

*Strategic Computing: DARPA and the Quest for Machine Intelligence, 1983–1993.* By Alex Roland and Philip Shiman. Cambridge, Mass.: MIT Press, 2002. xxvi + 427 pp. Index, notes, figures, photographs, glossary. Cloth, \$50.00. ISBN 0-262-18226-2.

Reviewed by James W. Cortada

This book details the history of how the U.S. Department of Defense's research arm, the Defense Advanced Research Projects Agency (DARPA), attempted—and failed—to develop artificial intelligence (AI) tools at a cost of \$1 billion. Strategic computing was an initiative undertaken by the agency to advance the development and manufacture of computing chips, computer architecture, and AI software. The story, told by Alex Roland and Philip Shiman, is an important one on a number of levels. DARPA, historically a leader in the development of computer technology since the early days of the cold war, achieved its best-known success with the Internet. For decades it has administered billions of dollars in research, coordinating work among university and private-sector organizations. When we think of the “military-industrial complex,” DARPA always comes to mind as a major player. Of particular interest to business historians is the constant stream of projects funneled by DARPA to the private sector that advanced information technologies.

*Strategic Computing* joins a growing list of books by scholars like Arthur L. Norberg and Jane Abbate on the role of the U.S. government in promoting computer-related technology. Prior to its publication, the public might have been under the impression that the Internet represented DARPA's high-water mark and that its activities then dwindled during the 1980s. Roman and Shiman are among the first to dispel this belief by demonstrating that the agency was extremely active in the 1980s and early 1990s. They offer proof that the U.S. government continued to promote innovations in technology, even beyond the end of the cold war, that were designed to meet the needs of the military (and it does so to this day in DARPA). The book lucidly explains the complex story of how research was funded, managed, and deployed in late-twentieth-century America, and it should be of particular interest to policymakers and businesses contracting to do research for the U.S. government. The authors devote considerable

space to the directors of DARPA, illustrating the interaction between personal agendas, congressional politics, White House priorities, and the interests of the uniformed services. It is a very large story that involves enormous expenditures directed simultaneously toward a broad front of technology research projects.

In the 1980s, the Reagan administration wanted to give free rein to American enterprise while continuing to challenge the Soviet Union. Congress, fearing the growing economic and technological power of the Japanese, sponsored research designed to contain that threat. DARPA's "high risk-high gain" management style continued through the 1980s, driving forward a variety of research agendas. Such an approach, however, prevented DARPA from generating a large body of useful research results. Extensive turnover among its senior leaders led to erratic management of priorities and projects. By failing to prioritize research agendas—starving the failures and feeding promising projects—"they produced a camel instead of a horse" (p. 325). The result was that DARPA was able to advance research on some elements of its grand plan, but it failed to integrate them as originally intended. The agency did succeed, for example, in advancing industry's capabilities in high-speed computing, which was incorporated into commercially available products during the 1990s, but failed to advance artificial intelligence (later called "expert systems"). Only the U.S. Navy received any AI benefits: two expert systems it could use to plan and analyze functions. DARPA turned its attention to businesses as well, to moving research from university laboratories into corporations by supporting start-up firms (e.g., Thinking Machines) and funding university-business collaborations (e.g., with Martin Marietta and General Electric). However, its private-sector investment did not lead to new technologies of much consequence, and so by the late 1980s funds for DARPA's grand initiative began to dry up.

Roland and Shimon emphasize the need for better accountability among policymakers, agency heads, Congress, and industry to prevent expenditures of this magnitude—one billion dollars—that are not linked to tangible results. Cover-ups and hyperbole enabled the Department of Defense and DARPA to spend so much money for so few results. However, in summing up their analysis of the programs, the authors argue

that DARPA did not spend its money any better or any worse than other agencies, and they point out that it did produce some useful results.

*Strategic Computing* is based on internal agency documents and interviews. The authors appear to have looked at all the relevant materials in producing this thoroughly researched and thoughtful account. A story that promised to be dry reading turned out to be an exciting tale, filled with insights on the management of high-technology research and development. By engaging in debate with other historians on related themes, such as government research and development and the role of DARPA, Roland and Shiman have linked the story to the larger body of historical literature on the same topic. The photographs and charts, particularly the organization charts, are useful additions. This is a valuable contribution to the history of information technology. A business manager who has to deal with the Pentagon or a government executive whose job is to run a complex R&D operation will find *Strategic Computing* useful reading. Business historians who wish to examine how large “high-tech” firms pioneered technology will discover in this book much material of vital importance.

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