

# CHARLES BABBAGE INSTITUTE NEWSLETTER

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CENTER FOR THE HISTORY OF INFORMATION PROCESSING

## A Farewell Comment

by Arthur L. Norberg

Before this Newsletter arrives in your hands, it is very likely that my successor as Director of the Charles Babbage Institute will have been appointed. As I turn my attention from primarily creating and assembling sources to primarily exploiting them, I look back with ample satisfaction on the collections available for research in electronics and information processing assembled over the years. June 1993 marks twenty years in which I have been engaged in historical exploration and archives development, at CBI and at Berkeley. During these two decades, I devoted most of my time, along with the time of several colleagues, to identifying, appraising, and creating documents for historical preservation. The fruits of these labors reside in several repositories in California and Minnesota.

Before I embarked on this path, the late James D. Hart, from whom I learned many things about library collections, local history, and fundraising, startled me with a question during my interview in 1973 for the position at Berkeley. He noted that I was just in the final stages of completing my training as an historian and probably had a teaching and research career in mind. "Why, then, are you seeking this position in a special collections library?" I do not believe it took me very long to answer his question, but it seemed like ages at the time. I responded that there are many ways to serve the field of history. One way is to create the collections that can be exploited by historians, and the Berkeley program was an ideal opportunity to explore 20th century activities in science and technology, areas which had not

received sufficient attention up to that time. Jim Hart was at least satisfied enough to offer me the position, which I was at first hesitant to accept for personal reasons. John Heilbron convinced me that these reasons were trivial and would disappear soon after I arrived in Berkeley. He was absolutely correct. After I began at Berkeley's Bancroft Library, I never looked back. In a sense, The Bancroft years were my coming of age as an historian.

While in California in the 1970s, I conducted an historical and archival project on behalf of the University of California, Berkeley, and Stanford University. Papers of scientists, engineers, entrepreneurs, and the records of companies, both large and small, involved in the growth of the nuclear sciences and the rise of the electronics industry south of San Francisco are housed in the special collections libraries at Berkeley and Stanford. In the 1980s, others have added many more collections to these, and the effort continues today.

Following a brief interlude at the National Science Foundation, in which I deluded myself that it was easier to give away money to support good research than it is to seek such funds for one's own efforts, I embarked on the building of another archival collection, this time in the area of information processing at the Charles Babbage Institute. Here, with the help of a very able staff, I applied a broader concept to collection development and the understanding of appraisal criteria for high technology records. The CBI collection is similar in kind to that of the science and technology collections at Berkeley and Stanford. Technical records, corporate materials,

*Farewell Comment continued on page 6...*

## Unisys Grant to CBI

In early May 1993, Unisys Corporation made a \$100,000 multi-year grant to CBI/CBF. The principal purpose of the grant is to facilitate arrangement of and research into the Burroughs Collection. Unisys donated the Burroughs Collection to CBI in 1991. The collection includes over 500 cubic feet of historically valuable records, correspondence, photographs, films, video tapes, speeches, sound recordings, technical material, and product literature covering over 100 years of the company's history from 1883 to its merger with the Sperry Corporations in 1986. (For a preliminary description of the collection see the *CBI Newsletter*, Volume 13, Summer 1991.)

Bruce Bruemmer will determine the policies that guide the arrangement, administer the work of a project archivist to be engaged for the purpose, and see to the incorporation of data about the contents into the network for CBI data. As the collection is arranged, the historical staff of CBI will analyze the collection for potential research topics and possibly explore them for publication. The secretarial staff will participate in preparing material about the collection for distribution in various forms.

The direct products of this grant will be the arrangement of the Burroughs Collection, a complete finding aid to the collection, increased use of the collection to record the history of Burroughs, and incorporation of data about the contents into CBI's general database. David Curry, Vice President of Unisys, wrote in his letter announcing the award that this

*Unisys continued on page 5...*

Tomash Fellowship Awarded

.....pg 3

## Oral History Cataloging Initiative

CBI is among a handful of archival repositories that have listed their complete oral history holdings on a national bibliographic database. The experience will be put to use in the development of national guidelines for descriptive cataloging of oral history collections. Bruce Bruemmer, CBI's archivist, is part of a six-person task force assigned to this work through a \$17,000 grant from the National Historical Publications and Records Commission (NHPRC). The eighteen-month grant, coordinated by the Minnesota Historical Society, will produce a manual that will enable better description of oral histories.

Making a cataloging manual available is the best way to promote access to oral histories on a national basis. Many oral historians have avoided the responsibility for describing their collections, while books and serials catalogers have not had adequate information about cataloging this format. The result is poor access to a large body of oral history interviews, a

subject that was highlighted in "Access to Oral History: A National Agenda," an article by Bruce Bruemmer that appeared recently in the *American Archivist*, the journal of the Society of American Archivists.

