

Proposal for SHOT 2008

Session Title: Looms, Chips, Users and Code: The Business of Computing

Organizer: Thomas Haigh, University of Wisconsin—Milwaukee, thaigh@computer.org

Chair: Helmut Trischler, Deutsches Museum, h.trischler@deutsches-museum.de

Commentator: Thomas Haigh, University of Wisconsin. Milwaukee. thaigh@computer.org

Papers:

- New Perspectives on “Jacquard” Looms and the Development of Punched Cards, Janet Delve, University of Portsmouth, Janet.Delve@port.ac.uk.
- Manufacturing Mainframes: The Evolving Semiconductor Strategies of IBM and Sperry Univac, 1960-1975, Jeffrey Yost, University of Minnesota, yostx003@tc.umn.edu.
- A Department for Ordinary Business: Application Software in the French Plan Calcul (1966-1975), Pierre-E. Mounier-Kuhn, CNRS & Université Paris-Sorbonne, mounier@msh-paris.fr.
- Computer Use and Earnings Inequality, 1960-2000, Peter B. Meyer, U.S. Bureau of Labor Statistics. meyer.peter@bls.gov.

This panel is submitted by the SIG on Computers, Information & Society.

It includes a mix of scholars from four nations. It combines scholars from different backgrounds – Meyer is a research economist at the Bureau of Labor Statistics with an economic history background, Delve is employed in a school of computing, and Haigh in a school of information studies.

Session Abstract -- Looms, Chips, Users and Code: The Business of Computing

Organizer: Thomas Haigh, University of Wisconsin—Milwaukee, thaigh@computer.org

Historians of computing have enjoyed a long and fruitful relationship with business history (as have other subfields within the history of technology). Until recently, however, they have been content to write stories about how hardware companies designed, built, and sold their wares from the 1940s onward. During this decade the two most important trends in the history of computing have been a new focus on software (most notably in Campbell-Kelly's business history of the topic) and an equally important new focus on businesses as users of computer technology (most notably Yates's *Structuring the Information Age* and Cortada's *Digital Hand* series). Following this lead, our papers explore new dimensions in the business and economic history of computing.

Delve's paper extends the traditional time period to explore the business career of Joseph Marie Jacquard. Jacquard invented a loom able to weave a pattern specified in a series of punched cards, a key step toward programmable machines. But although Jacquard occupies a prominent niche in most synthetic histories of computing, Delve claims that previous second- and third-hand accounts of his life have misrepresented many of its important aspects. In particular, she suggests that his looms were not, as widely believed, an immediate commercial success.

Yost looks at the semiconductor strategies of IBM and Sperry Univac. His paper bridges two largely distinct traditions: histories of the semiconductor industry (which tend to be dominated by Silicon Valley and specialist electronics firms) and histories of the computer industry (which tend to focus on machine lines and say little about component technologies or manufacturing). Yost reminds us that both firms were vertically integrated, and that IBM was one of the world's most important producers of semiconductors. Joining these two topics enriches our understanding of both.

Kuhn shifts the focus from hardware to software, with his examination of the software department of France's ill-fated national champion mainframe business, CII. He argues that the firm intended to use software to overcome the advantages of IBM and other incumbents, making it a key technological component of its distinctive business strategy. The French case provides a stimulating complement to the better known examples of the American and British computer industries during the 1960s.

Finally Meyer, an economic historian and research economist at the Bureau of Labor Statistics, broadens our understanding of the users in the business history of computing to include individual wage earners as well as companies. He uses census data on computing-related occupations from the 1960 to 2000 to explore the influence of this new technology on wage inequality. As computer workers comprised an ever growing proportion of the workforce over this period, this work sheds light on an important aspect of the relationship between technology and social change.

New Perspectives on “Jacquard” Looms and the Development of Punched Cards

Janet Delve, University of Portsmouth, Hampshire, UK

Topic: Despite the fact that the “Jacquard” loom is very-well known, scant reliable biographical information has been available to date on Joseph Marie Jacquard himself. The situation has been improved by recent research by Lyon local historian Jean Huchard which has thrown a completely new light on Jacquard and his work, overturning previous accounts which were largely built on legend. As the punched-card “Jacquard” loom plays a significant role in both business history and the history of computing, these new perspectives have important repercussions in several areas of the history of technology.

