TECHNOLOGY AND THE FUTURE

FOURTH EDITION

ALBERT H. TEICH, Editor

Technology and the Future
Albert H. Teich, editor
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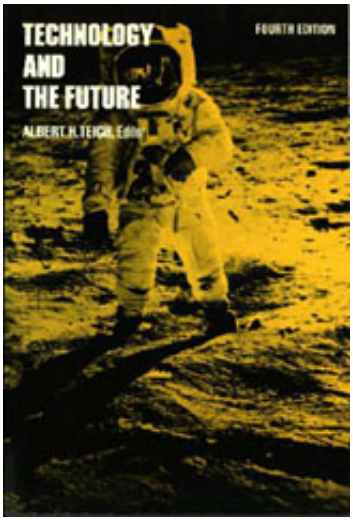

The mid-1980s were a time in which the U.S. government devoted a large share of its technological resources to the military sector while the growing dominance of Japanese consumer technology led Americans to worry about the future of U.S. industry. This was also an era of increasing concern about technological risk, concern that was underlined by the Challenger disaster, Chernobyl, and Bhopal.

The fourth edition of *Technology and the Future* mirrored many of these issues, in a chapter on risk and in the addition of a fourth section headed "using technology" that dealt with technological innovation, military research, and commercial biotechnology.

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American Association for the Advancement of Science

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Introduction

Technology is taking over the world. Keep up with it or you're going to be left behind.

So proclaims a U.S. Army recruiting commercial frequently aired on network television in early 1985. The images used in the commercial—computers and other electronic equipment, state-of-the-art helicopters—match the words; they are all new, exciting, and, like the music that accompanies them, fast-paced.

A technological bandwagon is rolling across the United States in the mid-1980s. High technology is "in." Soda machines talk. Greeting cards play "Happy Birthday" in electronic tones. Health spas feature the latest in microprocessor-based exercise equipment. Authors and editors—myself included—foresake pencil and paper for the keyboard and video display terminal.

Designers and advertisers have discovered that the key to selling consumer electronics, automobiles, cameras, and many other products is the high tech style, which mimics the look of professional, scientific instruments. Digital displays with light-emitting or liquid-crystal diodes are appearing everywhere; chrome, gray, or flat-black cabinets are becoming more popular than wood. The dashboard of a sports car is beginning to look like the cockpit of an F-15. Home stereo systems are designed to look more at home in a recording studio than in a living room or den.

High tech industry is the wave of future, we are told by the new economic prophets. So long, smokestacks. High tech industry is clean, growth-oriented, and efficient.

Spurred by the success of Silicon Valley and Boston's Route 128 (designated "America's Technology Highway" by the state of Massachusetts), virtually every state in the Union now has some version of a high technology development authority. These bodies are planning industrial parks adjacent to universities, seeking to

persuade entrepreneurs to locate their plants and laboratories in them by floating bond issues and offering tax credits or other economic incentives. The new pork barrel in the Congress of the 1980s is not dams or highways or post offices or veterans' hospitals; it is university laboratories—incubators to nurture the brainpower that senators, representatives and local boosters hope will stimulate industry, create jobs, and promote economic development.

Space is now the high frontier. "Star Wars" is no longer just the title of a popular film; it is a term in the new lexicon of national security, describing a multibillion-dollar space-based laser defense system that President Reagan hopes will end the threat of nuclear war once and for all. Research and development have begun in preparation for the establishment of a permanent, manned space station. In 1984 the National Academy of Sciences held a symposium to explore, in a preliminary way, the notion of a permanent lunar base. Orbital flight is now safe and routine enough for a U.S. senator (who happens to chair the subcommittee that oversees NASA's appropriations) and a schoolteacher (selected to represent the entire profession) to take trips aboard the space shuttle.

Technology and the Future (formerly *Technology and Man's Future*) is now in its fourth edition. When I prepared the original version of the book in 1971–72, the public mood related to technology seemed very different. A large and vocal segment of society viewed technology as a threat, a Frankenstein monster out of control, carrying humanity headlong toward destruction. Romantic, idealistic visions of society were popular and led many observers and social critics to question the direction of mainstream technology and call for more social control over it.

My purpose in assembling the book was to present a balanced set of readings on technology and society—to give students from both technical and nontechnical backgrounds an opportunity to explore the nuances and subtleties of the many differing views on this subject. At the same time, I sought to relate these views to policy perspectives, suggesting avenues of public action which might influence the future in positive ways. The present edition, though larger in size and broader in scope, still holds to this original concept. It is also consistent with previous editions in several other important ways.

In all its editions, *Technology and the Future* reflects my own search for purpose in the development of technological society. This search and questioning of the direction of technological development is as relevant today as it was fourteen years ago, when it was more in vogue.