The article proposed a five-point national agenda for oral history, consisting of the establishment of a MARC-AMC record for each oral history as a minimum, fundamental description for oral history, establishment of an inter-library loan program for oral history, investigation of new technology to enhance availability of information within oral histories, and support of the goal of adequate access to oral history collections by the oral history community. The fifth and most fundamental agenda item was the creation of guidelines to provide consistency in oral history cataloging records along with the communication of these guidelines to catalogers. A rough draft of the guidelines are expected to be produced by the fall of 1993, and final guideline are expected by the summer of 1994. □

## CHARLES BABBAGE INSTITUTE NEWSLETTER

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## High Performance Computing Exhibit

The Supercomputing '92 Conference held in Minneapolis featured a High Performance Computing exhibit. The exhibit included a high performance computing time-line for the period of 1946 through 1985 as well as information and pictures of selected computers and companies which had historic impact on high performance computing. The exhibit contained several artifacts including the Control Data Corporation CDC 7600 serial #3 (installed at Los Alamos National Laboratory 1970-1986), Cray Research Incorporated Cray-1 serial #12 (installed at the University of Minnesota 1981-1987), core memory bays from serial #2 of the Extended Core Storage (ECS) which was used on CDC 6600, CDC 6400, and CDC Cyber-74 systems at the University of Minnesota (installed 1968-1983), and Convex C-1 (installed at Convex 1984-1992). Another part of the exhibit focused on programming in the 1950s through pictures, a mock-up of a programmer's office of the era, and display of a flexowriter automatic typewriter and a

## Past Tomash Fellows Complete Programs

Anthony Gandy, Tomash Fellowship recipient for 1989-90, recently completed his program of studies and has been awarded the Ph.D. degree by the London School of Economics and Political Science. Dr. Gandy wrote his dissertation on the entry of established electronics companies into the early computer industry in the UK and US. He is currently working for the Financial Times.

Mark Clark, 1991-92 Tomash Fellowship recipient, completed his program of studies and was awarded the Ph.D. degree by the University of Delaware. Dr. Clark's dissertation was on the history of magnetic recording. He is currently writing a history of the University of Delaware's College of Engineering as part of its centenary celebration.

We welcome these two colleagues to the history of information processing and look forward to their further research and writings on the subject. □

magnetic drum.

The High Performance Computing Exhibit was organized by the Minnesota Supercomputer Center, Inc. Many companies, individuals, and institutions contributed to the exhibit, including the Charles Babbage Institute. □

## 1993 Friends of CBI

CBI gratefully acknowledges the individuals listed below for their recent renewals or new membership in the Friends of CBI program.

**Sustaining Colleague:** Richard Gilder  
**Colleague Member:** Arthur L.C. Humphreys

**Participating Associate Members:** David Chappell, Richard S. Rosenbloom, Joseph F. Traub

**Associate Members:** Ronald W. Hull, Hiroshi Iizuka, Rebecca E. Skinner, Linda C. Smith □

### When You Move...

Please let us know your new mailing address. This will ensure your receiving the *CBI Newsletter* on a timely basis and also save us postage costs. Thank you.

## Elichirigoity Chosen as Fifth Tomash Fellowship Recipient

Irving F. Elichirigoity has been awarded the fifth Adelle and Erwin Tomash Fellowship in the History of Information Processing by the Charles Babbage Institute. Mr. Elichirigoity is a Ph.D. candidate in the History Department at the University of Illinois-Urbana. He received a B.A. in Political Science from Principia College in 1979 and a M.A. in Social Theory from the New School for Social Research in 1984.

Mr. Elichirigoity's research project investigates the historical contribution of global computer modeling to the reconceptualization of the relationship between humanity and the biosphere, one that constitutes a total and irreducible system.

Elichirigoity will focus on the history of the *Limits to Growth* Project and



*Irving F. Elichirigoity*

Report, the career of Jay Forrester, and the history of the Club of Rome. Jay Forrester at MIT developed a computer model, the first of its kind, that served as the backbone of the *Limits to Growth* Project. The Project assumed a linkage between the health of the planet, the scarcity of natural resources, and human production and consumption, which was also embodied in the computer model. In 1972, the project produced a report that was highly controversial. The Project was sponsored by the Club of Rome, a private organization of western industrialists and highly placed non-elected government officials in the West and Japan.

Mr. Elichirigoity will spend part of the 1993-1994 academic year doing research at the Babbage Institute. □

## New Museum of Technology in Paderborn, Germany

*by Norbert Ryska, Director  
Forum für Informationstechnik GmbH*

The Westfalen Foundation, which was founded by the late German computer pioneer Heinz Nixdorf, plans to open a museum and Forum of Technology dedicated to the historic development and the present significance of Information and Communications Technologies.

