



# Scientific and Technical Advice to Congress

Michael Gough

*The Marshall Institute – Science for Better Public Policy*

**The George C. Marshall Institute**

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## About the Author

During a decade-long academic career, Michael Gough (PhD, biology, Brown University) published two dozen papers in molecular biology and was a Fulbright Lecturer in Peru and India. He joined the congressional Office of Technology Assessment in 1977, where he directed and contributed to OTA reports on subjects ranging from environmental causes of cancer, occupational health and safety and Love Canal through biotechnology to oil shale mining. He directed OTA's congressionally mandated oversight of studies of cancer in veterans of atom bomb tests and of the health of Vietnam veterans. He chaired a Department of Veterans Affairs advisory committee (1987-90) about the possible health effects of herbicides used in Vietnam and the Department of Health and Human Services committee (1990-95) that advises the United States Air Force study about the health of Air Force personnel who sprayed Agent Orange in Vietnam and served again on that committee (2000-2004). In 1995, he served on the Environmental Protection Agency's Science Advisory Board committee that evaluated EPA's dioxin reassessment. Gough has worked at a consulting firm, as a free-lance consultant in private sector think tanks, and he retired as Director of Science and Risk Studies at the Cato Institute and from full-time work in 1999. He wrote and edited four books, wrote more than forty papers about environmental and occupational health and numerous newspaper op-eds and testified about three dozen times before Congress. He is a fellow of the Society for Risk Analysis and was President of the International Society for Regulatory Toxicology and Pharmacology (2001-2002).

Since his retirement, he has been a volunteer teacher of English as Second Language to adults in suburban Maryland. He continues to consult and write about various aspects of science and technology.

## Preface

Interest in how policy makers, and Congress in particular, receive information about scientific matters continues to grow because of the importance of scientific and technical issues in determining national policy. The Marshall Institute agrees that a better understanding of how policy makers obtain information about matters of science is vital.

Recent calls for the re-creation of the disbanded congressional Office of Technology Assessment (OTA) illustrate this concern. The Congress is said to lack a source of objective, qualified advice on science and technology matters. Many S&T policy analysts feel the solution is the creation of a “professional advisory body on scientific and technology matters” to serve Congress.

In our view, these calls for a new organization raise several interesting questions that have not been adequately addressed:

- Is a formal structure even necessary? The calls assume that Members of Congress and their staff cannot obtain advice on scientific and technical matters in an efficient and effective manner on their own. Members and staff are said to be overextended and therefore lack the time to collect and analyze information or lack the intellectual backgrounds needed to analyze it correctly. Congressional hearings are seen as providing only partial viewpoints. Information derived from the private sector, interest groups, think tanks, and others is considered biased. Nevertheless, Congress is setting national priorities today in the absence of such a structure. Could informal or ad-hoc structures provide the information and analysis sought by proponents of an OTA-like institution while avoiding the problems associated with formal institutions? These concerns beg the question of how much scientific information is actually necessary to set policy.
- Is it possible to create and maintain a bipartisan congressional institution? Any new S&T advisory structure must be bipartisan if it is to have credibility, advocates conclude. The new structure would be governed by an equal number of representatives from both political parties. Is this requirement a sufficient defense against partisanship? Given that much of the actual work of the institution would be done by staff or outside consultants, as was the case with the original OTA, what steps can or should be taken to ensure political impartiality among staff? In a time of increased partisanship, is it possible to create a truly bipartisan advisory group?
- If created, how will the autonomy of the new institution be preserved? What steps can be taken to insure that the new organization is not “captured” or unduly influenced by federal departments or agencies, interest groups, private sector interests, academia, or others?
- How can a new institution connect with academia in a meaningful way? The very best scientists and engineers are principally engaged in their craft and may not be

attracted to policy studies. Moving from discussion of science to discussion of the policy implications drawn from scientific results may subject participants to enormous pressures to conform. How can a new organization protect participants from these pressures?

- What are the abilities or capacities of other institutions to provide similar kinds of advice? This question has been most studied by advocates of a new structure. Most conclude that the existing congressional support agencies (GAO, CRS, CBO) like the resident expertise and focus to provide the type of advice that is believed to be lacking. Pilot initiatives have tested whether these institutions could be altered.

Michael Gough's unique review of the origins and operations of the OTA, drawing on his experiences working inside the organization, offers an important perspective on the advantages and limits of the OTA structure. His report represents the starting point in the Marshall Institute's examination of these questions as well.