Argument: It appears that “Jacquard” was a nickname of one branch the Charles family, and that the correct name for the inventor in question was Joseph Marie Charles dit Jacquard, which would explain why material pertaining to just Jacquard was difficult to locate, and hence why so many stories were fabricated about him. The dominant narrative includes many claims regarding the early success of Jacquard’s automatic punched-card-driven loom which are now called into question. This paper will examine several such widely-accepted premises from this new perspective, focussing on the technological advances in perforated paper/card-driven looms from Basile Bouchon in 1725 to Jacquard and others in the early nineteenth century. In particular, the previously unacknowledged contribution of Jean Antoine Breton to the functioning of the Jacquard loom will be considered in depth.

Evidence: Secondary literature by Huchard in the Bulletin municipal officiel de Lyon is the starting point for this paper, and the archival sources upon which this is based is in the process of being consulted.

Contribution to Existing Literature: Jacquard plays a seminal role in most synthetic histories of computing, but has remained misunderstood. There is very little reliable material on Jacquard in English, though my recent biographies (Fall 2007) in the Annals of the History of Computing on Jacques Vaucanson and ‘Jacquard’ have helped to redress the balance somewhat.

A Department for Ordinary Business:

Application Software in the French Plan Calcul (1966-1975)

Pierre-E. Mounier-Kuhn, CNRS & Université Paris-Sorbonne, mounier@msh-paris.fr

Topic: This paper analyzes the evolution of the Application Software Department of the Compagnie Internationale pour l'Informatique (CII), the 'national champion' computer manufacturer in the French governmental policy (Plan Calcul) launched in 1966.

Argument: CII's Application Software Department was basically aimed at solving the strategic problem of this company: How a new entrant, with its engineering culture, could win clients on the European market in head-on competition against major established manufacturers? The perceived solution was to develop application packages which would convince clients to acquire CII mainframes, particularly in market segments where CII hoped to displace IBM and Bull or to install first computers. Along with migration aids to help clients leave IBM, whole software libraries had to be written for scientific as well as for commercial users. It was a never-ending task. How was it organized and staffed? What innovations and routines did it carry? How did it react to changes in its environment, such as IBM's unbundling policy?

Evidence: The main sources for this research are oral interviews, professional journals and the Historical Archives of Bull SA — particularly CII's users group reports and the correspondance between CII and 'pilot clients' who participated in the risky development of the company's software, and offered useful information feed-back.

Contribution: This paper is a chapter of a book in progress about CII. While the Plan Calcul has been extensively discussed from a broad political and economic point of view in books like *French Ordinateurs* (1977) or *L'Informatique Malade de l'Etat* (1990), its industrial arm, CII, was never studied in itself. Application Software was at the interface between CII, its clients and its partners/competitors the French software companies. It also reflected major concerns of this period: The European reactions in the face of US dominance in the IT industry, and the general concern about software economy and software 'engineering'. Beyond the history of a long-forgotten company, it offers a case study on the emergence of Software as a new branch of activity within IT companies, a topic where business and technology histories interact.

Manufacturing Mainframes: The Evolving Semiconductor Strategies of IBM and Sperry Univac, 1960-1975

Jeffrey Yost, University of Minnesota

Topic: This paper expands the understanding of the history manufacturing mainframe computers by focusing on semiconductor strategy—the changing mix of internal manufacturing, alliances, and sourcing mechanisms—at mainframe computer firms. Semiconductors made up a greater share of the cost of computers than any other by the end of the 1960s, and increasingly became a critical source for competitive advantage. The analysis concentrates on the evolving semiconductor strategies of two mainframe firms: industry leading IBM and its top competitor Sperry Univac (a division of Sperry Rand).

