

Section IV

**TECHNOLOGY ASSESSMENT
METHODS AND APPROACHES**

Section IV

TECHNOLOGY ASSESSMENT METHODS AND APPROACHES

During 1976, OTA undertook two separate but complementary appraisals of how and by whom technology assessment is practiced. In September and October, OTA conducted five workshops at the request of the Director to examine the lessons learned from the Office's nearly 3 years of performing technology assessments. The participants included the managers of the Office's eight program areas and other senior OTA personnel.

The OTA Board, expressing its continuing interest in the evolution and utility of the concept, held 4 days of public hearings in June on the uses and impacts of technology assessment on decisionmaking in other Government agencies and private sector organizations. The Board had previously held hearings in 1974 on the technology assessment activities of the National Science Foundation.

Both the hearings and the workshops showed that there is no one best method of performing technology assessments. Each assessment is unique. The method employed, the personnel involved, and the skills tapped depend on the technology being assessed, the client for whom the assessment is undertaken, the nature of the issues at stake, and the time available for and the setting of the project.

Because of their more immediate relevance to OTA, the workshops are discussed first in this section, followed by the hearings.

OTA Workshops

Held as the first long-term assessments undertaken by OTA in 1974 were nearing completion, the workshops were aimed at assessing the experience gained in conducting those projects and applying the benefits of the experience to the next generation of comprehensive assessments.

The workshops were centered around the five operational phases of the OTA process: selection, planning, execution, review and

reporting, and use. Each workshop was structured around an initial exposition of one program area's experience, followed by a discussion of variations adopted by other program areas. The emphasis was on what worked, what did not, the problems encountered, and what could be changed to improve the process.

Considering both the broad needs of Congress and the vast range of technological issues, as well as the resources available for a study, the workshop participants emphasized the need for a flexible approach to each assessment. All OTA assessments must meet three criteria: timeliness, quality, and credibility. Reports must be delivered on time, be of high professional quality, and be comprehensive yet balanced—that is, free from advocacy or ideological bias.

The selection phase begins when OTA receives a request for an assessment from the chairman of a congressional committee. It proceeds through defining the issues involved in, and the scope of, the potential assessment. Finally, it concludes when the Board, upon reviewing the preliminary efforts of the OTA staff, approves the proposed assessment for action.

At this stage, the program managers noted that close interaction with the staff of the requesting committee is vital. This allows both OTA and the committee to better identify the issues, scope the assessment, and arrive at mutual expectations concerning the expected results. Continued cooperation throughout the study permits OTA staff to stay abreast of often fast-changing congressional needs and issues.

The OTA Advisory Council, program advisory committees, and various relevant outside groups aid materially in both defining issues and scoping the assessment, the program managers stressed. They noted that other information sources are checked routinely at this time, to determine both the availability of

relevant data and whether other organizations may have undertaken similar studies which could either provide input to OTA or obviate the need for an OTA assessment. These include specifically, among others, the Congressional Research Service of the Library of Congress, the General Accounting Office, and the Congressional Budget Office.

Workshop participants also examined potential risks in attempting to broaden the scope of a request beyond the original intent during the selection phase. Such broadening could result in a more useful assessment for Congress, but care must be taken to ensure it does not demand a scale of effort either difficult to manage or exceeding available resources.

Once the Board has approved an assessment, the planning phase begins. During this phase, various interested parties to the study are identified and an advisory panel created for each project. A properly constituted advisory panel brings together a diversity of viewpoints, thereby lending credibility to the potential study, widening access to interested communities, and identifying possible conflicts or problems. To best accomplish this, it was agreed that no one person or outlook must be permitted to dominate. Selection of an able panel chairman can therefore be particularly crucial to the project.

During the planning phase, particular attention is given to determining which assessment activities may best be carried out by contractors and consultants. Contractors are generally used to provide technical information or specific analyses, while OTA staff develop the overall work plan, integrate findings and data, and perform policy analysis. Program managers differed as to how much experience in technology assessment was appropriate for contractors; some stressed the importance of selecting contractors and consultants with known expertise and proven performance, while others noted that those with less expertise or who are new to a project may be good sources of new ideas and fresh approaches.

While not always possible, the workshop participants agreed that the staff member who was responsible for planning the study was generally the best choice to be the project

leader. Contractors and consultants generally cannot be effective project leaders, OTA program managers noted, because they are not adequately familiar with the needs, processes, and people of Congress, or how OTA operates. In addition, they are too likely to be distracted by other commitments to give the project the attention its effective direction demands,

Planning also must incorporate, to the extent possible, sufficient time for the gestation of issues, problems, and ideas. The program managers observed that such a deliberate approach, although often at odds with the need to provide a timely assessment, usually promotes efficiency in the long run and results in the delivery of a higher quality product.