Jeffrey Kueter  
President, George C. Marshall Institute

## Summary

The Office of Technology Assessment (OTA) originated when Congress determined that it needed additional resources to understand and prepare for advances in science and technology. During its twenty-three years of operation (1973-95), OTA's several hundred reports on various technical subjects were well received by many experts, but their usefulness to Congress was less clear. Moreover, OTA sometimes took too long to deliver its reports, and the office was accused of leaning too much toward Democratic positions. The Republican Congress terminated funding for OTA in 1995, and the office closed. In the decade since, sporadic attempts in Congress to revive OTA or to fold an "OTA clone" into another congressional support agency have gone nowhere.

This paper discusses OTA's origins, products, measures of success, and demise. It analyzes reasons for that demise and offers cautions about the structure of any future OTA-like organizations. Whether a new organization is needed to provide Congress scientific and technical information is an open question, but a number of models for such an organization have been put forward and are summarized here. Three models propose enhancing analytical capacities at existing organizations. One recommends the establishment of an organization much like OTA. Three suggest new organizations with a small staff of congressional employees who would contract with outside experts for the analytical work needed by Congress. The last four proposals incorporate a bipartisan, bicameral board to oversee the organization's operations, just as the Technology Assessment Board (TAB) oversaw OTA.

Unless there is some dramatic adverse development concerning science and technology that reflects poorly on Congress or Congress decides that it needs additional information to understand and counter Executive Branch initiatives, there seems little chance that a new organization will emerge.

## OTA's Origins

At the end of World War II, science and technology entranced citizens who saw them as central to victory and eagerly looked forward to new developments. That infatuation was tempered by the mid-60s, when the technology-rich Vietnam War heated up and bogged down, and the effects of products of modern technology on the environment emerged as a central issue in policy. Partly in response to the public's changing perceptions, Congressman Emilio Daddario, a Democrat and chair of the House Committee on Science, spearheaded efforts so that Congress could "minimize the negative effects of new technologies and maximize the positive effects."<sup>1</sup>

The Science Committee spent six years, from 1966 through 1972, considering possible methods to provide technical advice to Congress and commissioned reports on the subject from the National Academy of Science (NAS), the National Academy of Engineering, the National Academy of Public Administration, and the Legislative Reference Service (later named Congressional Research Service, CRS) in the Library of Congress. Early in the 92nd Congress, the committee reported out a bill that was to become *The Technology Assessment Act of 1972*<sup>2</sup> and establish the Office of Technology Assessment (OTA). The Senate amended the House bill, the two chambers met in conference on October 4, 1972, and the compromise bill was forwarded to President Nixon, who signed it into law on October 17, 1972.

Mr. Daddario was OTA's outspoken advocate and Senator Edward Kennedy was an early champion in the Senate. Congress was not, however, the greatest source of the enthusiasm for the office. Instead, the enthusiasm "stemmed originally from the congressional support agencies and from the outside scientific community."<sup>3</sup> Harvey Brooks, a Harvard physicist who worked to meld science and public policy and who had chaired the 1968 NAS report that paved the way for OTA, is credited as the primary author of the 1972 legislation that created the office.<sup>4</sup>

Conflict between the Executive and Legislative branches of government and the perception that the Executive Branch "out-gunned" Congress in discussions of science and technology were important to the establishment of OTA. Indeed, Adam Keiper writes, "What finally provoked Congress to create its own science and technology agency was its growing mistrust of and increasing clashes with the executive branch."<sup>5</sup> Keiper relies on quotes from Mr. Daddario and Mr. Kennedy and "a leading Republican on the House Science Committee" to buttress his assertion.

The OTA organization that emerged looks good on paper. Its governing board, the Technology Assessment Board (TAB), was bipartisan and bicameral to prevent capture of the new organization by one party or one house.

During its early years, TAB acted much like a congressional committee. Its members instituted OTA programs to carry out research that interested them. The OTA Health Program was Mr. Kennedy's; the Oceans Program was Senator Ernest Holling's; the Materials Program was Representatives Olin Teague's and Charles Mosher's; the Food Program was Senator Hubert Humphrey's. During the first few years of its operation, TAB retained the authority to approve or reject people considered for employment at OTA, and TAB members appointed staffers and associates to positions at OTA. Mr. Kennedy appointed a long-time associate, Ellis Mottur, as OTA's Assistant Director.

The Technology Assessment Advisory Committee (TAAC, see Box 1) was not important to the operation of OTA. Neither was it important to many of the individuals appointed to it, who quickly resigned.

