

Technology — AND THE — FUTURE

**12TH
EDITION**

**Albert H.
TEICH**



Technology & the Future

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Preface

I am of two minds when it comes to technology.

One side of me is totally hooked on technology. While I do not necessarily feel compelled to be the first among my friends to own every new gadget, I do use and enjoy many technologies. I spend a great deal of my time at one or another of my computers (we have five in the house, six when our daughter is home), on my iPhone, listening to my iPod, or using one of my digital cameras. I love Google and the way it makes information about practically anything instantly available to me. I love letting my Roomba® robot vacuum clean my carpets while I'm occupied with other things. I am currently lusting after a plug-in electric car and hope to have one within the next year or two. I am a regular consumer of technology blogs and reviews of new technological products online as well as in newspapers and magazines. (Okay, so I do still read paper media.) And, perhaps most important of all (and under-appreciated), I am a beneficiary of modern, high-tech medicine – living a longer and healthier life because of scientific discoveries and biomedical technologies.

Still, I am fully aware that technology has its dark side and that much of the technology with which our society is suffused is designed to earn profits for high- (and low-) tech firms and entrepreneurs rather than to improve human well-being. I worry about where our technologies are taking us. Our man-made technological systems can be fragile and, as shown in the past several years by the failure of the levee system during Hurricane Katrina; the BP oil spill; and the devastating 2011 earthquake, tsunami, and consequent nuclear disaster in Japan, they are capable of causing or at least failing to prevent great harm. Many (perhaps most) beneficial technologies can also cause inadvertent harm to people, animals, or the environment — examples such as pesticides, polluting energy sources, and medical therapies with unanticipated side effects are legion. And of course technologies can also be used intentionally to harm people, to perpetuate social injustice, or to serve other destructive ends.

This book, now in its 12th edition and, at 40 years old, well into middle age, reflects the yin and the yang of my own understanding of and feelings about technology. The articles I've selected both extol the virtues and criticize the evils of technology and its role in society, although I have tried to avoid the extremes on both sides.

Except perhaps by science fiction writers, relatively few of the technologies that are discussed by the authors in this volume were even remotely imagined when I assembled the materials for the first edition of this book in 1971. (It was not actually published until the following year.) The preface for that first edition (and several subsequent editions) was written on a typewriter and the selections were cut and pasted into the manuscript using scissors and tape rather than Word's cut and paste functions. The manuscript was mailed to the publisher — not FedExed, not e-mailed. And the galleys and page proofs were returned to me the same way. I cannot imagine working like that again and wonder how I possibly could have assembled this book in such a primitive manner. The innovations of the past several decades are astounding for those of us who grew up without them, but for the current generation (and a couple of previous generations), they're routine — an ordinary part of life, taken for granted as if they had always existed.

Technology and society are both changing at an unprecedented pace. And a textbook on technology and society is hardly timeless. Experience shows that it needs to be substantially updated every few years. The development of this book since 1972 provides a mini-history of concerns about technology and society. (Take a look at the tables of contents of previous editions at <http://www.alteich.com/history/index.htm> to see what I mean.) Recognizing the pace of technological change, and taking into account the comments of users and reviewers as well as my own sense of the relative importance of various topics and the timeliness (or its lack) of various chapters, I have once again, for this new edition, performed major surgery on the book. I have dropped nine chapters that appeared in the 11th edition and replaced them with ten more current and/or more relevant articles.

Despite the changes, the structure of the book remains intact, and much of the content will look familiar to those who have used previous editions. In Part I, "Thinking about Technology," several well-known authors raise big questions: What is technology? Is it good, bad, or neutral (or good *and* bad)? Is it synonymous with progress? How does it influence society and how does society influence its development? Leo Marx and Robert Pool headline this section. Next, David Edgerton reminds us not to let the focus on new technology blind us to the importance of existing technologies, even those that may seem mundane. Alvin Weinberg's essay on the "technological fix," which follows, is one of only three articles that survive from the first edition. Though dated, it still raises important questions and seldom fails to provoke discussion. The chapters by engineer Samuel Florman and political scientist Langdon Winner (difficult, perhaps, but well worth the effort) should do the same. My hope in Part I, as elsewhere in the book, is to preserve the best elements of previous editions while also bringing in more current thinking.

The four-decade old, but still very relevant, debate over the role of technology in society between the late Emmanuel Mesthene and John McDermott, like

the Weinberg chapter a feature of the book since the first edition, comprises Part II, "Debating Technology: 1960s Style." Both the substance and the rhetoric of the Mesthene-McDermott debate contrast sharply with Part III, "Debating Technology: Twenty-First-Century Style," in which Bill Joy, a computer scientist and entrepreneur responsible for several major software innovations, presents his rather scary vision of a future in which the products of nanotechnology, genetics, and robotics converge and threaten the existence of humanity. Responding to Joy rather critically are John Seely Brown and Paul Duguid, as well as inventor Ray Kurzweil, a friend of Joy's whose views of the future are quite different from his.

The next three sections on "Contemporary Technological Dilemmas" turn to more concrete, current issues and explore some of the ethical, social, and human dimensions of a number of specific areas of technology and have been subject to considerable updating. Part IV examines one of the most critical issues facing society today: global climate change. Many people believe climate change is the most vexing problem facing global society in the twenty-first century. While agreement on what to do about it is still far off, all but a few of the most ardent skeptics agree that the problem is real and must be addressed. The lead article included here, by Collins et al., describes the scientific basis for the increasingly powerful consensus among researchers on the nature of this problem. It is based on the 2007 report of the Intergovernmental Panel on Climate Change and explains, in terms that do not require a PhD in atmospheric physics to understand, how and why the Earth's climate is changing.

