CHARLES BABBAGE INSTITUTE

CENTER FOR THE HISTORY OF INFORMATION TECHNOLOGY

In This Issue:

CHARLES BABBAGE INSTITUTE

CENTER FOR THE HISTORY OF INFORMATION TECHNOLOGY

NEWSLETTER   **Spring 2007**

Vol. 29

No. 1

In This Issue:

The Charles Babbage Institute for the History of Information Technology is sponsored by the University of Minnesota and the information technology community. *Charles Babbage Institute Newsletter* is a publication of the University of Minnesota. The *CBI Newsletter* reports on Institute activities and other developments in the history of information technology. Permission to copy all or part of this material is granted provided that the source is cited and a copy of the publication containing the copied material is sent to CBI.

New Archivist Hired for CBI

We are immensely pleased to announce that R. Arvid Nelsen has been appointed as the full-time professional archivist for the Charles Babbage Institute. Arvid began work at CBI during the first week in April. Mind you, moving from San Diego to the Twin Cities in early spring represents true dedication. Arvid brings a wealth of experience to his new position. In San Diego, he was coordinator of technical services in the Mandeville Special Collections Library and classical studies librarian at the University of California, San Diego. Arvid also was chair of collection development of the Lambda Archives of San Diego, the leading repository for the history and culture of the LGBT community in the region. Previously he had worked at the University of Wisconsin in the Special Collections and Digital Imaging departments. He is professionally active in the Rare Books and Manuscripts Section of the Association of College and Research Libraries as a member of the Nominating and Bibliographic Standards committees, and in addition he chairs the Seminars committee. He holds a Master of Arts in Library and Information Studies (MLIS) degree and an M.A. in Classics from the University of Wisconsin, and a B.A. in Greek and Latin from the University of Minnesota.

Arvid's successful hiring aptly represents the partnership that exists between CBI and the University of Minnesota Libraries. Arvid was selected after a nation-wide search conducted by the University Library, with CBI's director Tom Misa serving on the search committee. As our visitors can attest, CBI's office space and state-of-the-art archival storage facilities are housed in Andersen Library, the central location for the University's special manuscripts and archival collections. As a full member of the Archives and Special Collections department, Arvid can draw on the Library's impressive wealth of practical knowledge and professional expertise. Indeed, we are lucky in that CBI's former archivist, Beth Kaplan, is literally two doors away. Beth now heads University Archives and co-directs the University's Digital Conservancy, a newly launched "beyond-the-horizon" library initiative to develop entirely new means for tapping, organizing, and archiving the immense amount of digital data—including scholarly and administrative works—generated by the University. Moreover, Karen Spilman, who has been capably serving as Interim Archivist these past months, is also moving on—again, to University Archives. During Arvid's first month at CBI, he and Karen worked closely to make an effective handover, and both Karen and Beth remain right at hand for the inevitable questions down the line. (We also would like to recognize the efforts of Carrie Seib, who also served during a transitional period last year as Interim Archivist.) With a quarter century of pioneering activity in IT archiving, and now the capable leadership of Arvid Nelsen, CBI's archival program is in excellent hands.

Thomas J. Misa

3

Corinna Schlombs Named Tomash Fellow for 2007-2008

Corinna Schlombs, a doctoral candidate in History and Sociology of Science at the University of Pennsylvania, has been named the 2007-2008 Adelle and Erwin Tomash Fellow. Schlombs' dissertation investigates the transfer of computing technology between the US and Western Europe (focusing on Great Britain and Germany) from the end of World War II to the late 1960s. In the 20th century, multinational corporations became the main mediators of technology transfer across national borders. Her research concentrates on technology transfer by two of the major US computer manufacturers, IBM and Remington Rand/Sperry Rand, and how computer technology was appropriated to new local contexts.

Schlombs' special interests are on the international history of airline reservation systems and computer applications in banking. CBI holds substantial resources in both these areas. These include feasibility studies by Diebold Group and Auerbach Associates on banking and reservation systems, and records on the introduction of computer systems at Eastern Airlines and the Bank of America.

Currently, Schlombs is conducting research in Germany where she is based for four months in Munich as a scholar-in-residence at the Deutsches Museum. Schlombs was awarded a NSF Dissertation Improvement Grant for her archival research in the US and abroad. Earlier this year, she tied for first place in the Eighth Annual International Association of Science and Technology Studies (IASTS) Graduate Student Contest. She also published a recent "Think Piece" entitled "Toward International Computing History" in *IEEE Annals of the History of Computing* (28:1, pp. 107-108).

