

Section I.-Statements by the
Chairman and Vice Chairman of
the Board, TAAC Chairman, and
the Director of OTA

CHAIRMAN'S STATEMENT- SENATOR TED STEVENS

The Office of Technology Assessment (OTA) is now a decade old. In March 1982, the Senate Committee on Rules and Administration held oversight hearings on the progress of OTA. Witnesses from both the public and private sectors testified to the high quality of OTA's products. The hearings demonstrated that in the last several years OTA has developed a track record of competence. In 1982, OTA'S resources were used by 89 different congressional committees and subcommittees, signaling the usefulness of the Agency's work.

In these days of continued pressure on the Nation's finances, legislators must have access to unbiased, timely, and understandable information on which to base decisions about expensive technological activities. For example, OTA's report on the Management of High-Level Nuclear Waste was a useful reference during consideration of that highly controversial issue in the last Congress. The Agency is currently studying other topical issues for Congress such as: wetlands, natural gas availability, U.S. world competitiveness in space, electronics, biotechnology, and automation in the workplace.

OTA is designed to provide both Houses of Congress with unbiased information on technological issues facing Congress. During the last 2 years, OTA's shared staff has lessened the duplication of studies often found in the legislative process. And OTA has done so without losing the necessary objectivity of its work.

VICE CHAIRMAN'S STATEMENT- CONGRESSMAN MORRIS K. UDALL

OTA, now in its tenth year, has passed something of a milestone. I have been a Member of its Board since OTA was established, and it is heartening to note that bipartisan requests now come routinely from congressional committees whose chairmen and ranking minority members each view OTA as a key source of assistance.

Technology plays a critical role in a whole host of legislative areas: in upgrading our national defense, in reducing our dependence on foreign oil, in preserving the health of our people, in boosting the productivity of our workers, in keeping America competitive in international trade, and in providing adequate water for domestic agricultural and industrial use. To be able to make informed decisions on technological issues, it is essential that Congress receive unbiased information and the best analyses available. OTA's authorizing legislation gives it that task. In addition, OTA is charged with keeping Congress abreast of emerging sociotechnological issues. That dual role is not easy, but it is vital.

OTA has acquired an international reputation for excellence. It is always difficult to provide hard measures of quality, but it is surely indicative that OTA's reports are among GPO's "best sellers;" commercial publishers are now reprinting many OTA studies; and some have been translated and published abroad. Media attention to OTA's reports has grown steadily. Foreign interest has increased rapidly. Several countries are considering establishing agencies analogous to OTA. Most importantly, the volume of congressional requests for OTA assistance has risen steadily.

Several OTA assessment activities were of particular value in **1982**. The studies on transported air pollutants were frequently used by the Senate and House committees dealing with amendments to the Clean Air Act. OTA's analyses about the costs and benefits of reducing pollution emissions as well as their downwind effects were heavily utilized by committees, particularly since so much difference of opinion still exists on these issues. Similarly, OTA's pathfinding work on how to proceed with management of high-level nuclear wastes was extremely well received by both House and Senate committees. Its work had a significant and positive influence on congressional efforts to resolve this protracted, vexing, and most challenging issue.



Members of the Technology Assessment Advisory Council meet to provide guidance and direction to the OTA Director

TAAC CHAIRMAN'S STATEMENT- CHARLES N. KIMBALL

The Technology Assessment Advisory Council (TAAC) met in November 1982 for its semiannual review of OTA's progress. This most recent TAAC meeting was held just a decade after the creation of OTA by Congress. A number of observers in the early **1970's** had felt that 10 years would likely be required for the agency to get into full gear, due to the great complexity of the issues it should tackle, the lack of existing models for technology assessment in **1972**, and the difficulty of effectively resolving conflicting information. TAAC's impression is that OTA is now operating with great effectiveness, utilizing information from a diversity of sources, and producing first-rate, high-quality products.

At its November meeting, TAAC reviewed several current projects characteristic of OTA's work related to technology and industrial competitiveness. We found the studies to be well-organized and a good mixture of present issues (international competitiveness in electronics) and emerging opportunities (workplace automation; biotechnology). The results should provide broad insights into the nature of the national economy. The question of understanding structural change in the U.S. economy as it is affected by technological change, demographic change, and Federal policies is increasingly important. Therefore, one must encourage OTA's attempts to move toward an even more comprehensive examination of the future of the domestic economy.

