nuclear control, energy, resources, pollution, population, communications—but others need to be transferred downward as far as possible for diverse regional and community and individual self-determination.

Blueprint for Survival is the publication in book form of the famous and controversial manifesto which was endorsed by 33 British scientists and which constituted the January 1972 issue of the *Ecologist*. It was hotly debated in *Nature*, the *New Scientist*, the *Times*, the *Observer*, and elsewhere, and extensive counterattacks by such critics as John Maddox, the editor of *Nature*, have now been published. *Blueprint* translates the M.I.T. *Global Environment* statistics and the warnings of *The Limits to Growth* into a program for social and political reorganization. It is perhaps best summarized in the resolution adopted by the Board of Directors of the Sierra Club in May 1972:

> The Sierra Club supports the goals as described in the *Blueprint for Survival* of a stable but diverse society for the world community which minimizes environmental destruction, reduces the discrepancy between economic values and costs and social values and costs, and increases the diversity of physical and social environments.

Blueprint is actually trying to set up a "Movement for Survival," with "national movements to act at national levels, and if need be to assume political status and contest elections" (p. vi). It stresses the need for "orchestration" or concerted action on many fronts by many groups (pp. 61–65). But its technical emphasis is ecological, on the design of a cybernetic and self-regulatory society (p. 111), with diverse, humanized, and resource-conserving towns and farms, a society which "would provide us with satisfactions more than compensating for" those of our present exponential-growth societies (p. 157). It is a powerful statement of what life could be and what we need to do, and millions of people may be moved by it.

Lester Brown of the Overseas Development Council is a world food expert and author of the earlier, very optimistic *Seeds of Change*. His new book, *World without Borders*, gets into the social and human aspects of the problematique—the rich-poor gap, unemployment everywhere, the rural-urban migration, and hunger. To solve such problems, he urges the creation of a global economy—including and going beyond the multinational corporation—and a global infrastructure, of communications-education, transportation, and new oceanic, environmental, disaster-relief, and research agencies.

Brown proposes less long-range and fundamental reforms than the previous authors, but he is more attuned to the next steps that need to be taken by present institutions, governments, and United Nations agencies. He wants to turn swords into plowshares, to redistribute resources, to strengthen the United Nations, to formulate a new ethic (p. 361), and to take more American initiative in creating a unified global society (p. 358). Unfortunately he often relies too much on good will, on rather unlikely changes of national policy, and on a United Nations whose structure is obviously inherently defective for solving these global problems. He applauds the recent consumer and ecology and restructuring movements in the United States, but he does not see the need to integrate these into an organized movement for a new world order. He concludes, "The most urgent item on our agenda . . . is the creation of a world without borders, one which recognizes the common destiny of all mankind" (p. 364). A major subgoal, yes; but it conveys little sense of the total system building, from the roots, that is in fact necessary. Yet many of Brown's proposals may be feasible, and it would be important to try to get them adopted in the next few years.

Dennis Gabor won the 1971 Nobel Prize for the invention of holography, and his book *The Mature Society* is a continuation of themes from his 1964 book, *Inventing the Future*. It starts off with his opinions and futuristic proposals on various subjects, such as absenteeism, drugs, inflation, competition, education, "ethical quotients," and "the moral achievements of science." He is against "technology autonomous," but a sort of technocratic smugness often mars his off-the-cuff ideas. He dismisses nuclear war between the United States and Russia as having "probability *nil*" (p. 19). And he foresees unlimited power: "In the long run . . . uranium can be extracted from the seas . . . with abundant power all metals can be extracted, even from the poorest deposits, or from the sea" (p. 29). No mention of energy or entropy costs or thermal pollution.

Nevertheless his book must be included on the survival list, because he goes on to emphasize that "growth will have to reach a turning-point and we must work . . . towards a stable ecosystem" (p. 24). He sees this as requiring the urgent development of a Mature Society: "a peaceful world on a high level of material civilization, which has given up growth in numbers and in material consumption but not growth in the quality of life, and one which is compatible with the nature of *homo sapiens* . . ." (p. 3). And he says, as we must all say, "Let us avoid the greatest of dangers, while leaving as much freedom as possible for those who come after us . . ." (p. 5).

