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EDITOR

BY TECHNOLOGY

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Technology and Man's Future

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Technology and Man's Future originated in the syllabus for a graduate seminar that I taught at Syracuse University in 1970-71. The original title (changed to *Technology and the Future* for the 4th edition) was borrowed from an essay by futurist Hasan Ozbekan that, ironically, was dropped from the book due to space constraints.

The readings contrasted the perspectives of a number of scientists with those of several technological critics. They included Emmanuel Mesthene's attempt to reconcile these disparate views and John McDermott's bitter critique of Mesthene, concluding with a series of essays on the then-new field of technology assessment. Only four of the 18 articles in the original book have appeared in all seven subsequent editions.

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Introduction

I grew up believing in a technological future. The picture of tomorrow's world that I carried around in my head throughout my childhood years corresponded, more or less, to that which one might have acquired from any number of science-fiction movies or from such monuments to technology as the Museum of Science and Industry in Chicago. It was characterized mainly by neatness and order, miles of gleaming chrome, millions of buttons to push, and endless gadgets to do all the work. All of our "old-fashioned" ways of doing things were, I believed, to be replaced by new, modern, better ones. Automated highways would take the place of conventional roads; one nourishment pill in the morning would save us consuming three meals during the day. In retrospect, what I find to be particularly interesting in this childhood image is the fact that the technological future always seemed to be an end in itself. When adults in my life spoke of it, they implied its inevitability—with some interest and some, but not much, enthusiasm. No one seemed to care very much for the prospect, but it was "progress," and only a fool would try to resist its tide.

Similar notions were apparently the main themes of the Century of Progress International Exposition held in Chicago in 1933. In the great world's fair tradition, this extravagant celebration aimed to demonstrate what technology was capable of doing for humanity. In the process, it brought out dramatically what one author has called "technology's triumph over man." Upon entering the Hall of Science, one was confronted by a large sculptural group featuring a life-sized man and woman, their "hands outstretched as if in fear or ignorance." Between this couple stood a giant angular robot almost twice their size, bending down, with a metallic arm "thrown reassuringly around each." The visitor to the fair need not have searched far for the meaning of this image. It could be found in the Exposition motto: SCIENCE FINDS—INDUSTRY APPLIES—MAN CONFORMS.¹

As I grew older, I naturally began to question my childhood vision, putting aside a fascination with gadgets to ask myself what was lacking in this future. Why, despite all good intentions, did this image of the future always come out looking more like *Brave New World* or *1984* than *Utopia*? What was the meaning of "progress" in these terms, if no one ever asked whether

1. I am indebted to Lowell Tozer, "A Century of Progress, 1833-1933: Technology's Triumph Over Man," *American Quarterly* 4 (1952): 78-81, for a fascinating description of this event, which took place a number of years before my birth.

it serves to make people happier? At the same time, I began to seek out ways of developing and shaping alternative futures.

In many ways, I believe, this development of my own mind represents something of a parallel to what has been occurring in American society over the past several years. Within the crisis of confidence that we as a nation are experiencing, we have begun to look critically at the technological future we have been building. This critical examination, which is being felt at many levels, is particularly strong among college-age youth. The mainstream of this generation has matured in an environment characterized by unprecedented material affluence. Able to take for granted the satisfaction of material wants, it has at once the need and the ability to reach beyond them and ask those crucial questions of ultimate purpose: Is material progress an end in itself, or is it, more properly, a means to some higher end? Is the development of technology leading toward a more desirable state of human affairs, or is it actually producing a decline in the quality of life? Is technology a tool that man is capable of using as he chooses, or is it, in a very basic sense, a system gone out of control?

It is a proper function of a college or university to equip its students with the intellectual foundations they need to grapple with these types of mind-expanding questions. These intellectual foundations have many aspects. Some fall within traditional disciplinary bounds; others require a different, transdisciplinary approach. This book is intended to address the latter. It does not, however, aim to *answer* the questions posed by the relationship of technology to society. Rather, it *seeks to expose* the reader to a variety of perspectives—scientific, philosophical, empirical, and policy-oriented—from which others have asked these questions. The readings are not selected to appeal to students of any particular disciplinary bias. Those with backgrounds and interests in music, social science, philosophy, engineering, humanities, business, and science—or virtually any other field—should find them of equal value. Hopefully, the courses and seminars in which these selections will be read and discussed will bring together students with a diversity of outlooks.

