Government Interest in Technology Assessment Grows

Recent developments in Washington indicated that so-called "technology assessment" will play a major role in US science policy and in government funding of research and development in the 1970's. For physicists, already worried by research budget cuts, technology assessment may offer some new and significant opportunities.

The term "technology assessment," as currently used, covers all the means for predicting and weighing the impacts of technology on society, and the criteria for choosing among various technological alternatives. Examples of areas in which technological impacts might have been better assessed in advance, and where better current assessments are still needed, are numerous and increasingly familiar: DDT and other pesticides; atmospheric pollution from automobile engines; water pollution from various sources (including "thermal pollution" and radioactive effluents from nuclear reactors); aircraft traffic and noise; deteriorating cities; various population problems. While these and other problems may be partly "social," they also have important technological components; these components may, for the present at least, be more assessable and manageable than the social aspects of the problems.

NSF role. On 17 February, NSF Director William D. McElroy said that the Foundation plans to supplement many of its efforts to meet the new national concerns of environmental quality and social relevance. Testifying before the Subcommittee on Science, Research and Development of the House Science and Astronautics Committee (the Daddario subcommittee), McElroy emphasized the importance of technology assessment in coping with these critical problems of the 1970's. He noted that current environmental problems "require new knowledge and understanding obtainable only from intensive research," and that "contributions of virtually all of the sciences will be required." McElroy said that NSF will continue its support of basic research in the sciences, but it will "reserve a modest, though significant, portion of its funds" for projects directed to societal problems. These problems will include "a broad range of activities, extending from hailstorm prevention and earthquake engineering to the mathematical modeling of environmental systems." From now on, NSF will use technology assessment "as an organizing principle" in planning its redirected efforts.

Any major redirection of NSF activities must await Congressional approval, although approval seems almost certain in this case. Last November McElroy suggested to the Daddario subcommittee that perhaps 10% of the NSF budget might go to activities related to aspects of technology assessment.

Hearings. The new NSF emphasis is only the latest of a number of recent developments reflecting government interest in technology assessment. Last November and December the Daddario subcommittee held hearings on the main theme of how Congress could acquire a "technology assessment capability." Among the 17 witnesses appearing before the subcommittee were: McElroy, Presidential science advisor Lee A. DuBridge, Lewis M. Branscomb, director of the National Bureau of Standards, John R. Pierce of Bell Telephone Laboratories and Alvin M. Weinberg, director of Oak Ridge. The hearings produced general agreement on the importance of technology assessment but predictably different ideas on approaches and organizations for doing the job.

Weinberg told PHYSICS TODAY that energy transformations probably underlie 50-90% of total environmental pollution. Already about 10% of Oak Ridge's activities are focused in various ways on environmental questions, and Weinberg expects this percentage to increase. He noted that Argonne, Hanford, Livermore and other AEC-supported laboratories are building up new efforts in environmental and technology assessment.

Congressman Daddario was planning to introduce by the end of March a bill that will probably lead to the Technology Assessment Act of 1970. The Act will provide a means of technology assessment for Congress; later this year the subcommittee will take up technology assessment within the Executive branch of the government.

Reports. Last July three reports were submitted to the Daddario subcommittee, one from the National Academy of Sciences, one from the National Academy of Engineering and an account of previous Congressional technology issues by the Legislative Reference Service.

The NAS report, *Technology: Processes of Assessment and Choice*, came from a panel of the NAS Committee on Science and Public Policy, headed by Harvey Brooks of Harvard. The Brooks panel noted the present dispersion of technology assessment activities among various government and private institutions, such as industry, the marketplace, professional and other groups, and individuals. This multiplicity of approaches and viewpoints was deemed essential. But the panel observed that self-interested analyses of the kind usually made now "frequently reflect the views, interests, enthusiasms, and biases of unduly narrow constituencies" and effectively limit "public participation in choices having major public consequences." And present technology assessment activities "suffer in their totality from basic inadequacies that will prove increasingly critical as the

scale and intensity of technological development continue to mount."

Among recommendations from the Brooks panel were new federal organizations "with components located strategically" in both the Legislative and Executive branches. The organizations would be limited initially to technological areas already strongly influenced by the government, and they would be "separated scupulously from any responsibility for promoting or regulating technological applications." The new government organizations would be able to carry out in-house studies, support major external research, and promote an informed public awareness of technology assessment issues. The panel suggested, for technological assessment, an expansion of the President's Office of Science and Technology and a new division within NSF. For Congress, either a joint committee of the Senate and House, or a Congress-wide technology assessment office was discussed.