We also reviewed the videotape OTA has produced on the Soviet gas pipeline issue, which presents the issues, opinions, and policy options clearly and objectively. This use of audiovisuals to supplement a formal report can be very helpful in transferring a considerable amount of information in a brief period while clarifying complicated technical details.

Most importantly, we are reassured by the *process* through which OTA carries out its studies. OTA's use of advisory panels, its search for all sources of expertise, and its procedure of soliciting both internal and external review of draft material provide TAAC with assurance that final OTA products will be technically accurate and understandable.

DIRECTOR'S STATEMENT-JOHN H. GIBBONS

The world is less than two decades into learning how to conduct formal technology assessments. Proposals to create a U.S. Office of Technology Assessment (OTA) were widely discussed in the United States during the **1960's**, partly due to controversy that surrounded technologies such as long-lived pesticides and the SST. The situation seemed to be rather straightforward:

1. the world was becoming inescapably dependent on technology for its well-being, if not its survival;
2. virtually all nations looked to technology as their main hope for economic growth;
3. the advent of new, powerful technologies were creating a situation in which the margin for error without large penalty was getting perilously thin; and
4. policymakers recognized the need to improve the means to analyze more carefully and with greater foresight the implications (for good and for bad) of science and the applications of technology.

Congress established OTA 10 years ago. Since then interest in technology assessment has risen both in Congress and worldwide, driven by the necessity to gain not only a better understanding of the complex issues we face but also of the plausible options to deal productively with those issues.

What is New

The “goods” and “bads” of technology have been explicitly recognized for at least two millenia. More recently, but still a century ago, Ralph Waldo Emerson captured the issue in two sentences: “Nature never gives anything to anyone; everything is sold. It is only in the abstractions of ideas that choice comes without consequence.” What is new is the present attempt to apply analytical methods from a variety of perspectives (e.g., diverse disciplines and parties of interest) to an issue and then to synthesize and integrate the results to address the full array of impacts.

The Shape of the Future

Technology assessment (as practiced by OTA) is not, and should not be, oriented toward forecasting the future, but rather toward gaining more reasoned information about how different policy actions could influence or shape the future. As C. P. Snow remarked, “A sense of the future is behind all good politics. Unless we have it, we can give nothing—either wise or decent—to the world.”

How can one do a future-oriented technology assessment without making forecasts or predictions? The answer is not hard. Rather than trying to set each of many parameters at their “most likely” value and

then forecasting a future condition, one can identify the parameters and make alternative projections of outcomes based on different, explicit assumptions about key parameters or events. This enables one to gain a sense of how the future could be shaped by actions taken between now and then—but not a prediction of what the future will be.

Gaining Understanding

When technology assessment was first undertaken, it was sometimes viewed with considerable suspicion. OTA, for example, in its earlier years had been called (not entirely with tongue-in-cheek) the “Office of Technology Harassment.” Fortunately, it also was labeled by some different observers the “Office of Technical Assistance.” Such concerns can be overcome by demonstrating—both by the process of review, and content of the product—that advocacy and bias have been avoided. The process of substantial involvement of diverse parties at interest, plus extensive review and critiques of draft material helps ensure quality and minimizes the chances for bias in the final results.

The OTA Approach

A great advantage of OTA is the fact that its framers were able, by taking advantage of the structure of American political parties and the separate establishment of executive and legislative branches, to craft a strictly bicameral and bipartisan organization. Such a procedure is not readily adaptable to other forms of government. However, it appears that most of the procedures employed by OTA are, to a very large degree, widely transferable. This includes the use of external advisers, reviewers, and contractors to supplement an in-house analytical staff, in a well-tested process of focusing the best minds and using the best information available on issues. The OTA staff structures the work, analyzes and integrates the individual tasks of the study, writes the report, and is involved in the extended process of delivering the information (publications, briefings, testimony) to the policy decisionmakers.

Common Issues and Concerns

Sociotechnical problems faced by the world’s industrialized nations are very similar in nature. Assessments commonly encountered in different countries include energy (supplies, wastes, and utilization); environment (air pollution, water supplies); innovation and competitiveness as influenced by technology (electronics, steel, agriculture, space); automation in production and service industries (automobiles, finance); and health care (costs and benefits), to name a few. In other words, they have to do with the constant struggle, independent of *political structure*, of societies to achieve and maintain their wants and needs. The analytical methods used to investigate these issues are comparable from one country to another, and there is much to gain by sharing successes

and shortcomings. The actual transfer and use of results in the political decision process also has many similarities among nations, but it is clear that the process must be carefully and individually tailored to the audience. One reason for this is that policymaking is a very delicate and complex process, frequently relying on personal interactions. Unless the results of technology assessments can be transformed into a format that is compatible with the realities and workings of the policy decision world, one cannot hope that the work will have much direct value.