Its operating unit, the *Forum für Informationstechnik GmbH*, is a public company that was established earlier this year. The company recently bought the former Nixdorf Computer headquarters building. The 16,000-square-meter Forum will be established after the required renovations and rebuilding are completed. At the end of the first extension phase, scheduled for the middle of 1995, it will become Europe's largest institution of its kind.

The planned exhibition is based on a chronological and topical step-by-step concept. It will deal with the world of data processing along with the consequences and perspectives of its technical development. The aim is an interdisciplinary link of the plethora of subject-matters, points of view, and activities into a meaningful overall picture.

In front of an historical background, an insight into the development of computers will be given. Starting from

the framework of "counting, writing and reckoning," the exhibition will follow the threads of development that are visible in information and communications technologies. The exhibition will lead from the earliest days, touching on the development of calculating machines and typewriters, up to the first computer. Machines, devices and books collected by Heinz Nixdorf will form the nucleus of the exhibition.

Research and study of the company and product history of the Nixdorf Computer AG will offer an important contribution to the economic and technological history of the Federal Republic of Germany. One theme will be the distributed data processing concept, which Heinz Nixdorf was one of the first to support. This system philosophy will be represented and exhibited by examining various products, main application areas, and benefits offered to the user.

The Museum will also showcase current and future developments in this dynamic and economically important technological sector. Along with others, Siemens Nixdorf, the leading European computer manufacturer, will contribute its latest technologies and comprehensive know how to the exhibition.

The institution will be more than a pure technology show. In particular, it is to be a place of education, meeting and

communication. These roles are emphasized by the integration of a multitude of activities: from conferences and seminars about the structure of archives and data bases to research work in the history of technology. The exhibition is to provide possibilities of instruction and further education, orientation aids, and leisure time facilities.

The Museum and Forum will be designed for an expected 200,000 visitors per year with a potential of over 20,000,000 people living within a 100-mile radius around Paderborn. Paderborn has a population of 130,000 and is an old university town, as well as a cultural and commercial center of Eastern Westphalia. In the vicinity of the university campus are numerous institutes, including CADLAB, a Computer-Aided-Design Laboratory, and the Heinz Nixdorf Institute, a research center for the application of information technology in engineering sciences. Siemens Nixdorf also has one its two main sites in Paderborn.

Norbert Ryska and Theodor Rode are the directors of the Forum. They can be reached at:

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## Current Projects and Research

A wide range of activities are under way in the history of computing. In this issue, three of our colleagues, David Allison, Paul Ceruzzi, and Jan Rune Holmevik, report on their current projects. We invite other researchers to share their interests and current research in future newsletters.

### Division of Computers, Information & Society

David Allison

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The Division has recently completed a collections plan to govern our ongoing collection activities. Our collections break into the following areas: Non-electronic Digital Aids to Computation; Punched Card and Paper Tape Machines; Cipher Machines; Mathematical Instruments; Integrators and Other Analog Computing Devices; Calculating rules (logarithmic slide rules); Mathematical Models, Paintings and Teaching Apparatus; Psychological Apparatus; Mainframe & Mainframe/Minicomputers; Minicomputers; Microcomputers; Miscellaneous computers; Analog computers; Computer Peripherals; Software; Electronic components; Electronic calculators, desk top and pocket.

Recently we have added several significant items to our collections. These include:

- An Applied Materials 5000 Microchip fabrication machine. This is on display in the Information Age exhibition.
- A Series of information artifacts (hand-held scanners, radios, digital dispatch terminals) from Federal Express Corporation that detail the process of item tracking of packages.
- An original prototype ethernet card and associated research notebooks from Xerox PARC.

### Information Age Updates

Much of my work involves making updates and modifications to the Information Age exhibition. Recent additions to the exhibition include:

- A display incorporating the Applied Materials 5000 chipmaking machine

mentioned above. This displays the process of semiconductor manufacture.

- A display related to Computer-Aided Design. In this display, visitors are invited to try their hand at redecorating the Oval Office in the White House.
- A display that allows visitors to learn how direct mail marketers categorize the consumer habits of people in their zip code area.
- Foreign language captioning to the video materials that visitors can select in the exhibition.

### Software Archives

We have begun exploring the idea of creating a "National Software Collection." The elements of this collection would be held by many different institutions, including both private corporations and public institutions. A coordinating body would develop standards for the collection and a shared catalog.

### Interactive Information Technology studies

I have been engaged in several studies of the future use of information technology at the Smithsonian in general and the National Museum of American History in particular. The goal has been to study how new media should be applied to both exhibition design and dissemination of museum information.