Schlombs studied sociology at Bielefeld University and in Paris before starting the doctoral program at the University of Pennsylvania. She spent six months at CBI as a visiting student in the 2000/2001 academic year, made a dissertation research trip to CBI last academic year, and plans to visit CBI to conduct additional research during her fellowship year.

Jeffrey R. Yost

A Travel Fund is Born

What can we do to increase CBI's impact on the computer-history field? Dollar for dollar, at this time, there is nothing better than offering modest travel-to-collection grants. Such small grants will help researchers come to CBI and spend time with its substantial riches. Happily, we have the opportunity to combine this worthy activity with the fine task of honoring CBI's founding director, Arthur Norberg. His colleagues at the University of Minnesota have launched the "Arthur Norberg Travel Fund," and they invite you to join them by making a contribution today. You'll be directly supporting research in the history of computing, and making the most of the work that Arthur and colleagues have done over the years in assembling an unparalleled set of research resources.

As a young researcher working on my Ph.D., I remember scouring the history profession's newsletters and advertisements, looking for "grants in aid" and other ways of funding my research. Libraries and archives that offer these small grants prompt researchers to give their collections a second, serious look—or to extend a planned stay. It's really the case that scholarship in history often proceeds on shoestring budgets. The good news is that libraries and archives do not need to make multi-million-dollar grants. But they do need some funds to encourage and facilitate visiting researchers.

The sum of $500 might allow a graduate student to travel to CBI and firm up part of a dissertation chapter, while $1,000 might permit an assistant professor to do some in-depth research at CBI and turn a promising paper into a publishable article that might speed the passage to tenure. Even a short visit can lead to a successful grant application down the road: funding agencies such as the National Endowment for the Humanities (NEH) or the National Science Foundation (NSF) look most favorably on historians who have made a preliminary visit to an archival collection, examined the materials first hand, and made an informed assessment of their worth to the research project at hand.

Reading the first installment of our new series ("Exploring the Archives") on CBI's hidden archival treasures—on the under-explored topic of international computing—who can doubt that researchers, more than ever, need to use CBI's collections? And who could such a fund be better named for than Arthur Norberg, CBI's founding director and guiding hand for most of a quarter century?

We have a pledged sum from Arthur's University colleagues in the low "five figures," which is itself enough to generate an on-going annual income permitting one researcher to spend one week at CBI. And thanks to a generous initiating gift, we can start this up immediately. It's a small beginning, and we'd like to do much more. CBI is open to researchers something like 50 weeks in the year, and we'd love to fill the reading room with CBI researchers.

The beauty of this plan is that all sums—large or small—contribute directly and meaningfully to a core mission of CBI: fostering high-quality research in the history of computing. And as the fund grows, so will CBI's capacity for supporting additional researchers in the archives. Over the years, this fund will meaningfully multiply the efforts

of our archival donors, the archivists who've transformed boxes of documents into research tools, and the wider community that has supported this effort. Please consider making a special donation to this special fund.

You can mail us a check to "University of Minnesota Foundation/Arthur Norberg Fund" or contact CBI for information on how to make an electronic transfer. Please direct any questions you might have about the fund—its purpose, our selection criteria, or the details of its investment—to me at tmisa@umn.edu or 612-624-5050. We'll keep you posted on the results!

Charles Babbage Institute; 211 Andersen Library; University of Minnesota; Minneapolis, MN 55455

Thomas J. Misa

"Rave Reviews" for CBI's IBM–Rochester Study

In January CBI staff members published *IBM Rochester: A Half Century of Innovation* in commemoration of the Minnesota facility's 50th anniversary. Arthur Norberg and Jeffrey Yost, CBI's former director and present associate director, respectively, conducted seventeen oral histories with Rochester executives and engineers to supplement the available archival record. Long an important manufacturing and development center, IBM Rochester is today perhaps best known for developing the AS/400 mid-range computer system, rolled out with great success beginning in 1988 with more than 1,000 software packages and an attractive mix of cost and speed. Norberg and Yost begin the story with the founding of the Rochester division in 1956, when IBM was seeking a Midwestern manufacturing facility for its mechanical punch card machines, and carry the story all the way through present-day concerns with quality manufacturing as well as IBM's emphatic shift into software and services.

