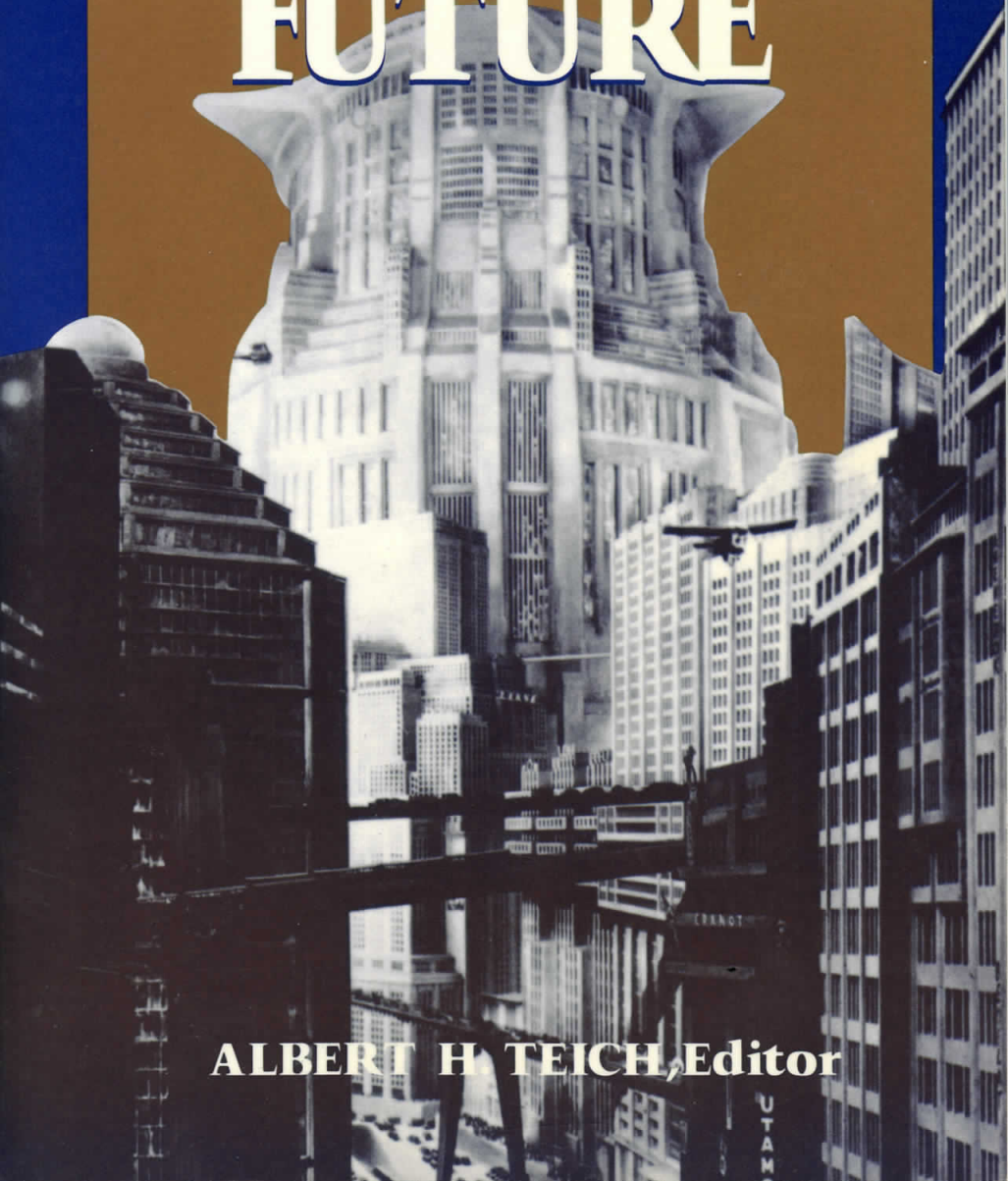


FIFTH EDITION

TECHNOLOGY AND THE FUTURE



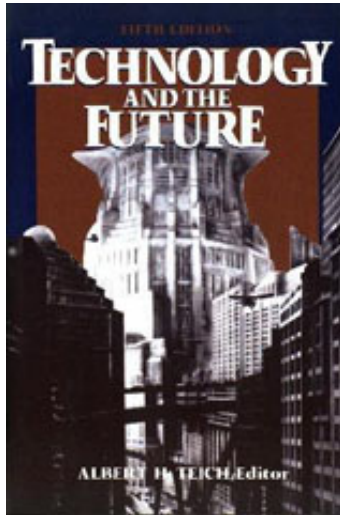
ALBERT H. TEICH, Editor

Technology and the Future

Albert H. Teich, editor

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Fifth edition, 1990



The cover of the fifth edition employs a striking photograph from Fritz Lang's famous 1927 film, *Metropolis*. (See the [Metropolis Film Archive](#) for more information and other images related to this dark science fiction film.)

This edition, fittingly enough, was marked by the appearance of Leo Marx's essay, "Does Improved Technology Mean Progress?" which has opened all subsequent editions. The topic of women and technology was also addressed in this edition. Several chapters devoted to specific technologies (artificial intelligence, biotechnology, superconductors, and neonatal care) rounded out the last section.

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Preface

The year 2000 is rapidly approaching, but the future is already here. One expert reports that if you regard every microprocessor chip as a computer, there are now more computers in the world than people. Teenagers in Hong Kong stroll the streets of Kowloon chatting with their friends on cellular phones—devices not much bigger than Maxwell Smart's famous shoe phone and considerably more practical. Just 20 years after humans first walked on the moon, the Voyager space probe is expected to send back the first close-up television pictures of the planet Neptune, more than 2.5 billion miles from Earth. Fax machines send letters around the world in seconds; optical storage devices make it possible to put an entire encyclopedia on a compact disk. Recombinant DNA technology allows the creation of bacteria capable of producing human insulin and growth hormone.

One of the major differences between modern and traditional societies is that in modern societies we expect change. The future *will* be different from the past. Technology is key to that change—both as a manifestation and as a cause. And an understanding of how technology relates to society and society relates to technology is vital if we want that change to lead to an improvement in the human condition.