### Computing After Computers

Paul E. Ceruzzi

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I am presently at work on a book that will chronicle and illustrate the invention, commercial development, market penetration, and social impact of the electronic digital computer, from the time of its invention shortly after World War II, to about 1985, when networked personal computers and workstations began to find their way into offices, homes, and factories throughout industrial societies. I expect to complete a draft manuscript in 1995, with publication expected the following year.

**Background:** More than ten years ago a group of (what were then young) historians of computing got together and discussed the need for a comprehensive

yet concise textbook that introduced the major themes of this subject to other historians and to an interested public. Led by William Aspray, the group (Aspray, myself, Michael Williams, Martin Campbell-Kelly, and Allan Bromley) surveyed the subject and agreed to write chapters that covered the major subdivisions of the field. After some months of work, and with skillful and energetic leadership from Bill, we reconvened and discovered an interesting problem: while drafts of chapters covering the development of computation through the end of the Second World War were coming along well, those that attempted to tell the story of subsequent events did not jell. Attempts at rewriting these sections, plus numerous brainstorming sessions, did not help. We decided to publish the chapters that did work, and defer the problems of the post-1945 era to a later date. Published as *Computing Before Computers* by Iowa State University Press in 1990, the book met our expectations, was well-liked by reviewers familiar with computing, and has been accepted by the community of general historians as well.

Still, the problem remains of how to tell the story of the events that followed the building of the ENIAC and the acceptance of the stored program architecture. The reasons are not hard to discern and have been the subject of numerous discussions in this newsletter and in historiographic articles in the *Annals of the History of Computing*. I shall not repeat them here. I believe, however, that the passage of time, combined with recent historical research and trends in the technology, allow me to undertake what was an impossible task in 1983, namely to write a single-volume history of computing since 1945 that will connect the development of computing machinery to the larger issues of social, technological, and cultural history. *Computing After Computers* is the working title to remind me not only of what the subject is, but of my goal to produce something readable, accurate, and concise.

**Justification:** There is now an extensive literature on the history of modern computing, but with one or two excep-

*Current Research continued on page 5...*

# Don't Be An Adding Machine -Buy One



## Burroughs

Adding, Bookkeeping, Calculating, Billing Machines

Produced in the Burroughs Print Shop at Detroit, Mich., U.S.A. Form 6304-1-24-Adv. '66

*An ink blotter produced by Burroughs, used as advertising c.1925. The grant from Unisys will improve access to this and other rich historical resources of the Burroughs Corporation records at CBI.*

*Unisys continued from page 1...*

grant is part of Unisys's "continuing relationship with CBI." Erwin Tomash, Chairman of the Board of the Charles Babbage Foundation, paid especially warm tribute to Unisys. "Unisys, and its

*Current Research continued from page 4...*

tions there is no single volume that covers the subject accurately and at a level both understandable by the lay person and of value to the professional historian or computer engineer. Many books fall into the category of highly technical histories or collections of source documents, such as Charles Bashe, et al *IBM's Early Computers*, the Proceedings of the 1978 conference on the *History of Programming Languages*, or Brian Randell's *The Origins of Digital Computers: Selected Papers*. Others attempt to reach a general audience but are marred by oversimplifications and not getting many details right, e.g. René Moreau's *The Computer Comes of Age*. A third group of books suffers from the "Whig" tendency to regard all of the history of computing as a prelude to the invention and spread of the Personal Computer and related events of the past decade. Among the rare exceptions are Herman Goldstine's *The Computer From Pascal to von Neumann*, still recommended for college courses although by now 20 years old; and Stan Augarten's *Bit by Bit*, a well-researched, well-illustrated, and readable book published at the dawn of the PC era. All of the above books, but especially those that

earlier companies Burroughs and Sperry, was one of the earliest and strongest supporters of CBI and CBF, and we are extremely grateful for this latest statement of their support." Work under this grant will commence in July 1993. □

emphasize the personal computer era, suffer from rapid obsolescence in the face of new product announcements and trends in the industry.

Several authors have recognized the impact computing is having on our daily social life: at work, in banks, transportation, etc. Their books, such as Shosanna Zuboff's *In the Age of the Smart Machine* and David Noble's *Forces of Production*, have been well-received by historians and have reached a market outside the narrow range of computer historians. But in their focus on the social dimension they too often treat the underlying technology as a "given," not as something whose invention and subsequent development into a commercial product involved human drama, creativity, and energy. Between these two extremes is a place for a book that chronicles the history of the underlying technology accurately and simply, while addressing its role as both driver of and something driven by social forces.