IBM Rochester was awarded the Malcolm Baldrige National Quality Award in 1990 for its achievements with the AS/400. IBM Rochester was also the birthplace of the firm's Engineering and Technology Services (E&TS) division. E&TS has pioneered with building computing into devices – ranging from MRI coils and hand-held NYSE order-processing machines to processing chips for the Xbox 360 and dual-core power processors for IBM's Blue Gene/L, the fastest supercomputer in the world.

The 50-page history is amply illustrated, including many color photographs, and IBM is distributing 9,000 printed copies throughout the corporation. IBM vice president Walt Ling testified to hearing "rave reviews" from employees and retirees alike, who liked the study's emphasis on innovation and change. "Our thanks for giving authenticity to our many stories and memories!" he said. Paul Lasewicz, IBM's corporate archivist, praised the authors for writing "a business history with academic credibility." The Rochester *Post-Bulletin* called it "a required resource for anybody interested in the history of Rochester." CBI can make available a limited numbers of copies. Please contact cbi@umn.edu.

Thomas J. Misa

News from the Archives

Collection News

Frederic G. Withington donated a collection of his professional papers on the forecasting of the computer industry.

Richard W. Clarke donated a collection on magnetic drums, including photographs and other information on the Flying Head Drum, which Clarke patented in 1965.

Additions to the Willis C. Drake papers were donated by his daughter Nancy Drake.

Charlie Bachman donated a significant addition to his collection of papers already held in CBI.

Finding Aid Update

As noted in the Fall 2006 *CBI Newsletter*, the Archives and Special Collections at the University of Minnesota have been engaged in a collaborative project to encode finding aids into EAD. The web interface is now available at: http://discover.lib.umn.edu/findaid.

All finding aids are searchable by subject, title, personal name, place, or keyword. Both basic and advanced Boolean searching are available. Users can search across multiple collections at one time, or limit their search to one single collection. The web interface is continuing to be modified as we hear from users. Please report any questions, suggestions, or problems with the web interface to cbi@umn.edu.

Processing

Archives staff has completed processing of the following collections:
- Russian, Soviet, and Eastern Bloc Computing Collection (CBI 148)
- Curt A. Monash Papers (CBI 160)
- M. Eugene Cook Papers (CBI 151)
- International Y2K Cooperation Center Records (CBI 153)
- Richard W. Clarke Collection on Magnetic Storage Drums (CBI 184)
- Frederic G. Withington Papers (CBI 183)

Processing continues on the Walter Anderson collection and the Control Data Corporation Photographs and Slides series as well as the Audio-Visual series.

Karen Spilman

Exploring the Archives

Part One: International Records

The following article is the first in a series highlighting materials in the CBI collections. The topics in this series have been chosen both for their historical significance as well as to call attention to materials/collections that may not be known to the research community.

CBI has nearly 200 different collections. Three of CBI's largest collections are the Burroughs Corporation Records, Control Data Corporation Records, and the National Bureau of Standards Computer Literature Collection.

These U.S.-based collections might suggest that CBI's archival records are heavily concentrated on the U.S. In fact, CBI records also contain an abundance of rich materials on international computing. The following article will explore some of these international resources.

International Federation of Information Processing

The International Federation for Information Processing (IFIP) was founded in 1960 and has long been an important force for international cooperation in research and education in the computer and software fields. CBI holds a wealth of information on this important organization, particularly in the pivotal years from its founding through the mid-1970s.

IFIP was born in large part from the dedicated effort of Isaac Auerbach. Materials in CBI's Isaac Auerbach papers include materials on the founding of the organization, the biennial congresses and the growth of the organization, the relationship between IFIP and other associations, strategic planning documents, and other related materials.

CBI also has a collection entitled International Federation for Information Processing Working Group 2.1, *ALGOL Bulletin* records. ALGOL (Algorithmic Language), a family of programming languages developed in the second half of the 1950s by a joint committee of European and American scientists and computer specialists, was used widely by computer scientists for decades. The *ALGOL Bulletin* grew out of a 1959 conference in Copenhagen, and served primarily European users. In 1962 IFIP created Working Group 2.1 and the *Bulletin* became an IFIP publication. CBI holds *Bulletin* numbers 1-8, 10-16, and 19-39 (1959-1976). [CBI would like to fill in the few missing issues!]