While it may seem intuitively correct to await the development of data bases, the program managers stressed that it is of critical importance to analyze the issues early in the execution stage of an assessment so as to relate them to the policy options that will be considered or subsequently developed. They noted that failure to do so at this time can waste time and result in the study becoming little more than a data collection project.

On the other hand, in that new issues and options are quite likely to surface during the course of an assessment, the early identification and analysis activity must be structured so as not to preclude consideration of those issues and options that emerge later.

The participants cautioned that the required guidance of contractors and consultants during the course of a project must come from OTA staff, not the advisory panels. The project leader must therefore clearly inform the staff, contractors, consultants, and advisory panels of their proper roles and of the timing and sequence of their responsibilities. Several program managers noted experience illustrating that while advisory panels are good at conceptualization and critique, they cannot be relied on for the actual work of the study.

Through its public participation activities, OTA has sought to involve the public in technology assessment by various means, including identifying parties interested in or affected by a technology, creating broad-based

citizens' panels, and publicizing various projects and their products. The most extensive effort in public participation involved more than 15,000 persons as part of the assessment of the coastal effects of offshore energy systems. Even though such an extensive effort may not be required or feasible in every project, program managers observed that the appropriate public participation element must be identified and planned for early in any study.

In employing mathematical and computer-assisted models, as many projects have, program managers observed that a thorough understanding of their strengths and weaknesses, of the assumptions upon which the models are based, and of how the outputs relate to those assumptions is absolutely essential. Similar caveats were applied to the use of economic analyses, often vital to future projections and evaluations of options.

To meet interim or fast-rising needs of Congress for information from ongoing assessments for deliberations or hearings, OTA staff place initial emphasis on those issues and data which will facilitate the congressional process. Sharply focused interim reports can be useful in transmitting findings from projects not yet completed, although some program managers preferred informal communications as a more effective means of meeting interim committee needs.

A report—the final product of an OTA assessment—is written concurrently with and as a part of the ongoing study, rather than being left to the last minute. Likewise, the review of OTA reports is a continuing and vital process throughout the project, essential to assure the quality and credibility of OTA reports. Program managers review draft reports prior to their being submitted to outside reviewers to ensure that the issues identified as relevant by the requesting committee have been addressed, and that the report is structured to best meet the needs of Congress.

Advisory panels are particularly useful in reviewing early drafts. However, because they often work so closely with the staff in reviewing the early drafts, review of later drafts is more appropriately accomplished by persons outside of the OTA process. These include

people in academia, business and industry, Government, the user community, citizen groups, and often staff of the requesting committee.

In addition, the OTA Director conducts a review through senior Office personnel. Finally, each Member of the OTA Board, either personally or through the staff liaison for the Office, reviews the final draft before approving it for publication.

Program managers noted that several potential problems can arise in the review process. First, because the review process is oftentimes slow, the work plan must allow adequate time to accommodate reviewers. Second, while large numbers of reviewers are often required to ensure that all perspectives have been considered in a report, attempts to incorporate all reviewers' comments creates the potential of producing a bland report.

Finally, distributing drafts to a large number of reviewers risks premature release to the media and public. In that the language of a draft may be revised, entire sections reorganized, or findings modified on the basis of concerns brought forth by reviewers, draft reports may not reflect the final document and premature public release may misrepresent it. However, the program managers felt that striving for utmost quality and credibility through a widespread review process was worth the risk of premature public disclosure.

As an assessment is concluded, its findings are delivered to Congress and the public in a variety of effective and useful ways, often going beyond the delivery of the final report to the committees and Members of Congress. In many cases, OTA's Director, program staff, and advisory personnel are asked to augment the report's findings by testifying at hearings by the requesting committee and several other committees of jurisdiction. Executive agencies and State governments are provided early copies of reports, as appropriate, for their consideration and utility. Affected parties, interests, professions, and business groups are either sent copies of reports or informed of their availability via news releases. In selected cases, a brochure summarizing key elements of a particular report supplements other information about its availability, often effectively

communicating project results in more depth than can other channels of information.

At the conclusion of this series of meetings the participants suggested, as a result of the benefits derived from this workshop, that future sessions might gainfully include discussion of long-range planning, expanded public participation, program management, and model 'building.

OTA Hearings

The hearings showed that whereas a decade ago, when the first technology assessment bill was introduced in Congress, only a very few people had heard of this new study technique, it is now being practiced by a wide variety of Government agencies, academic institutions, and private businesses. Chaired by Congressman George E. Brown, Jr., OTA Board Member, the Board sought to develop a better understanding through the hearings of how technology assessment affects decisionmaking, as well as its operational role in various Government and private sector organizations.

The witnesses represented a broad array of Government agencies, universities and research organizations, and private companies. Among the organizations represented were the Departments of Commerce and Interior, the National Science Foundation, the University of Oklahoma's Science and Public Policy Program, the Jet Propulsion Laboratory of the California Institute of Technology, and the Coca-Cola, Monsanto, and Ford Motor companies.