Argument: The critical importance of path dependency in making decisions on semiconductors and the complexities of timings and targets of innovation. IBM made a major move to vertically integrate with the formation of its Component Division in 1960. Shortly thereafter, in planning the legendary IBM System 360 series, IBM opted for a less risky hybrid semiconductor technology, Standard Logic Technology (SLT), than the new technology of integrated circuits (ICs). The paper explores underlying manufacturing and strategic factors of this choice, as well as the aggressive move of IBM to become a leader in ICs before the end of the 1960s. In the early 1960s Sperry Univac received semiconductors internally from the Sperry Rand Semiconductor Division. This division, however, repeatedly faltered and Sperry Univac shifted to a market model for its needs. The study details Sperry Univac's strategic planning and mechanisms to shift to IC production in the early 1970s within the context of the legacy of its successful internally produced plated wire main memory and market relationships for ICs.

Evidence: IBM's vast secondary literature addresses some aspects of the firm's semiconductor practices (particularly Ross Bassett's *To the Digital Age*, and Emerson Pugh, et al.'s *IBM's Early 360 and Early 370 Systems*). More important to the study, however, is an extensive oral history series with dozens of IBM engineers from the 1960s and 1970s. With Sperry Univac, much of the small secondary literature on the firm is from its early years (prior to the coverage of my study, such as Arthur L. Norberg's *Computers and Commerce*) and there is virtually nothing on the area of semiconductors. The extremely rich Sperry Univac Corporation Records at Hagley are the main resource I used to piece together this important history.

Contribution: While the history of manufacturing has long been a central focus of the field, there is a relative dearth of information on manufacturing computers (and the fundamental manufacturing decisions by mainframe firms). R&D has been the near exclusive focus—despite the fact computers were built in substantial volume by the 1960s. To the extent manufacturing semiconductors have been studied, it has been predominately from the side of semiconductor firms and the history of Silicon Valley (Bassett, Saxenian, Lecuyer), not the mainframe company focus of my paper. Second, the study addresses a fundamental question at the center of the intersection of the history of technology and business history, the boundaries of the firm, and the technological and strategic factors that play into this decision for manufacturing companies (a question examined by many historians, economists, and management theorists—from Chandler and Lazonick to Usselman and Lamoreaux).

Computer Use and Earnings Inequality, 1960-2000

Peter B. Meyer, U.S. Bureau of Labor Statistics.

Topic: Novel technologies appear to cause increases in income inequality. Here we show evidence of two sets of forces that cause this to happen. First, there are occupations closely tied to new computer technology. Five occupations closely tied to new information technology have experienced growing earnings inequality within them for as long as they can be tracked. They expand both because of growing opportunities and obsolescence both. Second, “superstars” can appear because of expanding capabilities of the media, e.g. the worldwide audience that the top sports stars can now get. These jobs are not closely tied to information technology but rather to some kind of performance.

Argument: Several forces cause technological opportunity in computer technology occupations to experience an expanding earnings distribution – rising inequality – more than other occupations. First, the kinds of work done are expanding qualitatively. For example, digital design, a new category of electrical engineering appeared and expanded greatly. Second, in those same occupations there are a lot of opportunities to succeed by doing something novel, e.g. by making a new invention; creating a new product; by starting a firm; by owning stock options in a firm that is not yet public. Third, in fast-changing occupations, opportunities disappear, depreciate, or obsolesce faster than in other occupations. For example, a product worth developing in 1990 was probably not worth developing in 1995 because it was already obsolete. This exerts a downward force on some earnings in the occupation, especially toward the bottom of the earnings distribution. The combination of these three forces adds new “noise” to the distribution of earnings. A distantly related force discussed in Rosen (1981) is that with the expansion of communication around the world, musicians, athletes, and other performers have larger audiences which raises the top of their earnings possibilities.

Sources: Data on earnings of individuals comes from repeated U.S. Census Bureau surveys. The occupations have been standardized over the Census years by Meyer and Osborne (2005). The occupations interpreted as close to computer technology are these five: electrical engineers, electrical engineering technicians, computer programmers, systems analysts, and data processing equipment repairers. The occupations in which media-amplified “superstardom” are tested for are these: actors and directors, artists, athletes, authors, dancers, designers, editors and reporters, musicians, and photographers

Contribution to literature: A great deal of attention has been paid to the influence of information technology adoption on corporate productivity. But economic historians and historians of technology have done little to explore the influence of information technology on the earnings of individuals. As computer workers comprised an ever growing proportion of the workforce over this period, this work sheds light on an important aspect of the relationship between technology and social change. More generally, this work contributes to a debate among labor economists on “technological uncertainty,” described for example by Dosi (1988) and Rosenberg (1996).

