Reviews

PEGGY KIDWELL, EDITOR

The Reviews Department includes reviews of publications, films, audio and video tapes, and exhibits relating to the history of computing. Full-length studies of technical, economic, business, and institutional aspects or other works of interest to Annals *readers are briefly noted, with appropriate bibliographic information.*

Colleagues are encouraged to recommend works they wish to review and to suggest titles to the Reviews Editor.

☐ Homer R. Oldfield, ***King of the Seven Dwarfs, General Electric's Ambiguous Challenge to the Computer Industry,*** Los Alamitos, Calif.: IEEE CS Press, 1996, ISBN 0-8186-7383-4, $22.00, xiv + 252 pp.

The General Electric Company (GE) slid tentatively and reluctantly into the commercial computer business in 1956, with a contract to construct a guaranteed operating version of Stanford Research Institute's special-purpose computer system, Electronic Recording Machine Accounting (ERMA), for the Bank of America. From this, GE stumbled cautiously to the creation of a line of more-or-less upward compatible general-purpose computers in spite of its own top management's doubt and disapproval. After a decade, GE seemed to be well on the way to second place, ahead of the other aspirants in the hapless group of minor computer firms mocked by the press as "The Seven Dwarfs." In particular, GE had pioneered in time-sharing and multiprocessing and as a consequence was threatening IBM's dominance of the large computer business. In 1970, to the astonishment of many, GE dumped computer development and sold out to Honeywell. At the time, the GE Information Systems Group had 25,000 employees and $1.5 billion in installed equipment. This is Oldfield's version of the story.

He was in at the beginning. In his first 108 pages, Oldfield tells how he initiated and managed the ERMA project, made the successful delivery of the first model, and along the way founded the GE Computer Department. This part ends in 1958, when he voluntarily left. Oldfield reconstructed the rest of the GE computer story on the basis of interviews and correspondence with the GE employees, chiefly engineers and marketers, at his middle-management level who were there after he left.

The tale is lively and detailed and moves quickly. It is replete with names, personal facts, and invented conversations. Oldfield, a hardware-engineer-turned-manager, concentrates on the development of hardware, the making of sales, and GE headquarters' convoluted attempts to solve all problems by repeatedly reorganizing and installing new professional managers drawn from other departments. They had no understanding of computers or the computer business and were committed only to short-term financial success. The powerful chiefs at 570 Lexington Avenue in New York and the employees they assigned as managers are the villains. The hardware engineers, the marketers, and the managers who shared the author's dream of GE's becoming a computing giant are his heroes.

Oldfield's basic point is that the top men at GE were never convinced that computing and computers were important or a business in which they really wanted to have a presence. They dragged their feet and reluctantly went along with Oldfield and his successors, whom they did not understand or trust. This lack of committed leadership from the top resulted in the embarrassing sell-out that may not have cost GE much. Near the end of the book, Oldfield tells how engineer-turned-creative-accountant George Snively puts a different spin on the final result by explaining how GE "made a substantial financial success in computers."

The story has been told in part and in whole before. Indeed, Oldfield says that he was stimulated to write this "true" history by the errors in other works, particularly mentioning *Computer: Bit Slices From Life*, by Herbert R.J. Grosch. (Grosch was very critical of Oldfield, who seems to be reciprocating.)

A major flaw in the book is the distracting style that Oldfield uses. He refers to himself in the third person and includes totally invented, distracting, and often annoying dialog. In the first part of the book, Oldfield does most of the talking, usually in typical engineer/manager clichés, but everyone else who is quoted also speaks in the author's own voice and style (e.g., "Hi, George. Have you come up with any bright ideas to feed Barney?" or "Say no more, I'll make sure his experts always return to New York fat, dumb, and happy.").

This is a narrative, internalist history that gives no recognition to the surrounding social and cultural forces. Indeed, the author seems never to have understood the complexities or importance of ERMA's software or grasped the idea that a successful computing company needs genius programmers more than genius hardware designers. The competition, chiefly IBM, is touched on very lightly, as are most of the customers.

While IBM was always Snow White, the Seven Dwarfs had a varying membership. Oldfield names GE, RCA, UNIVAC, Honeywell, Burroughs, Scientific Data Systems, and Control Data Corporation, which is probably an appropriate list of dwarfs for the latter part of this period. GE was "King" only by virtue of size and not in terms of power or leadership.

The book is well-printed and well-bound, includes photographs, has very readable type, and is largely devoid of typos. However, its 7¼-inch width makes it awkward to shelve or read. There is no index, an unforgivable fault today in a history.

