a new state-of-the-art archives facility. The new library building has above ground office suites and below ground temperature and humidity controlled caverns for archival storage. CBI moved into the new facility, which enhances its ability to pursue its mission and serve its clientele.

### *Conferences and Service*

Over the years, CBI has sponsored, co-sponsored, and participated in conferences of all kinds related to archives and history, in addition to those noted above. The relevant point about these conferences is the range of topics and venues. History programs have been conducted at the University of Manchester, England (international computing); at the Nixdorf (Computer) MuseumsForum, Paderborn, Germany (software); at Rockefeller University in New York City (computing and communications); Palo Alto, California (history of the software industry); Minneapolis, Minnesota (40<sup>th</sup> anniversary of ERA, Inc.); Philadelphia, Pennsylvania (issues in the history of computing); Washington, D.C. (history of Sperry Univac); and Seven Pines, Wisconsin (CBI's scientific computing research, and research by CBI/Tomash Fellows). In addition, CBI staff participated in literally hundreds of professional meetings sponsored by other organizations and

professional societies around the world. It would be too tedious to list all of these, but it is important to mention that many of them resulted in publications to which CBI staff contributed.

Just as history and collecting played out together to build a great archival collection in CBI, our service functioned in the same way. CBI historians and archivists offered advice on countless historical research and writing projects, described the range and depth of collections useful for such projects, and answered numerous questions of a host of people interested in specific subjects in the history of information processing. Service to professional organizations has also been a major part of CBI activities as well. I offer here only a few examples of CBI staff participation: the Society of American Archivists, American Association of Computer Machinery, *Annals of the History of Computing*, History of Science Society, Society for the History of Technology, American Association for the Advancement of Science, NASA, the Commission on Preservation and Access, the American Federation of Information Processing Societies, the American Mathematics Association, and the MIT Press. We tried to bring our message to as many venues as possible, and benefited greatly in return from participation with these other organizations. This participation only strengthened our ability to pursue the mission of CBI.

As we look to the future, three things characterize the past two decades. First, there is the delightful burden of success. Primarily through its service to individual scholars, corporations, patent attorneys, writers, and students, CBI has helped hundreds to achieve their goals. The more requests we accommodate, the more requests we receive. The more collections and oral histories we acquire and record, the more people find their way to our institute seeking information. In the end, all these efforts, both ours and the researchers we serve, help to provide greater information to a public increasingly interested in the history of information technology and its impact.

Second, CBI provided a training ground for historians and archivists embarking on their careers. The variety of people includes postdoctoral historians in their first professional position, archivists just out of training, and graduate students working for degrees at the University of Minnesota. This training was in addition to the substantial number of historians who received the Tomash Fellowship over the years. These people went on to become leaders of history and archives related organizations. Others took up faculty positions at various colleges and universities. Each of these people brought strengths to CBI, which enabled it to broaden its programs and activities.

Third, as this brief historical survey of the CBI program above indicates, the program focused originally on the early years of information technology development in order to ensure the preservation of historically significant material. We began with collections of product literature, manuals, mainframe corporations, education materials, government documents, oral histories with early pioneers, and personal papers, all of these including photographs and other media items. The program then broadened in time and topic to encompass other areas: software, software companies, minicomputer materials, artificial intelligence research, networking, consultant groups, and professional societies and sharing groups, including a wide range of oral histories.

Our collections represent a cross section of the activities and organizations in information technology and our historical publications were often the first, and in some cases are still the only, interpretations of developments and events in the history of information processing. Consequently, CBI pursued its mission diligently, achieved many of its objectives, and opened the way for many others to research and comment on specific items in this history. Quietly and with determination CBI has provided a legacy for the history of information processing, one for which our sponsors can take just pride. But the task is far from completed. Information technology people continue to push the frontiers of information processing, introducing new concepts and artifacts that require our constant attention. Our collections will continue to grow. Our service will continue to be needed. Our involvement with the information community will continue to be rewarding. And when the next technological wave overtakes the information wave, the archive will be there waiting for another century's researchers.

