problematical whether the NASA budget can be reduced much further while still keeping manned spaceflight in the programme. But if manned spaceflight continues, there will have to be remedies for the "grave defects" within NASA's organization of life sciences programmes. These defects, the report says, stem from "overlapping authority, insufficient internal communication, a multiplicity of advisory groups, each with a very limited purview, inadequate programmatic involvement on the part of the life sciences community, and lack of any strong representation of the interests of the life sciences at high administrative levels".

If this is true it is remarkable that manned spaceflight has gone so well, and indeed the report implies that if NASA is to continue in the direction of Skylab, the space shuttle and space station, with their heavy reliance on man in the system, then NASA should have a better way of dealing with the life sciences. Too little work has been done on the sociopsychological aspects of spaceflight, for example, and the committee has easily been able to cite missed opportunities for the gathering of vital data during the Gemini and Apollo missions.

What then is to be done? Although only five per cent of the NASA budget goes on the life sciences, the committee is clearly right when it points out that the programme should not be spread through three departments—the Office of Advanced Research and Technology, the Office of Manned Space Flight, and the Office of Space Science and Applications. What the committee would like to see is the creation of an Office of Space Biology and Medicine under which work in the life sciences would be consolidated. At the same time there should be a Life Sciences Advisory Board made up of ten to fifteen scientists to act as an external reviewing body. The report also puts forward measures that should improve the quality of the experiments that are undertaken by NASA. As an example of what needs to be changed, the report says that the Biosatellite 3 experiment, in which a subhuman primate was orbited at a cost of $40 million, provided no new or unpredictable information, or any information that could not have been obtained in a terrestrial laboratory. The Office of Manned Space Flight did not request the flight and showed little interest in the result of the experiment. And if manned spaceflight does continue there needs to be more realistic research into space medicine. Indeed, if it is true, as the report says, that "a sufficiently comprehensive and integrated biomedical program in support and extension of man's activities in space does not now exist", then NASA has been guilty of a serious folly.

HARVARD

The Sociology of Technology

NEARLY three-quarters of the people interviewed during a public opinion survey conducted by a team from the Harvard Program on Technology and Society believe that technology tends to reduce people "to a set of punched holes in an IBM card". This, in itself, is good reason for looking at the complex interrelationships between technology and society, and indeed, public disillusionment with science and technology has probably provided the chief stimulus which has attracted many social scientists to this fashionable area of research. The Harvard program, during its six-year lifetime, has, however, now evolved past the point of scratching at the surface of the more obvious problems involved in the relationships between technology and society, and its sixth annual report gives details of a solid research programme involving thirteen projects conducted by research personnel from universities as far apart as Edinburgh and Stanford.

The work of the programme has been concentrated in three broad areas: technology and the individual, technology and values and the impacts of technology on economic and political organization. The first of these categories includes the project conducted by David Armour and Sherwin Feinhandler of Harvard, under the intriguing title "How People Perceive Technology". According to the preliminary results of the public opinion survey, it seems that most people perceive technology in a dim light. Although the respondents were fairly enthusiastic about the material benefits that technology has bestowed upon society—"machines have made life easier" was a familiar reply to the questionnaire—a strong anti-technology feeling was expressed in the popular statement that "people have become too dependent on machines". The feeling that technology has depersonalized many aspects of life also seems to be in vogue.

These findings, although interesting in themselves, do little more than quantify some of the more well-known attitudes to technological development, and the finding that it is those with the least knowledge and education who are most likely to feel alienated and to put the blame on technology also comes as little surprise. But what is more of a surprise is that most of the people surveyed are content to leave decisions about technology to the agencies they believe are now making them.

Other projects in the category of technology and the individual include a study of the psychological character of industrial managers and an examination of the hypothesis that technological obsolescence of individuals is becoming a prevalent and serious problem in advanced technological societies. If the hypothesis turns out to be correct, this project will then turn to an examination of ways of overcoming the problem. Professor Hilde Himmelweit, of the London School of Economics, is also updating for the Harvard program the research into the effects of television on young people, which she first published in the 1950s.

Among the projects concerned with technology and values, the study by Professor Renee Fox and Dr Judith Swazey of issues involved in kidney transplantation highlights some of the acute ethical problems brought about by modern medical techniques. The project, which should be finished next year, has consisted of two years of observation at two kidney transplant units. Professor Fox and Dr Swazey have developed two novel concepts in their study: that transplantation is a type of gift exchange, involving a complex network of reciprocal obligations, and that the exchange is not direct, but goes through the hands of doctors who choose which patients will receive the gifts and who will give them. It is here that complex medical and social ethics are brought into play, and the study has served so far merely to highlight some of the more important questions. For example, are the results of kidney transplants worth the psychological cost to the close relatives involved, and is the quality of life given by a transplant worth having?