National Bureau of Standards Materials

The National Bureau of Standards (NBS) Computer Literature collection contains an immense number of reports and documents collected by NBS from the mid-1950s to the late 1970s. Regardless of their specific topic, researchers would do well to check the contents of the NBS collection. This definitely holds true with internationally focused research projects. The collection contains many reports on or about the major Western European countries and Japan. Regarding Japan, there are more than 100 reports from the 1960s and 1970s, including white papers from the Japan Computer Usage Development Institute, UNESCO reports on science policy and the organization of research in Japan, and documents of the Japan Electronic Industry Development Association.

Burroughs International Operations

The bulk of the Burroughs Corporation material is on U.S. operations and issues. Nevertheless, there is a significant amount of material on international sales operations and foreign subsidiaries. This includes Burroughs correspondence with the British Board of Trade from the mid-1950s; financial analysis on most Western European countries between 1965 and 1969; international marketing studies from the late 1950s and early 1960s; subsidiary literature from Asia, Austria, Chile, Jamaica, Nicaragua, and Spain in the 1960s; and Burroughs International Group 10-Year Forecasts from 1965-1979.

International Computing Collection

The International Computing Collection contains a geographically diverse set of materials. Part of the collection is arranged by continent and region, with materials organized by individual countries. The other part of the collection contains reports of international surveys on computing. For the major Western European nations and Japan, there are a substantial volume of reports, journals, and other literature. This is especially true with the United Kingdom, where there are records from Cambridge University on EDSAC and EDSAC 2 and from National Physical Laboratory on the ACE computer and the Division of Computer Science. There is also documentation on many British computer firms, including Elliott Brothers Ltd., English Electric, Ferranti Ltd., LEO, Powers-Samas, ICT, ICL, and others. For many other countries, such as Egypt, South Africa, Brazil, China, Israel, India, Czechoslovakia, Hungary, the Netherlands, Switzerland, Denmark, Norway, and Sweden there are a small number of reports and literature.

The collection also contains roughly three boxes of materials of international surveys and conference reports that concentrate on computing in Western Europe. A few examples of

the dozens of surveys and institutionally supported reports include those from NATO, the European Computer Manufacturers Association, IFIP, UNESCO, and the Council of Europe. These reports include Mina Rees' *Applied Mathematics in Western Europe* (1948) and a report by the Commission of European Communities (1980), with the bulk of the material from the 1960s and 1970s.

International Y2K Records

By the first hours and days of the year 2000, Y2K concerns and preparations appeared overblown. While the hype of many journalistic accounts may have been excessive, the massive expenditures and investments in Y2K compliance clearly helped to limit problems resulting from the fact that original software code often contained only two (rather than four) digits to specify the year. Substantial expenditures by many nations of the world during the 1990s mitigated problems stemming from Y2K, and this had an important impact on trends in future IT spending and the global economy. How did different countries perceive and respond to the Y2K crisis, and what was the international cooperative effort to deal with these problems? Such questions are just a few of those that researchers can explore in CBI's newly processed International Y2K Records collection.

The International Y2K Cooperation Center (IY2KCC) was established in December 1988 by representatives from more than 120 countries at the First Global Meeting of National Y2K Coordinators at the United Nations. The organization's mission was to "promote increased strategic cooperation and action among governments, peoples, and the private sector to minimize adverse Y2K effects on the global society and economy." Materials in the collection include: country reports, popular press clippings, country questionnaires, country telephone directories, background materials on Y2K and IY2KCC, audio visual materials, conference reports and presentations, sector reports, and the relevant papers of Bruce W. McConnell, the director of IY2KCC.

Soviet Union, Russia and Eastern Bloc Computing

CBI's Russian, Soviet, and Eastern Bloc Computing Collection primarily comes from Mosaic Group, an interdisciplinary organization founded by Seymour Goodman in 1977 at Princeton to regularly collect documentation and study the development and application of computing in the Soviet Union, Eastern Europe, and China. The collection is nearly 50 cubic feet and was housed at the University of Arizona prior to Goodman's donation of the material to CBI in 2000. Additions have subsequently been made from material donated by Willis Ware (grey literature) and the American Institute of Physics (books). Overall, the collection contains technical reports, trip reports, foreign language books and serials, product literature, dictionaries and glossaries, meeting/conference materials, dissertations, technical manuals, and grey literature. The bulk of the material is on computing in the former Soviet Union between 1960 and the 1980s.

