

IT Policy History Meeting

The London School of Economics (LSE) hosted a meeting in July to explore the history of governments' role in the development and diffusion of information technology across the globe. The meeting was organized by Richard Coopey (University of Wales and the London School of Economics), Martin Campbell-Kelly (University of Warwick), and William Aspray (Computing Research Association). Over 20 scholars met to describe and discuss the historical role of government in 9 countries around the world toward IT policy, from the highly industrialized nations to industrializing countries, covering the years 1945 to 1999.

The conference opened with a presentation by Dr. Jeremy Bray, a former Member of Parliament and the 1960s Labour government's technology spokesman. In the 1960s the Wilson Labour government implemented the British government policy to create a national champion in the computer industry to compete with IBM internationally. His discussion of his education and early professional activity in mathematics and his background in politics and knowledge of events surrounding the development of the 1960s IT policy in Britain offered a vivid example of what the historians were to discuss over the next two days.

In the opening session, contrasting pictures of policy development in the United States and the United Kingdom were offered by Arthur Norberg, Richard Coopey and Frank Land (LSE). Coopey

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Elisabeth Kaplan Joins CBI as New Archivist

Elisabeth Kaplan joined CBI as the New Archivist on July 1st. She brings a wealth of experience in archival administration, including collection development, reference service, archival processing and cataloging, and outreach.

Beth comes to CBI from Iowa State University of Science and Technology, where she served as Collections Archivist and Assistant Professor at the Special Collections Department of the University Library. In this position she worked with records of agricultural organizations, businesses, university records and personal papers of faculty members.

Prior to this, Beth was the Assistant Archivist at the Institute Archives and Special Collections at Massachusetts Institute of Technology. There, she worked with many collections relating to the history of information processing, including those of Project MAC and the



Institute's Laboratory for Computer Science, as well as the papers of faculty members such as Jay Forrester, J. C. R. Licklider, Claude Shannon, and Norbert Weiner.

While pursuing her B.A. in History and then her graduate degree in History and Archival Methods at the University

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CBI Archives Temporarily Closed

From September through December of 1999, the CBI's archives will be unavailable to researchers while the collections are moved to a new building on the West Bank of the University of Minnesota Twin Cities campus. During this period, CBI staff will not have access to the bulk of the

collections, and will not be able to provide the usual level of reference service to on-site or remote users. We will accommodate reference requests to the best of our ability during this period, but would urge anyone planning a research trip to CBI to contact the archives immediately.



Recent Publications

Auletta, Ken. "HARD CORE: Why does Bill Gates think that the Microsoft antitrust trial has been such a disaster for him and for the company" *The New Yorker* 75 (August 16, 1999) 42-69.

Bronson, Po. *Nudist on the Late Shift: And Other True Tales of Silicon Valley* (New York: Random House, 1999).

Brosveet, Jarle. "IBM Salesman Meets Norwegian Tax Collector" *IEEE Annals of the History of Computing* 21:2 (Apr.-June, 1999) 5-13.

Campbell-Kelly, Martin. "Data Processing and Technological Change: The Post Office Savings Bank, 1861-1930" *Technology and Culture* 39 (1998) 1-32.

Carleton, Jim. *Apple: The Inside Story of Intrigue, Egomaniac, and Business Blunder* (London: Century, 1998).

Carmichael, Hamish. *Another ICL Anthology: More Anecdotes and Recollections from the People of ICL* (Surbiton: Laidlaw Hicks, 1998).

Dujnic, Josef, et. al. "On the History of Computer Science, Computer Engineering, and Computer Technology Development in Slovakia" *IEEE Annals of the History of Computing* 21:3 (July-Sept. 1999) 38-48.

Dyson, Freeman J. *The Sun, the Genome, and the Internet: Tools of Scientific Revolutions* (New York: Oxford University Press, 1999).

Friedman, Walter A. "John H. Patterson and the Sales Strategy of the National Cash Register Company, 1884-1922" *Business History Review* 72 (Winter 1998) 552-584.