The Brooks panel concluded on an eloquent note: "The future of technology holds great promise for mankind if greater thought and effort are devoted to its development. If society persists in its present course, the future holds great peril, whether from the uncontrolled effects of technology itself or from unreasoned political reaction against all technological innovation."

The NAE report, *A Study of Technology Assessment*, came from the NAE Committee on Public Engineering Policy whose chairman is Chauncey Starr of UCLA. The Starr committee conducted three "experiments in technology assessment." Three task forces worked on: the technology of teaching aids, subsonic aircraft noise, and multiphasic health screening. For each of these areas the report contains observations on assessment methods and possibilities for more complete studies.

Need for physicists. Many technology assessment questions need applied physical research. Not enough is known, for instance, about some practical aspects of electromagnetic spectrum crowding; the generation, propagation and effects of aircraft and other noise; and the effects of atmospheric pollution on the earth's radiation balance.

There is another kind of problem, involving "systems studies" of various types, that may appeal to physicists with the right intellectual bent, for example quantitative modeling of ecological systems, studies of the dynamics of pollution, and some aspects of global energy transformations.

DuBridge, McElroy, Daddario Comment on Budget Prospects

The amount of university research supported by the Department of Defense, the National Aeronautics and Space Administration and the Atomic Energy Commission will decline in fiscal year 1971 (PHYSICS TODAY, March, page 69). Only NSF, with a proposed $45 million increase for university research, projects a gain for 1971 among federal agencies that fund physics research. Any major effect, however, will be lost to inflationary pressures and the budget cuts in most of the other federal agencies.

Lee A. DuBridge, scientific advisor to President Nixon, says, "The total DOD budget for 1970 for university research is roughly $20 million below that of 1969 because of congressional action, and therefore the DOD has been forced to reduce university funding by that amount. In the process of making the cut the DOD has been looking closely at existing projects to see if they meet the criterion of the Mansfield amendment. It is estimated that the dollar amount of the projects affected by the Mansfield amendment will be a small part of the $20 million, possibly on the order of $5 million, although the exact figure is uncertain. According to the DOD well over 90% of existing projects are allowable under the provisions of the Mansfield amendment."

This year, however, cuts in DOD support of university research and the passage of the Mansfield amendment will create additional proposal pressure at NSF. No procedures have been established by Congress for the orderly transfer of projects from DOD to civilian agencies. NSF must wait until DOD finishes assessing the military relevance of current research before knowing exactly how many additional projects it will be asked to pick up.

William D. McElroy, director of NSF, told PHYSICS TODAY: "We will have increased proposal pressure, and we have asked for $10 million in fiscal 1971 to allow for new proposals. Besides projects directly affected by the Mansfield amendment, added proposal pressure will come from new researchers whose projects have been dropped by NASA, the AEC and DOD. Projects affected by the Mansfield amendment will not get any special treatment; they will have to come in and compete with all the other proposals."

McElroy went on to say: "It's a little too early to tell what the effect will be on physics alone. Maybe more social science projects will be affected than physics projects."

NSF has allocated $31.4 million for physics in the proposed 1971 budget, up 13.3% from the estimated 1970 level but only 3.6% higher than the 1969 allocation. Even if physics projects are not badly cut by DOD, the NSF increase for physics over 1969 will not cover the inflationary rise in cost, let alone make allowances for new researchers entering the field. But the increase over 1970 is significant.

Before physicists and other scientists begin counting on any upturn in funding, though, Congress must first authorize and then appropriate the new NSF request. Last year the President asked for approximately $500 million for NSF; the Labor and Public Welfare Committee authorized a sum in excess of $500 million, but the final congressional appropriation cut the request to $438 million. Roy Millenson, minority staff director of the Labor and Public Welfare Committee says: "If we follow the pattern of last year we will probably increase the amount asked by the President."

What are the chances that NSF's request for $511 million can escape a cut similar to the one made last year? Congressman Emilio Q. Daddario (D., Conn.) who is chairman of the House Subcommittee on Science, Research and Development and who recently announced his intention to run for governor of Connecticut, feels that the outlook for the NSF budget is better than last year, that a major cut is unlikely.

Summer Institute at Maryland Planned for Black Teachers

The University of Maryland physics department, working with a National Science Foundation grant, will conduct a summer institute this year for 26 college science teachers, most of them from predominantly black colleges. The program includes concentrated course work in classical mechanics and relativity, advanced lab-