CENTER FOR THE HISTORY OF INFORMATION PROCESSING

Charles Babbage Institute Annual Report for 1989-90

This year efforts at CBI can be classified into three categories: research projects' progress, archives development, and community involvement.

Historical Research

The research was mostly on continuing history projects. After twenty months of work, investigation of the Defense Advanced Research Projects Agency's (DARPA) support and stimulation of computing in the 1960s and 1970s reached the stage where we could begin to draft sections of the final report, which will appear in book form. In fact, one case study, networking, was in an advanced stage of completion. The remaining three case studies, time-sharing, graphics, and aspects of artificial intelligence, existed in various outlined stages.

A complete outline of the management history and the case studies was presented to the Advisory Committee at its May 1990 meeting. This research has unearthed many new sources to tell the story of DARPA management of the computing program and the relations between the academic research and defense communities in recent computing developments. However, the change of staff commented on in last year's annual report affected the nature of progress in this study.

A new area, graphics, was added to the study after six months of effort, and the artificial intelligence case study proved more complex than expected. Moreover, we realized that a more significant study could be presented if we analyzed the prehistory to DARPA efforts in this area. With the consent of the Advisory Committee, we requested an additional eight months to complete the project, pushing the completion date to June 1991. (Since considerable progress has been made from July to October 1990, we now have some 200 pages of manuscript written, suggesting we can meet the June 1991 completion date.)

CBI is also playing a part in the Center for History of Electrical Engineering study of the role of the National Science Foundation (NSF) in computing in the last 40 years, albeit at a considerably reduced level as compared to the DARPA project. Many of the same questions are being asked regarding the NSF records, and a similar approach to the study of influence is being used. CBI's role has been almost exclusively in the search for and evaluation of records; the Center project staff is doing the analysis, interviewing, and writing.

While these projects proceed, we continue to pursue our study of the computer industry. Some time ago, we divided the industry up into segments along the lines used by the industry; for example, mainframes, applications software, printers, time-sharing services, graphics. Data are collected on the companies active in these areas, including some description of their products and trends in the segment. This material is to be used to prepare an encyclopedic volume on the industry to be published in the series *Encyclopedia of American Business History and Biography*. During the coming year this background material will be assembled by CBI, and it will be circulated to others to prepare entries for the volume.

These efforts all have been under my direction. Help on the DARPA project consisted of Judy O'Neill, who worked full time on the project from August 1989 to June 1990, and several graduate students, who worked an average of fifteen hours per week since the project began. Archivist Bruce Bruemmer is the point man on the NSF project, working with William Aspray, the director of the project. I am directing the industry study with the assistance of one graduate student, who works an average of ten hours per week.

Archives Development

Archives development covers a number of areas: donor solicitation, receipt of collections, and arrangement of collections

Contents

CBI Fellowship Stipend Increased

At its annual meeting on 30 October 1990 the Board of Directors of the Charles Babbage Foundation voted to increase the amount of the Adelle and Erwin Tomash Fellowship in the History of Information Processing for the 1991–92 academic year. (See *CBI Newsletter* Volume 12, Number 4.) We are pleased to announce that this fellowship will now provide a stipend of $10,000 plus research expenses up to $2,000. The Charles Babbage Institute extends its gratitude to the Charles Babbage Foundation for this added generous support. □

Recent Publications

● William Aspray, *John von Neumann and the Origins of Modern Computing*. Cambridge, MA: MIT, 1990.

● *Computing in Musicology 1990*. Center for Computer Assisted Research in the Humanities, 525 Middlefield Road, Suite 120, Menlo Park, CA 94025.

● Raymond Kurzweil, *The Age of Intelligent Machines*. Cambridge, MA: MIT, 1990.

● John Napier, *Rabdology or Calculation with Rods in two books with an Appendix on the High-Speed Promptuary for Multiplication and One Book on Location Arithmetic*, Vol. 15, CBI Reprint Series for the History of Computing. Translated by William Frank Richardson; introduction by Robin E. Rider. Cambridge, MA: MIT Press; Los Angeles: Tomash Publishers, 1990.

