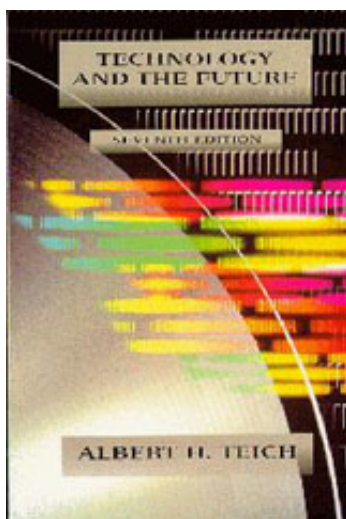# Technology and the Future
Albert H. Teich, editor
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Technology and the Future entered the Internet Age with the establishment of a **web site for the seventh edition**. The site, which went live in July 1996, was one of the earliest for a book of this type. The content and organization of the book followed that of the sixth edition fairly closely. Articles by Alvin Toffler, Neil Postman, Thomas P. Hughes, Judy Wajcman, and Tom Forester and Perry Morrison were among the additions. A short piece by novelist Douglas Coupland, both funny and provocative, was also added. The article, speculating on what time traveler from today's world might pack for a trip 200 years in the future, was originally published in *Wired*.

The development of this book, begun on a shoestring in the early 1970s, through nearly 30 years, is a reflection of the growing importance of technology in human affairs and the growing interest in the study of how technology and society are shaping each other and our future.

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Preface

Each decade in our technological age seems to have its technological icon—not necessarily the technology that is promoted as having the greatest impact on people's lives, nor that which may ultimately have the most historical significance, but the technology that seems most to capture the public imagination and the spirit of the time. In the 1950s, it was certainly atomic energy, with the awesome destructive power of the Hiroshima and Nagasaki bombs still fresh in the minds of many and the prospect of "Atoms for Peace" and electricity "too cheap to meter" tantalizingly just around the corner. In the 1960s, it was unquestionably space, as we raced the Soviet Union to the moon, watched one televised space spectacular after another, gained our first close-up views of the nearby planets, and began to reap the benefits of communications, weather, and remote-sensing satellites.

By the 1970s, we had become disillusioned with many of these technologies, and our symbols took on a negative cast—the antinuclear movement and the opposition to atomic power; the worries over resource shortages, the "limits to growth," and the energy crisis; the growing concerns over environmental pollution; and the somewhat overblown fears (at least in retrospect) of dangerous mutant organisms escaping from gene-splicing laboratories. While these anxieties did not disappear in the 1980s, they were at least partially overshadowed by the appearance of a new technological icon—the computer, which had evolved from a room-sized behemoth, found only in large organizations, to a ubiquitous "user-friendly" desktop (and laptop) appliance.

And what of the 1990s? There seems little doubt that the technology of this decade is the next stage in computer evolution: the Internet, and especially the Internet's "World Wide Web," the system that has transformed this once obscure network used mainly by scientists and academics into the darling of Wall Street and the popular press.

The incredibly rapid growth and increasing pervasiveness of the Internet brings to mind a piece of science fiction, a short story that I read many years ago in the days when UNIVACs and enormous IBM mainframes represented the popular image of computers. In the story, a

group of scientists decides to wire together all of the world's giant computers in order to seek the answers to humanity's ultimate questions. Having finally reached their goal after long and difficult labors, the scientists throw a switch activating their gargantuan electronic brain. They then approach the machine and ask it their first question: "Is there a God?" Suddenly, a bolt of lightning comes down from the sky, striking the device and fusing the switch in the "on" position. "There is now!" comes a booming voice in reply.

While such an exaggerated view of the power of networked computers may now seem charmingly quaint, it is not that far beyond some of the wilder claims one hears for the future of the global information superhighway, of which the Internet is widely regarded as the prototype. And if those claims are exaggerated, they at least reflect the extent to which this technology has caught hold of the popular and commercial imagination.