Finally, events that have occurred since 1985 led me to conclude that it is feasible to write a history with thematic unity. Computer architecture is no longer

*Current Research continued on page 7...*

## History Conference

The British Society for the History of Mathematics (BSHM) is organizing a two-day conference on the history of computation. The conference *Making Numbers: Computing, Mathematics, History and Culture* will be held 18-19 September 1993 at Rewley House, Oxford University. The program includes talks by Steve Russ ("The History of Algorithms"), John Tucker ("The Origins of Software"), Sister Benedicta Ward ("Bede and the Computus"), Eduardo Ortiz ("From Tables to Algorithms"), Willem Hackmann ("Computational Instruments in the Museum of the History of Science, Oxford"), Martin Campbell-Kelly ("Victorian Data-Processing"), Doron Swade ("Babbage's Difference Engine"), William Aspray ("John von Neumann"), Clive Kilmister ("Turing and Models of Computation"), Glanffrwd Thomas ("Boole and AI"), Ian Stewart ("The Unfolding of Chaos"), and Mary Croarken, ("Comrie and Scientific Computing Services Ltd."). The conference organizers are Martin Campbell-Kelly, John Fauvel, Raymond Flood and Steve Russ. For further information contact:

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*Farewell Comment continued from page 1...*  
 personal papers, photographs, speeches, and correspondence tell exciting and often noble stories of the growth of science and technology in the academy and industry. Where these collections contained gaps, we vigorously pursued an oral history program.

A close connection exists between the oral histories collected in California in the 1970s and those assembled in CBI since 1981. In a reminiscence published in 1990, Nathan Reingold pointed out that "history should have clear beginnings and ends." He was referring to the scarcity of records for the beginning of careers. From the outset, in all the oral histories I have recorded, I tried to capture some of that evidence. I realized that this oral history data will not substitute for contemporary records, but in the absence of records this is all we can obtain. Thus, every interview, whether 15 hours or 1 hour long, contains some background data on the interviewee's early choices.

This determination to collect early data revealed some startling lives and provided more informative and entertaining interviews. There is Alexander M. Poniatoff's recollections of life in Russia at the beginning of the 20th century, his education in Germany at the start of the First World War, and his escape to

England. Poniatoff later founded Ampex Company in California, also detailed in the interview. Melvin Calvin, Nobel Laureate in chemistry, and Erwin Tomash, founder of Dataproducts Corporation, discussed life at home as teenagers and their choices of careers. Allen Newell described his years growing up in Palo Alto and his early education. And John E. Parker, one of the founders of Engineering Research Associates, Inc., entertained me with his description of life at the Naval Academy and his entry into the business world of the 1930s. But this is only a sidelight of these oral histories, however useful. The most significant part of these and other interviews is the recollections about the involvement of these people in scientific/technical/entrepreneurial activities between 1911 (the Leonard F. Fuller interview) and 1992 (the Allen Newell interview).

Yet, while I offer praise for the value in oral history, I have mixed emotions about recording oral memoirs, considering all the time and effort involved. They are after all reflections on the past, and may tell us more about the present view of the past than about the past. The interviews are supposed to tell us about the past. More often than not, they do not; consequently, I continue to struggle with the concept and seek better ways to

use them in historical research. When I see how some historians have used these interviews in their research, I am heartened that the process is so effective, and maybe I exaggerate the difficulty. For example, Hugh Aitken in his book *The Continuous Wave* about the early radio industry, found ways to employ the information in the Fuller interview that I would not have thought possible. Whatever its strengths and weaknesses, oral history should be informed by historical research, and the results should aid archival development. We have applied this idea consistently in CBI.

My main purpose in preparing this comment is to pay special tribute to the many people, both staff of the programs and contributors to collections, who have helped me to amass these materials. So many people helped it is impossible for me to list them here. Silently I pay them homage, and hope that the collections will continue to grow, historians will continue to find them useful in research, and the organizations will continue to pursue excellence in archives development and historical research. For myself, I still believe my answer to Jim Hart during that interview long ago was correct, and the subsequent contributions to historical resources are a great source of pride for me. □

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# Exhibition to celebrate the 400th Anniversary of Wilhelm Schickard's Year of Birth (1592-1636)