● Margaret Schabas, *A World Ruled by Number: William Stanley Jevons and the Rise of Mathematical Economics*. Princeton, NJ: Princeton University Press, 1990. Although primarily a study of Jevons' contributions to economics, sections contain information on his work with logic machines and his differences with Boole concerning logical method and philosophy

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CHARLES BABBAGE INSTITUTE
NEWSLETTER

The Charles Babbage Institute, Center for the History of Information Processing, is sponsored by the University of Minnesota and the information processing community. Arthur L. Norberg, Director

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● Stuart S. Shapiro, "Computer Software as Technology: An Examination of Technological Development." Ph.D. Dissertation. Carnegie-Mellon University, 1990. Ann Arbor, MI: University Microfilms International. Order number: 9026782.

Articles of Interest

Georges-Louis Baron and Pierre-E. Mounier-Kuhn, *"Computer Science at the CNRS and in French Universities: A Gradual Institutional Recognition,"* Annals of the History of Computing, 12(2)(1990): 79–87.

Ralf Bülow, "Three Inventors—Scenes from Early German Computing History," *Annals of the History of Computing*, 12(2)(1990):109–126.

I. Grattan-Guinness, "Work for the Hairdressers: The Production of de Prony's Logarithmic and Trigonometric Tables," *Annals of the History of Computing*, 12(3)(1990):177–185.

T. A. Heppenheimer, "How von Neumann Showed the Way," *Invention & Technology*, 6(Fall 1990):8–16.

Colette Hoffsaes, "The French Society of Computer Scientists: AFCET," *Annals of the History of Computing*, 12(3) (1990):167–176.

Jean Kuntzmann, "Informatics at the University of Grenoble," *Annals of the*

History of Computing, 12(2) (1990):91–93.

Leon Łukaszewicz, "On the Beginnings of Computer Development in Poland," *Annals of the History of Computing*, 12(2)(1990):103–107.

Arthur L. Norberg, "High-Technology Calculation in the Early 20th Century: Punched Card Machinery in Business and Government," *Technology and Culture*, 31(October 1990):753–779.

C. Pair, "CRIN: The History of a Laboratory," *Annals of the History of Computing*, 12(3)(1990):159–166.

Helmut T. Schreyer, "An Experimental Model of an Electronic Computer," *Annals of the History of Computing*, 12(3)(1990):189–197. (Translation and combination of two papers published by Schreyer in 1983 in Report No. 143 of the German Society for Mathematics and Information Processing.)

Jean-Pierre Verjus, "Programming in Grenoble in the 1960s and Those who Flew from the Nest," *Annals of the History of Computing*, 12(2)(1990):95–101.

Maurice V. Wilkes, "Herschel, Peacock, Babbage and the Development of the Cambridge Curriculum," *Notes and Records of the Royal Society of London*, 44(1990):205–219. □

Boelie Elzen Colloquium at Minnesota

Dr. Boelie Elzen, of the University of Twente, returned to the University of Minnesota in October to continue his work on the development of supercomputing and the history of the changing industry. The study, a collaborative effort of Elzen and Donald MacKenzie of Edinburgh University, is sponsored by the UK Economic and Social Research Council under the Programme on Information and Communication Technologies (PICT). [For a description of the project, see the Spring 1990 *CBI Newsletter*, Volume 12, Number 3.] Elzen presented a review and preliminary findings of the study.

In his remarks, he focused on the demands for more speed (megaflops) and the gradual change in the complexion of the industry in the United States. The demand for more megaflops was a straightforward response to the successes of Control Data Corporation and later Cray Research, Inc. in designing faster and more capable machines.

In assessing the changes in the industry, Elzen and MacKenzie see a repetition of an earlier phenomenon in a company's approach to markets: a choice of attending to an installed base at the expense of changes in the technology or of seeking new users by modifying and extending the technology, in this case through the development of extensive software. Elzen described a number of applications that produced this broadening of the customer base: petroleum, chemicals, aerospace, and automobiles. In supercomputing, Control Data stressed the installed base, while Cray Research sought new users. These emphases tell a great deal about the companies and their success or lack of success.