Janet Delve Janet.Delve@port.ac.uk

School of Computing, Buckingham Building, Lion Terrace, Portsmouth, PO1 3HE, U.K.

Full vitae online at <http://www.port.ac.uk/research/ceisr/members/title,28440,en.html>

Selected Academic:

University of Portsmouth, Principal Lecturer, School of Computing, 1996 -

University of Winchester, Senior Lecturer, Computing and Mathematics, 1992-1996

University of Canterbury, Christchurch, New Zealand, Visiting Researcher, Department of Philosophy, 2002-

Middlesex University, History of Mathematics Ph.D. Jan 1999

UCL (UK), Department of Electrical and Electronic Engineering, M.Sc., 1978-1979; Department of Mathematics, B.Sc., 1975-1978

Selected Peer Reviewed Publications:

Delve, J., 2007, 'Joseph Marie Jacquard: Inventor of the Jacquard Loom', *The Annals of the History of Computing*, IEEE., Volume 29, No. 4 Oct-Dec pp.98-102.

Delve, J. 2007, 'Jacques Vaucanson: 'Mechanic of Genius'', *The Annals of the History of Computing*, IEEE. Vol 29 No. 4 Oct-Dec pp.94-97.

Delve, J., 2004, 'Thomas Turner Wilkinson' *Dictionary of National Biography* on CDROM, Oxford University Press.

Delve, J., 2004, 'William John Clarke Miller' *Dictionary of National Biography* on CDROM, Oxford University Press.

Delve, J., 2003, 'The College of Preceptors and the *Educational Times*: Changes for British Mathematics and Education in the Mid-Nineteenth Century. *Historia Mathematica*, Elsevier Press, vol. 30, 140-172.

Other Publications, Honors & Service:

Delve, J., Anderson, D. and Croarken, M., 2003 'Max Newman: forgotten father of the computer?' *Annals of the History of Computing*,

Delve, J., 2002, 'Bootstrapping', *Global Business and Economics Review*, 4.2, 370-372.

Delve, J., Anderson, D., 2001, 'The Pinkerton Lecture', *Annals of the History of Computing* 23.2, 68-73.

Elected member of Council of the British Society for the History of Mathematics, 2002- 2007.

Elected Committee member of the UK branch of the Association for History and Computing, 2003-2008. Editorship of BSHM / BLC Turing 2004 Conference Proceedings

www.bcs.org/ewic/turing04. Referee for the Encyclopedia of Data Mining and Warehousing.

Invited lecture on Max Newman at the Royal Institution, London, 2001. Co-director of the

Winchester Project, University of Winchester. Invited lecture for the BCS CCS (Computer

Conservation Society) at the Science Museum, London. Organiser of Turing 2004 BSHM / BLC conference.

Pierre-E. Mounier-Kuhn

CNRS & Centre de recherches en Histoire de l'Innovation

Université Paris-Sorbonne

28 rue Serpente, 75006 Paris

mounier@msh-paris.fr

Pierre-E. Mounier-Kuhn (CNRS & Université Paris-Sorbonne) devoted his doctoral dissertation to the History of Computing in France from the 1930s to the late 1960s: L'informatique en France de la Seconde Guerre mondiale au Plan Calcul : Science, Industrie, Politique Gouvernementale (CNAM, Paris 1999, 800 p.).

He has published some 50 papers on related topics:

- Historical geography of computing research and higher education in France,
- French computer and peripheral manufacturers, particularly Bull and SEA,
- Origins of French software and service companies, particularly the service bureau sector,
- The development of early Air and Navy defense systems, and their influence on the French computer industry,

He was elected "International scholar" with the Society for the History of Technology in 1993.