Greenwood, Jeremy and Boyan Jovanovic. "The Information-Technology Revolution and the Stock Market" *American Economic Review* 89:2 (May 1999) 116-122.

"History of Computer Developments in Romania" [anonymous] *IEEE Annals of the History of Computing* 21:3 (July-Sept. 1999) 58-60.

Hughes, Thomas Parke. *Rescuing Prometheus: The Story of the mammoth projects SAGE, ICBM, ARPANET/Internet, and Boston's Central Artery/Tunnel* (New York: Pantheon, 1998).

Jackson, Tim. *Inside Intel: Andy Grove and the Rise of the World's Most Powerful Computer Chip Company* (New York: Dutton, 1997).

Johansson, Magnus. "Big Blue Gets Beaten" *IEEE Annals of the History of Computing* 21:2 (Apr.-June, 1999) 14-30.

Katz, David H., F. Lawrence, and Alan B. Krueger. "Computing Inequality: Have Computers Changed the Labor Market?" *The Quarterly Journal of Economics* 113:4 (November 1998) 1169-1213.

Klimenko, Stanislav V. "Computer Science in Russia: A Personal View" *IEEE Annals of the History of Computing* 21:3 (July-Sept. 1999) 16-30.

Kluser, Per V. "From Research Institute to Computer Company" *IEEE Annals of the History of Computing* 21:2 (Apr.-June, 1999) 31-43.

Laver, Ross. *Random Excess: The Wild Ride of Michael Cowpland and Corel* (Toronto: Viking, 1998).

Leslie, Stuart W. and Robert H. Kargon. "Selling Silicon Valley: Frederick Terman's Model for Regional Advantage" *Business History Review* 70 (1996) 435-472.

Light, Jennifer S. "When Computers

CBI Planning Software Industry Conference

The second annual CBI conference on the history of information processing, sponsored by the Tomash Family Foundation, will be devoted to the history of the software industry and will occur in fall 2000. The conference theme is the "Emergence of the Software Product," and is linked to the larger CBI Software History Program. In the 1960s, the computing industry began to move from the development of custom software for specific applications to off-the-shelf products that addressed a context rather than the needs of an individual client. Many see the unbundling decision of the late 1960s as the key event in this shift. While unbundling provided the environment for the emergence of a software industry devoted to the development of software products, the transition was evident even before the unbundling decisions. To explore this emergence, the conference will contain three sessions.

- 1) Early Products in the 1960s
- 2) Unbundling, IBM and other firms
- 3) Industry growth after unbundling

The conference will take place on a Saturday to enable many people interested in computing and its history to attend, and will be preceded on the Friday evening by an address by a major software industry figure followed by a reception. The conference will be free and open to the public. Details will appear in our Winter 2000 *Newsletter*.



Were Women" *Technology and Culture* 40:3 (July 1999) 455-483.

Mazurek, Jan. *Making Microchips: Policy, Globalization, and Economic Restructuring in the Semiconductor Industry* (Cambridge: MIT Press, 1999).

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CHARLES BABBAGE INSTITUTE NEWSLETTER

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A Closer Look at Reference Service at the CBI Archives

Elsewhere in this issue of the *Newsletter* is a description of some recent research projects conducted at the CBI archives. ("Scholars Come From Afar to Use CBI Archives"). These projects demonstrate the richness of the CBI collections themselves and the wealth of opportunities for innovative scholarly inquiry at the CBI Archives. While these efforts illustrate extensive on-site use of the archives by members of the international scholarly community, they are also examples of what may now be considered a traditional approach to archival research: researchers consult with archivists to identify potentially significant materials, and make a trip to use those materials at the archives, whether for a day or for months at a time.

It is interesting to note, though, that the CBI research clientele continues to be diverse, and that archival materials are accessed in a variety of ways. Reference requests arrive from all over the world, from a range of patrons that includes high school students, television and film producers, journalists, historians, lawyers, industry professionals and computer enthusiasts.