The story is better and more succinctly told in the historical ac-

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counts of GE and ERMA in *Annals*, vol. 17, no. 4, 1995, by J.A.N. Lee, John Couleur, James L. McKenney, and Oldfield (written in the first person), which are often close duplicates of parts of this book. Although the book names more participants and the author makes more penetrating judgments and gives more details, I cannot recommend it as being superior to what *Annals* has already published about the GE fiasco: The Lee et al. article mentioned above is particularly good. I had hoped for more and better.

A Personal Note

I represented a middle-sized industrial customer of both IBM and GE during this period. I had confidence in both firms. I had no idea of the GE infighting or of the half-hearted support that was given to the Computer Department or of GE's lack of commitment to computing. At sell-out, GE may not have suffered much financial loss, but it did suffer a substantial loss of industrial customer confidence that extended to its other products.

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☐ David C. Mowery, ed., ***The International Computer Software Industry: A Comparative Study of Industry Evolution and Structure***, Oxford and New York: Oxford Univ. Press, 1996, ISBN 0-19-509410-7, $49.95, 324 pp.

This book is a very important addition to the literature of the history of the software industry. While a number of monographic business histories of software firms have been written in recent years, and several countries have produced reports on the development of their indigenous software industries, this is the first comparative international study of this major industry.

The book consists of nine contributed chapters, together with an introduction and conclusion by the editor, David Mowery. Of the 10 chapters, three are devoted to the United States, two cover Japan, and there is one chapter each for Western Europe, Britain, and Russia. The ninth chapter covers present-day intellectual property issues.

Mowery has produced an insightful introduction to the volume, setting an agenda for the contributed chapters and discussing three major issues in understanding the software industry. The first issue is the distinction between traded and nontraded software: that is, the difference between software that is sold as an artifact in its own right and software that is produced as a byproduct of some other business activity (the book is almost entirely devoted to the former). The second issue Mowery discusses (but does not fully define) is the structure of the industry, which can be defined in terms of product genre, market, or type of producer. The third issue Mowery discusses is the emergence of dominant software standards such as Microsoft Windows. This last is a theme that recurs time and again in the contributed chapters and can be seen as the leitmotif of the book.

Turning to the individual chapters, the three chapters devoted to the U.S. software industry include: first, an excellent analytical history of the industry; second, a discussion of the federal government's role in establishing the industry; and third, a case study on the impact of software standards on the emergence of RISC architectures. The two chapters on the Japanese software industry offer two fascinating comparisons: between the successful mainframe and custom software industries, on the one hand, and the remarkably unsuccessful microcomputer software industry, on the other. The contrast illustrates the supremacy of standards and "network externalities" over raw technologies in establishing a successful software industry. The chapters on the Western European and British software industries reveal characteristic positions similar to each other, but different from both the United States and Japan. The Western European countries tend to have strong domestic custom software industries, but relatively weak packaged software sectors. The weak packaged software industry can be attributed to the lack of a major European computer industry (compared with the United States and Japan) and to the difficulty of competing with the de facto standards of U.S. software producers. Finally, the story from Russia has changed again. Prior to the mid-1980s, the story was one of a protected market for lackluster software producers for sub–state-of-the-art computers. Since the Gorbachev reforms of 1985, however, the industry has been in a state of massive transition.

Like all contributed volumes, this book reflects the current state of knowledge. The need for multiple authors is a reflection of the fact that our knowledge of the software industry is surprisingly slight, surprising not only because of its importance in its own right but also because of its secondary-producer nature that impacts almost all other present-day economic activity. Like all contributed volumes, the quality of the whole depends on the editor first securing and then orchestrating the different talents of the contributors. It is, for example, disappointing that there are no chapters on the developing nations' software industries (such as that of India) or on the tiger economies (such as South Korea). However, one cannot make bricks without straw, and Mowery and the publishers are to be congratulated on producing a remarkably polished volume.

This book is an essential library purchase and strongly recommended for individuals with a specific interest in the software industry.

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☐ Donald MacKenzie, ***Knowing Machines: Essays on Technical Change***, Cambridge, Mass., and London: MIT Press, 1996, ISBN 0-262-13315-6, $35.00, 338 pp.

The readers of the *Annals of the History of Computing* may suppose, as did I, that Donald MacKenzie's book, composed of articles such as those he has written for this journal and *Technology and Culture*, is primarily concerned with those "knowing machines" we call computers. Although three of its essays do concern supercomputers and microelectronics, the title is not a play on words, as the subtitle makes clear.