The Internet is essentially a worldwide collection of networks through which millions of computers and the people who operate them can communicate with one another. Its most widely used application is electronic mail (e-mail), which for many people is increasingly taking the place of conventional mail ("snail mail"), fax, and even the telephone. What has propelled the Internet into popular culture, however, is the World Wide Web.

Fundamentally, the Web is an information service that operates on the Internet, allowing information providers to place text, pictures, movies, and sound on "Web sites" or "home pages" on their computers. Anyone with a computer, an Internet connection, and a "Web browser" (a specialized software program such as Netscape Navigator) can gain access to it. Two features of the Web make it particularly engaging. First, it operates through hypertext—that is, most sites contain information allowing users to jump to other sites and thereby "surf" from one location to another, often with unexpected results. Second, using a browser requires relatively little expert knowledge, making such surfing fairly effortless and accessible to a wide audience.

As the Web emerged into public view in 1993 and 1994 and millions of people started to explore it, information providers, more and more of them profit-oriented, began to make available on the Web an astonishingly wide range of material. This stimulated more interest, and a positive feedback loop was established, fueling additional growth. Thus, by mid-1996, the number of sites accessible through the Web had reached an estimated 200,000 and was growing at a rate of more

than 20 percent a month. In the space of a few minutes, a Web surfer can "visit" sites that offer, for example, the full text of current congressional legislation; live radio broadcasts of professional basketball games; a model railroad setup in Germany whose trains can be controlled remotely by the "visitor"; home pages for hundreds of elementary and high schools and for thousands of individuals; a wide range of pornographic materials; and the pope's most recent Christmas message (in Italian, English, French, Spanish, German, and Portuguese).

In some ways this remarkable development was not entirely unforeseen. As far back as the 1960s (and perhaps earlier), futurists were forecasting the development of data banks that would allow people to access information from their homes or offices. The first edition of *Technology and the Future* (1972) included a study by two futurists predicting that, within a decade or so, the nation would see the "establishment of a central data storage facility (or several regional facilities) with wide public access (perhaps in the home) for general or specialized information retrieval, primarily in the areas of library, medical, and legal data." If this forecast seems to have more in common with my "deus ex machina" science fiction tale than with the decentralization, variety, and even anarchy of today's World Wide Web, it is perhaps worth remembering the following: the prediction was made long before the invention of PCs and modems, in the days when most computers were used for accounting or scientific calculations, most data were entered on punched cards, and the concepts of computer games and computer graphics were just glimmers in the eyes of a few computer scientists and engineers.

The Web is not only an icon for today's technology (as well as an icon, literally, on millions of computer screens); it is an apt metaphor for the pervasiveness and interconnectedness of technology and human life. We exist in a web of technology—a set of tools, machines, and human infrastructure based to a large extent on the products of scientific research and development. As a result, we now have the means both to control our destinies to a greater extent than ever before and to destroy ourselves and most of the life on our planet. Understanding our relationship with technology is essential if humans are to make responsible use of the power they have created. Helping to broaden this understanding has been the goal of *Technology and the Future* since I first conceived the book as a young academic in 1971.

My aim over the years has been 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 have sought to relate these views to policy perspectives, suggesting avenues of public action that might influence the future in positive ways.

Through twenty-five years and six revisions, *Technology and the Future* has changed a great deal. This seventh edition includes just four readings that appeared in the original version of the book and only a handful of others from early editions. Ten readings are new to this edition; a number of these are brand-new, published within the past year or two. The selections are—by design—a mixed bag. Not all students and not all instructors will like all of the readings. Most readers will probably love some, hate others, find some fascinating, others tedious. I myself do not like or agree with all of the selections. I do, however, feel they are all important and worth reading—most because of what they say, others because of what they stand for or who their authors are. If readers are troubled or offended by a selection, I hope they will recognize that its inclusion in the book reflects not an endorsement of its point of view, but rather my belief that it is something to which students of technology and society should be exposed.