Box 1

**Organizations and Roles Established by the  
Technology Assessment Act of 1972**

**1. The Technology Assessment Board (TAB).**

A board to direct and control the operation of the Office of Technology Assessment. Six Senators and Six Representatives, with three Senators and three Representatives from the majority party, and an equal number from the minority party. Chairmanship moved from one house to the other with each Congress. A member of the majority party in the house where the TAB was located was chair and a member of the minority party in the other house was the vice-chair. TAB had to approve the initiation of (most) OTA projects and had to approve the release of (most) OTA reports.

**2. The Technology Assessment Advisory Committee (TAAC)**

Non-congressional members selected by TAB to be its advisors. It was of little consequence.

**3. Congressional Committees.**

Only congressional committees could initiate requests for studies by the Office of Technology Assessment. Either the chairman or the ranking minority member of a committee could make the request on his own behalf, on behalf of the committee, or, of course, as a favor to anyone.

**4. The Office of Technology Assessment.**

A congressional support agency. OTA staff carried out research and contracted for research with outside-of-government entities in response to requests from TAB. TAB appointed the OTA Director. After a few years, while TAB made hires for the office, the director had responsibility for staffing the agency. OTA staffers were congressional employees. They had no tenure, but had access to government medical and retirement plans. Each major OTA project had an advisory panel—unpaid, non-government experts and “stake-holders”—that met and commented on and reviewed OTA's work. The written reports from OTA projects were reviewed by other experts and “stakeholders,” and finally reviewed by TAB. With TAB approval, OTA reports were published, delivered to Congress and other parties, and made available to the public.

Box 2		
OTA Directors		
Director	Background	Tenure
Emilio Daddario	War hero, former U.S. Representative	Nov. 1, '73 – Jul. 1, '77
Daniel DeSimone (acting)		Jul. 1, '77 – Jan. 23, '79
Russell Peterson	Ph.D. chemist, former governor of Delaware	Jan. 23, '79 – Mar. 31, '79
Daniel De Simone (acting)		Mar. 31, '79 – Jun. 20, '79
John H. Gibbons	Ph.D. physicist, former science advisor in White House	Jun. 20, '79 – Jan. 28, '93
Roger Herdman (acting)	M.D., former vice-president, medical institute	Jan. 28, '93 – May 5, '93
Roger Herdman		May 6, '93 – Sep. 30, '95

OTA had four directors (see Box 2). Mr. Daddario, who had led the fight for the OTA in Congress, resigned from Congress and unsuccessfully ran for governor of Connecticut. No one could have better understood congressional expectations for OTA, and he was named its first director. His tenure is remembered as an effort directed at maintaining good relations with TAB rather than in establishing an independent agency. He resigned abruptly in May 1977.

At that time, some TAB members and some editorialists were criticizing Mr. Kennedy's dominance of TAB and his influence on hiring and direction at OTA. Some TAB members resigned from the board, saying that Mr. Kennedy had pressured Mr. Daddario to resign so that Mr. Mottur could replace him. True or not, the perception of OTA as a Kennedy-dominated operation left OTA in serious trouble.

Russell Peterson, a liberal Republican and the second director, distanced OTA from TAB and is given credit for "saving OTA" when its future was very much in doubt. He successfully wrested responsibility for hiring and firing OTA staff away from the board. He solicited ideas for possible OTA projects, "the priority list," from a wide variety of organizations and individuals, but that effort backfired with TAB, which was determined to direct OTA's activities. Accusations about Peterson's management style might have presaged worse relations to come with TAB, but Peterson resigned (suddenly) to take the presidency of the Audubon Society.

John Gibbons, known as "Jack" to just about everyone, is given credit for rescuing OTA from a fall into oblivion and presiding over the office's golden age. His first step was to fire about 15 percent of the OTA staff who had been employees or associates of TAB members. He established and maintained good relations with TAB members and the often-heard talk about the agency disappearing faded away.

Four years later, in 1993, Gibbons resigned when President Clinton appointed him Presidential Science Advisor. A half-dozen or so senior people in the OTA Director's office went with him to the White House.

Roger Herdman, an OTA assistant director, was appointed acting director upon Gibbons' departure and served in that position for a little over three months. During that time, TAB looked for a new director from outside the agency, and appointed a prominent academic scientist to the position, only to be turned down. In May 1995, Herdman became director and had the unhappy distinction of closing the agency a little less than six months later.