This summer, the CBI Archives provided background information on early standardization attempts by the American National Standards Institute's Committee of Computers and Information Processing for an article in the *Washington Post*; assisted a high school debate team from Australia examining 19th century information technologies; provided highly specialized technical information for patent attorneys; and helped a very bright eleven year old from Pennsylvania reach the finals of the National History Day competition.

Methods of archival inquiry and reference service are constantly evolving—driven in large part by advances in information technology. The volume of

Scholars Come From Afar to Use CBI Archives



Osamu Uda and CBI Associate Director Jeffrey Yost

During the past six months the Charles Babbage Institute has welcomed a number of scholars from around the world as they visited the Twin Cities to use the CBI archives.

In March, Osamu Uda, a Research Associate and Ph.D. Candidate at Waseda University's Graduate School of Commerce, in Tokyo, conducted research at CBI for his dissertation on the comparative development of the U.S. and Japanese computer industries between 1945 and 1980.

Uda's research concentrates on how Fujitsu, as a late-comer to the international computing industry, sought to achieve competitive advantage over IBM

and other U.S. computer manufacturers. Uda utilized numerous collections at CBI to gain perspective on the organizational capability and management strategies at IBM and Remington Rand, and how the practices and structure of these firms differed from those incorporated at Fujitsu.

In August, Uda made a follow-up research visit to CBI conducting further research on this theme and experiencing the other extreme of Minnesota's climate.

Dr. John Vardalas a Fellow at the Inter-University Centre for Research on Science and Technology, in Montreal,

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"traditional" archival research remains steady; the volume of off-site research, conducted via email and telephone, continues to increase. Email seems to expedite the process of requesting information on the patron's end; it does not significantly change the process of providing information on the archives' end.

Some figures will demonstrate how these transactions are categorized. In fiscal year 1999, approximately fifty

percent of initial requests began as email queries, forty percent as telephone calls, and ten percent as faxes or letters. Approximately two-thirds of those initial requests for information were then categorized as "extended"; that is, the complexity of the initial question led to a series of extended interactions between the researcher and the archivist. An extended reference request can take various forms. Often, it is necessary for

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IT Policy History Meeting

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and Land discussed the context facing the British companies in the 1960s and the options considered by companies and the government, ending in the choice to pursue a national champion strategy and form ICL out of the existing companies.

Norberg, on the other hand, focused on shifting interests of the US government, which began with one-of-a-kind project support, continued with a search for greater interactivity in the 1960s, and gradually came to focus on targeted-use as a prime criterion for large-scale support. In effect, support for basic research relative to R&D decreased over the 50 year period, even though dollar amounts increased.

Steven Usselman (Georgia Institute of Technology) described another aspect of US government policy in this period: the use of antitrust to maintain competition in the industry. He contrasted the actions of the government with respect to IBM in the 1970s with those aimed at Microsoft in the 1990s, highlighting the similarities and differences so as to appreciate the consistency of the government's policy.

Jan van den Ende and Nachoem Wijnberg (Erasmus University, Rotterdam) examined Dutch government policy and efforts at Philips. They reported that government programs were for R&D the company would have done anyway. And in the end the programs failed, like those of so many other countries.

During the next session, we returned to Britain when Campbell-Kelly discussed the policies of UK governments in the decade 1975 to 1985. A National Enterprise Board (NEB) was established to encourage small start-up firms that had promising products. Although the standard view of the NEB is that it failed, Campbell-Kelly showed that it had one success out of four major projects, which success made back all the investment in the four. This ratio of success to failures is analogous to the record of any good venture capital firm. Eda Kranakis described the evolution of the European collaboration and the stage setting for

the pan-European venture Unidata.