Instead, the subjects of the essays vary from the Marxist analysis of the role of technology in labor relations to the invention of the laser gyroscope. MacKenzie provides a rationale for his collection in a well-written introduction: the so-called strong program in the sociology of science, pioneered at Edinburgh Univer-

sity. This program has been under critical attack by scientists led by Paul Gross and Norman Leavitt, whose 1993 book *The Higher Superstition* takes the practitioners of this and related approaches to task. MacKenzie's articles, together with a new work by David Bloor, Barry Barnes, and John Henry, *Scientific Knowledge: A Sociological Analysis* (London: Athlone Press 1996), provide an in-depth defense of these techniques.

Certainly, opponents of the strong program in the sociology of science will take little comfort in MacKenzie's careful analyses, which make sound use of interviews, the professional literature of computing and the physical sciences, and statistical techniques to evaluate the nature of modern scientific activity. Although some who still follow Thomas Carlyle's "great man" interpretation of history or Thomas Kuhn's refinements of the "history of ideas" approach to the history of science and technology will no doubt find MacKenzie deficient in a detailed technical exposition of his subjects, those who are more concerned with the historical importance of technology will find much here to ponder. Certainly the readers of the *Annals of the History of Computing* should find his articles on that subject arresting, if not compelling.

His essays on supercomputers, for example, try less to describe the history of the hardware than to portray the patterns of motivation and social interaction that called forth LARC, Stretch, the CDC 6600, and the Cray-I. Like the companion essays on nuclear weapons, these essays rely heavily on interviews with the participants. Although such interviews provide invaluable insights, the historian would be happier if they were available for consultation or verified by documentation, since one must place a good deal of trust in the interviewer to properly interpret his subjects. I have no doubt that a number of the processes of development MacKenzie describes will be documented by historical study; it would be a step forward, however, if the interviews were available for that purpose.

MacKenzie's study of the development of missile guidance systems, reflected here in his essay on the laser gyroscope, established him among the most able sociologists of technology. This collection reflects the same clear writing, interpretive skill, and painstaking analysis. I recommend it heartily to all who are interested in the history of computing and technology.

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Briefly Noted

☐ James W. Cortada, ***A Bibliographic Guide to the History of Computer Applications, 1950–1990***, Westport, Conn.: Greenwood Press, 1996, ISBN 0-31329876-9, $85.00, 304 pp.

This volume, the third of a series James Cortada has prepared for Greenwood Press, offers further tantalizing information about sources available in the history of computing. The annotated bibliography is divided in two parts, the first for the period 1950–1965 and the second for 1966–1990. Within each section, the entries are divided alphabetically by subject (accounting, agriculture, airline reservation systems, banking, etc.) and then alphabetically by author. There is no table of contents listing the subject headings, but there is a thorough index. Sources cited range from the journal *Theatre Crafts* to the periodical *American City* to the more familiar *Datamation*. Cortada does not include reports on computer applications from annuals such as *Data Processing Yearbook* and has managed only limited coverage of publications by computer manufacturers. The book focuses on literature published in the United States. These limitations noted, one can point out that this bibliography will intrigue anyone trying to trace the ways in which the computer became a part of 20th-century life.

☐ Arne Kaijser, "From Invention to Global System," ***The World's Largest Machine: Global Telecommunications and the Human Condition***, Magnus Karlsson and Lennart Sturesson, eds., Stockholm: Almquist & Wiksell, 1995, ISBN 91-2201-696-1, pp. 106–138.

The book is a publication of the Department of Technology and Social Change of Linköping University in Linköping, Sweden. It is primarily concerned with contemporary issues relating to information technology. Arne Kaijser's chapter concerns the historical development of telephone networks in Sweden and in Scandinavia more generally.

☐ Fred Moody, ***I Sing the Body Electronic: A Year With Microsoft on the Multimedia Frontier***, New York: Viking, 1995, ISBN 0-670-84875-1, $24.95, 311 pp.

Seattle journalist Fred Moody spent a year in the early 1990s at Microsoft, observing the design and development (programming) of a multimedia children's encyclopedia that has been sold since 1995 under the name *Explorapedia*. Microsoft purchased the text of the *Dorling Kindersley Children's Encyclopedia* and added graphics, sound, and text-searching capabilities in an effort to appeal to both children and their parents. Moody's book offers an intriguing glimpse into one of the largest computer software companies in the United States.

☐ Tony Sale, "The Colossus of Bletchley Park," ***IEEE Rev.***, vol. 41, no. 2, pp. 55–59, Mar. 16, 1995.

This is a brief history of the pioneering Colossus computer, which was built in England during World War II for decrypting enciphered messages. The article describes current efforts to build a working replica of the machine at the Bletchley Park Museum.