Bruce Bimber, in his study of OTA, makes the case that the agency strived for political neutrality and had marked success in achieving it in the products it produced for Congress.<sup>6</sup> Whatever success it had, it never removed the stigma of a "Kennedy organization" or a "Democrat organization" that was attached to it in its first years. Gibbons' decampment to the Clinton White House, taking several members of his staff with him, added to the Democratic taint in many people's minds. The taint did not help OTA when the Republicans took control of both Houses of Congress in 1995.

## OTA Products

During its twenty-one or so years of operation, OTA produced about 400 assessments (its principal products—book-length reports), other shorter studies, and memoranda for Congress.<sup>7</sup> The interested reader can find OTA's written products, "The OTA Legacy," maintained by Princeton University, at <http://www.wws.princeton.edu/~ota/>.

Among other subjects, OTA analyzed

- *biotechnology*;
- *defense*—virtual reality for combat training, the Strategic Defense Initiative, weapons against terrorism and weapons of mass destruction;
- *energy*—gasohol, coal slurry, oil shale, and nuclear power;
- *environment* – clean air, waste reduction, invasive species,
- *health*—MRI, contact lenses, wheelchairs, prosthetics, passive smoking, and cost-benefit determinations of the value of preventive measures and certain procedures;
- *the oceans*;
- *space*—new boosters, satellites, and anti-satellite weapons; and
- *telecommunications*.

OTA staff wrote the assessments and other reports, sometimes drawing heavily on reports from "contractors" or "consultants," individuals and organizations with particular expertise in the particular area. Every assessment had an advisory panel that

met one or more times while the project was underway to comment on the assessment plan, selection of contractors, and organization and writing of the report. The advisory panel members and other experts and stakeholders reviewed the draft report before it was sent to TAB. Except under unusual circumstances, Executive Branch employees did not serve on advisory panels, but many participated in the review process. The extent and depth of reviews differed, of course, as did the attention given to them by OTA staff.

OTA did not make recommendations or suggestions for congressional actions about development or use of a technology, but the agency offered “options” for congressional action. Options generally ranged from “do nothing different and the expected consequences include...” to “dump the current system, establish a new program, and the expected consequences include....” What is important in options is the detail and documentation that accompany each expected consequence. Careful detailing of the expected positive consequences made an option look better. Elaboration of expected negative consequences had the opposite effect.

In most assessments, staff developed the options late in the project. Often, probably, review of the options by advisory panel members and others were perfunctory, and OTA staffers, rushed to complete the assessment, were likely reluctant to consider major changes to them. It may seem odd to read of “rushed” in an agency with a reputation for slowness, but that adjective described the wind-up of many OTA projects.

OTA assessments were published as softbound books and made available to the public through the Government Printing Office. Sold for a nominal price, they, like all government publications, were not copyrighted. Some outside organizations bought OTA publications for, say, \$6 a copy, and re-sold them for \$40. Most assessments were accompanied by a shorter—a few to a few dozen pages—summary that included the assessment’s conclusions and options, and a one-page distillation of the report.

In addition to the assessments, OTA produced “tech (or “staff”) memos” and “background papers,” shorter written pieces focused on specific questions from Congress. In some cases, these projects originated from legislation that required OTA to undertake a study (called “mandated studies”).

### **“Mandated Studies.”**

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TAB and OTA did not welcome legislated (“mandated”) studies because those studies took direction of OTA studies and expenditures away from TAB. One proposed piece of legislation would have directed OTA to investigate accessibility of the public transportation system by handicapped persons and another would have mandated the study the transportation infrastructure. Either of these mandates would have consumed a great deal (all?) of OTA’s budget. Both were turned aside by TAB members before they became law.<sup>8</sup> In other cases, TAB learned of mandated studies only after legislation had been signed into law, and TAB, like everyone else has to follow the law.

Whatever problems they caused, *enough mandated studies might have insured OTA's survival*. Congress *wanted* studies it mandated, and it expected or *required* that they be delivered on time.

### **“OTA-Fostered” Reports.**

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Ideally, every request for an OTA project would have originated from a congressional interest. Many did. Others resulted from OTA staff contacting committee staff and suggesting a study. Whatever pluses and minuses accompanied such OTA-fostered requests, two big minuses were that the congressional committee did not depend on the study to further its legislative agenda, and it brought no pressure for timely delivery. I think that the absence of such pressure contributed to the lateness of OTA reports, which former Representative Robert Walker, chair of the House Science Committee in 1995, identified as a major factor for what he considered to be OTA's failure to contribute to legislation.<sup>9</sup>

OTA-fostered requests were surely the origins for many OTA reports—well-done, informative, and interesting as they were—that fell unnoticed into the seas of papers that inundate Congress and Washington, in general. As Keiper summarized them, “not all OTA reports were definitive studies or influential in shaping legislation; many were forgettable documents written on topics only of passing interest to Congress.”<sup>10</sup> OTA staff wanted to be busy, and when they finished a project, they were looking for new work. They ginned up the OTA-fostered studies, and lack of committee interest in such projects doomed most of them to a leisurely schedule and delivery to an uninterested Congress.

