Technology and the Future, 9th edition
Albert H. Teich, editor
Resources for Readers

Technology and the Future, edited by Albert H. Teich, is a collection of readings intended for use in courses on technology and society, but also of interest to anyone else concerned with how technology and society are shaping each other and our future.

Published by Wadsworth Publishers (a division of Thompson Learning), it has been in print since 1972 and has been used in hundreds of schools and colleges in courses ranging from high school through graduate school.

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Preface

A great deal has changed since the eighth edition of *Technology and the Future* appeared in late 1999. The stock market bubble, based largely on technology stocks, the hype surrounding the commercial potential of the Internet, and the "dot.coms" has burst. As a result, early in 2001 the economies of the United States and other industrialized nations, together with those of much of the developing world, began drifting into recession. Then, on September 11, 2001, the horrendous terrorist strikes that killed over 3,000 people, destroyed New York's World Trade Center, and severely damaged the Pentagon, shook the confidence of governments, industry leaders, financiers, and virtually everyone else who had become accustomed to relative stability and continuing technology-based economic growth in much of the world. For a short while, the world seemed to stop and catch its breath as rescue workers dug frantically (and mostly fruitlessly) through the rubble, searching for anyone who might have survived.

Things have more or less returned to normal as I write this in the spring of 2002. But 2002's normal is different from that of 2001. The economic exuberance of the late 1990s and 2000 is gone. The stock market is down; unemployment is up; and, in the United States, the federal government's enormous budget surplus, which appeared unexpectedly at the end of the 1990s, has gone up in smoke, and the government, once again, is deeply in the red. (All this may have changed for the better by the time you read this — or it may not.)

The effects of the terrorist attacks went deeper than these economic impacts, which are, hopefully, transient. The shocking ease with which a small number of committed individuals created so much havoc highlighted the fragility and vulnerability of today's complex technology-based society. People began to look at skyscrapers, power plants, monuments, water supply systems, and even the Internet not just as symbols of modernity, wealth, and technological prowess but also as potential terrorist targets. The attacks also abruptly shifted the balance in public attitudes between the desire for personal privacy and for security. As New York Senator Charles E. Schumer observed nearly three months after the attacks, "Sept. 11 has forced all but the most doctrinaire on the right and the left to be open to a recalibration of the balance between security and liberty."[1] In fact, according to a *New York Times*/CBS News poll taken in late September, nearly four-fifths of Americans expressed a willingness to "give up some of their personal freedoms in order to make the country safe from terrorist attacks."

As the voices of privacy and civil liberties advocates have become more muted, governments in the United States and elsewhere have begun to expand their use

[1] Laurie Goodstein, "Jewish Groups Endorse Tough Security Laws," *The New York Times* (January 3, 2002), p. A-12.

of eavesdropping, biometrics (e.g., computerized facial identification), and electronic surveillance technologies. Research priorities have shifted, too. The U.S. National Institutes of Health, beneficiary of large budget increases in recent years directed at fighting cancer, AIDS, Alzheimer's, and other diseases, as well as conducting basic research in such areas as genetics, neuroscience, and cell biology, received another big financial boost in President Bush's proposed budget for fiscal year 2003 (released in February 2002). But this time, instead of fighting diseases, half of the $3.9 billion increase would be devoted to research aimed at countering bioterrorism. What effect the shift in priorities — not just in NIH but throughout the government and industry as well — might ultimately have on the pace of technological innovation and, thus, on economic growth in the United States and the rest of the world, is an open question at this point.

One other victim of the shifting *zeitgeist* is likely to be the highly optimistic view of the future that has been so prominent in recent years in the media as well as in popular writings (such as those of Nicholas Negroponte, whose book, *Being Digital,* was excerpted in the eighth edition of *Technology and the Future* but dropped from this one). "Was That the Future We Just Passed By?" asked John Leland in a *New York Times* commentary in late 2001.[2] Leland notes that much of the futurist hype of the 1990s was ahistorical. By this he means that rather than looking at social trends and how they might interact with new technologies, the gurus of this high-tech future simply extrapolated their visions of technological progress without reckoning how these technologies might fit into social patterns and themselves be shaped by society. An example he cites is the e-book, a clever technology that was developed "to meet a consumer need that did not exist." So far, at least, it has failed to lure very many people away from the old-fashioned ink and paper variety (although it may yet find a niche in libraries).