The structure of the book is the same as it has been in recent editions. There are four major sections. Part I raises the big questions: Is technology good, bad, or neutral? Is it synonymous with progress? How is it influencing culture, social relations, the distribution of political and economic power? Part II looks at forecasts of technology and of social and environmental trends. It considers how well we can predict the course of technologies and their impacts on society and what the consequences of such predictions and assessments are. In Part III, the authors challenge the status quo. Their essays discuss developing alternatives to contemporary mainstream technology or view mainstream technology from unorthodox perspectives. Finally, in Part IV, the authors address questions related to individual technologies or areas of technology rather than broad conceptual issues. Recognizing that not all instructors or students will choose to move through the book from front to back, I have provided, in addition to the standard table of contents, a topical table of contents, which groups the selections somewhat differently and which may be useful to those who wish to pursue specific topics, such as risk, energy and environment, or women and technology.

Each of the four parts of the book opens with a brief introduction

discussing the theme that ties the chapters in that part together. Each chapter, in turn, is introduced by a headnote that puts it in context and provides some background about its author. These headnotes are particularly important for the older selections, some of which may easily be misunderstood if taken out of their historical context.

Technology and the Future has been a part of my life throughout nearly all of my professional career. It is gratifying, therefore, to have watched the growing interest in the study of science, technology, and society in American colleges and universities over the past twenty-five years and to feel that the book may have made a modest contribution to this important intellectual development.

I am grateful to many people who have contributed to the success of the book. My deepest appreciation goes to the authors and publishers of the essays included for allowing me to reprint their work. In many cases, the selection that appears in this volume represents only a brief introduction to a rich body of thought and writing. I hope that the exposure to these authors gained here stimulates readers to seek out some of their other writings.

I want to express my appreciation to users of the book for their interest and helpful feedback. In particular, I offer my thanks to: Stephen Frantzich, United States Naval Academy; Thomas Misa, Illinois Institute of Technology; Matthew Novak, California Polytechnic State University; Robert Rydell, Montana State University; and Aaron Segal, University of Texas at El Paso. The following individuals also provided suggestions through responses to questionnaires: Sister Caroline Marie Sloan, Mount Mary College; Dalton Smart, Millersville University; Javier Ibanez-Noe, Marquette University; Terry Richardson, Northern State University; Daniel W. Hackmann, Kirkwood College; Nancy Rose MacKenzie, Mankato State University; George Gmelch, Union College; Catherine Hobbs, University of Oklahoma; Thomas A. Easton, Thomas College; Daniel W. Pound, University of Alabama at Tuscaloosa; Thomas Ilgen, Pitzer College; Reza Rezazadeh, University of Wisconsin; M. Comninou, University of Michigan; and Margaret Lang Ott, formerly of the University of Alabama at Huntsville.

A special note of thanks goes to the staff of the college division of St. Martin's Press, for their vision in publishing the first edition in 1972 and for their continuing interest and support. My editor for several years was Don Reisman. I look forward to working with his successor, Beth Gillett, and I am grateful for the many ideas and suggestions of Meg Spilleth, who has worked with me closely in preparing this edition. Finally, I must

acknowledge the roles of my wife, Jill Pace, my sons Mitch and Ken, and my daughter Samantha, for the ideas and the love they share and for the meaning they give to my life.

A SPECIAL NOTE

The emergence of the World Wide Web provides an opportunity for me to add another dimension to this edition of *Technology and the Future*: I have set up a Web site for the book. The site includes basic information about the book (this preface, the table of contents and topical table of contents, and ordering instructions), images of the covers of all seven editions, and a personal homepage with some information about me. Also included are hypertext links to sources of additional information about the authors represented in the book and to other sources of information on the study of technology and society, as well as an e-mail link for readers to provide me with feedback on the book and suggestions for future editions. Eventually, I hope to create an interactive forum on the site in which to discuss the issues raised by the book. The URL (Web address) for the site is http://www.intr.net/ateich. If, for any reason, this address should change, it should still be possible to locate the site through links on various related sites; by using one of the increasingly sophisticated Internet search engines, such as Yahoo, Lycos, InfoSeek, or AltaVista; or by contacting either the College Division of St. Martin's Press or me (preferably by e-mail at ateich@aaas.org).

ALBERT H. TEICH