INTRODUCTION

We started the research project reported here with one question in mind: can new technologies be used to reduce significantly the costs and pains of needed social changes and to accelerate their pace? Recognizing that remedial social change is usually slow, expensive, and tortuous, we examined six "cases," not so much in order to study these particular ones, but rather to gain an insight into the opportunities and limitations of technological shortcuts. The cases examined include two medical ones (methadone for heroin addiction, antabuse for alcoholism); an educational one (instructional television—ITV); one dealing with violent crimes (gun control); one dealing with highway safety (the breath test), and one dealing with the population explosion (IUD).1

We came up with two partial answers. One pertains to the conditions under which shortcuts can be effected, since the general answer has turned out to be not a matter of "yes" or "no," but rather one of degrees and specifications (i.e., all shortcuts which "work" are much more effective for some subpopulations than for others). Second, we learned something about a question we had not thought about asking: under what conditions, and to what extent, can one answer such questions as ours regarding the efficacy of a social solution? It was not only that we were hampered again and again by our own shortcomings, i.e., our limited capacity to gather, absorb, and analyze information from a large variety of sources and disciplines, but that we saw the great difficulties of those we observed—experts, political leaders, "think tanks," governments—in making informed, relative, rational choices.

This book is, hence, at one and the same time, a substantive treatment of one issue—the uses of technology to solve social problems—and a treatment of the conditions the "actors" facing the same question encounter when they try to solve it for themselves.

1 The report on the IUD (Intra-Uterine Device) is being completed by Sarajane Heidt and will be published independently. This part of the study is supported by the Population Council. As there are several fine summary works on instructional television, we return to this case only in the Conclusion. See the Conclusion, p. 179 also for references to these works.
TECHNOLOGIES

We mean by technology a set or system of tools, techniques, and the knowledge their use requires.

Technologies extend or replace human capacity. Of those we deal with here, the use of machines for teaching instead of actual instructors (ITV) is the clearest example.

Merrill defines our subject as:

Technologies are bodies of skills, knowledge, and procedures for making, using, and doing useful things. They are techniques, means for accomplishing recognized purposes.2

Webster defines technology as follows:

1. The terminology of a particular subject: technical language 2a: the science of the application of knowledge to practical purposes: applied science [the great American achievement has been . . . less in science itself than in~ and engineering—Max Lerner] b (1): the application of scientific knowledge to practical purposes in a particular field [studies are also made of polymeric materials to dental~—Report: Nat’l Bureau of Standards] (2): a technical method of achieving a practical purpose [a~ for extracting petroleum from shale] 3: the totality of the means employed by a people to provide itself with the objects of material culture.3

However, as Merrill notes, “There are techniques for every conceivable human activity and purpose. The concept of technology centers on processes that are primarily biological and physical rather than on psychological or social processes.”4

In contrast to science, especially fundamental research, technology focuses more on objects, less on symbols; more on service and applied objectives, less on discovering fundamental generalities. Most commonly, we think about technologies as extending our capacities, usually in terms of our muscles (historically most machines have served this purpose); and more recently as means of aiding our nervous system, our perceptive and integrative capacities (with communications equipment and computers).

In 1966 Alvin M. Weinberg, then Director of the Oak Ridge National Laboratory, inquired,

In view of the simplicity of technological engineering, and the complexity of

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4 Merrill, op. cit., p. 577.
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social engineering, to what extent can social problems be circumvented by reducing them to technological problems? Can we identify Quick Technological Fixes for profound and almost infinitely complicated social problems. "Fixes" that are within the grasp of modern technology, and which would either eliminate the original social problem without requiring a change in the individual's social attitudes, or would so alter the problem as to make its resolution more feasible?²

Specifically, the question of the feasibility and effectiveness of technological shortcuts is that of the ability to use technologies significantly in handling the kind of domestic problems the society now faces. Can the teaching of the disadvantaged, for instance, be turned over to machines; or the treatment of drug addicts? Few would question that some marginal aspects of these problems can be so handled; say, a slide projector as a teaching aid. But what about the core of teaching? Social work? Mental health? Crime control? How much help can we gain here?

In trying to answer this question, it seemed useful to us to separate two kinds of domestic problems. Some are manifestly "technological," in the realm of objects, and we see little reason even to question that technological development would make a difference. The problem of limiting atmospheric pollution by eliminating the most harmful components from the emissions of automobiles and industrial plants, for instance, is primarily a technological problem requiring a technological solution.

The second kind of domestic problem, concerned with the realm of human action, is basically located in people, not in objects (e.g., alcoholism, drug addiction, lack of education). These problems seem to require handling by a person, a teacher, a nurse, a psychotherapist. Can technology help here in a significant way, we ask?

We chose the technologies to be studied in terms of their relevance to the problems our society faces, particularly alcoholism, drug addiction, crime control, population control, the overloading of educational systems, and highway safety. It is not surprising that we found ourselves dealing more often with biological techniques than with physical ones, as this is the area in which involvement with human beings is most direct, and where science is currently making much progress.

Accordingly, three of the technological solutions studied are "medical" in one sense or another: methadone (to curb heroin addiction), antabuse (to fight alcoholism), and IUD to curb population growth. All have to be introduced into the human body; two are drugs; and one is a tool. All do not treat the personality or require its restructuring. This is the source of the

potential economy provided by these "shortcuts." While it is not agreed what are the sources of addiction or of preferences regarding family size—whether they rest in early childhood, peers, group influence, or subcultural values—it is widely recognized that it is very difficult to change a large number of personalities in a calculated and useful way. (As this is an essential point in our discussion, we shall return to it below.) As very large numbers of people are involved in the relevant domestic problems (e.g., 9 million alcoholics in the United States*), if a "mechanical" insertion could solve or significantly reduce any of these domestic problems, the economy would obviously be enormous. The image of treating polio or Parkinson's disease with and without a drug is indicative of the economies suggested. Unfortunately this is not "as simple" as it sounds, but then nothing is.

One of the examined technologies, instructional television (ITV), is clearly analogous to other uses of technology, only it replaces not animal or human muscles, but the entire physical presence of a teacher. Additionally as ITV never tires, gets angry, rarely breaks down, does not mind repeating a lesson a number of times, and can teach the same lesson to ten, a hundred or a million people, the potential economy is obviously large. But can it handle a significant part of the teacher's human, personal interaction with students?

We also deal with automobile safety which is in part "pure" engineering and in part a "medical" technological problem.

Crime control involves a manner of solving problems which may well become more common—the treatment consists of removing an existing technology rather than introducing a new one.

The second general issue, which we were aware of but did not plan to study here, was the way information about the value of a technology is generated, assessed, and used. This question can hardly be separated from ours as almost never is there a clear answer if a technology "works" or not, and the decision if it "works" is much affected by the societal context in which knowledge is produced, communicated and used. Thus we found it necessary to give considerable attention to this issue.

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