This work is a good example of the use of published and archival sources as well as oral history. Several manuscripts will emerge from the project in 1991, and we will keep our readers informed as they appear. □

Cray Research Cares about Its Past

by Janet V. Robidoux
Staff Consultant, Cray Museum Project

About three years ago Cray Research became concerned that some of its history was slipping away forever. And they began a project to assure that historical artifacts and information would be protected and assigned a staff consultant to the project.

In the summer of 1990 two major goals of that project were achieved. First, in August Cray Research opened an internal computer museum in one of its buildings in Chippewa Falls, Wisconsin.

In addition to Cray Research's history, the internal museum plans to include as much as possible about the computers its founders worked on before forming Cray Research. In particular, founders such as Seymour Cray, Frank Mullaney, George Hanson, Noel Stone, and Les Davis—among others—helped design machines at Engineering Research Associates (ERA), Univac, and Control Data Corporation (CDC). Cray Research is looking for pre-1958 artifacts from the ERA

and Univac machines. Already on display are the following CDC machines: serial 2 of the CDC 160A; serial 27 of the CDC 1604 on loan from the Computer Museum in Boston; serial 1025 of the 6500 (two 6400 processors); serial 3 of the CDC 7600 and a 7611. Cray Research's own machines on display include serial 1 of the CRAY-1 and serial 101 of the CRAY X-MP.

At this time the museum is open for employees and their visitors but is not open for the general public since the building housing the museum is one that has limited access.

Another role of the Cray Research museum project is to lead the community of Chippewa Falls in the establishment of a museum for industry and technology. The museum, which is still in conception stage and several years from reality, would feature the technology of the various Chippewa Falls industries and would

The CDC 6500 computer system, in the Cray Corporate Computer Museum, was retired from Purdue University in June 1989. It is thought to have been the last operational CDC 6000 machine in the United States.

CDC 1604 S/N 27 computer system, last used in Madison, Wisconsin is on loan from The Computer Museum in Boston. Standing left to right are Frank Mullaney, George Hanson, and Les Davis. Seated is Janet Robidoux.

include hands-on educational displays.

Secondly, a historical events/timeline was unveiled in September. The historic time-line is in the new corporate headquarters complex, called Cray Park, in Eagan, Minnesota. The time-line consists of a 90-foot display aligned along a hallway near the marketing building lobby. The display lists major or interesting events by year, starting with the founding of Cray Research in 1972. Supporting the time-line are about 75 photos and other memorabilia arranged above it. Employees and customers who visit the display are encouraged to donate historical items so that the display becomes richer with time. Cray Research plans to update the display annually.

For more information about this Cray Research project, contact the author at 612, 571-5141.