## **CBI Historical Research: The Recent Past and a Look Toward the Future**

*By Jeffrey R. Yost*

While the Charles Babbage Institute's history of information technology research program was initiated more than two decades ago to identify areas to focus archival collection work, it rapidly grew to concentrate on conducting scholarly analyses of major areas and themes in the history of computing, software, and networking. The impact of CBI's historical research nevertheless continued to be fundamental to informing efforts of and opening opportunities for collection development. Oral history is the most visible result of the synergy of the historical research and archives programs at CBI, with Institute historians conducting the majority of the interviews in CBI's collection (which includes more than 350 transcripts) and archives staff adding value to these resources by providing description, maintenance, and accessibility (most recently by creating a frequently used online database of full-text PDF transcripts on the CBI Web site—<http://www.cbi.umn.edu>). Gaining new contacts and achieving clearer understanding of subspecialties in the field has and continues to pay dividends in advancing collection efforts. In short, CBI's historians and archivists have collaborated within the Institute as well as with individuals and outside organizations (see Arthur Norberg's article for further discussion of the history of CBI's external and internal collaborations) to advance the understanding of the history of information technology (historical interpretation) and the infrastructure for its future study (archival collections, historical and historiographical scholarship, and reference resources).

Over the past three years CBI historians have conducted 32 interviews with software pioneers from industry and academe as part of the Institute's National Science Foundation-sponsored Software History Project. Other components of this project include the peer-reviewed software history journal *Iterations: An Interdisciplinary Journal of Software History*, the Software History Dictionary, and the Software History Bibliography (all available as links off the front page of the CBI Web site). The Software History Project, officially titled, "Building a Future for Software History," has been focused on developing content and tools for the future analysis of this understudied area (the oral histories, dictionary, and bibliography), as well as the dissemination of scholarship and discussion (*Iterations*). The project has funded an additional historian at CBI, Dr. Philip Frana, who serves as the full-time Software History Project Manager. The project has also helped support three doctoral candidate research assistants from the University of Minnesota's Program in the History of Science and Technology.

The Software History Project (which ends in November 2003 and will be written about more extensively in an upcoming issue of the *CBI Newsletter*) is one of a series of major sponsored research projects that the Institute has engaged in to advance the knowledge of important topics and themes in the history of information technology. Large-scale federally-sponsored historical research projects in CBI's past include studies of: DARPA Information Processing Techniques Office and its funding of networking, graphics, time-sharing and artificial intelligence research (DARPA-funded); computing in cognitive science, and the physical and biological sciences (NSF funded); the origin of computer science (NSF-funded); NSF-sponsored computer research (NSF-funded); analysis of historical methods and documentation of high technology companies (NHPRC-funded); and the history of Engineering Research Associates, and more broadly, the Minnesota computer industry (NEH and NSF-funded). This research has resulted in a number of books, including: Arthur L. Norberg and Judy O'Neill's *Transforming Computer Technology: Information Processing for the Pentagon, 1962-1986*. (Baltimore, MD: Johns Hopkins University Press, 1996); William Aspray. *John von Neumann and the Origins of Modern Computing* (Cambridge, MA: MIT Press, 1990); Jeffrey R. Yost. *A Bibliographic Guide to Scientific Computing* (Westport, CT: Greenwood Press, 2002); and Bruce Bruemmer and Sheldon Hochheiser. *The High Technology Company: A Historical Research and Archival Guide* (Minneapolis, MN: Charles Babbage Institute, 1989).

Both within and outside of major federally-funded CBI projects, the Institute's professional staff of historians and archivists have continued to publish work to advance the history of information technology. CBI Staff's recent and forthcoming (accepted in final form) scholarly publications of the past two years are listed below.

### **CBI Scholarly Publications of the Past Two Years**

#### *Books:*

Reinhard Keil-Slawik, Ulf Hashagen, and Arthur L. Norberg, eds. *History of Computing Software Issues* (Munich: Springer-Verlag, 2002).

Jeffrey R. Yost, *A Bibliographic Guide to Resources in Scientific Computing, 1945-1975* (Westport, CT: Greenwood Press, 2002).

*Articles:*

Philip L. Frana, "Hunting the Wumpus: Internet Gopher and the Information Revolution" *IEEE Annals of the History of Computing* (forthcoming)

Elisabeth Kaplan, "Many Paths to Partial Truths: Archives, Anthropology, and the Power of Representation" *Archival Science: International Journal of Recorded Information* 2:4 (2003).