Catalogued Reference Collection Material

There are also resources on international computing in CBI's non-circulating reference collection of books and reports. Some of these are relatively rare such as Computer Consultants Limited, *The European Computer Users Handbook* (1967). This contains

information on the number of installations of various computers (U.S. and non-U.S.) throughout Western Europe. It also provides lists and short descriptive notes on European-manufactured digital and analog computers. Other sources in CBI's reference collection are extremely rare, such as James Connolly's *History of Computing in Europe* (IBM World Trade Corporation, 1967). CBI holds the *only* copy of this informative volume listed on WorldCat (OCLC).

CBI aims to further expand upon its rich set of research materials on international computing and software in the coming years and decades.

Jeffrey R. Yost

NACCB History Workshop

Founders and early members of the National Association of Computer Consultant Brokers (NACCB) convened at the Computer History Museum (CHM) in Mountain View, California for a two-day workshop at the end of March. The co-leader of the Software Industry Special Interest Group (SIG) of the Computer History Museum, Burt Grad, organized and moderated the event, with help from the SIG's other co-leader Luanne Johnson. Grace Gentry, a pioneer in the computer services independent contracting business and past NACCB President, was critical to ensuring the attendance and active participation of a high percentage of founding members of the NACCB.

A panel at one of the plenary sessions (left to right): Dave Cassell (past NACCB President), David Hicks (past NACCB President), Harvey Shulman (longtime General Counsel for NACCB), Grace Gentry (past NACCB President), Burt Grad (NACCB History Workshop organizer and co-director of the Software Industry SIG of CHM)

The NACCB was launched in 1987 in response to a specific change in the tax code (Section 1706 of the 1986 Tax Bill) that singled out computer services workers by taking away the "safe harbor" provision to qualify as independent contractors (forcing workers in

the computer services field to either become employees or qualify as contractors under the more difficult and less defined common law provisions).

While the NACCB began with a narrow focus on trying to get Section 1706 repealed (not accomplished to date), it quickly developed other mechanisms such as model contracts to address the new legislation, as well as began to evolve into a more broad-based trade association that helped define and facilitate the growth of an industry. Over the past two decades the NACCB has aided the success of many individuals and firms in the computer services contracting business.

Plenary sessions were held to explore the history of the NACCB, and special workshops were conducted on various topics for independent contractor-broker businesses, including customer relations, independent contractor relations, business operations, and business specialization.

In addition to the industry pioneers, two historians also attended and participated in the plenary sessions and the workshops, CBI Associate Director Jeffrey Yost and Moment, LCC's Glenn Bugos. Yost conducted a video oral history for the Computer History Museum with the founding and longtime general counsel of the NACCB Harvey Shulman, and Bugos conducted a video oral history with current NACCB general counsel Mark Roberts.

Yost is currently working on a history of information technology independent contractors (and the NACCB's history) as part of a larger book project he is researching on the history of the computer services industry from the mid-1950s to the present.

Among the "CBI Friends"

We are very pleased to report that our expanded annual appeal—the CBI Friends program—had outstanding results from the fall campaign. Not only did we hear back positively from numerous old "friends," many of whom have long supported the history of computing, but we also heard from a large number of new "friends" as well. Compared with last year, we experienced a striking 50 percent increase in the number of positive responses, with especially large numbers of "Colleagues" and "Associates" joining or renewing as well as a gratifying number of new "Friends" joining for the first time.

If joining the CBI Friends for 2007 somehow slipped your mind, it's not too late. For a $100 contribution, we will send you a full year of the *IEEE Annals of the History of Computing*, the field's most important journal. There you can read about efforts around the world in support of the history of computing. Shortly after each issue appears, we get a large box from the IEEE and mail the issues, hot off the presses, directly to each and everyone of our Friends. You can join today and receive all the 2007 issues of *Annals*.

The money that we raise in our annual appeal goes to support CBI's research and archiving activities. We have a number of new collections that have been donated to CBI in the past 12 months, and it takes real resources in our archivists' time and effort to transform these newly arrived materials into publicly accessible research tools. It's a simple fact that if we have extra support for the work of archiving, these exciting materials can be made available more quickly to interested researchers. In fact, CBI has enjoyed outstanding support from the community over the years, and this has permitted us to process the vast majority of our donated materials. To all of our donors, we give our profound thanks.