The testimony elicited at the hearings led to six major findings: (1) technology assessment is an evolving study strategy that is being widely adopted by the public and private sectors; (2) the strategy of any particular assessment should be tailor-made to fit the resources, timing, and needs of the decision-makers; (3) technology assessment, in addition to exploring options and alternatives, can provide early warnings of consequences of the application of technology that might otherwise be unanticipated; (4) both Government and industry have a growing awareness of the value of technology assessment for improving

the policymaking process by broadening the information base; (5) technology assessment is being employed by major corporations as a useful planning tool; and (6) communication by assessment team members with potential sponsors and users of technology, decision-makers, and affected groups in the general population is essential for producing an effective assessment.

A consensus emerged during the hearings that although the long-term effects of technology—both beneficial and adverse—are of increasing importance to the public, technology assessment is still an evolving study strategy. It incorporates other kinds of policy analyses, such as environmental impact studies, net assessments, social impact analyses, and future studies. As Selwyn Enzer, Associate Director of the Center for Futures Research at the University of Southern California's Graduate School of Business, noted: "Many government and industrial organizations find themselves having been engaged in technology assessment activities before they had any awareness of technology assessment."

Government and industry policy makers agreed that technology assessment provides a range of options and alternatives on which decisions can be based. Dr. H. Guyford Stever, then Director of the National Science Foundation, said that "technology assessment per se does not make either policy or decisions. It provides information for these activities." Monte Throdahl, Vice President of Monsanto, put it another way: "Technology assessment provides the thought process through which . . . difficult value judgments can be made."

Another major finding of the hearings was that technology assessment is a dynamic process, with no routine or prescribed method for its conduct. As Don Kash, Director of the Science and Public Policy Program at the University of Oklahoma, noted: "Any proposed assessment that is characterized as being primarily dependent on a formal methodology should be rejected." Rather, the approach should be tailored to the resources available and the requirements of those using the results. Technology assessment should be, and, witnesses pointed out, to a large extent

has been, capable of adapting to a wide range of circumstances.

Flexibility is necessary, according to Jack Moore, Vice President for Advanced Engineering for Southern California Edison, because "... it is not possible at the outset to account for all technological advances that will occur during project development, or to forecast those that will be acceptable several years in the future." As Lawrence Day, Assistant Director for Business Planning at Bell Canada, said: "If there is a viable technology assessment technique around, we have used it. One thing I can say is that there is no technique today that has received any sort of universal acceptance."

Viewed by the business sector, technology assessment is an important policy tool for understanding the business environment, thereby improving corporate decisionmaking. The executive and legislative branches of the Federal Government regard TA as a policy tool for understanding the public choices before them, as well as for providing information essential for implementing those choices. The witnesses agreed that technology assessment will gain in importance, especially for predicting consequences of technologies that would otherwise be unanticipated, as it is used more widely.

As with other policy studies, the witnesses generally agreed that technology assessments are of increasing value in the policymaking and planning processes in both business and Government. As W. Dale Compton, Vice President for Research at the Ford Motor Company, said, "We regularly carry out technology assessments, and we believe that the results provide a valuable input to our decision process."

Achieving completeness and balance in a technology assessment requires a diversity of inputs from many disciplines. In addition to scientists, engineers, and technologists, the resources of the social sciences, law, education, public interest groups, affected parties, and

many others are frequently tapped. Thus, technology assessment is more of an art than a formal discipline. It depends for success on the resources, talent, and experience of its practitioners.

Another point made during the hearings was that effective technology assessment requires communication with a variety of audiences: potential sponsors and users of technology, decisionmakers, and affected groups in society. One difference, in this regard, was noted between the private and public sectors. In industry, assessments often involve proprietary information, and thus the public is rarely involved and the results may not be released. The opposite is usually the case in Government. Witnesses representing Government agencies told of extensive efforts to involve the public in assessments through public hearings, review panels, and oversight committees. Moreover, there was general agreement among the witnesses that the results of publicly funded assessments should be fully and freely available to the public.

A question raised by several witnesses concerned whether technology assessments should be conducted by in-house staff or whether outside contractors should be used. The decision frequently hinges on the available financial and staff resources, the need for confidentiality, and the question of credibility.

In transmitting the hearings report, Congressman Brown noted that opening and improving communication between the public and private sectors engaged in technology assessment will continue. He added: "Based upon these hearings, and other evidence, I believe that the technology assessment process can help decision makers—in Congress and elsewhere—avoid serious problems that might arise without the availability of such analytic tools. In conclusion, I am satisfied that the utility and acceptance of technology assessment is great enough to warrant our further encouragement of the process both in and out of Government."