Arthur L. Norberg, "Table Making and Astronomy" in Martin Campbell-Kelly, et al., eds, *The History of Mathematical Tables: From Sumer to Spreadsheets* (Oxford: Oxford University Press, 2003).

Jeffrey R. Yost, "Computers and the Internet: Braiding Irony, Paradox, and Possibility" in Carroll W. Pursell, ed. *American Technology: Blackwell Reader in American Social and Cultural History* (Oxford: Blackwell Publishers, forthcoming).

Historians at the Institute are also in the process of completing a number of other books. Arthur Norberg is in the final stages of revising his completed book manuscript on the first decade and a half of the U.S. computer industry. Jeffrey Yost is completing a synthetic overview book manuscript that examines the computer industry from the origins of digital computers to the present and focuses on strategic management within firms. Philip Frana is writing a book on the history of medical informatics.

While CBI historical research has added important analysis to the field, the resources and skills of CBI staff have further aided research and scholarship in the history of information technology through assisting other scholars and by helping to fund doctoral students. The CBI/Tomash Fellowship was initiated almost simultaneously with the formation of the Institute, and a fellowship has been granted every year since the 1978-1979 academic year. The dissertation research of these scholars, many whom are now leaders in the history of information technology field, was profiled in a recent piece in the *IEEE Annals of the History of Computing* (Volume 23:4, Oct.-Dec. 2001, pp. 24-28). Since this publication, past fellows have continued to excel and new fellows have extended the tradition of doing cutting edge research. The 1999-2000 and 2000-2001 Tomash Fellows, Thomas Haigh and Nathan Ensmenger, both from the University of Pennsylvania, have completed their doctoral degrees. Dr. Haigh is now teaching in the Informatics Department at Indiana University and Dr. Ensmenger is a faculty member of the Program in the History and Sociology of Science at the University of Pennsylvania.

The current Tomash Fellow, MIT doctoral candidate Eden Miller, is researching and writing an important dissertation on the politics and ideology of computing within Chile

between 1964 and 1973. Miller's project continues CBI's tradition of supporting research on the international history of computing. Past CBI/Tomash fellows have examined various topics and themes of the history of computing in the Soviet Union and Great Britain. International conferences and workshops have been another important means to help facilitate understanding of the international history of information technology (see Arthur Norberg's article in this issue for further discussion of such collaborative events).

Looking to the future, CBI will continue to engage in timely historical research projects to advance understudied areas of the field, while maintaining and extending its dedicated service to the research community. Historians and archivists at the Institute are currently exploring the possibility of some new research projects, and will prepare proposals for federal funding. One potential project historians at the Institute are currently investigating is the history of computer security and privacy. Regardless of the particular topics or themes explored in future, CBI's historical research will build upon the Institute's strengths of simultaneously advancing literature in the field through internal scholarship, partnering with various individuals and organizations both nationally and internationally, and maintaining and adding to our world class archives.

## **CBI Archives: The Recent Past and a Look Toward the Future**

*By Elisabeth Kaplan*

Elsewhere in this issue, Arthur Norberg notes the value, and the uniqueness, of the fertile relationship between CBI's historians and archivists. This mutually beneficial collaboration, where the whole is much greater than the sum of its parts, is perhaps best demonstrated by the CBI's oral history database, which went online in October 2001. Research-grade oral history interviews created by historians at CBI are cataloged according to archival standards, and added to an online database designed and maintained by archives staff. This marriage of deep subject knowledge and rich content with a commitment to making historically valuable information not simply accessible, but increasingly useful, is one key to CBI's continued success.

CBI's mutually supporting programs also result in an approach to collecting that is at the same time discerning and opportunistic. CBI archivists have known from the start that we



cannot collect it all. That means making difficult decisions about what *should* be collected, preserved, and made accessible to researchers. These decisions are greatly informed by knowledge and instincts lent from the historical research activities. In turn, the archives support those activities by providing the raw material for much of the historical research. The fruits of this collaborative approach are evident in the “Recent Acquisitions” notices in each CBI Newsletter.

The CBI archives has increasingly focused efforts on digitization efforts. The Burroughs photograph database is an online resources of more than 500 images from the Burroughs Corporation Collections. CBI is also working with the University Libraries to establish the technological infrastructure to support digitized texts.

Equally important is CBI’s increased attention to matters involving materials that are *born digital* (as opposed to those that are digitized). Research, education, and a recently submitted grant proposal will help CBI to work closely with an international collaboration of stakeholders in the preservation of historically important born digital material in the history of information technology.