D. Allan Bromley, who served on President Reagan's White House Science Council and later as the first President Bush's assistant for science and technology, summarized the impact of a study (not OTA's) that was produced during the Strategic Defense Initiative debates, “It had no influence on events because *there's nothing more useless than advice that is not wanted* (emphasis added). And so, nobody got asked for this particular study and so nobody paid that much attention to it.”<sup>11</sup> A harsh judgment, it may apply to many OTA products, especially in the eyes of some Republican legislators.

Bruce Smith and Jeffery Stine summarize Republican attitudes to OTA. OTA

was regarded as a costly, unresponsive staff unit that worked on its own rather than of a congressional time schedule.... [It] was faulted ... for its slow pace, the irrelevance of many of its studies, and as a hotbed of industrial policy advocacy on behalf of Democrats.<sup>12</sup>

The Republican complaints might have been the same if OTA had worked only on mandated studies and projects that originated from committee and TAB-initiated requests. That seems unlikely, however. More reports would have been important to Congress, delivered on the “congressional time schedule,” and Republican members of TAB and TAB staff would likely have been more diligent in identifying Democratic bias if the reports were going to be used in legislation.

## Bringing Attention to OTA Products.

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OTA staff, the director, and assistant directors were sometimes invited to testify before a congressional committee, but congressional testimony did not accompany every project. Informal contacts between OTA and congressional staff to discuss projects and reports were encouraged, and such contacts, when made, were maybe the most successful way to interest Congress in OTA. Underlining this conjecture, Bimber states, “Most staff whose committees used OTA studies claimed that personal contacts, telephone calls, meetings, and briefing were just as important if not more so than written reports.”<sup>13</sup>

Many OTA staff came from academic positions or backgrounds, had published papers in professional journals, and made presentations to professional societies. As far as I am aware, OTA management made no move to restrict publications in professional or popular journals or talks to professional and general audiences except to insist that nothing definitive be said about ongoing, not-yet-completed projects. Such publishing and speaking broadened reception of OTA reports and may have increased congressional attention.

## Measuring OTA’s Performance

Evidence that OTA affected the workings of Congress is sparse. As Bimber writes,

Indeed, it is impossible to identify a single bill where an OTA study was clearly decisive to the outcome—as measured in votes. Neither agency personnel, congressional staff, nor legislators interviewed for this [Bimber’s] study could cite a single case where a member of Congress voted for or against a bill chiefly on the basis of an OTA study.<sup>14</sup>

and

When one does so [examines *The Congressional Record*], an unmistakable finding stands out: the agency [OTA] is nearly absent from twenty-three years’ worth of political rhetoric.... During the 1980s and 1990s, Congress’s 535 legislators together referred to an OTA study by name less than once a month.... OTA citations in the record actually declined annually in the 1980s and 1990s, despite the fact that agency’s annual output in studies doubled during this period.<sup>15</sup>

It’s no surprise that no one cites an OTA report as the basis for a vote. OTA options didn’t come down on the side of a single specific action, and a person looking to explain his vote would probably cite a more one-sided analysis or conclusion. Even so, some OTA assessments contributed directly to legislative debates and decisions.

A few OTA reports—on subjects like polygraph testing, worker dislocation, the trucking industry, post-Cold War defense spending, and preventive interventions in healthcare—correlate directly with specific bills that became law. It is also

possible to show direct links between a few OTA reports and bills that were proposed but didn't ultimately become law.... the agency sometimes convinced Congress to kill bills or do nothing at all. "Sometimes, inaction [was] a salutary effect" of OTA's work, one former staffer explained.<sup>16</sup>

Adam Keiper,<sup>17</sup> Bimber,<sup>18</sup> and authors in the collection of papers *Science and Technology Advice for Congress*<sup>19</sup> argue that OTA's work was important to early steps of legislative process. OTA's chronic lateness with reports somewhat undercuts this claim. On the other hand, OTA staff could talk with congressional staff about the findings of their studies while the studies were underway.