In a sense, it is surprising that we allowed ourselves to be seduced by this simplistic approach to technology and its role in society. Perhaps it was the excitement of all the new technological innovations that cascaded into our lives during the past few years. In any case, the tools for a more dispassionate way of thinking about the possibilities and the pitfalls of technology exist, and it is the purpose of this book to equip both those people who are creating or will create that technology, and the rest of us who will have to live with it, with some of these tools.

Our understanding of technology's relationship to society and our attitudes toward technology have changed substantially over the years. I first conceived of *Technology and the Future*[3] in an era when many Americans looked upon technology with fear rather than excitement. In the atmosphere of social turmoil that gripped the United States in the late 1960s and early 1970s, a large segment of society (at least in the academic world, of which I was part) saw technology either as a force that was careening out of control or a tool of oppression by which those in positions of power maintained their hold over the rest of the populace.

[2] Sunday, December 9, 2001, Week in Review section, p. 5.

[3] Instructors who have used this book over the years may recall that it was originally called *Technology and Man's Future,* a title that was retained through the first three editions but that seems almost impossibly inappropriate today.

Technologists, who had been lionized for their accomplishments during World War II and the early postwar years, were put on the defensive, and discussions of technology often degenerated into sterile "pro" and "con" debates. I was teaching a course called "The Future of Technological Society" at Syracuse University during the early 1970s, and I found these pro and con arguments tiresome and unproductive. I developed this book in the hope that it might contribute to reasoned discussion of the relations between technology and society. I wanted to give students an opportunity to examine the subtleties in these relations and the tools with which to examine the thoughts of some of the most significant writers on the subject and to form their own opinions. That was thirty years ago.

Today, although the problems created by human uses of technology are very much with us, technology itself is no longer demonized as it was in the early 1970s. Indeed, technologies are increasingly woven into the fabric of our everyday lives. Moreover, 9/11 notwithstanding, concerns about the negative impacts of technology, are, with a few exceptions (such as genetically modified foods), taking a backseat to a broad-based desire to share in technology's benefits.

The possibilities for technological change are being created by the huge engine of research, development, and innovation that involves governments, universities, and private sector firms and organizations in an increasingly globalized network of knowledge generation. However, whether these possibilities will be exploited and, if so, who will gain and who will lose depends on the structures of human society. The sometimes startling rate of technological change may also cause us to overlook the fundamental stability of human nature. There is a tension here that revolves around the need for societies to employ the tools of technology to promote change, not for the sake of change itself, but as a means of advancing civilization according to moral and ethical principles that cannot come from science and technology alone.

This ninth edition of *Technology and the Future* is a significant update and revision of the previous edition. The organization of the book has not changed, however, and the first couple of sections remain largely the same. In Part I, "Thinking about Technology," the authors raise the big questions: Is technology good, bad, or neutral? Is it synonymous with progress? How does it influence society? The most important change in this section is the addition of a superb article by Robert Pool taken from his book, *Beyond Technology*, replacing a piece by Thomas Hughes. Pool's analysis of the mutual impacts of technology and society mirrors my own perspective and puts this important concept in easily understandable terms. Otherwise in Part I, the best elements of previous editions are retained and serve to introduce readers to the process of thinking about technology.

The dated, but still very relevant, debate over the role of technology in society between the late Emmanuel Mesthene and John McDermott, a feature of the book since the first edition, comprises Part II, entitled, "Debating Technology: 1960s Style." Both the substance and the rhetoric of the Mesthene–McDermott debate contrast with Part VII, "Debating Technology: 21st Century Style," in which Bill Joy, a computer scientist responsible for several major software innovations, presents his rather scary vision of a future in which nanotechnology, genetics, and robotics converge and threaten the existence of humanity.

Paired with Joy is an article by two other leading technologists that debunks his vision.