by Friedrich W. Kistermann

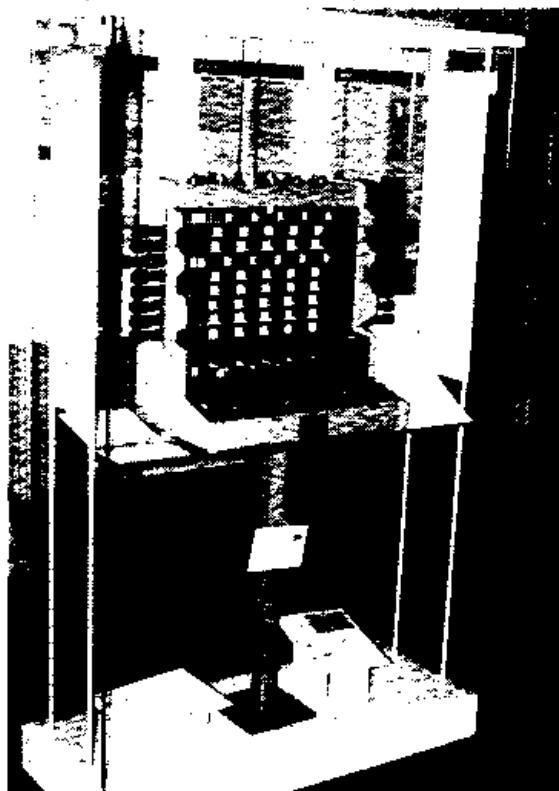
Last year the Town Archives of Herrenberg, a small town near Böblingen and Tübingen in the south-western area of Germany, under the direction of Dr. Roman Janssen, had the idea for an exhibition to celebrate the 400th Anniversary of Wilhelm Schickard's year of birth. The writer took over the task to develop the architecture and to realize the exhibition.

In addition to the Schickard Anniversary, the intention was to exhibit the path to the New Astronomy of Copernicus and Kepler, the subsequent need for better observations, much more calculation, development of calculating methods, etc. The exhibit then highlights the birth and development of the exact sciences, mathematics, astronomy and physics.

The exhibition contains a special display on Schickard that tells the story of his life with a timetable of historical events occurring around that time, displays and explains his calculating machine, achievements with his calculating machine/adding machine, surveying, direct subtraction, and shortened multipli-

*Current Research continued from page 5...*

stable, as will be discussed below. Since 1985 computing has penetrated not only to the desktops of most offices but also into homes, either as systems embedded in other machines or as stand-alone home computers. Robotics, "just-in-time" inventory processes, and other computer-dependent systems have become common in factory production, even in activities typically categorized as "low-tech." Indeed, the radical restructuring of the American corporation since 1985 reveals how deep this penetration has been, through the managerial as well as blue-collar ranks. Since about 1985 (just after the introduction of the Macintosh) many children have been using computers as a basic "given" in elementary schools. These children, of whose environment computers have always been a part, are now entering the work force. In short, there is no point in writing a history of computing after 1985—such a history would be synonymous with the history of



*Schickard's Calculating Machine  
1623/24*

cation from left to right.

The exhibition includes timetables of events in science, technology, politics, culture, religion, and literature. There is information about Roman and Arabic

modern industrial society. Before 1985 that was not so.

**Structure:** This book will present the story chronologically but will also have a thematic unity based on the following notion: From about 1950 to 1985, in the face of enormous advances in computing power per dollar or per unit of space, certain aspects of computer technology remained surprisingly stable. That pattern was a way of organizing the flow of information or work through a computing machine or a workplace where such machines were employed. In its most technical manifestation it is called the "von Neumann Architecture" of computers, after the mathematician who was one of its early proponents. Its value as an organizing principle for an historical narrative stems from the fact that the reader need not understand its technical nuances. The principle can be simply stated and applied to a variety of historical situations. This pattern of

numbers, reckoning, abacii, trigonometric tables, calculating rods, logarithms, slide rule, and calculating and adding machines. Historical figures include Simon Stevin, Ptolemäus, Copernicus, Kepler, Brahe, Galilei, Gunter, Napier, Bürgi, Oughtred, Pascal, Morland and Leibniz.

Schickard and Pascal calculating machines are exhibited and used to explain how they work. One of Schickard's calculators can be used by visitors, supported by detailed explanations and instructions.

The exhibition was open from March 14th until May 2nd, 1993. It occupied approximately 860 square feet, with six showcases and 26 displays. It is being transferred to Town Museum of Tübingen for another session, December 1993/January 1994.

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Germany* □

information flow and handling has been ingrained and internalized among those who worked in the computer industry. Around 1985, parallel-processing architectures gained mainstream acceptance after a long period of experimentation. That led to the unraveling of the pattern dominated by the von Neumann architecture, and revealed for the first time to those who were swimming in that ocean its nature and extent.

Related to this theme is one that connects the internal organization of the technology to those who used it and whose lives were affected by it. That has to do with the way the power of the computer has been made accessible and available to those who wanted it. In simple terms, there has been a gradual trend from a so-called "batch" method of operation, in which the computer's time and resources are most valued, to a more interactive use that emphasizes the user's

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time and needs. How that happened is a complex story, and it is by no means one of inevitable "progress" from an inferior to a superior mode, whose evolution required only that people saw the rationality of the situation. How and why it has happened will be a thematic thread running through the narrative.