The remaining talks mirrored these in their attention to context and to detail. Boris Malinovsky (International Academy of Sciences, Ukraine) described some of the achievements and failures in Soviet IT policy. Pierre Mounier-Kuhn (CNRS and the Sorbonne) presented a view of French shifting interests over the last 50 years similar to Norberg's for the United States. Knut Sogner (Norwegian School of Management) illustrated the nature of Norwegian government policy toward IT before and after 1970, when conditions changed from a tightly-integrated group of government policy makers heavily involved with industry to a more bureaucratic form of planning.

Turning to geographic points further east, Richard Heeks (University of Manchester) talked about the software activities in India, which concentrate on work for companies and organizations in other countries. His conclusions about the state of the industry in India and its contributions to the Indian economy were very mixed, which suggested that the activity is good for some, but few in the end.

Seiichi Yonekura (Hitotsubashi University, Tokyo) discussed two types of activity in Japan. First, he presented a picture of the components of the industry over time, and the nature of the products they offered for sale. Second, he described the policies, both similarities and differences, of the Ministry of Finance and the Ministry of Trade and Industry (MITI), whose policies were often at odds. Later, Junya Nishimoto (MITI and the Department of Trade and Industry [DTI], UK) compared more recent policies of MITI and the DTI with respect to IT.

William Aspray closed the conference with a detailed description of the US government's policy for IT education. This presentation merged quite nicely with those of Norberg and Usselman, by showing how the government over time provided support for a highly-trained work force, from the shop floor to university laboratories.

Discussion throughout the meeting centered on the similarities and differences across national boundaries. Europe and the UK chose to follow a national champion model to compete with IBM, with little success. The United States continued to support an open structure for R&D, a large market for purchases, and import/export policies to favor US firms. Japan pursued a mixed policy with a great deal of success, but the main thrust was still "Beat IBM." Countries like India piggybacked on to the greater industrialized countries to grow its own industry.

Negotiations are underway to publish the papers presented in this conference, after revision to take into consideration the discussion.

Arthur L. Norberg

International Scholars...

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Canada, and an Adjunct Professor in the Department of History and Classics at the University of Alberta, visited the CBI archives in March. He is finishing a book that examines the articulation of the digital revolution within the Canadian political economy from 1945 to 1980. Utilizing a series of case studies, his analysis centers on how the interplay of economic, political, corporate and geographic imperatives with technical logic shaped the direction, rhythm, and contents of technological change.

One of Dr. Vardalas' case studies focuses on research and development at the Canadian subsidiary of the Control Data Corporation. He conducted research using the Control Data Corporate Collection at CBI to further his understanding of the firm's strategy of developing a strong R & D team in Canada, and the role of



Dr. John Zablotzky

this strategy in building international collaborative relationships in response to IBM's massive R & D spending.

Dr. John G. Zablotzky, Managing Director of ICOS Vision Systems GmbH, in Oberhaching, Germany, spent the second half of June at CBI examining Control Data Corporation engineering training manuals and research and development reports.

Dr. Zablotzky's research focuses on technological evolution during the early years of the Control Data Corporation, from basic devices used over gate structures to implementation of machine architecture. The CDC training manuals and R & D reports provided information on logic card families and the logical implementation of some CPUs. He found the CDC 1604 and 6000 family of machines to be particularly well-documented in the CBI Control Data Corporation Collection.

The Charles Babbage Institute is an international research and archives center, and the staff welcomes the opportunity to meet, learn from, and assist members of the international community.

Jeffrey R. Yost

Net Gains in History of Information Processing Resources

Internet resources for obtaining facts, documentation, photographs, analysis, and overviews on the history of information processing are substantial and continue to grow.

Extensive finding aids for archive materials are available on the websites of the Charles Babbage Institute (<http://www.cbi.umn.edu>), Hagley Museum and Library (<http://www.hagley.lib.de.us/>), the American Institute for Physics-Center for History of Physics (<http://www.aip.org/history/>), the University of Manchester-National Archive for the History of Computing (http://www.man.ac.uk/Science_Engineering/CHSTM/nahc.htm) and the National Museum of American History (<http://www.si.edu/nmah/>). As well, there are numerous topical web-sites with articles, time lines, photo galleries, oral histories, digitized versions of historical documents, announcements of upcoming meetings and conferences, and other materials for scholars and interested individuals.

