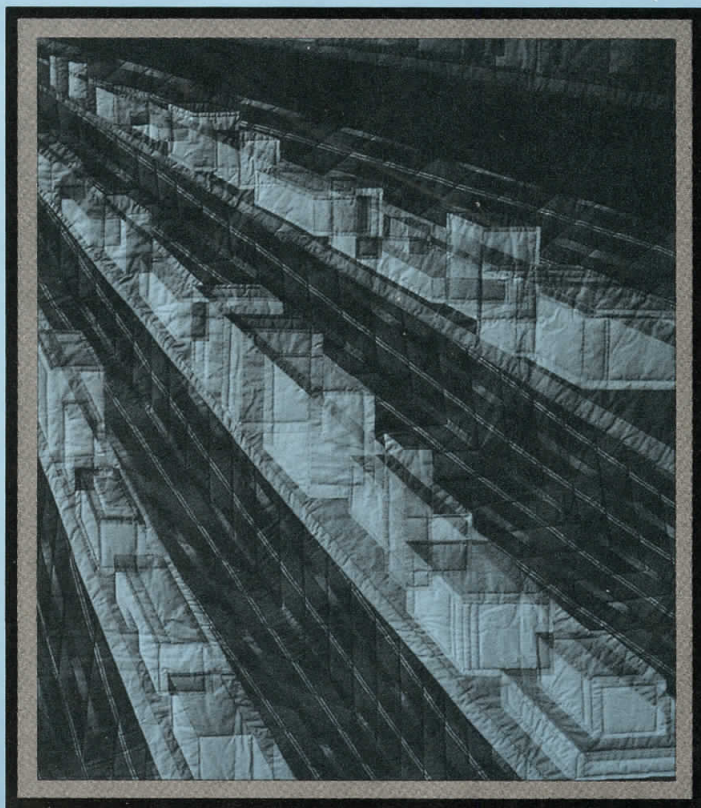


# T·e·c·h·n·o·l·o·g·y

*and the future*



S I X T H E D I T I O N

**Albert H. Teich**

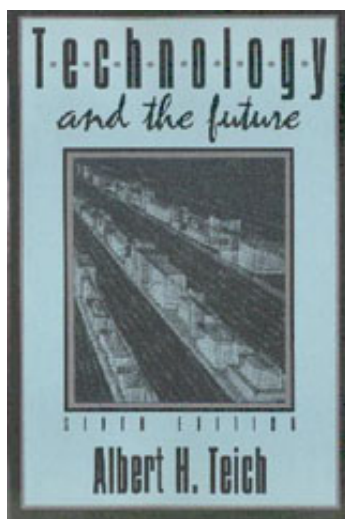
# Technology and the Future

Albert H. Teich, editor

New York: St. Martin's Press

Sixth edition, 1993

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The tone of *Technology and the Future* began to evolve toward more explicit attention to the social and ethical impacts of specific new technologies in the sixth edition. Chapters on implications of new genetic technology and on computer and information technology impacts were added, and the title of the last section of the book was changed from "Using Technology" to "Using Technologies and Confronting Their Dilemmas." Also new in this edition was an article on African-American perspectives on technology.

The cover motif, based on a quilt entitled "City V" by Jo Olf, was suggested by my wife, [Jill](#), who, in addition to being executive director of an association, is also [a quilter](#). The quilt was purchased by the science and art program of the American Association for the Advancement of Science in 1994 and hangs in the first floor lobby of the AAAS building in Washington, where I work.

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## Preface

The 1990s are certain to be seen as a historic decade. They opened with the Iron Curtain fading away and the once-mighty Soviet Union crumbling into history. As the nations of the world enjoyed a respite from more than half a century of war and global tension, local, regional, and ethnic conflicts rose to the surface in places that few Americans could pronounce, much less locate on a map. Meanwhile, scientists warned of possible long-term global climate change brought about by unanticipated impacts of technology. All of these developments seemed—and were—important. But when historians of the twenty-fifth century look back on this era, they might just regard the 1990s as the decade in which a computer first passed the Turing Test.