## **Arnold A. Cohen (1914-2003)**

Dr. Arnold A. Cohen, age 89, died this summer in St. Louis Park, MN. He was raised in Duluth, Minnesota, and educated at the University of Minnesota. He earned his Bachelor of Electrical Engineering (1935), Masters (1938) and Ph.D. in Physics (1947) from the University of Minnesota. After receiving his Ph.D., Cohen, a soft-spoken kindly man with a pronounced mid-Western drawl, started his professional career at RCA, where he became familiar with the characteristics of newly developed vacuum tubes. Cohen became a renowned physicist, noted for his significant contributions as a pioneer in the computer industry, primarily in the design and development of digital magnetic storage.



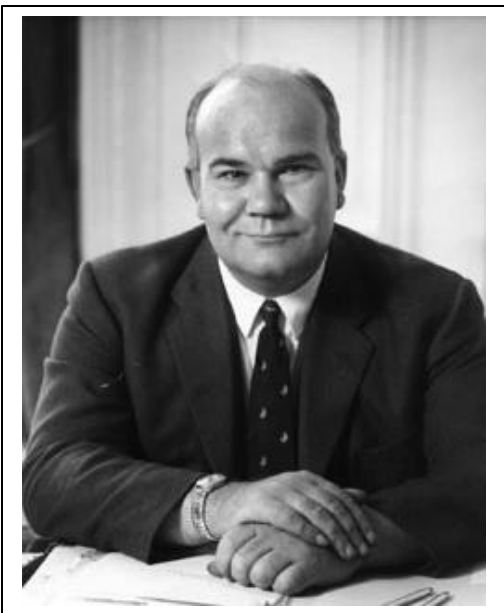
In 1946, Cohen became a member of the engineering group of Engineering Research Associates, Inc. (ERA) in St. Paul, Minnesota. While working on mass spectrometry in his Ph.D. studies, he designed circuits using these tubes, and this knowledge he integrated

with later data processing designs at ERA. Cohen spearheaded circuit design for the new storage machines of the late 1940s, along with the able assistance of William Keye and George Hardenbergh. Cohen's approach was basic and experimental, testing designs and evaluating breadboard models of circuits and prototypes of components. He was a major member of the group that designed the two Atlas systems for the NSA and the 1101 and 1103 commercial machines. Following ERA's acquisition by Remington-Rand Univac in 1952, which later became Sperry-Rand, Cohen and Dr. Sidney Rubens, another significant member of the ERA research and design group, led the division responsible for development of computer systems for the military.

In the 1960s and 1970s, Cohen also served as a member of the Scientific Advisory Board to the National Security Agency. In the 1970s, he was Associate Dean at the Institute of Technology at the University of Minnesota. In the 1960s, he was honored by the State of Minnesota as "Inventor of the Year" for his achievements in computer engineering. In 1984, he was awarded an IEEE Fellowship for "pioneering achievement on computer and storage devices and sustained service to the profession in this field." He was a founder in 1978 and served as a faithful board member for many years of the Charles Babbage Foundation for the History of Information Technology, which organized the Charles Babbage Institute. As a Senior Fellow of CBI, he frequently assisted the staff, offering advice about people in the industry, information about companies in the Twin Cities area, and strategies for fundraising.

*Arthur L. Norberg*

## **In Remembrance: Arthur L. C. Humphreys**



Arthur L. C. Humphreys, CBE died at the end of August at the age of 86. Humphreys was the former Managing Director of leading British computing firm ICT and a longtime Trustee of the Charles Babbage Foundation. He began his career at British Tabulating Machines Limited (BTM) in 1940 after working for several years in the legal field as an apprentice. At BTM he served as the Company Registrar before moving into the position of Assistant Secretary-Commercial of the firm in 1951. Beginning in 1958 he led the team that combined and integrated British Tabulating Machine and Powers-Samas to form ICT, and became Manager of Commercial Services of the combined entity. By 1963 he was appointed to

the Board as the full-time Director, and the following year became the Deputy Managing Director. In 1967 Humphreys was named the Managing Director of ICT, a position he held until 1972. During that time ICT merged with its last remaining domestic competitor in computing, English Electric, to form a national champion firm International Computers Limited, or ICL—a move that was encouraged and partially subsidized by the British government. In 1972 Humphreys was named Deputy Chairman of the company, and though he retired from a full executive post in 1977, he served as non-executive Director of the firm into the late 1970s. CBI is grateful for Arthur Humphreys continuing interest in computer history and his involvement, support, and years of service to the Charles Babbage Foundation and the Charles Babbage Institute.