Editor's note: Janet Robidoux and her twin sister Janice started in the computer industry as clerk typists at Univac in 1956 while working on their degrees. They eventually became junior mathematicians at Univac and left in 1963 to complete their formal education at the University of Minnesota. Both went to CDC as technical writers in 1965. Janet left CDC in 1975 to become the first technical writer at Cray Research. Janice is still at CDC in technical publications. □
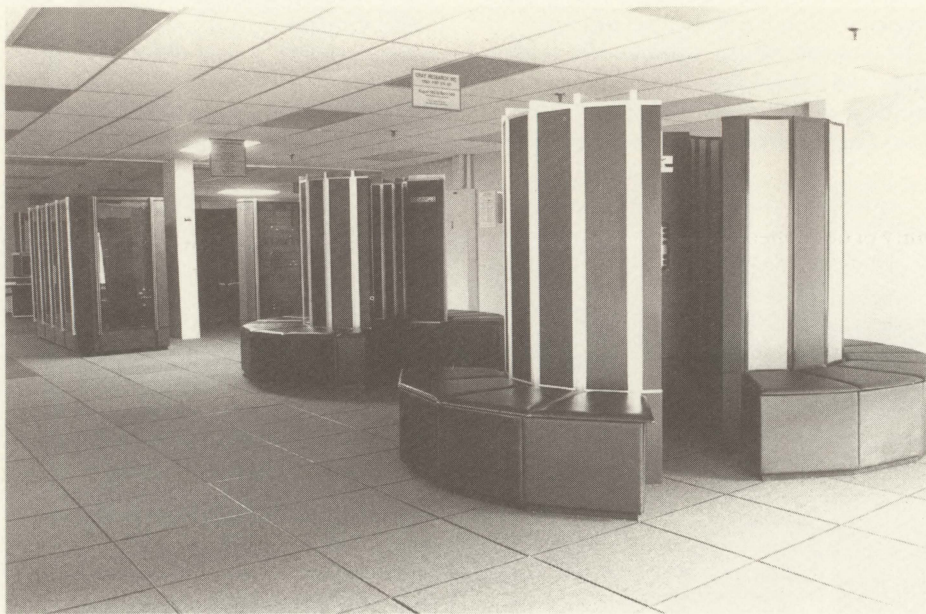
On display at the Cray Corporate Computer Museum are, from left to right, CDC 7600 S/N 3 from Los Alamos National Laboratory, CRAY-1 S/N 1 retired from service in May 1989 from a government site in the United Kingdom, and the first CRAY X-MP computer system, which was used by Cray Research, Inc. in its computer center in Mendota Heights, Minnesota.

IEEE Fellowship in Electrical History

The Institute of Electrical and Electronics Engineers (IEEE) invites applications for its 1991–92 Fellowship in Electrical History.

The Fellowship supports either one year of full-time graduate work in the history of electrical engineering and technology at a college or university of recognized standing or up to one full year of post-doctoral work in the same field for a recent graduate.

The IEEE Fellowship in Electrical History is made possible by a grant from the IEEE Life Member Fund and is administered by the IEEE History Committee.

Further information and application materials may be obtained by writing to:
Director
Center for the History of Electrical
 Engineering
Rutgers—The State University of
 New Jersey
39 Union Street
PO Box 5602
New Brunswick, NJ 08903
The deadline for submission of all application materials is 1 February 1991. □

Fifteenth Volume in Reprint Series Available

The Charles Babbage Institute is pleased to announce the appearance of Volume 15 of the MIT Press and Tomash Publishers Reprint Series for the History of Computing: *John Napier's Rabdology or Calculation with Rods.* First published in 1617, this is the first complete version in English, translated by William F. Richardson. The translator's preface and an introduction by Robin E. Rider provide important statements of the historical context of this work by Napier and the reception of the work after its publication in Latin.

The *Rabdology* describes several instrumental aids to calculation, which "represent the result of Napier's own absorption with the nature of number and computation," according to Rider. The part of the work that received the most attention through the years is that on the description of the calculating rods.

Copies of Volume 15 (ISBN 0-262-14046-2) can be obtained directly from The MIT Press, 55 Hayward Street, Cambridge, MA 02142. □

for efficient retrieval. Emphasis this year was on developing donors rather than receiving collections. Negotiations are ongoing with several companies and professional associations as well as a significant group of individuals. Bruce Bruemmer examined records in several parts of the country, many of which, we are confident, will come to CBI eventually. These activities will yield information on the companies, programming language developments, and market research. A number of these collections is expected in fiscal year 1991.

A total of 119 linear feet of records (33 separate accessions) was added to CBI's collection. Among the largest of these were the collections of Roland Arndt, Alan Perlis, and Erwin Tomash. We received a collection of the literature in computational linguistics (on loan) and market reports and other company literature. We added 24 new oral histories, almost all of which are connected to the DARPA project. This brings our oral history collection to 245 interviews.

In the area of processing, the shelflist was brought up to date, arrangement of the Edmund Berkeley papers was completed, further organization of the manuals and product literature collections was accomplished, and a significant amount of duplicate materials was weeded from the collections. A large collection of market research publications was itemized on a computer file. It will soon be possible to load our large inventories on a database that will be accessible through the local library database, LUMINA. This will significantly increase the local use of our archives collections.