Technology is “in” today. Despite a string of disasters—from Bhopal to Challenger to Chernobyl—the public mood (to the extent it is possible to judge such a thing) seems strongly enthusiastic about technology. The “high-tech” style is maintaining its hold on the popular fancy in everything from automobiles to furniture, home appliances, and exercise equipment. There is growing interest in high-technology industry as a route toward economic development. Virtually every state in the Union, from Pennsylvania to Arkansas, has established an agency to subsidize the growth of technology-based firms through tax incentives, “incubator” facilities adjacent to university campuses, cooperative applied research centers, and research grants. Even popular music reflects the interest in technology. A newsletter published by engineering students recently listed its “High Tech Hot 50” songs, including *Radio Waves* (Roger Waters), *99 Luft Balloons* (Nena), *I, Robot* (The Alan Parsons Project), *Weird Science* (Oingo Boingo), and *The Future's So Bright (I gotta wear shades)* (Timbuk 3).

This is the fifth edition of *Technology and the Future* (originally *Technology and Man's Future*). When I prepared the original version

of the book in 1971–72, the public mood regarding 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 in vogue 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 that might influence the future in positive ways. Subsequent editions, including the present one, though larger in size and broader in scope, have held to this original concept.

In all its editions, *Technology and the Future* has reflected my own search for purpose in the development of technological society. This search and questioning of the direction of technological development are as relevant today as they were nearly two decades ago, when they were more fashionable.