I introduced the first edition with some personal reflections on the images of the future with which I had grown up: World's Fair-style images characterized by neatness and order, miles of gleaming chrome, millions of buttons to push, endless gadgets to do all the work, automated highways on which to travel effortlessly, once-a-day nourishment pills to save one the trouble of eating three meals. This type of future seemed inevitable to me in my childhood, but as I grew older I began to wonder whether the type of *technological* progress I had envisioned was also *human* progress. My hope, then and now, in publishing this book was not to answer questions such as this, but rather to stimulate students to think about them and to provide some help in structuring that intellectual exploration.

At the same time, the book reflected—and continues to reflect—my ambivalence and that of our society as a whole toward technology. Introducing the second edition in 1977, I was struck by the contrast between the technological achievement of the Apollo moon landing in 1969 and the technological failure of the energy crisis which arose only four years later. I suggested that this contrast reflected an ambivalence characterized (as many authors have described it) by admiration of what technology can achieve on the one hand, and concerns about the problems it creates on the other. In the third edition (published in 1981), I suggested that a similar ambivalence could be seen in the unproven but not unlikely speculation that many of the protestors who took part in the famous demonstration against construction of a nuclear reactor at Seabrook, New Hampshire, were also admirers of the intensely technological fantasy film, "Star Wars."

Despite today's technological bandwagon, ambivalence toward technology is still very much apparent. Those who employ technology most effectively are often critical of its social dimensions. Pope John Paul II, for example, as adept as any world leader in using the most up-to-date transportation and communications technology to carry out his mission, warned steelworkers in Venezuela in early 1985 that they must not become "slave[s] of the machine." The Pope, who worked in a chemical factory before becoming a priest, spoke of the "ideology of technology," declaring that it must not be allowed to impose "the primacy . . . of the technical over the moral."[1]

Finally, the continuity of this version of *Technology and the Future*

[1]E. J. Dionne, Jr., "Pope Says Workers Must Not Be 'Slave of Machine,' " *The New York Times*, January 30, 1985, p. A3.

with prior editions can be seen in the book's attention to policy. In the first edition, the major policy theme was technology assessment. The topic of world models was introduced in the second edition. The third edition brought in the notion of alternative or "appropriate" technology, a departure in thinking about technology policy. The present edition retains all of these and enriches the policy dimension with selections on risk assessment and the promotion of technological innovation.

The book is divided into four major sections. "Thinking About Technology," the first section, brings together several different perspectives on the relationship of technology to society. It does not attempt to represent all the writers or schools of thought who have addressed this vast subject. Rather, the selections are intended to stimulate readers to question their own ways of thinking about technology. What exactly is the phenomenon under discussion? Everyone seems to know, more or less, what technology is—that is, until one starts trying to define it. The selections in this section will enable the reader to understand how differing concepts of technology influence various authors' perspectives on the relationship of technology to society.

The second section, "Forecasting, Assessing, and Controlling Technology," is policy-oriented. Most of the articles focus on the need for concerted public action in matters relating to technology. Several selections are devoted to the growing field of forecasting through large-scale computer-based models. Two deal with assessment of the impact of new types of technology in the framework of the policy process. Another paper presents the concept of risk assessment and explores its potential contributions to the control of technology through government regulation. Finally, the last paper in the section examines the role of technical controversies in democratic policymaking.

The third section, "Reshaping Technology," reflects an interest in questioning the assumptions underlying mainstream, industrial technology and in examining alternatives to it. The writers in this section share a belief that simply guiding the development of conventional technologies may not be enough. The time has come to ask fundamental questions about the very direction of technological change and to consider ways in which that direction might be altered. In a real sense, the writers here are trying to respond positively to the naive but poignant question posed by Robert Morison at the beginning of the book's first selection: "What is all your technology for?"

"Using Technology," the fourth section, is new to this edition

and reflects the current enthusiasm for using advanced technology to promote economic growth and national security. The opening article reviews the literature on technological innovation and its relation to the economy. Subsequent papers explore two important areas in which innovation is taking place: military technology and biotechnology. These papers are quite different from those found elsewhere in this volume and are intended to stimulate thought and discussion about the future of technological society in concrete and specific terms.

A new "About the Authors" section, containing brief biographies of contributors, is included at the end of the volume.

The fact that interest in the topics explored in *Technology and the Future* continues to grow, and that this interest is matched by increases in the numbers of college and university courses and programs on technology and society, is very gratifying to me. I am grateful to many people who have contributed to the continued success of this book: to the authors and publishers of the selections included here for allowing me to reprint their work; to the users of the book for their interest and helpful feedback; to numerous friends and colleagues for their comments and suggestions on the outline; and to my editors at St. Martin's Press, for their foresight, interest and support.

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