*Jeffrey R. Yost*

## Recent Publications

Agar, John. *The Government Machine: A Revolutionary History of the Computer* (Cambridge, MA: MIT Press, 2003).

Black, Don. “Watson and Me: A Life at IBM” *IEEE Annals of the History of Computing* 25:3 (July-Sept. 2003): 4-19.

Copeland, Jack. *Colossus: The First Electronic Computer* (Oxford: Oxford University Press, 2003).

Croarken, Mary. “Tabulating the Heavens: Computing the Nautical Almanac in 18<sup>th</sup> Century England” *IEEE Annals of the History of Computing* 25:3 (July-Sept. 2003): 48-61.

Ermann, M. David and Michele S. Shauf. *Computers, Ethics, and Society* (New York: Oxford University Press, 2003).

Grier, David Alan. “Think Piece: The Great Machine Theory of History” *IEEE Annals of the History of Computing* 25:3 (July-Sept. 2003): 96+.

Hook, Diana H. et al. *Origins of Cyberspace: A Library on the History of Computing, Networking, and Telecommunications* (Novato, CA: historyofscience.com, 2002).

Kita, Chigusa Ishikawa. “J.C.R. Licklider’s Vision for the IPTO” *IEEE Annals of the History of Computing* 25:3 (July-Sept. 2003): 62-77.

Maney, Kevin. *The Maverick and His Machine: Thomas Watson, Sr. and the Making of IBM* (New York: J. Wiley & Sons, 2003).

Moore, Joe F. "Creating Profit with Computers: My Life as CEO of Bonner & Moore Associates" *IEEE Annals of the History of Computing* 25:3 (July-Sept. 2003): 30-47.

Mullin, Sherman N. "Into Digital Computing Through the Back Door" *IEEE Annals of the History of Computing* 25:3 (July-Sept. 2003): 20-29.

Norberg, Arthur L. "Table Making and Astronomy" in Martin Campbell-Kelly, et al., eds, *The History of Mathematical Tables: From Sumer to Spreadsheets* (Oxford: Oxford University Press, 2003).

Reilly, Edwin D. *Milestones in Computer Science and Information Technology* (Westport, CT: Greenwood Press, 2003).

Schein, Edgar H., et al. *DEC is Dead, Long Live DEC: The Lasting Legacy of the Digital Equipment Corporation* (San Francisco: Berrett-Koehler Publications, 2003).

Steane, A. M. "A Quantum Computer Only Needs One Universe" *Studies in History and Philosophy of Modern Physics* 34:3 (2003) 469-478.

Swade, Doron. "Calculation and Tabulation in the Nineteenth Century: Airy Versus Babbage." Ph.D. Dissertation: Univ. Col. London, 2003.

Zygmunt, Jeffrey. *Microchip: An Idea, Its Genesis, and the Revolution It Created* (Cambridge, MA: Perseus, 2003).

*Compiled by Jeffrey R. Yost*

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**CALL FOR PAPERS**

**2004 IEEE Conference  
on the  
History of Electronics**

**THEMES AND TRANSITIONS IN THE  
HISTORY OF ELECTRONICS**

**Bletchley Park, United Kingdom**  
**28–30 June 2004**

The intention of this IEEE conference is to help build a comprehensive view of electronics history through several dozen papers, each of which investigates some formative development in this 100-year-long history. The developments may include the opening of a new area of application, the invention of a major technique, or the gradual replacement of one dominant technique by another. An important feature of this conference is the participation of people with different backgrounds—engineers, historians, museum curators, avocational historians—that should make discussions particularly fruitful. The retreat-like setting of the conference should stimulate the exchange of ideas also.