He co-organized several international conferences on the history of computing, of patents and of telecommunications. He acted as special issue editor of a series of the Annals of the History of Computing about the History of Computing in France (1989-1990). A co-founder of AHTI, the French computer and telecom history society, he is a member of ACONIT and Federation des Equipes Bull, the two IT preservation societies active in France. He is Associated Partner of the research program Software for Europe (SOFT-EU) within ESF EUROCORES.

P.-E. Mounier-Kuhn is currently working on the history of the Plan Calcul and its 'national champion', the CII (Compagnie internationale pour l'informatique), and on the history of Bull.

Jeffrey R. Yost, yostx003@tc.umn.edu

Associate Director, Charles Babbage Institute for the History of Information Technology,
University of Minnesota, Minneapolis, Minnesota, 1998 to present

Education

Ph.D., History of Technology and Science, Case Western Reserve University, Cleveland,
Ohio, 1998

M.A., History of Technology and Science, Case Western Reserve University, Cleveland,
Ohio, 1993

B.A., Magna Cum Laude, History, Macalester College, St. Paul, Minnesota, 1990

Concurrent Positions:

Editor in Chief, IEEE Annals of the History of Computing, 2008-

Principal Investigator, "Building a Future for Software History," National Science
Foundation sponsored project, 1999-2004 [\$488,000 project]

Co-Principal Investigator, "The Computer as a Scientific Instrument," National Science
Foundation sponsored project, 1998-2000. [\$200,000 project]

Select Publications:

"Internet Challenges for Nonmedia Industries, Firms, and Workers: Travel Agencies,
Realtors, Mortgage Brokers, Personal Computer Manufacturers, and Information
Technology Services Professionals." In William Aspray and Paul E. Ceruzzi. Eds. *The
Internet and American Business* (Cambridge: MIT Press, 2008): 315-350.

The Computer Industry (Westport, CT: Greenwood Press, 2005).

"Maximization and Marginalization: A Brief Examination of the History and
Historiography of the U.S. Computer Services Industry." *Enterprises et Histoire* 40
(November 2005): 87-101.

"Computers and the Internet: Braiding Irony, Paradox, and Possibility," in Carroll
Pursell, ed. *American Technology: Readings in Social and Cultural History*. (Oxford:
Blackwell Publishers, 2005).

Bibliographic Guide to Resources in the History of Scientific Computing, 1945-1975
(Westport, CT: Greenwood Press, 2002).

Select Presentations:

The Internet and the Transformation of American Industries: A Case Study of Travel
Reservations." Society for the History of Technology (SHOT) Annual Meeting, Las
Vegas, Nevada (October 13, 2006).

"A Brief Historical Examination of Business Strategy and Innovation in the Computer
Services Industry" Computer Science Colloquium, University of Minnesota (April 3,
2006)

"Reprogramming the Hippocratic Oath: The Early History of Medical Informatics and
Privacy." Conference on the History and Heritage of Scientific and Technological
Information Systems, Chemical Heritage Foundation, Philadelphia, Pennsylvania
(November 17, 2002)

Peter Benjamin Meyer meyer.peter@bls.gov

Research Economist, Office of Productivity and Technology, U.S. Bureau of Labor Statistics.

Fields of specialization: Technological change; economic history; labor economics

Ph.D., Economics, Northwestern University, Evanston, Illinois, 2001.

Dissertation title: “Technological uncertainty and earnings inequality”

Faculty committee: Joel Mokyr, Joseph Ferrie, Christopher Taber

A.B., Applied Mathematics with Computer Science, Harvard College, Cambridge, MA, 1988.

Recent working papers and publications

“Network of tinkerers: a model of open-source technology innovation” Nov 2007. BLS Working paper 413. <http://www.bls.gov/ore/abstract/ec/ec070120.htm>

“Proposed category system for 1960-2000 Census occupations.” (with Anastasiya M. Osborne). Sept 2005. BLS working paper 383. <http://www.bls.gov/ore/abstract/ec/ec050090.htm>

“Turnbulence, inequality, and cheap steel.” Feb 2005. BLS working paper 375. <http://www.bls.gov/ore/abstract/ec/ec050010.htm>

“Preliminary estimates of multifactor productivity growth” (with Michael J. Harper) *Monthly Labor Review* 128:6 (June 2005), 32-43. <http://www.bls.gov/opub/mlr/2005/06/contents.htm>

Recent Presentations

“Technological discussions in U.S. iron and steel, 1871-1885”, at Society for the History of Technology conference, Oct, 2006 (joint with Carol Siri Johnson).