Some thematic areas in the history of information processing, such as women and computing, have particularly strong resources on web. "Past Notable Women of Computing and Mathematics" (<http://www.cs.yale.edu/~tap/past-women.html>) provides biographies of women in the computing field, as well as a photo gallery of women and computers. Other sites with a focus on women and the history of computing include "Women and Computer Science" (http://www.mills.edu/ACAD_INFO/MCS/SPERTUS/Gender/gender.html) and the "Association for Women in Computing" (<http://www.awc-hq.org>).

More general sites, such as "4000 years of Women and Science" (<http://www.astr.ua.edu/4000WS/4000WS.html>) also provide biographies and photographs of some of the most prominent

women in the history of information processing (see section on mathematicians).

Web sources on the history of the ARPANET/Internet are also substantial. "A Brief history of the Internet" (<http://www.isoc.org/internet-history>), written by a team of authors from academe and industry prominent in the development and utilization of networking technologies, provides a concise narrative history that gives perspectives on major developments in networking. Alternatively, "NetHistory: An Informal History of the Internet" (<http://www.geocities.com/SiliconValley/2260/>) provides an archive of the text of many early net newsletters and publications, as well the reminiscences of several individuals involved in early networking.

"Internet History and WWW History: Internet Resources" (<http://www.vissing.dk/Internet.History/ihistlist.html>) provides links to many articles on the history of the internet written by participants in the development of networking technologies, scholars, and journalists. The site also connects to frequently updated statistical resources on the use of the World Wide Web.

Brief anecdotes by some prominent participants in the history of software can be found at the Software History Center (<http://www.softwarehistory.org/>). This site also provides a "Partial List of People Important to the History of Software."

"Science and Technology in the Making" (<http://sloan.stanford.edu/Welcome.htm>), a two-year project sponsored by the Alfred P. Sloan Foundation, takes the development of on-line resources a step further by featuring audio/video clips, including interviews with Douglas Engelbart, a Stanford University researcher credited with

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Reference Service...

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archives staff to help researchers to fine-tune their requests; at other times, requests broaden as a research topic evolves. A researcher may contact the Archives with the intention of using one particular collection; with the archivist's assistance, valuable information in related collections may be uncovered in the process.

Two-thirds of the initial requests became extended requests, the final third were answered during that initial contact. These requests take many forms. Typical is the frequent requests for oral histories. The CBI Archives holds over 300 oral histories; the majority of these can be

sent directly to researchers via email as rich text format (rtf) files.

Why is it important for archivists to keep reference statistics, and what can be learned from their analysis? The ability to track trends in research, for example, is critical in developing new collecting areas. As well, evolving media lead to new information seeking behaviors, and new methods of information delivery. An alertness to these kinds of changes in the present allows archivists to prepare better strategies for providing access to collections in the future.

Elisabeth Kaplan and Patricia Hemmis

Internet Resources...

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inventing the computer mouse. The site encourages contributions from participants in five designated large-scale engineering projects, and demonstrates the many opportunities as well as challenges of developing and disseminating primary source material over the web.

Historical documents, time lines, and photographs of computing machines are also being placed on the web with increasing frequency. For example, R.F. Clippinger's "A Logical Coding System Applied to the ENIAC," Ballistic Research Laboratories Report 673 (1948) (<http://ftp.arl.mil/~mike/comphist/48eniac-coding>) and Adele Goldstine's "A Report on the ENIAC," Technical Report 1 Volume 1, Moore School of Electrical Engineering, University of Pennsylvania (1946) (<http://ftp.arl.mil/~mike/comphist/46eniac-report/>), are available in full-text.