The fact that these different authors with many different points of view are all converging so suddenly on such a shared image of the global future, with such a shared sense of urgency and needed effort, is astonishing and heartening. It suggests that 1973 may be the year when a world survival movement actually develops. If these books, and the groups they represent, could generate a real movement of this kind, it could create a focus of hope, a sense of community, and a mobilization of personal and political resources for the long haul on a scale that would in fact transform these global problems. It would be not merely a human organizational event, but a scientific and biological event that could change the slopes of all those Doomsday curves. It could create the possibility of a human future that would be, for the first time, believable.

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Addressing a Central Problem

Harvard University Program on Technology and Society, 1964–1972. A Final Review. Emmanuel G. Mesthene, director. Harvard University, Cambridge, Mass., 1972. vi, 286 pp.

Our Tool-Making Society. IRENE TAVISS. Prentice-Hall, Englewood Cliffs, N.J., 1972. 146 pp. Cloth, $5.95; paper, $1.95.

Harvard University's Program on Technology and Society began in 1964 when, in a widely publicized move, IBM made $5 million available for an interdisciplinary study of the impact of technology upon society. The program, slated to run for a full decade, was headed by philosopher Emmanuel G. Mesthene, whose background included experience in business, government, and education. After eight years of work, and the expenditure of some $3.5 mil-

lion, the program ended abruptly in 1972 with the announcement that the president of Harvard University, acting in response to the recommendation of an external committee, had decided that the program should be terminated and the balance of funds utilized to create "teaching posts in the general field of technology and society within existing faculties and departments." The books under review here provide a summary of the program's accomplishments during its life-span. In addition they reveal the working philosophy that motivated the choice of topics and methodologies and shaped the program's basic outlook on the social implications of technology.

The books, as such, do not deserve extended treatment in the columns of *Science*. Except for the fact that they document the activities of a generously funded and well-known project located at a major educational institution and addressing itself to a central problem of industrial society they are not of any great significance to scientists, scholars, or librarians. Nor were they intended to be, especially in the case of the first volume. Mesthene's book is the director's final report to the program's academic and business sponsors, its research participants, and the scholarly community interested in the interaction of technology and society. It takes the form of a long, annotated bibliography that lists, summarizes, and at times evaluates the findings of some 100 researchers who published 29 books and 164 articles in scholarly journals and magazines under the auspices of the program. The results are divided into four broad categories: Institutions (business, education, medicine), Political and Economic Organization (legal and political structure, economics, urban affairs, science and public policy), Culture and Life Style (work and occupations, values and attitudes), and Technology-Society Interaction (seen in a broad overview). In appendices the research personnel are listed with their institutional affiliations, publications, and courses they taught on technology and society.

One of the services of the program's Information Center was the publication of a series of *Research Reviews* featuring carefully selected, annotated bibliographies of books and articles on specified topics touching upon technology: work, values, social history, the city, biomedical research, and so on. Each of the eight published *Research Review* booklets (*1*) opens with an essay that summarizes the issues and controversies pertaining to its topic. Sociologist Irene Taviss was the author and compiler of several of these *Reviews*, and she has resurrected them in a different form in her commercially published book *Our Tool-Making Society*. Her volume attempts to weigh the social effects of technology and provide some sort of foundation for an understanding of the relationship between technology, values, and social and political structures. Unfortunately, the short chapters comprising the book reveal their origins all too clearly. They are filled with references and quotations from authors who offer varying viewpoints on the topics under consideration; they are not essays that build into a book but a series of comments reflecting the range of ideas expressed in the surveyed literature. Why was it felt necessary to publish in book form introductory essays that were written for another, and more appropriate, format? The book does not supersede the *Research Reviews*, which retain their value as first guides to their respective subjects. Nor is it well suited to the classroom. Having recently assigned it to students in an undergraduate technology and society course I can report that its "survey of the literature" format detracts from its usefulness as an introductory textbook.