Still, the scientific consensus is not unanimous. A significant number of policymakers and a lesser number of scientists have a different view. Among the scientists who take a contrarian position, Richard Lindzen stands out. He is a highly respected professor at M.I.T. and his article (new to this edition), originally an op-ed in the *Wall Street Journal*, provides an excellent summary of the arguments against the scientific mainstream. Following Lindzen, the third and fourth articles in Part IV (also new) approach climate change from a rather different angle, that of geoengineering, fixing the problem with a massive technological intervention. The article by Victor et al. looks at the international political ramifications of such an approach; the piece by Robock marshals the arguments against it.

Part V looks at some of the social and ethical dimensions of recent advances in the life and biomedical sciences: stem cell research, synthetic biology, genetic engineering, and neuroscience. Research involving human embryonic stem cells offers the tantalizing prospect of breakthroughs in the treatment of diseases and injuries, but, in the minds of critics, it also opens the door to possible abuses of the sanctity of human life. Christopher Thomas Scott lays out the basic features of both sides of this debate clearly and concisely.

Going a step beyond stem cell research, synthetic biology employs scientific and engineering techniques to create artificial organisms capable of reproducing themselves. The idea is controversial, and in May 2010 President Obama charged his Presidential Commission for the Study of Bioethical Issues with examining its prospects and problems. An excerpt from the commission's report is included as

chapter 17, followed by an article from *Nature* examining the barriers faced by this exciting but controversial technology. Both are new to this edition.

In chapter 18, carried over from the 11th edition, Michael Sandel takes a conservative approach to the possibilities of designer children and other kinds of human enhancement created by developments in biotechnology. And, following Sandel, in chapter 20, Stanford law professor Henry Greely speculates on the meaning of advances in neuroscience which, some scientists believe, will soon provide a means of gauging an individual's mental state — i.e., reading his or her mind — with an imaging device.

Under the heading of information and communications technology in Part VI is an article by computer historian Paul Ceruzzi — a favorite of mine — on why those most responsible for originating the information technology revolution failed to anticipate its extent or its impact. It is followed by a curmudgeonly but entertaining piece by poet and farmer Wendell Berry, on why he rejects the idea of using a computer to do his writing, and by an up-to-date, broad-based survey by philosopher Deborah Johnson of the ethical issues raised by computers and information technology. New to Part VI is chapter 24, in which Nicholas Carr, writer about technology and culture, and author of the blog *Rough Type*, asks “Is Google Making Us Stupid?” More precisely, he explores the question of how the Internet is affecting our modes of reading, writing, and thinking. His thought-provoking piece is followed by two more new articles on one of the critical policy issues that will shape the future of the Internet: the matter of “net neutrality.” Net neutrality is the principle that Internet service providers may not discriminate among different forms of content and applications that they carry on their lines. A short piece from *savetheinternet.com* argues against network operators who, the organization claims, want to change that principle and discriminate among different uses by charging differential fees to web site operators. In the following article, an analyst at the Information Technology and Innovation Foundation looks at the issue from a different perspective, that of broadband network managers, and asks what kinds of policies can balance the competing interests involved in using the Internet as well as future computer networks.

The last section, “Governance and Globalization,” takes a step back from these rather technical concerns and returns to the broader questions of technology and society through the prism of governance. The first chapter is my own article on the relationships between governments and technology, an article I wrote originally for an encyclopedia of science, technology, and society. The other (new to this edition), by three-time Pulitzer Prize winning columnist for the *New York Times* Thomas Friedman, is a brief excerpt from his best-selling book, *The World Is Flat*. In it he describes life in a call center in Bangalore, India, using the story to illustrate how, in many respects and in many economic sectors, technology (again, especially the Internet) has made geography virtually irrelevant.

As in previous editions, my selections are — by design — a mixed bag. Not all students or all instructors will find every reading to their liking. Readers will probably love some and hate others, find some fascinating, others tedious. I have chosen the

individual articles with an eye toward diversity in their authors' views of technology and political leanings. They do not necessarily 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 professional life throughout my entire career. It is gratifying to have watched the growing interest in the study of technology, society, and the future in colleges and universities worldwide over the past several 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 feedback from the book's users. I am indebted to them all for the ideas that they shared with me, some of which have helped to shape this volume.

My thanks go also to the staff of my current publisher, Cengage Learning (formerly Thomson Wadsworth), especially Carolyn Merrill and Katie Hayes; to my previous publisher, Bedford/St. Martin's; and finally to St. Martin's Press's College Division, 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.

I wish to acknowledge the advice of those who have contributed comments and suggestions that helped shape this edition:

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Finally, a very special note of gratitude goes to my family: my wife, Jill; my daughter, Samantha; and my sons, Mitch and Ken; their wives Gretchen and Sara; and my grandchildren, Calvin Avery, Madelyn Elise, Sylvi Reine, and Charlie Joel, for the meaning they give to my life and for the strength I draw from our relationships.

Once again I invite readers — both faculty and students — to contact me with comments and suggestions. I can be reached most readily by e-mail at ateich@gmail.org, through ateich.com or altech.com. The latter site (“Al Teich’s Technology and the Future Toolkit”) contains supplementary resources related to the book, including the tables of contents of earlier editions, my personal home page, and more. You can also follow me on Twitter: [@al_teich](https://twitter.com/al_teich).

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