All of this archival work, along with a heavy load of reference work for patrons, was accomplished by Bruemmer and one three-quarter time assistant—an amazing accomplishment. And this is not all he did, as I will explain below.

Community Involvement

CBI offers its services to the University Library, the University teaching program, visitors and correspondents seeking materials and advice, and professional associations. We also presented papers and attended the annual meetings of professional societies and special conferences and gave lectures in other venues. A few of these activities are described.

Bruce Bruemmer delivered papers at meetings of the Society of American Archivists and the Midwest Archives Conference and at a conference sponsored by the National Air and Space Museum of the Smithsonian Institution. He also was one of the organizers of the Univac Oral History Conference, sponsored by Unisys and held at the Smithsonian Institution (see *CBI Newsletter* Volume 12, No. 3), and attended a working conference concerning the preservation of microcomputer software.

Bruemmer was involved in a lengthy study of the bibliographic control needs of the archives and special collections units in the University Library. A report from this study, released in summer 1990, argues for better cataloguing of all formats held by archival units, so as to be more informative to potential users, and access to collections via LUMINA. CBI will benefit directly from this activity, because in fiscal year 1991 the Libraries' Central Technical Services unit plans to catalogue CBI's monograph and serial holdings, which will place them on LUMINA and further increase the visibility of our collections.

A number of visitors spent varying amounts of time working at CBI this year. The Tomash Fellow, Anthony Gandy, arrived in September 1989 and stayed through July 1990, working through many collections in his comparative study of the United States and United Kingdom computer industries. Professor Donald MacKenzie of Edinburgh University and Dr. Bolie Elzen of the University of Twente used CBI as their base in the United States to pursue a study of the development of supercomputing. Professor Shane Greenstein of the University of Illinois, a past Tomash Fellow, returned to CBI for an extended period for research.

Besides these and other people visiting CBI, patent attorneys and publishers continue to use CBI collections with good results. Two television stations, KCET (Los Angeles) and WGBH (Boston), are producing shows of different lengths and are making use of CBI materials. Once again, Bruemmer is responsible for seeing to the needs of these people and organizations.

Erwin Tomash and Arthur Norberg both delivered papers about aspects of the United States computer industry at the second (French) international conference on the history of computing organized by the Conservatoire National des Arts et Metiers. Norberg also delivered papers at the annual meeting of the Society for the History of Technology, a conference on federal support for science since 1945 sponsored by the Smithsonian Institution and the Naval Research Laboratory, as well as talks at several campuses around the country. Norberg participated in an advisory committee meeting for a new series on the information age under production by WGBH and was a participant in the Univac Oral History Conference.

Objectives for Fiscal Year 1991

During the coming year, CBI will
- complete the history of DARPA's influence on the development of computing
- continue vigorously to pursue potential donors of collections to the CBI archives
- evaluate past progress and future prospects in the research and archives programs and re-evaluate staff distribution and needs
- plan a general program for the 1990s and specific projects for the next two years
- and seek further support from our loyal friends and new associates.

This year we will be joined by a new historian, who will also serve as associate director. □

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Thirty-Year-Old Technology

Between the development of magnetic cores and semiconductors, a host of technologies was developed for random-access memory. One, developed by National Cash Register, involved rods coated with a magnetic thin film inserted through a stack of coil planes. Electrical pulses sent through the coils would magnetize the cylindrical thin films, which could be read by sensing the magnetic state at any location in the array. The magnetic rod memory was faster than toriodal core memory, required lower voltages, and could operate under extremes of temperature.

Initial research was conducted in 1960 for the Air Force Cambridge Research Laboratories by the Electronics Division of National Cash Register. The memory was incorporated in the NCR 315, which was renamed the NCR 315 RMC (Rod Memory Computer). While the CBI archives has photographs and product brochures on rod memory, little is known about its success before being displaced by semiconductors. □

Pictured is an NCR 315 RMC (circa 1964). The memory module (held by the model) could store up to 240,000 digits with a basic cycle time of 800 nanoseconds. The photograph was among over 200 prints recently donated to CBI by Professor Gordon B. Davis.

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