As I have already indicated, the real importance of these two books is what they reveal about the program itself. And the first general observation to be derived from a reading of them is that the venture was marked by a predilection for the bibliographical approach. Granted, the program's selected and extensively annotated reading lists are more valuable and usable than some comparable publications such as the thick, two-volume compendium by Lynton K. Caldwell. For example, John Weiss's *Research Review* "Technology and Social History" might serve as proof of the utility of judiciously culling and appraising bibliographical material instead of printing every title that promises to deal with a given subject category. My complaint is not with the production of selected literature surveys but with a stolid kind of Baconianism that inspired the collection of bibliographical items instead of fostering a fresh search for new ideas and outlooks. I hasten to add that the passion for annotated bibliographies appears to have been centered in the director's office—one-fifth of his book *Technological Change* was devoted to bibliography—and was not shared by the majority of the participants whose research was sponsored by the program. Nevertheless, the director's prejudices did give a peculiar bibliographical tinge to the entire undertaking.

In the introduction to his final report Mesthene outlines the goals of the program as he originally envisioned them. Initially he had to make a choice between *policy action problems*—how can we clean up Lake Erie?—and *intellectual problems*—what is the nature of the mechanism of the technology-society interaction? Convinced that the first set of problems was attracting the attention of government, industry, and the foundations, Mesthene turned to the long-range intellectual problems that were being neglected in the rush to formulate effective political and social action. A distinguished group of business educators, economists, sociologists, philosophers, and political scientists were called together to aid the program in the implementation of its goals. The emphasis upon the intellectual was commendable, especially at a time when the universities were coming under attack for their failure to act in the social arena.

The crucial decision to place understanding and scholarship above political and social action was evidently interpreted, however, to mean that issues of technology and society being pursued by the activists were not fit material for study by the scholars of the Program on Technology and Society. How else can we explain the fact that a project dedicated to the exploration of the social implications of technology failed to confront *intellectually* some of the central technology-related social problems of our times? How else can we explain the absence of extended, theoretical treatment of the following: urban transportation and the significance of the automobile in American society; military technology and the imminence of a nuclear war; industry's effect upon the environment; provision of adequate health care; critical evaluation of the space venture; population growth in industrialized and industrializing societies; social effects of mass media; and the relationship between the industrial producer and the consumer of his products? It is not that the program deliberately avoided any issue that might have social and political components so that it could keep itself pure for its abstract pursuits. The societal impact of computers and information technology received a good deal of at-

tention, as did corporate and urban management. Nor did the program proscribe the study of a subject that might have immediate news value—witness its concern for the ethical questions raised by the organ transplantation controversies.

Why then did the program, with all its money and talent, fail to respond to the most pressing contemporary problems arising from the interaction of technology and society? First, in the program's defense it should be understood that the theoretical framework for a study of the social implications of technology was virtually nonexistent. This is still an area where truisms and prejudices abound and where expert knowledge is often nothing more than a sophisticated elaboration of some commonsense propositions. But that is only a partial answer to the question posed. More pertinent is a survey of the research personnel subsidized by the program. Of the 109 researchers one-half were drawn, in equal numbers, from business and economics. From the other social sciences there were only 12 sociologists, eight political scientists, and a scattering of others, and there were only ten humanists. From technology not only were there no engineers, there were no representatives of labor. To complete the professional profile, the director had worked as a Rand Corporation economist for a decade. Therefore, the research group was dominated by people who if not technological optimists were those least likely to be sensitive to the criticisms leveled against technology by environmentalists, consumer advocates, and peace marchers.

The program's optimistic faith in technology was revealed in a 1969 front-page *New York Times* story entitled "Study Terms Technology a Boon to Individualism":

> Modern technology, far from crushing and dehumanizing the populace, has made Americans the most genuinely individual people in history, a Harvard-based corps of scholars is concluding after the first four years of a 10-year appraisal.
>
> The group holds that technology has created a society of such complex diversity and richness that most Americans have a greater range of personal choice, wider experience, and a more highly developed sense of self-worth than ever before.