By the next *Newsletter*, we hope to formally honor the key group of financial backers that helped launch the entire CBI and CBF enterprise. These "CBF Founders" each provided early funding to help found computing history as we know it today. Our best records indicate that there are two dozen individuals that we need to recognize. If you wish to make sure that your name, or that of a valued friend or colleague, is properly recognized, please do contact me at tmisa@umn.edu. We also will be formally recognizing the generous "lifetime" supporters who have sustained their giving to CBI over the years.

Annual Giving for 2007

Benefactors ($5,000)
Paul Baran
James W. Birkenstock
   (bequest)

Patrons ($2,000)
Walter L. Anderson
Charles W. Bachman
Lockheed Martin
   Corporation

Sponsors ($1,000)
Martin A. Goetz
Erwin & Adelle Tomash

Colleagues ($500)
Bruce Gilchrist
J. Scott Hamilton
Thomas J. Misa
Jack Shemer
Clarence W. Spangle
Frederic G. Withington
William A. Wulf &
   Anita K. Jones

Associates ($250)
Corrado Bonfanti
Jonathan Coopersmith
David Alan Grier
John Impagliazzo
Kenneth W. Kolence
Michael J. Samek

Friends ($100)

Mark D. Bowles	Richard Hedger	Science Museum Library
Frederick P. Brooks	Thomas P. Hughes	Linda C. Smith
Judith S. Diffenbaugh	Chigusa Kita	Tokio Suzuki
Gerald & Thelma Estrin	Sally G. Kohlstedt	Barbara Tomash &
Philip L. Frana	Arthur L. Norberg	Edward Bussa
Bernard Goldstein	Montgomery Phister	Osamu Uda
George E. Gourrich	Carlo Randone	Haruyo Yoshida
Heinz Nixdorf	Richard S. Rosenbloom	John Zabolitzky
MuseumsForum		

Douglas T. Ross, 1929-2007

Longtime Charles Babbage Foundation Trustee, CBI Friend, and pioneering computer scientist Douglas T. Ross passed away on January 31, 2007. He was a seminal figure in applying computer and software technology to automation and mechanical design and led research and development efforts in numerical control and other areas at MIT and as president of SofTech, Inc., a Waltham, Massachusetts-based software engineering firm he founded in 1969.

Ross, born in Canton, China, in 1929, graduated from Canadaigua Academy (New York) in 1947. He graduated cum laude in mathematics from Oberlin College in 1951 and went on to complete his M.S. in electrical engineering at MIT in 1954. He finished coursework for a doctoral degree in mathematics from MIT in 1956, but became too busy heading MIT's Computer Applications Group to complete his doctoral exams or his dissertation.

Ross was the developer of the first general-use machine-tool programming language, APT, a language that became an ISO standard. In 1959 he coined the term "computer-aided design" (CAD), and went on to head influential MIT CAD projects through Mechanical Engineering and later as part of Project MAC. This involved influential research in language theory, language design, computer graphics, generalized compiler construction, and design applications. He also taught MIT's first graduate level course in software engineering.

Ross was very active in professional societies and generous with his time to help advance the work of numerous organizations. In addition to serving on the Charles Babbage Foundation for two decades, he was a founding member of IFIP Working Group 2.3 on Programming Methodology, and was an organizer and participant in the famed NATO software engineering conferences in Germany (1968) and Italy (1969).

He was president of SofTech from 1969 to 1975 and subsequently served as the Chair of the Board of Directors. He started the firm to concentrate on using his Structured Analysis and Design Technique to develop products and solve real-world problems.

Among many other honors, Ross won the Prize Paper Award at the 20th Anniversary National Meeting of the ACM in 1967, the Joseph Marie Jacquard Award from the Numerical Control Society in 1975, the Distinguished Service Award from the Society for Manufacturing Engineers in 1980, and was named Honorary Engineer of the Year by the San Fernando Valley Engineer's Council in 1981.

CBI is grateful for the support and advice Ross offered over the years. CBI historians conducted two oral histories with Ross, both of which can be accessed at http://www.cbi.umn.edu/oh/display.phtml?id=106.

Jeffrey R. Yost

Recent Publications

Agalianos, Angelos. "The Social Shaping of Logo." *Social Studies of Science* 36 (2006): 241-267.