“Network of tinkerers: a model of open-source innovation” Midwest Economic Association, Mar 2006; Bureau of Economic Analysis, July, 2006; Naval Postgraduate School, Monterey, CA, Aug 2006

“The airplane as an open-source invention” at Nov 2005, Social Science History Association conference; Asia-Pacific Economic and Business History Conference, Feb 2006, Brisbane, Australia; International Economic History Congress, Helsinki, Aug 2006; SHOT 2007 in Washington DC.

“Technological uncertainty and earnings dispersion in U.S. iron work 1866-1881” at Berlin Colloquium workshop of economic history, in Dec 2005; Society of Labor Economists conference, April-May 2004; American University, Oct 2003; Economic History Association, Sept 2003; Social Science History Association, Oct. 2002; University of North Carolina, spring 2002.

“Updated unified category system for 1960-2000 Census occupations” at Social Science History Association conference, Nov, 2006

Other work experience

Senior Software Engineer and other software-related positions. Symantec Corp., Cupertino, CA. 1988-1994.

Thomas Haigh

1550 E Royall, #504, Milwaukee, WI 53202 + 414.287.0062 (H) 414.526.6631 (M)

Full vitae online at www.tomandmaria.com/tom.

Selected Academic:

University of Wisconsin--Milwaukee, Asst. Professor, School of Information Studies, 2004-
Indiana University, Bloomington, Visiting Assistant Professor, Informatics School, Fall 2003
Colby College, Visiting Instructor/Visiting Researcher, STS/Admin. Sci., 2001-3
University of Pennsylvania, History and Sociology of Science Ph.D. May 2003
Manchester University (UK), Department of Computer Science, B.Sc. & M.Eng, 1991-1995

Selected Recent Publications:

"Protocols for Profit: Web and E-mail Technologies as Product and Infrastructure" in *The Internet and American Business*, edited by William Aspray and Paul Ceruzzi, MIT Press, 2008: 105-158 (online).

"The Web's Missing Links: Search Engines and Portals" in *The Internet and American Business*, edited by William Aspray and Paul Ceruzzi, MIT Press, 2008:159-200 (online).

"Ein wahrer Eimer voller Fakten" (German translation of "A Veritable Bucket of Facts:' Origins of the Data Base Management System") in «Nach Feierabend - Zürcher Jahrbuch für Wissensgeschichte» (Zurich Yearbook in the History of Knowledge), 2007.

"Sources for ACM History: What, Where, Why" (with Elizabeth Kaplan and Carrie Seib), *Communications of the ACM* 50:5 (May 2007):36-41. (online)

"Remembering the Office of the Future: Word Processing and Office Automation before the Personal Computer," *IEEE Annals of the History of Computing* 28:4 (October-December 2006).

Other Publications, Honors & Service:

Around thirty other publications, including research articles, book reviews, obituaries, biographies, and a review essay. Around thirty published or forthcoming oral history interviews.

Twenty three competitively reviewed presentations, including five SHOT papers, three Business History Conference papers, and papers at the North American Labor History Conference and Hagley conference on the Technological Fix. Twenty eight invited presentations and departmental seminars including Tokyo University, ETH, UIUC, the Deutsches Museum, and a public keynote address at the 2005 CHOC workshop in Amsterdam.

Awards, Grants and Fellowships include: Software History Center Research Fellowship (2003), IEEE Life Member Fellowship in Electrical History (2000-01), Tomash Fellowship in the History of Information Processing (Babbage Institute, 1999-00), William Penn Fellowship (1995-99), Fulbright Award for post-graduate study in the US (1995-96)

Biographies editor and board member of *IEEE Annals of the History of Computing*

Chair, SHOT SIG on Computers, Information and Society, 2005-