Topical time lines, such as "Hobbes' Internet Time Line" (<http://www.isoc.org/guest/zakon/Internet/History/HIT.html>) and PBS' Life on the Internet Timeline (<http://www.pbs.org/internet/timeline/index.html>) are common on the web. Many computer and software corporations, including Microsoft (<http://library.microsoft.com/mshist/mshist.htm>) and Hewlett-Packard

(<http://www.hp.com/abouthp/history.html>), also provide historical time lines, highlighting developments within their respective firms.

Most computing museums around the world have web-sites with "on-line exhibits." A list of computer museums can be found at <http://www.comlab.ox.ac.uk/archive/other/museums/computing.html>. Some of the most famous images of computers are displayed at <http://ftp.brl.mil/ftp/historic-computers>. A number of these photographs are in the public domain.

Four web-sites that provide excellent starting points for conducting on-line research on nearly any topic in the history of information processing (through their extensive number of links) are: CBI (see above), the Computer History Association of California (<http://www.chac.org/chhistpg.html>), Mike Muuss's "History of Computing Information" (<http://ftp.arl.mil/~mike/comphist/>), and the Virtual Museum of Computing at Oxford University (<http://www.comlab.ox.ac.uk/archive/other/museums/computing.html#orgs>).

All aforementioned web-sites were accessible and operational as of August 23, 1999.

Jeffrey R. Yost

Kaplan...

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of Massachusetts, Boston, Beth served as an intern in the Audiovisual Department at the John F. Kennedy Library.

One of her major projects involved processing the Robert F. Kennedy film collection, which consisted of hundreds of reels of unidentified, raw footage produced during Robert F. Kennedy's Senate and Presidential campaigns. She created an on-line finding aid to the collection that provides researchers with general subject access and filmographic description of the footage.

Intrigued by the special challenges of description of audiovisual materials, Beth pursued research in this area of study. Her M.A. thesis, "Archivists, Historians, and the Concept of Visual Literacy: Translating Audiovisual Information Into Words," won the History Department's Award for Excellence in History. In this study she argued that archivists need to become "visually literate," developing the skills to understand audiovisual materials and to provide adequate descriptive access to serve a variety of kinds of researchers.

Beth has published and presented widely on archival topics of both a theoretical and practical nature. She has been active in national and regional archive professional societies, serving on various program committees and editorial boards, as well as on the New England Archivists Board of Directors.

At the annual meeting of the Society of American Archivists in August 1999, Beth presented, "Something to Declare: A Practical Approach to the Postmodern Challenge" as part of the session "Premises, Promises, and Problems: Practicing Archives with a Postmodern Perspective."

Most recently, Beth has served on the program committee for the upcoming Midwest Archives Conference. She has organized sessions on data warehousing, administrative skills for archivists, and problems of technological obsolescence facing archivists.

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Information Technologies-2000

A Conference entitled, "Information Technologies-2000, Current Status and Future Prospects" will be held in Kyiv, Ukraine June 4-7, 2000.

The conference will consist of plenary sessions with selected keynote speakers, parallel sessions with contributed (refereed) papers, and issue-oriented panel discussions.

Themes identified for the conference include: internet influences on globalization; IT in science, economics, culture, and education; the impact of globalization on the evolution of scientific investigations and technology transfer; and priority achievements in computer science and technology.

The Program Committee invites prospective participants to submit papers or proposals for panel discussions.

Interested individuals should contact:

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Recent Publications...

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Mowery, David C. *The International Computer Software Industry: A Comparative Study of Industry Evolution and Structure* (New York: Oxford University Press, 1996).

Mowery, David C. and Nathan Rosenberg. *Paths of Innovation: Technological Change in 20th Century America* (Cambridge: Cambridge University Press, 1998). [Esp. Chapter 6, "The Electronics Revolution"]

National Research Council. *Funding a Revolution: Government Support for Computing Research* (Washington, D.C.: National Academy Press, 1999).

Owen, Bruce M. *The Internet Challenge to Television* (Cambridge: Harvard University Press, 1999).