Agar, Jon. "What Difference Did Computers Make?" *Social Studies of Science* 36 (2006): 869-907.

Atkinson, Paul. "Man in a Briefcase: The Social Construction of the Laptop Computer and the Emergence of a Type Form." *Journal of Design History* 18:2 (2005): 191-205.

Belanger, Jay. "Shadowy Vision: Spanners in the Mechanization of Mathematics." *Historia Mathematica* 32 (2005): 76-93.

Bergin, Thomas J. "The Origin of Word Processing Software for Personal Computers: 1976-1985." *IEEE Annals of the History of Computing* 28:4 (Oct.-Dec. 2006): 32-47.

Bergin, Thomas J. "The Proliferation and Consolidation of Word Processing Software: 1985-1995." *IEEE Annals of the History of Computing* 28:4 (Oct.-Dec. 2006): 48-63.

Cain, Frank. "Computers and the Cold War: United States Restrictions on the Export of Computers to the Soviet Union and Communist China." *Journal of Contemporary History* 40 (2005): 131-147.

Ceruzzi, Paul, and Burton Grad. "PC Software: Word Processing for Everyone." *IEEE Annals of the History of Computing* 28:4 (Oct.-Dec. 2006): 4-5.

Coopersmith, Jonathan. "Does Your Mother Know What You Really Do? The Changing Nature and Image of Computer-Based Pornography." *History and Technology* 22:1 (2006): 1-25.

Davids, Mila, and Geert Verbong. "Intraorganizational Alignment and Innovation Processes: Philips and Transistor Technology." *Business History Review* 80:4 (Winter 2006): 657-688.

Dzisah, James. "Information and Communication Technologies and Development in Ghana." *Science Technology and Society* 11 (2006): 379-396.

Gillespie, Tarleton. "Engineering a Principle: 'End-to-End' in the Design of the Internet." *Social Studies of Science* 36 (2006): 427-457.

Green, Christopher. "Was Babbage's Analytical Engine Intended to Be a Mechanical Model of the Mind?" *History of Psychology* 8:1 (2005): 35-45.

Haigh, Thomas. "Remembering the Office of the Future: The Origin of Word Processing and Office Automation." *IEEE Annals of the History of Computing* 28:4 (Oct.-Dec. 2006): 6-31.

Hine, Christine. "Databases as Scientific Instruments and Their Role in the Ordering of Scientific Work." *Social Studies of Science* 4 (2006): 269-298.

Kline, Ronald R. "Cybernetics, Management Science, and Technology Policy: The Emergence of Information Technology as a Key Word." *Technology and Culture* 47:3 (July 2006): 513-535.

Lagesen, Vivian Anette. "The Strength of Numbers: Strategies to Include Women into Computer Science." *Social Studies of Science* 37 (2007): 67-92.

Norberg, Arthur L., and Jeffrey R. Yost. *IBM Rochester: A Half Century of Innovation* (IBM, 2007).

Rubinstein, Seymour. "Reflections: The Rise and Fall of WordStar." *IEEE Annals of the History of Computing* 28:4 (Oct.-Dec. 2006): 64-73.

Turner, Fred. *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism* (Chicago: University of Chicago Press, 2006).

Vang, Jan, and Bjorn Asheim. "Regions, Absorptive Capacity and Strategic Coupling with High-Tech TNC: Lessons from India and China." *Science Technology and Society* 11 (2006): 39-66.

Wolff, Edward N. "The Growth of Information Workers in the US Economy, 1950-2000: The Role of Technological Change, Computerization, and Structural Change." *Economics Systems Research* 18:3 (September 2006): 221-255.

Compiled by Jeffrey Yost

Featured Photographs

Konrad Zuse, Z1 and Z3 computers

Konrad Zuse was born on 22 June 1910 in Berlin, Germany. He studied mechanical and civil engineering, graduating in 1935. After graduation, he worked as a design engineer for the Henschel aircraft factory, leaving his position after one year.