Besides computer architecture, three other factors come into play when telling this story. Each has developed in concert with the others, but at a different pace and oftentimes with unintended and interesting interactions. These are: 1) the development of a base technology of electronic devices that make up computing hardware. These include the familiar transistors, chips, and memory devices; they also include packaging and manufacturing techniques, which affect cost, performance, and reliability. 2) Software and Systems: the development of computer hardware has been accompanied by a corresponding need to develop programming, including programming languages, operating systems, and programming "environments" that can take advantage of it. 3) Applications: finally, the narrative shows the close relationship between a customer's needs and the capabilities of computer systems. The relationship is complex and reciprocal; at times new computer systems are developed explicitly to meet a customer's perceived need, at other times the need is not recognized or understood until a computer system with sufficient capability "forces" itself onto that market.

A major challenge will be to keep these four highly interdependent factors in view while not getting lost among the details. As the *Computing Before Computers* team discovered, doing that may be impossible. But it is worth a try.

### On the Sociotechnical Construction of Technology

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As a graduate student at the University of Trondheim I am currently in-

involved in a study of the development of the SIMULA programming language. The study is for my dissertation in history "Hovudfag", which is the subject for the higher Norwegian university degree Cand. philol. (not to be confused with Ph.D.) The time frame of this project is approximately three years. It was started in the spring of 1991 and is to be completed sometime late 1993, early 1994.

The SIMULA programming language was designed by Ole-Johan Dahl and Kristen Nygaard at the Norwegian Computing Center in Oslo between 1962 and 1967. It was originally designed and implemented as a language for discrete event simulation, but was later expanded and re-implemented as a full scale general purpose programming language. Although SIMULA never became widespread in use, it has been highly influential on modern programming methodology. Among other things, SIMULA introduced important object oriented programming concepts like classes and objects, inheritance, and dynamic binding.

While I find the history of SIMULA interesting, my rationale for studying it  
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## Bank of America Honors ERMA Pioneer

The Bank of America recently re-named its Technology Center's headquarters in honor of retired executive vice-president Al Zipf. Zipf was the head of the bank's first computer department and a pioneer in automating bank operations. Among Zipf's achievements during his forty-year career with the bank was his management of the Electronic Recording Method of Accounting (ERMA), which was one of the first successful application of computers to bank operations. ERMA dramatically increased the speed of check processing, allowing accounts previously posted by hand to be processed by computer. Zipf was also responsible for convincing the American Bankers Association to adopt another ERMA innovation called Magnetic Ink Character Recognition (MICR) as the standard for the banking industry. There is an ERMA exhibit in the Al Zipf Building which includes

## NEH Grants

The National Endowment for the Humanities announces the availability of grants under the program of Humanities, Science and Technology for the support of research that brings to bear the knowledge, methods, and perspectives of the humanities in the subjects of science, technology, or medicine. Historical studies and studies of current topics are eligible. However, studies of current science, technology, or medicine must deal with fundamental issues in the humanities. Individuals and institutions are eligible to apply. Applicants may request support for full or part-time salaries, travel, and other costs of conducting research for periods of from one to three years. This category of support is for projects that, because of their intellectual scope and consequent size, duration, or complexity, cannot be accomplished through individual one-year fellowships.

Application materials are available from Daniel Jones, Program Officer for Humanities, Science and Technology, Room 318, National Endowment for the Humanities, Washington, DC 20506 Telephone: 202 606-8210. Deadline for receipt of applications is Oct. 15, 1993. □



Al Zipf Building Plaque

photographs, several videos and a set of ERMA equipment. □



# Market and Product Reports Collection Available

CBI's Market and Product Reports Collection (CBI 55) includes more than 1600 titles or 100 cubic feet of reports on products and services related to information processing. As the reports become obsolete, they are increasingly difficult to find because they are not saved by research libraries. Many of the product reports, such as Auerbach or Datapro, are updatable services in which most subscribers destroy older reports. The market reports often never find their way to research libraries. CBI has received most of its market reports from the Unisys Corporate Information Center in Blue Bell, Pa., which sends the reports to CBI once they are no longer needed by the Center.

In response to growing needs for access to the valuable historical information contained in this collection, the CBI Archives created a bibliographic database on Procite software. Previously researchers could only search a word processing file for authors/marketing firms, title, and keyword. In addition to author, title and keyword searches, the new database includes date of publication, identifying report numbers (when used by publishers), the location of the report within the collection, notes on the type and condition of the report, and subject terms. This work enables researchers to gain more

detailed subject access to the voluminous reports, especially the looseleaf subscription services which have been given the most thorough subject analysis. The database may be used on-site, or researchers can arrange to obtain a copy of the Procite data file.