Palasri, Sirin. *The History of the Internet in Thailand* (Eugene, OR:

The 2000-2001 Adelle and Erwin Tomash Fellowship in the History of Information Processing

The Charles Babbage Institute is accepting applications for the Adelle and Erwin Tomash Fellowship to be awarded for the 2000-2001 academic year to a graduate student whose dissertation will address a topic in the history of computers and information processing.

The fellowship may be held at the recipient's home academic institution, the Charles Babbage Institute, or any location where there are appropriate research facilities. The stipend will be \$10,000 plus up to \$2,000 for tuition, fees, travel to the Charles Babbage Institute and relevant archives, and other approved research expenses. Priority will be given to students who have completed all requirements for the doctoral degree except the research and writing of the dissertation.

Applicants should send their curriculum vitae and five page statement of their dissertation project (excluding bibliography). This statement should include an examination and justification

of the research problem, and discussion of methods, research materials and evidence of faculty support for the project. Applicants should also arrange for three letters of reference and certified transcripts of all graduate school credits to be sent directly to:

Charles Babbage Institute
University of Minnesota
103 Walter Library
117 Pleasant Street S.E.
Minneapolis, MN 55455

Statement of project and all supporting materials must be received by January 15, 2000.

In honor of past generous support by Adelle and Erwin Tomash, the Charles Babbage Institute is able to advance the professional development of historians of information processing by offering this predoctoral fellowship.

□

Network Startup Center, University of Oregon, 1999).

Persson, Per-Arne. "Transformation of the Analog" *IEEE Annals of the History of Computing* 21:2 (Apr.-June, 1999) 52-64.

Prokhorov, Sergei P. "Computers in Russia: Science, Education, and Industry" *IEEE Annals of the History of Computing* 21:3 (July-Sept. 1999) 4-15.

Shasha, Dennis Elliott. *Out of Their Minds: The Lives and Discoveries of 15 Great Computer Scientists* (New York: Copernicus, 1998).

Stolyarov, G. K. "Computers in Belarus: Chronology of the Main Events" *IEEE Annals of the History of Computing* 21:3 (July-Sept. 1999) 61-65.

Szentgyorgyi, Zsuzsa. "A Short History of Computing in Hungary" *IEEE Annals of the History of Computing* 21:3 (July-Sept. 1999) 49-57.

Tehan, Rita. *The Internet: History Infrastructure, and Selected Issues*

(Washington, D.C.: Congressional Research Service, 1998).

Telksnys, Laimutis and Antanas Zilinskas. "Computers in Lithuania" *IEEE Annals of the History of Computing* 21:3 (July-Sept. 1999) 31-37.

Vehvilainen, Marja. "Gender and Computing in Retrospect" *IEEE Annals of the History of Computing* 21:2 (Apr.-June, 1999) 44-51. □

Kaplan...