Zuse began to think about electronic calculators during his school years, as he found long hand-held calculations tedious. From 1936 to 1938 Zuse constructed the Z1, a mechanical calculator with binary logic and 64-word memory. The Z1 could only be programmed by punched paper tape, thus programs were never stored in the computer's memory. The original Z1, which Zuse constructed in his parents' apartment (see photo below), was destroyed during World War II along with the blueprints.
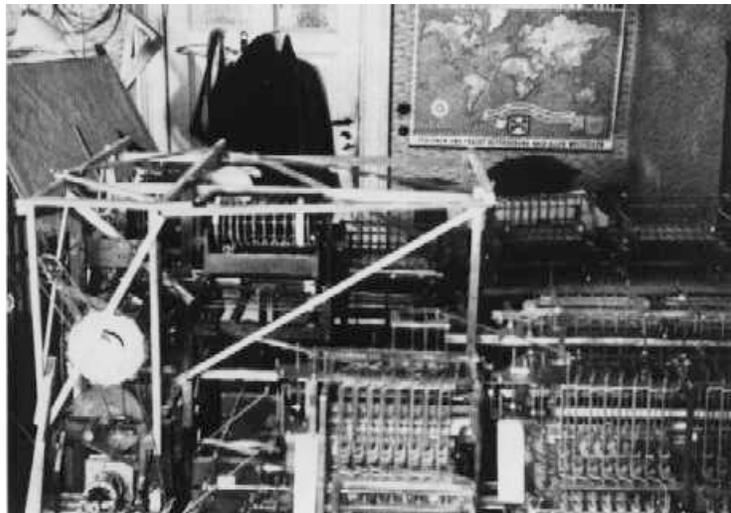
Zuse Z1 (Berlin 1936),
CBI Reference Photograph Collection

Zuse continued to improve upon his original Z1 design. In 1939, the Z2 was released. Using the same mechanical memory system, the Z2 used electrical relay circuits instead of the mechanical logic of the Z1. The Z2 was destroyed in a bombardment in 1940.

The Z3 was introduced on 12 May 1941 in Berlin to a group of German scientists; it was a fully automatic, programmable machine. The Z3 used 2,000 relays, a clock frequency of 5–10 Hertz, and a word length of 22 bits. Calculations were performed by binary floating point arithmetic. The Z3 read its programs from punched celluloid-film tape. Because of Zuse's isolation from the international scientific community, his ideas were unknown to U.S. and UK scientists. Its supporters believe that the Z3 was the first program-controlled digital computer, introduced before the Atanasoff-Berry computer, Colossus, Harvard Mark I, or ENIAC.
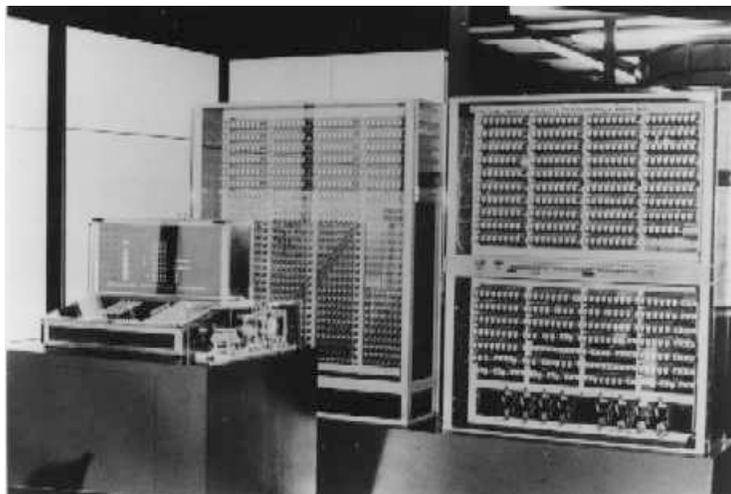
Model Zuse Z3 in the Deutches Museum, in Munich
(re-construction), CBI Reference Photograph Collection

In 1939, Zuse established his own company, Zuse Apparatus Engineering. His company was destroyed, along with the original Z3, by an allied bombing raid in 1945. He established a new company, Zuse KG, in 1949. He continued to produce new computing machines, each beginning with Z, such as the Z4, which was his first commercial computer; the Z11, sold to universities; and the Z22, which was the first of his computers with a magnetic memory. By the time Zuse's company was bought by Siemens in 1967, he and his firm had produced 251 computers.

Konrad Zuse died in Hünfeld, Germany, on 18 December 1995. A reconstituted Z1 may be seen in Berlin's Museum for Transport and Technology, and replicas of the Z3 and Z4 are on display at the Deutsches Museum in Munich.

For additional reading, see "Konrad Zuse (1910-1995)" *Annals of the History of Computing* 18:2 (1996): 3-5.

Karen Spilman