A WORD ON CONTEXT

In concentrating on the assembly of divergent perspectives in the *overall* problem of technology's relationship to society, this collection necessarily and knowingly fails to deal with important statements of certain parts of the problem. Thus, one will find here no direct treatment (except as examples) of either the specific benefits that technology has brought to human life or the

specific problems for which it is said to be responsible. The absence of material on these matters does not imply any lack of concern for them. It is simply a reflection of the higher level of generality represented here.

By way of setting the stage for the general discussion, it may be useful to review very briefly some of these specific matters. We cannot really even begin to measure the improvements that technology has made in man's capacity to cope with his natural environment. Through technology, man—alone among all known species of life—has developed means by which he may transcend the physical limitations of his body. In agricultural technology, he has devised methods for vastly increasing his food supply; in medical technology, he has learned to maintain his health and extend his lifespan; in construction technology, he has created means for protecting himself against hostile conditions of nature; in communication and transportation technology, he has developed systems for transporting himself and his ideas rapidly across vast distances; and in industrial and information technology, he has learned to perform physical and mental work far beyond his individual abilities.

All of this, however, has not been achieved without some cost. The contention that the continued development of technology will generate corresponding increases in human happiness and societal well-being is being challenged on numerous grounds. (1) It is widely charged that through consumption of nonrenewable resources, indiscriminate discharge of noxious waste products into the environment, and unchecked population growth, we are creating an environmental crisis that could endanger the very existence of life on this planet. (2) Even if one is inclined to discount such charges as exaggerated, it is more generally agreed that man's ability to manipulate his environment has run ahead of his sense of responsibility in doing so. Through such practices as unplanned land development and indiscriminate hunting of wildlife, man has unthinkingly destroyed valuable segments of the environment. (3) At a different level, the technology of modern weaponry and the arms race through which it has been fostered and disseminated have given man the power to destroy all life on the earth—without giving him the wisdom to insure that he will not do so. (4) In the minds of many observers, the manner in which technology is applied to social needs is inextricably interwoven with the perpetuation of a system of domination of one class by another—and consequently with the far-reaching problem of social injustice. Some would go further, in fact, viewing the requirements of technology as being incompatible with the democratic process and as inevitably leading to a totalitarian state. (5) We often hear that the status of the individual has suffered in the technological society. Complex organizations and advanced data processing

techniques have, it is claimed, threatened the individual's right to privacy and reduced him to feeling that he is no more than a computer punchcard facing a vast bureaucracy. (6) Finally, projected developments in biology and medicine (including genetic engineering) will soon pose a number of very difficult moral dilemmas for man, as he acquires the potential to create artificial life, duplicate individual human beings, and willfully alter the course of his own evolution.

Each of us may see these several problems as more or less serious, and each of us may have a personal bias about the balance between technology's costs and its benefits. The point is that these are all widespread and important human concerns today and that they represent the types of issues which define the context—if not the substance—of this book.

ON READING THIS BOOK

One of the most difficult conceptual problems in developing an understanding of the technology-society relationship stems from a lack of general agreement about what technology actually is. In conventional usage, technology appears to be associated with, if not defined by, the notion of mechanization. But, it is clear that technology is more than merely machines. How much more depends upon whose definition you are willing to accept. Perhaps the broadest concept is that of Jacques Ellul, who incorporates technology into his idea of "technique." "Technique" he defines as "the totality of methods rationally arrived at and having absolute efficiency in every field of human activity." A narrower and more operationally useful concept, which still extends considerably beyond the simple notion of "hardware" is that employed by the Harvard University Program on Technology and Society: "The organization of knowledge for practical purposes." It is clear that the explicit or implicit definition of technology held by each of the authors represented in this book deeply affects his view of its role in society. In attempting to read and analyze the works presented here, the reader should seek out these differences in concept and constantly bear them in mind.