The Turing Test is an experiment proposed in 1950 by British mathematician and computer pioneer Alan M. Turing as a means of resolving a key philosophical debate about artificial intelligence—whether a computer could ever be built to imitate the human mind. On Friday, November 8, 1991, a panel of ten judges—selected as persons-on-the-street rather than computer experts—sat down at terminals in the Computer Museum in Boston to evaluate several computer programs in a competitive Turing Test. They spent three hours in typed conversations, trying to decide whether they were communicating with another human being connected through the terminal or with a computer programmed to respond like a human.<sup>1</sup> Turing had suggested that if a computer could be programmed such that a person could not tell whether he or she was conversing with another person or with a machine, then the philosophical issues would be settled.

A piece of commercial software called PC Therapist III, designed by computer programmer Joseph Weintraub of Queens, New York, at home in his spare time, fooled five of the judges. This was enough to have it declared the winner and awarded the \$1,500 first prize. Ironically, what helped to persuade the judges that PC Therapist III was human was the fact that its conversations did not always make a lot of sense:

<sup>1</sup>See John Markoff, "Can Machines Think? Humans Match Wits," *The New York Times* (November 9, 1991), and Michael Specter, "A Computer Mistaken for a Human," *The New York Times* (November 16, 1991).

**Terminal:** A whim is a sudden capricious and often peculiar behavior. A bit of sunlight in a grim gray world!

**Judge:** Something like a hunch?

**Terminal:** Everybody sets out to do something and everybody does something, but no one does what he sets out to do.

**Judge:** Well anyway I would imagine whimsical conversation is like a series of knight's moves in chess—sort of zig-zag rather than following any particular line.

**Terminal:** A whimsical person is subject to erratic behavior and unpredictable thoughts . . . How nice to be unpredictable!

**Judge:** Are you kidding? Sure, total predictability would make the world a dull place, but unpredictability is hardly a virtue!

The significance of this version of the Turing Test is open to debate. Enthusiasts claimed it was an event of historic proportions, marking a watershed in the development of computers and artificial intelligence. Purists noted that its significance was limited because the nature of the programs restricted conversations with the computers to a narrow range of topics, such as women's fashions, romance, and wine. Cynics were amused that the start of the test was delayed 45 minutes by a technical glitch.

In truth, we hardly need a Turing Test to tell us that the future is coming at us at an ever-increasing rate.

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 the key to change in modern society—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. Helping students to gain this understanding of the relations between technology and society is the central objective of this book.

With the publication of this sixth edition of *Technology and the Future*, the book will have been in print more than twenty years. A great deal has been learned about technology and society during these two decades. The simplistic debates about whether technology is an autonomous force operating on society or a neutral tool that in itself is neither good nor bad have been more or less laid to rest. The literature of "technology studies" has grown and begun to mature. The notion of "social construction" of technology has emerged, in which it is argued

that the nature of society shapes the characteristics of technological systems just as the technology has impacts on society. A recent book, for example, analyzes how negotiations and accommodations among bureaucratic organizations and interest groups shaped the development of the "Landsat" earth resources satellite program even more than technical considerations.<sup>2</sup>

Still, public understanding of science and technology remains problematic and public attitudes toward technology are very much ambivalent. People are awed by the achievements of technology and are grateful for the improvements that technology has made in their lives. At the same time, they are frightened by the prospects of technologies beyond their control affecting their environments, their livelihoods, and the shape of their futures.

My original and continuing aim 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.

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 more than two decades ago, when they were more fashionable.

This 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 a personal 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 it? Everyone seems to know what technology is—until he or she starts 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.

Faithful readers of prior editions will notice that two articles have been dropped from this section and two new ones added. The famous

<sup>2</sup>Pamela E. Mack, *Viewing the Earth: The Social Construction of the Landsat Satellite System* (Cambridge, MA: MIT Press, 1990).



