will be engaged in handling research.

Just as the curve may be beginning to flatten, information technology has given it a boost by making researchers more efficient and, possibly, making scholarly communication more manageable. Meadows's theme in this book is that research communication has always been evolving and changing. Researchers themselves, the readers and the authors, and their communities change slowly. The means of communication, which are handled by publishers, libraries, and others in the middle, have always changed more rapidly, and the rate of change is being accelerated by developments in information technology.

His message is especially critical to academic librarians. With his background at the British Library and his deep scholarship as a historian of science combined with his extensive research in information science, Meadows achieves a special balance that is fresh and welcome. In this book, he traces the growth of scholarly and scientific inquiry over the centuries with a focus on the sciences and brings his discussion remarkably close to the present day, given the production schedule of a scholarly monograph (a subject he treats in the book). It is a well-structured book with six chapters that often parallel each other as he discusses the evolution of research and its communication and how the growth of research resulted in the development of disciplines. He also focuses on the character of the people who undertake research, the channels involved in communicating research, the way that research is made public, and how people find out about research. He always ends his chapters by focusing on the effects of technology.

Meadows is evenhanded in his treatment of libraries and publishers. He stresses that both institutions face difficulties as electronic publications become increasingly important for the communication of some research. He outlines the issues thoroughly and, although his purpose is not to offer an overarching solution, he does suggest how the future may evolve.

Any practicing academic librarian will find much that is familiar here but also will learn a great deal as Meadows builds his arguments methodically and completely. He does not spend much time on the economics of publishing or on explaining how commercial publishers came to dominate STM (scientific, technical, medical) publishing. Although that would have been useful, he is concerned with broader trends.

This would be an excellent text book for a course on the subject and a superb primer for administrators and faculty who want to learn about the underlying pressures that threaten the research endeavors of our universities. Any academic librarian will benefit from reading it and will be better grounded when explaining the crisis we face in scientific publishing to faculty, administrators, and the public.—*William Gray Potter, The University of Georgia, Athens.*

Rochlin, Gene I. *Trapped in the Net: The Unanticipated Consequences of Computerization.* Princeton, N.J.: Princeton Univ. Pr., 1997. 293p. alk. paper, $29.95 (ISBN 0-691-01080-3). LC 96-41003.

If you have not already read this book, you owe it to yourself to do so. It is masterfully structured, well researched and documented, and often as gripping as a

good whodunit. The author, a physicist retrained in the social sciences, unites the relentless belief from physics that causes have effects (and vice versa) with social and technological history and management theory into a very persuasive and often alarming account of how computers have transformed our society and proscribed many of our options for the future. Because computers have an impact on everyone's life, this book concerns you—and probably your job and safety.

The "net" in the title is not the Internet but, rather, the all pervasive network of computers and networks that surround us. The "trap" is "shorthand for the elaborate, long-term, collective effects of the possibly inevitable and largely unexamined desire to computerize and network everything and anything where efficiency or economic performance might thereby be improved." Rochlin systematically points out that those who are redesigning and reengineering toward this end "have little understanding of the potential vulnerabilities they are creating."

These "vulnerabilities" are the topic of the case studies that make up the bulk of this book. Rochlin chooses gripping examples embracing real events, tragedies, and narrowly averted disasters: stock market trading and crashes, piloting of commercial aircraft, air traffic controllers, fighter jet cockpits, and battleship command stations. He traces the history and social purposes of each, and shows how automation has increased risk to life and the social good, decreased human control, decreased opportunities for human ingenuity, and dehumanized work.

The case studies are preceded by an eloquently presented foundation of social and technological history. His succinct and highly readable history of automation traces the evolutions of both computers and networks. Both begin as bright ideas conceived for a specific purpose, but market, technical, and unanticipated forces caused both to evolve toward the

de facto, unplanned standardization and the options available today. Each presents a tale of "unanticipated consequences." Rochlin makes the point that, like Taylorism in management theory, computers have created increased distance between the artisan/worker and his or her craft/product. Computers allow workers only to perform the range of options available in the computer's programs, power, and connectivity. Human individuality is reduced to predetermined options. Thus, although computers have extended individual freedom by allowing decentralization of work hours and the work site, computers and networks have extended management's control over employees, procedures, and the measurement and supervision of production. Ultimately, workers have less freedom to use their unique judgment, intuition, and discretion. They cease being artisans to become managers of the automated systems they operate. They are "empowered" to work independently, but in an increasingly circumscribed (less human) range of activity.

"Deskilling" results from this process. A whole generation of workers is becoming trained only in operating the computers that fly the aircraft, scan and analyze data for air traffic control, coordinate weaponry on battleships, or monitor crash warnings in the global stock exchange. They lack direct experience—"the feel"—of running these systems. Once "deskilled," they lack (and no one possesses) the ability to function when the computers fail or encounter a crisis they are not preprogrammed to analyze and handle. This leaves society at greatest risk from the most unforeseeable possibilities. When crises occur, no one is accountable because no one present programmed the computer and deskilled employees cannot be expected to handle what they have never been given any opportunity to learn.

This scary situation is aggravated when "slack time" is eradicated from high-speed, complex processes. Re-

moval of slack time coincides with management's desire to maximize productivity. Automation has facilitated this goal in many tasks beneficially. However, during crises, removal of slack time abolishes the moment when humans might see a problem and intervene and thus avert disaster. In the battles, stock markets, air traffic towers, and other situations Rochlin uses as case studies, he argues convincingly that current trends in automating will increase the number of future disasters and decrease accountability for them.

So, what can be done? This book offers few consoling remedies. Obviously, slack time and respect for direct human experience at crucial tasks are invaluable. But current profit-hungry trends in management and automation do not head in this humane direction. Rochlin encourages everyone to learn to become wary of the limitations of computers, to learn to see what overautomation is doing to transform public safety and welfare. The most reassurance he offers for the future is his conclusion that although comput-

ers are unbeatable at a game of chess, they cannot "play" chess. And winning—like the desire for efficiency, profit, managerial control, and no slack time—is a less vital human urge than the urge to play and be creative, individual, and human.

Although libraries are rarely mentioned in this book (Rochlin worries that computerized selection processes may turn libraries into "Walmarts of the mind"), it is indirectly about their future and recent past. Libraries already have experienced automation of processes and Taylorism—both in its original and modern versions. The shift in publishing to many media and Internet-enabled possibilities follows the patterns of unanticipated consequences Rochlin describes. The reduction of workers' options, preprogrammed dehumanization of tasks, deskilling, and concerns for management and worker accountability are well known to most librarians and will, undoubtedly, dominate our lives in the future.—*Joseph W. Barker, University of California-Berkeley.*