I introduced the first edition with some personal reflections on the visions of the future with which I had grown up: World's Fair-style images characterized by neatness and order, miles upon 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 a day. This type of future (captured vividly by Joseph J. Corn and Brian Horrigan in a Smithsonian traveling exhibition and a book entitled *Yesterday's Tomorrows* [Summit Books, 1984]) seemed inevitable to me in my childhood, but as I grew older I began to wonder about whether the type of *technological* progress I had envisioned was also *human* progress. My hope in publishing this book, then as now, was not to provide definitive answers to questions such as this, but rather to stimulate students to think about them constructively, 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 that arose only four years later. I suggested that this contrast reflected an ambiva-

lence 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 implausible 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 most critical of its social dimension. 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* 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, and the third edition brought in notions of alternative or "appropriate" technology. The fourth edition added risk assessment and promotion of technological innovation. The present edition retains elements of all of these, while adding a women's perspective and expanding the discussion of using technology.

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 represents my own sampling of the many writers and schools of thought on this vast subject. 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 they start trying to define it.

The articles in the first section will enable the reader to understand how differing concepts of technology influence various authors' perspectives on the relationship of technology to society.

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

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. One selection deals with trends in indicators of the Earth's "health." Others are devoted to assessing the impact of new types of technology in the framework of the policy process (including a retrospective assessment of what was expected of computers when they were first developed) and to assessment of technological risks. Finally, the last paper in the section examines the role of technical controversies in democratic policymaking.

In Section 3, "Reshaping Technology," six writers question the assumptions underlying mainstream industrial technology and examine alternatives to it. These writers share a belief that simply guiding the development of conventional technologies may not be enough. The time has come, they feel, to ask fundamental questions about the very direction of technological change and to consider ways in which that direction might be altered. The first four articles center on the concepts of alternative or "appropriate" technology. The last two consider the impact of technology on women, with particular emphasis on labor force and career issues.

"Using Technology," the fourth section, was introduced in the fourth edition, but has been completely revised in the fifth. On the whole, it reflects the current enthusiasm for using advanced technology to promote economic growth and industrial competitiveness. In this regard, individual chapters focus on superconductivity, biotechnology, and artificial intelligence. At the same time, however, the section includes a piece on biomedical technology that highlights the moral dilemmas posed by advances in that area. These articles, a bit different from those found elsewhere in this volume, are intended to stimulate thought and discussion about the future of technological society in terms of specific, tangible technologies, not just abstractions.

In a departure from prior editions, I have added a brief "headnote" before each selection in order to put the selections in context and provide background about their authors. To avoid duplication, I have shortened the section introductions and eliminated the "About the Authors" section.

I continue to be gratified by the growing interest in the study of technology and society in U.S. colleges and universities and by the remarkably wide range of disciplines and courses in which *Technology and the Future* is used. I am grateful to many people who have con-

tributed to the success of the book. My deepest appreciation goes to the authors and publishers of the selections included here for allowing me to reprint their work. In many cases, the selection that appears here represents only a brief introduction to a rich body of thought and writing. I hope that the exposure to these authors in *Technology and the Future* serves to stimulate readers either to seek out the complete work from which the excerpt is taken or to look for other writings by these authors.

I also want to express my thanks to the users of the book for their interest and helpful feedback; to a number of friends and colleagues for their comments and suggestions on the outline of this new edition; and to my editors at St. Martin's Press for their foresight, interest, and support. The following individuals also provided suggestions through reviews or responses to questionnaires: Paul Chambers, Broome Community College; Michael Feuer, Drexel University; Devendra P. Garg, Duke University; Patrick W. Hamlett, University of Missouri-Rolla; Ronald Hoy, California University of Pennsylvania; Ralph G. Lewis, Florida International University; Peter Limper, Christian Brothers College; Timothy John Lomperis, Duke University; Daniel Pound, University of Alabama at Tuscaloosa; Mareleyn Schneider, Fordham University; Eugene Selk, Creighton University; Carl Swenson, Seattle University; John Visvader, College of the Atlantic. Special thanks are reserved for my sons, Mitch and Ken, and my wife, Jill, for their patience and for giving me inspiration, assistance, encouragement, and much more.