Mesthene-McDermott debate, which dates from the original edition, remains, although both articles have been abridged somewhat to make room for new works.

The second section is concerned with "Forecasting, Assessing, and Controlling the Impacts of Technology." One selection examines trends in population, resources, and environment and the possibilities for affecting them in light of the recent political changes in the world. Two subsequent chapters discuss technological forecasts and the question of why so many are off the mark. Also included are essays on risk assessment and the political value of disputes among experts, as well as a new paper that seeks to redefine and assess technology from a feminist perspective.

The writers in Part 3, "Reshaping Technology," question many of 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 first two essays ask fundamental questions about the direction of technological change and consider ways in which that direction might be altered. Subsequent papers consider the impacts of technology on women and on the Black community and point to ways in which technology can improve their relative economic positions. A new paper by Langdon Winner completes this section, arguing that technologies themselves express political ideas and proposing ways in which technological development can be shaped to promote rather than inhibit democratic values.

The fourth section, "Using Technologies and Confronting Their Dilemmas," has changed somewhat from previous editions. It differs from the first three sections of the book in that most of it focuses on specific areas of technology rather than on technology as a concept. In addressing those technologies—including the technology of neonatal care, genetic testing, the household, information processing in the workplace, and virtual reality—the articles in Part 4 bring out the dilemmas they raise. Some are ethical, moral, and legal. Others are social or interpersonal. In a sense, these chapters are case studies illustrating some of the issues raised in broader terms in earlier parts of the book.

In concluding, Part 4 turns to a current political dilemma about technology—the problem of what government should do to encourage the development of commercial technology as a means of improving U.S. competitiveness and maintaining our standard of living. This

new selection, by two distinguished scholars of science and technology policy, rounds out the book's treatment of technological issues by illuminating the policy debate about how far government should go in promoting technology.

Each of the four parts of the book opens with a brief introduction, and each chapter is introduced with a headnote that puts it in context and provides background about the author. A new topical table of contents at the front of the book is intended to assist instructors whose courses are organized in a manner different from the book as well as readers interested in specific subject areas, such as computers and information technology or women and technology.

I continue to be gratified by the growing interest in the study of science, technology, and society in U.S. colleges and universities (and to an extent, in elementary and secondary schools), 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 contributed to the success of the book. My deepest appreciation goes to the authors and publishers of the articles included 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 gained here stimulates readers to seek out some of their other writings.

I want to express my thanks to users of the book for their interest and helpful feedback. The following individuals also provided suggestions through responses to questionnaires: Jennifer L. Altenhofel, California State University—Bakersfield; Vance L. Eckstrom, Bethany College; Stephen Frantzich, U.S. Naval Academy; Steve Fuller, Virginia Polytechnic Institute; Charles R. Green, Macalester College; W. A. Gross, University of New Mexico; Joseph Haberer, Purdue University; Thomas L. Ilgen, Pitzer College; Richard Keller, Seattle Central Community College; Vincent F. Lackner, California University of Pennsylvania; Alan Lamb, Washington State University; W. Henry Lambright, Syracuse University; Eileen Leonard, Vassar College; Jo Jane Marshall, West Los Angeles College; Daniel W. Pound, University of Alabama; Richard C. Prust, St. Andrew's College; Lee C. Rice, Marquette University; Robert W. Rydell, Montana State University; Leonardo Salamini, Bradley University; Aaron Segal, University of Texas; Robert J. Topitzer, Suffolk University.

I also appreciate the foresight of St. Martin's Press in first publishing this book when both I and the field of technology and society

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were much younger, and I value the continued interest and support of the staff of the College Division, especially my editor, Don Reisman. Finally, special thanks are reserved for my sons Mitch and Ken, my daughter Samantha, and my wife, Jill, for sharing my time and attention with this manuscript and, most important, for giving me a center to my life.