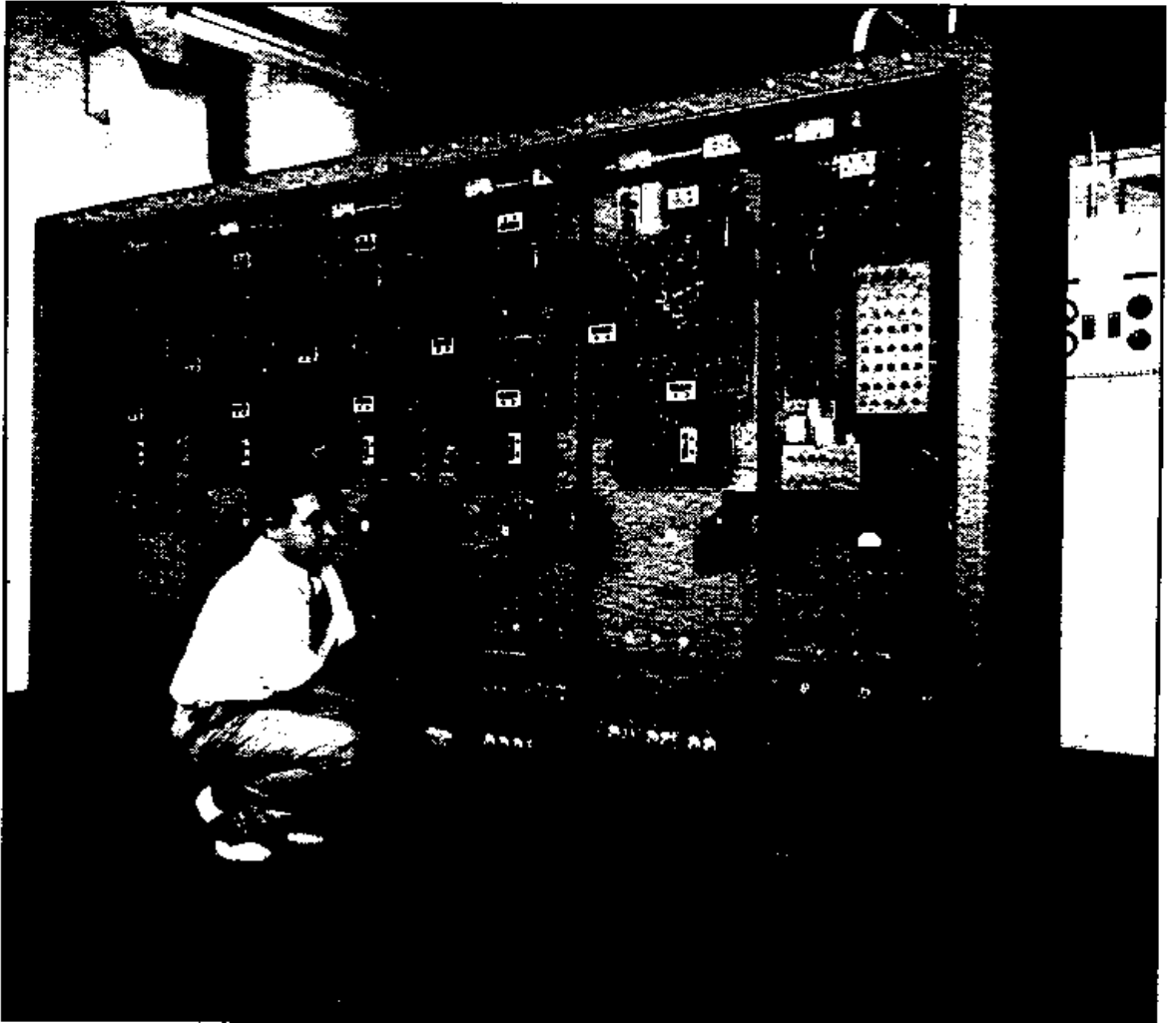
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Beth's experience at M.I.T. and Iowa State University led to the development of her special interest in records of the recent history of technology and science. She looks forward to the many challenges and opportunities of promoting, managing, and developing collections in the history of information processing at CBI.

Jeffrey R. Yost

Fifty Years Ago

In 1949 Whirlwind first became operational. Conceived of by Jay Forrester, director of MIT's Digital Computer Laboratory, and completed in 1951, Whirlwind was the first machine to use magnetic cores for internal storage. The original caption for this undated photograph reads, "An engineer checks the operation of the prototype arithmetic element. This unit is used to study circuit performance before the construction of a full-scale machine. Shown are 5 stages of a parallel type multiplier for binary numbers. A manual control panel on the right substitutes for the central high-speed control of the final machine." (Auerbach Associates Records, CBI 33, Charles Babbage Institute). -*Elisabeth Kaplan*



Moving?

Don't forget to send your change of address to CBI, 103 Walter Library, University of Minnesota, Minneapolis, MN 55455

CHARLES BABBAGE INSTITUTE

NEWSLETTER

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