As with any tool, the database will be fine-tuned with use for more optimal search results. Additional editing will be required to remove irregularities introduced as subject access strategies changed over the course of the development of the database. □

An example of information extracted from the database after a subject search on the term "supercomputers."

1. Auerbach Publishers. Computer technology reports: Computer systems. 1981.
2. Auerbach Publishers. Computer technology reports: Mainframe computers. 1983.
3. Consortium for Supercomputer Research. Analysis and forecast of international supercomputing: Economics of supercomputing. 1987.
4. Consortium for Supercomputer Research. Analysis and forecast of international supercomputing: Part B, Industrial and commercial. 1987.
5. Consortium for Supercomputer Research. Analysis and forecast of international supercomputing: Software and services, Market analysis and trends. 1987.
6. Consortium for Supercomputer Research. Analysis and forecast of international supercomputing: Systems market analysis and technology trends. 1987.
7. Datapro. Computer systems series: Overviews. 1992.
8. Datapro. Datapro '70: The EDP buyers bible. 1986.
9. Datapro. Datapro '70: The EDP buyers bible. 1986.
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15. Datapro. Datapro newscam. 1973.
16. Dataquest. Executive and Financial Programs. Research newsletter. 1989.
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## Recent Publications

William Aspray, editor, *Technological Competitiveness: Contemporary and Historical Perspectives on the Electrical, Electronics, and Computer Industries*. New York: IEEE Press, 1993.

Mark H. Clark, "Magnetic Recording 1888-1960: An International Study in Business and Technological History." Ph.D. Dissertation. University of Delaware, 1992.

Daniel Crevier, *AI: the Tumultuous History of the Search for Artificial Intelligence*. New York: BasicBooks, 1993.

Anthony Gandy, "The Entry of Established Electronics Companies into the Early Computer Industry in the UK and USA." Ph.D. Dissertation. London School of Economics and Political Science, 1992.

Katie Hafner and John Markoff, *Cyberpunk: Outlaws and Hackers in the Computer Frontier*. New York: Touchstone Books, 1992.

Stuart W. Leslie, *The Cold War and American Science: the Military-Industrial-Academic Complex at MIT and Stanford*. New York: Columbia University Press, 1993.

Richard Lynch, "On Analytical 'Engines,' Data 'Architectures,' and Software 'Engineers': Metaphoric Aspects of the Development of Computer Terminology." Ph.D. Dissertation. Columbia University, 1992.

Norman Macrae, *John von Neumann*. New York: Pantheon, 1992.

Judy E. O'Neill, "The Development of Interactive Computing through Time-Sharing and Networking." Ph.D. Dissertation. University of Minnesota,

1992.

Jamie Parker Pearson, editor, *Digital at Work: Snapshots from the First Thirty-five Years*. Burlington, MA: Digital Press, 1992.

### Articles of Interest

William Aspray, "Edwin L. Harder and the Anacom: Analog Computing at Westinghouse," *Annals of the History of Computing*, 15:2(1993):35-52.

A. Ben Ciymer, "The Mechanical Analog Computers of Hannibal Ford and William Newell," *Annals of the History of Computing*, 15:2(1993):19-34.

James S. Small, "General-Purpose Electronic Analog Computing: 1945-1965," *Annals of the History of Computing*, 15:2(1993):8-18.

Special Supplement: "The Wonderful World of the Usenet News," *Amateur Computerist*, Fall 1992. □

*Current Research continued from page 8...*

stems from a somewhat deeper concern with the nature of technological change and the shaping of technology. In classical internalist studies of technology and science we are often led to believe that technologies constitute an autonomous, self-sustained force of great impact on society, and that they evolve according to their own inherent momentum or inner scientific logic. Over the years many have criticized this rather simple deterministic notion of the nature of technology, and in the 1980s it was directly challenged by new directions in the history and sociology of technology and science.

New constructivist theories suggest

that technologies are cultural expressions, mirrors of society rather than pure reflections of the laws of nature. The basic tenet is that technologies are shaped or constructed in a complex interplay between a whole range of more or less contingent, heterogeneous factors. Technologies are thus not only technical, they are also political, economic, social, cultural and even historical. This means that if we want to come to terms with the heterogeneous nature of technology, and furthermore be able to understand the complex sociotechnical webs in which we are implicated, we will have to consider the social and cultural context as well as the technical content.

In essence, the study of the SIMULA development is an empirically grounded attempt to explore some of the more fundamental aspects of the sociotechnical construction of a computer programming language. The study seeks to invoke constructivist perspectives, along with a suitably modified vocabulary for sociotechnical analysis, within the framework of a traditional contextual approach to the history of technology. The basic idea is to structure the analysis through means of powerful models and general theories of the sociotechnical construction of technology, without restraining the heterogeneous character of the traditional historical analysis. □

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