In this connection, it is worth mentioning a subtle distinction that is often overlooked. In some instances, writers on technology and society appear primarily concerned with the effects of technology *per se*. In others, the apparent emphasis is upon technological *change*. The difference is seldom made explicit. Of course, the notion of change and constant innovation is so very much a part of our system of technology that it may not really be possible to conceive of it as a static system. Nevertheless, some subtle and probably unex-

plored differences do exist here, and the reader will be well advised to bear this distinction in mind in considering the various articles.

A word is also in order on the relationship between science and technology. While today we are inclined to identify the two quite closely, they have not always been seen in this way. In fact, a number of analyses show that, until recent times, science and technology progressed more or less independently of each other. Today's close identity between the two is a result of the explicit recognition on the part of society that scientific research, which in its purest sense is the pursuit of knowledge for its own sake, provides the basis for technological advance. The scientific community, for its part, has fostered public consciousness of this linkage as at least a partial justification for public financial support of scientific research. As a consequence, science has not only become associated with technology's benefits, but it is also increasingly seen as partially responsible for the problems technology has caused. The links between science and technology thus deserve serious attention in the context of this book.

Many of us have a tendency to view our problems in defining and regulating the role of technology in society as characteristic of our own time. In a sense, the readings in this volume, because they are all of recent vintage, contribute to this impression. We should hasten to point out, therefore, that there is, in fact, a long history of thought in this area. The societal tensions that accompanied the Industrial Revolution were interpreted by thinkers of those times in ways roughly analogous to those we see today. One can trace the view of technology as a Utopian force to such nineteenth-century philosophers as Karl Marx and Auguste Comte. On the other side, one may cite numerous critics of machine technology including Thomas Carlyle, who wrote of an "Age of Machinery, in every inward and outward sense of the word"; the poet, Matthew Arnold; and even Mark Twain, who late in his life authored a little-known essay entitled "Man a Machine?"² Among those whose fear of and resistance to technological change impelled them to action were a considerable number of English workers, known as the Luddites, who, in the early nineteenth century, gained wide repute by smashing the machines they hated in a series of riots. We do not presume to review this lengthy history here, but we maintain an awareness of the fact that today's discussions of the role of technology in society are not without their cultural and intellectual forebears.

2. See Victor C. Ferkiss, *Technological Man: The Myth and the Reality* (New York: George Braziller, Inc., 1969), chap. 3, for a discussion of early technological criticism.

STRUCTURE

The book is divided into four sections. The first three consider differing approaches to the understanding of the general problem of technology's role in society. The thrust of Part 1 is the examination of the essentially positive view of technology held by many scientists and engineers. While the extreme and simplistic notion that technology is an unalloyed blessing to mankind is not represented here, the common thread that ties together the three central articles in this section is the unquestioned assumption that further development of science and technology will provide solutions to many of the ills apparent in today's society.

The writings of several contemporary philosophers whose views of technology's role range from apocalyptic to Utopian are assembled in Part 2. The first three articles seem to share the important notion that technology, as a cultural tendency, has somehow transcended man's ability to control it and has thus become a seemingly autonomous force. The last sounds a more hopeful note in forecasting the emergence of a new human type—technological man—who is able to cope with the situation technology has created.

The core of Part 3 is an effort at empirical synthesis. Perhaps the major institutional effort to develop an empirical understanding of the issues with which we are concerned has been undertaken by the Harvard University Program on Technology and Society. In an essay taken from the Program's fourth report, its director sets out some of the principal ideas emerging from and guiding its activities. Juxtaposed with this essay is a highly critical review of the Harvard University Program's basic assumptions, which asserts that they are representative of "a not new but . . . newly aggressive right-wing ideology in this country."

Part 4, the final section of the book, draws upon threads that emerge from the first three sections to deal with one promising (but partial) political response to the problem—the concept of technology assessment. Documents that resulted from the activities of the House Subcommittee on Science, Research, and Development form the core of this section. Responding to them are several independent critiques. Although this part of the collection does not claim to offer definitive solutions to the problems posed, it does seek to add a policy-oriented dimension to discussions of technology and society and thus perhaps render them more satisfying as well as more productive.

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