Part III brings together seven authors who challenge the technological status quo in different ways. Their essays discuss alternatives to contemporary mainstream technology or view mainstream technology from unorthodox perspectives. Included are Langdon Winner's provocative chapter, "Do Artifacts Have Politics?" as well as an article by Timothy Jenkins, which adds an African American perspective to the mix. New to this edition is a piece by Muslim scholar and commentator Ziauddin Sardar, in which he critiques the increasingly dominant western views of the future and exhorts the nonwestern world to think of a future in its own terms.

The three sections that follow explore some of the ethical, social, and human dimensions of technology. Reflecting a heightened sensitivity to the fragility of our technological society in the aftermath of 9/11, Part IV presents two articles on what the authors of one, Amory and Hunter Lovins, call the "brittleness" of the complex, centralized systems we have created. The Lovinses' article, written in the fall of 2001, draws on their prescient earlier work on energy systems. It is followed by a 1996 article by Australian scholar and social activist Brian Martin that dissects the issue of technological vulnerability in a systematic fashion.

Parts V and VI focus on technological areas that are certain to play key roles in our future — genetics and information technology. In the bioethics section are discussions of the exquisitely difficult dilemmas posed by our growing knowledge of molecular genetics and biotechnology — discussion of the prospects for human cloning; differing perspectives on the controversial issue of stem cell research, including President George W. Bush's August 2001 address to the nation on that subject; and an examination of the possibilities for choosing traits in our offspring. Under the heading of information technology are articles on why those who created the IT revolution failed to anticipate its extent or its impact; a broad-based survey of the ethical issues raised by computers and information technology; discussions of the impact of computers on the organization and character of work, as well as on warfare (the latter, by Gene Rochlin, new to this edition); and a new, highly topical article by Lawrence Lessig, who fears that the promise of the Internet is being wasted as outmoded ideas based on old technology choke off the innovative potential of this revolutionary new technology.

Finally, following the debate over Bill Joy's ideas in Part VII, described above, Seth Shostak's short story, "In Touch at Last," provides some entertaining and thought-provoking speculation on perhaps the ultimate scientific/technological achievement — discovery of extraterrestrial intelligence.

As in previous editions, my selections are a mixed bag. Not all students or all instructors will find all twenty-nine readings to their liking. Most readers will probably love some and hate others, find some fascinating, others tedious. The individual essays do not represent my own views, and I do not necessarily endorse their perspectives. As a whole, however, the book reflects what I hope is a balanced view of the important issues in the field of technology and society, a view that I hope will be useful to others who are interested in these topics.

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

Throughout the life of this book, I have benefited from the interest, suggestions, and helpful feedback from the book's users. This feedback increased significantly with the establishment, in 1996, of the *Technology and the Future* Web site, which became *Al Teich's Technology and the Future Toolkit* in 1999. Through the Web site and the e-mail traffic it generates, I have had the opportunity to correspond with many instructors and students, as well as with others who share an interest in this subject area. I am indebted to them all for the ideas that they shared with me, some of which they may recognize in this volume.

My thanks go also to the staff of Wadsworth Publishing, which in 2001 acquired the political science list of Bedford/St. Martin's, including the previous edition of this book. It was St. Martin's Press's College Division, forerunner of Bedford/St. Martin's, whose editors had the foresight to publish the first edition of this book in 1972 and who, through a generation of staff changes, mergers, acquisitions, and restructurings, remained helpful, interested, and unfailingly supportive. I have been fortunate in having a series of editors over the years with whom it has always been a pleasure to work.

Finally, a very special note of appreciation goes to my family, to whom I have dedicated this edition: my wife, Jill; my daughter, Samantha; and my grown sons, Mitch and Ken, their wives Gretchen and Sara, and my grandson Calvin Avery Teich; for the meaning they have given to my life and for the strength I draw from our relationships.

In the hope that readers continue to find this book useful and that there will be future editions, I once again invite readers — both faculty and students — to contact me with comments and suggestions. I can be reached most readily by e-mail either directly, at <ateich@aaas.org>, or through the links on my Web site, which can be found at <http://www.alteich.com>. The Web site also contains a variety of supplementary resources related to the book, including links to more information about the authors of the various articles, tables of contents of earlier editions, the full text of several hard-to-find articles from earlier editions, my personal home page, and more.

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