Communication of Findings

The translation and communication of the results of a technology assessment is a challenging process. Results must be laid out carefully in terms of findings and conclusions, but the relevant policy choices should be discussed in terms of options and alternatives in a way that does not preempt those charged with actually making choices and decisions. The line between findings and conclusions *versus* recommendations can be fine but the distinction must always be made. Several examples from OTA's past experience might help to illustrate this point:

- In a study of Government vaccine immunization programs, OTA found evidence strongly confirming this approach to be cost effective as a public health measure. While no specific "recommendation" was made by OTA, Congress decided to act on the basis of those facts.
- OTA examined Soviet energy production and resolved apparent earlier conflicts over projected supplies. It also identified natural gas exports to Western Europe as a key issue. The assessment pointed out the limited utility of the United States taking unilateral action to try to stop the Soviet gas pipeline.
- In an analysis of alternative basing modes for the MX missile, a number of specific findings were made about relative strengths and weaknesses of different basing options. - As a consequence, one could favor one or another (or none) of the alternatives depending on the relative degree of importance one placed on such parameters as sensitivity of vulnerability to technological change, time needed to deploy, and cost. Thus, the study did not recommend just one alternative but allowed decisionmakers to make choices on the basis of their own explicit policy judgments.
- During the process of examining the issue of high-level commercial nuclear waste disposal, OTA discovered a series of interlocking steps that, if taken together, seemed to point to a way to resolve this multidecade problem. In this study, the plausible "options" were so few, and the views of widely different parties of interest so strongly developed, that OTA's findings and conclusions did point more to a single integrated plan for action than to a set of different alternatives. Some policymakers have expressed their opinion that more assessments such as this are needed.

Where We Are Going

Information derived from OTA assessment analyses must be packaged carefully, keeping clearly in mind the needs of the ultimate customer. While the nominal completion of an assessment is the publication of a formal report, the actual delivery of the results of a technology assessment is most effective when it consists of a process, extending over time and containing a variety of forms both written and oral. This fact underscores the value of having a full-time staff located close to the seat of government that can effectively gather, integrate, translate, and deliver information.

While the news of late seems to be mostly good in terms of the perceived value of technology assessment to policy decisionmakers, there is little room for complacency. First of all, the need for more socially adaptable technology—to respond to the burgeoning challenges of economic growth, avoidance of international conflicts, environmental improvement, and social equity and justice—has never been greater. As this process accelerates and as increasingly powerful technologies are developed, we encounter narrowing margins for error. There are critical errors in these areas whose cost can be enormous. Hence, the methods of analysis and means of delivery of technology cannot afford to be merely good—they must be very good and constantly improved.

Second, the time allowed for policy decisionmaking in most cultures is characteristically shorter than the time inherently required for the kind of careful and comprehensive analysis as characterized in a technology assessment. Answers are usually needed very quickly by decisionmakers after the questions are identified. That can result in superficial responses unless the questions can be anticipated with sufficient leadtime to enable thoughtful analysis to occur before the answers are needed. Therefore, we must continue to work in two areas related to timeliness: 1) develop ways to do a better job of anticipating the policy debate, preferably 2 years or more in advance, and to scope the analysis so that it can be carried out in time; and 2) develop ways to provide decisionmakers with timely information drawn from an ongoing assessment while still continuing the analysis. Obviously, such information cannot be as comprehensive as that from a completed project, but a fundamental lesson that technology assessment practitioners must understand is the extraordinary time-value of information in the policy decision process.

Finally more attention needs to be given to the integration of results from interrelated groups of assessments. For example, one can do separate assessments of the impacts of energy development, agriculture, industrial and population growth, or defense activities on water and

other resource demands in the Southwestern United States. But what of their combined impacts? Integration is essential if we are to gain a clear perspective of the relationship and tradeoffs among major national goals and priorities. To do so requires a high level of synthesis of information—a notoriously difficult thing to do. But, as a wife responded to her husband’s complaint about growing old: “consider the alternative. ”