Some possible themes for conference sessions are the following:

Electronics and Music  
Electronics in Communications  
The Tools of Electronics Design  
Power Electronics and Electronics in Industry  
Semiconductor Electronics: A Story of Continuity or Discontinuity?  
Behind the Front Panel: Forgotten Bits and Pieces of Electronics.  
Standards and Technological Trajectories  
Electronics in National Contexts  
The Business of Electronics

For submission guidelines, registration information, or other information contact Program Committee Chair Frederik Nebeker by email <f.nebeker@ieee.org> or by regular mail: IEEE History Center, Rutgers University, 39 Union Street, New Brunswick New Jersey 08901 USA). The Program Committee is also interested in proposals for sessions. *The deadline for paper proposals is 31 January 2004.*

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## **Featured Photo: 25 Years Ago**

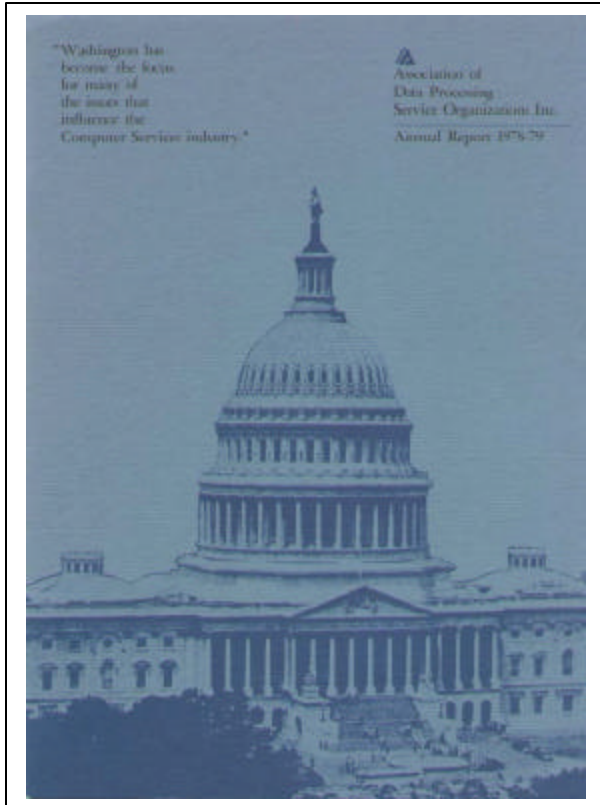
*(Please contact the CBI archives for more information about the collections listed in association with the events below.)*

... A consortium of twelve corporations, churches and community organizations, including the Control Data Corporation (CDC), formed City Venture Corporation, in Minneapolis. CDC was the largest stockholder and heavily involved in the development of City Venture, a for-profit corporation intended to help communities achieve revitalization and a better investment image through job creation.

**Control Data Corporation Records (CBI 80)**  
**William C. Norris Papers (CBI 164)**

. . .The Association for Women in Computing was founded in Washington, D.C. to promote communication among women in computing and further the education, professional development, and advancement of women in computing.

**Association for Women in Computing Records (CBI 49)**



*“Washington has become the focus for many of the issues that influence the Computer Services industry.”*  
ADAPSO Annual Report, 1978-1979.

. . .ADAPSO moved its headquarters to metropolitan Washington, DC.

**Association of Data Processing Service Organizations (ADAPSO) Records (CBI 172)**

. . .The FBI arrested Stanley Mark Rifkin in Carlsbad, California on charges he stole \$10.2 million from the Security Pacific National Bank in Los Angeles using the Federal Reserve’s electronic funds transfer system (EFT), Fedwire. Rifkin, a computer analyst who had worked on the security system at the bank, gained access to the wire transfer room and observed that day’s Fedwire code, impersonated a bank officer and transferred \$10.2 million to an account in New York. He used most of the money to buy diamonds from the Soviet Union. Rifkin was sentenced to eight years in prison in 1979.

**Donn B. Parker Papers (CBI 166) SRI Case File #78313**

. . .The 2nd Annual West Coast Computer Faire was held in San Jose, California.

**Uncataloged Serials (CBI 152)**

. . .The Minnesota Joint Computer Conference (MJCC), a series of professional data processing seminars held annually from 1979-1994, was founded. The conferences were initially sponsored by the Data Processing Management Association (DPMA) Twin Cities chapter and held in conjunction with DPMA’s Northwest Computer Show. The local ACM chapter became a supporting member in 1979, as did the local chapter of ASM in 1981.

**Minnesota Joint Computer Conference (MJCC) Records (CBI 173)**

*Carrie Seib*