Accompanying this utopian outlook was the all-too-ready acceptance of the need for a ruling technocratic elite. In the same news story Mesthene was quoted as stating, "In governing the nation . . . it may well be essential to rely heavily on an emerging group of 'technocrats': persons trained in computer-based analysis techniques needed to sort out the complexities and subtleties" of an industrial society. He admitted the drawbacks of a technocracy, but contrasted them with the "chaos" likely to ensue if the "hippie population" had its way, and finally put the burden of the preservation of democracy on the "ordinary citizen," who must work harder to understand what the technocrats were doing.

The utopian and technocratic ideals of the program were not shared by the critics of technology, who simultaneously were coming to their own conclusion about the meaning of the machine in American life. In an ironic turn of events, the scholars who retreated to academe to fashion a theoretical approach to technology and society offered fewer intellectual innovations than did the activists who scorned theory and extolled practical involvement. Consider the period 1964 to 1972 and compare the theoretical contributions of the program's personnel with those of the dissidents. In contrast to the often bland and sterile philosophizing and the state-of-the-literature surveys that characterized the Program on Technology and Society we find: the environmentalists, who brought, to a wide segment of the American population, a heightened sensitivity to the natural environment and a reevaluation of the place of material goods in our lives; Ralph Nader, who raised fundamental questions about the responsibilities of the producers of consumer goods in an industry-dominated society; the antiwar protesters, who brought to our attention the military uses of advanced technology and the interlocking relationship between the military and industry; the zero-population-growth advocates, who argued that the population of industrial nations must be limited as their living space and natural resources diminished; the young assembly-line workers at the Vega plant in Lordstown, Ohio, and elsewhere, who demonstrated that worker alienation was more than a concept in Marx's social philosophy. Finally, special attention should be called to one notable attempt to articulate in formal, theoretical terms the complaints of these social critics and activists: John McDermott's 1969 *New York Review of Books* article, "Technology: The Opiate of the Intellectuals."

These voices of dissent and criticism were often shrill, superficial, illogical, confused, and irresponsible. One might deplore their tactics, become exasperated with their rhetoric, and still learn much from them, for they were bringing us a new awareness of the social repercussions of technology. It is an indication of the extent of the failure of the Harvard Program on Technology and Society that it did not respond to the most exciting movements in technology and society of the 1960's. The program might have played an important role in taming, shaping, or challenging, on intellectual grounds, the ideas put forth by the dissidents. Its shortcomings were not the result of its commitment to thought over action but stemmed from its failure to see that the activists, in their own crude ways, were generating new ideas and concepts worthy of further study.

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Reference

1. The titles of the Program on Technology and Society *Research Reviews* are as follows: No. 1, "Implications of Biomedical Technology"; No. 2, "Technology and Work"; No. 3, "Technology and Values"; No. 4, "Technology and the Polity"; No. 5, "Technology and the City"; No. 6, "Technology and the Individual"; No. 7, "Implications of Computer Technology"; No. 8, "Technology and Social History." Except for No. 4, which is now out of print, they are available (for $2 each) from the Harvard University Press.

A Tormented History

Genetics and American Society. A Historical Appraisal. KENNETH M. LUDMERER. Johns Hopkins University Press, Baltimore, 1972. xiv, 222 pp. $10.

Genetics is as old as this century; and in the course of its growth it has influenced and been influenced by events in the society in which it exists. Kenneth Ludmerer has explored this interaction provocatively.

In its early years genetics was used, primarily by nongeneticists, to justify a program of negative eugenics based on state sterilization laws aimed at the unfit. Even before Mendelism this eugenics movement looked upon the Jukes, the Kallikaks, and other "families" as social parasites corrupting the American stock. The labeling of pauperism, feeblemindedness, alcoholism, and habitual criminality as results of genetic defects stimulated the passage of sterilization laws. (By 1917 such laws had been adopted by 16 states.) Their application, especially to the feeble-