OTA reports were sometimes used by proponents and/or opponents of bills in testimony or written comments delivered to Congress, and some OTA advocates point to OTA reports raising the level of discussion about some issues. Still in all, there is little written record of OTA influence on legislation. "Most OTA reports were just a low-key part of the policy process, serving to distill reliable facts, clarify debates and improve congressional understanding."<sup>20</sup>

Some OTA staff thought it desirable and a worthwhile goal for the office to "empower" the public and stakeholders about issues in science and technology. Others would have agreed with a fictional English entrepreneur, who viewed empowerment as a step toward opening decisions through "tokenism, special interests, and minority groupings."<sup>21</sup>

Robert Margolis and David Guston<sup>22</sup> discuss the results of two surveys of congressional staff about the usefulness of OTA reports. In 1978, the House Committee on Science and Technology<sup>23</sup> reported the results of interviewing forty-seven congressional staffers "who had used one or more OTA assessments." The survey found that 4 percent of the interviewed staffers considered OTA reports "not useful;" 20 percent, "somewhat useful;" 25 percent, "useful;" 51 percent "very useful." Twelve years later, in 1990, Bimber<sup>24</sup> surveyed thirty-five congressional staffers "regularly involved in science and technology issues." No staffers judged OTA reports to be "not useful;" 9 percent, "somewhat useful;" 41 percent, "useful;" 50 percent, "very useful." Between 1978 and 1990, the combined "not useful" and "somewhat useful" responses dropped from 24 percent to 9 percent, and the combined "useful" and "very useful" responses rose from 76 percent to 91 percent. Margolis and Guston conclude, "OTA's reputation among congressional staff who deal with science and technology issues on a regular basis improved considerably."<sup>25</sup>

In terms of impact, the results of the surveys must be considered in terms of congressional staff members. Congress had 28,000 employees when the House Science Committee surveyed forty-seven staffers who had used OTA reports, so the surveyed staffers represented about 0.2 percent of total staff. The number of congressional staff dropped to 24,000 in 1999, and the thirty-five staffers interviewed by Bimber in 1991 was on the order of 0.1 percent, or one in a thousand. Not all congressional employees were staffers serving in analytical and legislative positions, but a considerable number were, and the number of surveyed staffers is a small part of the

total. There can be no measurement of the impact of OTA among staffers who knew nothing about it, but it is certain that that number greatly exceeded the number who did.

## **A Negative Congressional Appraisal.**

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The most important judges of OTA's value were Members of Congress. Mr. Robert Walker, the former chairman of the House Science Committee, judges OTA harshly. When the House was considering "zeroing-out" OTA in 1995, he surveyed House members and no member told him that OTA had been important in legislation.<sup>26</sup>

## **OTA Impacts Outside of Congress.**

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Quite apart from their impact or lack of impact on Congress, OTA reports can be judged on how well they did in presenting information about technology in the real world. For example, Daniel Greenberg, a science journalist and critic of the U.S. scientific establishment, favorably contrasts OTA's reporting about the uncertainties of predicting future demands for Ph.D.s in the marketplace with the National Science Foundation's (NSF's) projections of ever-increasing demands. In that case, NSF, under new leadership, eventually backed down from its projections.<sup>27</sup>

The "policy options" from a 1988 OTA assessment of alternatives for the Space Shuttle illuminate the difficulty of predicting the future, which was what options amounted to. The options from *Launch Options for the Future: A Buyer's Guide* (OTA, 1988) are reproduced in Granger Morgan and Jon Peha.<sup>28</sup> Missing from the options is any consideration of the effects of another disaster (after *Columbia*) to the Space Shuttle Fleet and the resulting direction of much of the National Air and Space Administration's (NASA) budget and effort to repair and correct the shuttle. I do not doubt the rigor of analyses that went into the options and the optimism that guided their development, but they have not been a guide to the activities in space research or travel. The options missed the mark, illuminating the difficulties of predicting the future.

## **Costs and Benefits of OTA.**

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It is possible to look at the history of OTA and find examples of where its work saved many more dollars than the office cost. To take a tiny example, the OTA conclusion that the "Agent Orange twin study" (see below) should not be undertaken saved at least \$10 million (the study's budget), and probably much more because epidemiology studies have a tendency to go on longer than planned and cost more than budgeted. On a far larger scale, OTA's review and confirmation of a Government Accounting Office (GAO) study's cautions about a Social Security Administration's plan to upgrade its computer system saved \$368 million dollars.<sup>29</sup> Its cautions against proceeding with the Synthetic Fuels Corporation in the early 1980s saved about \$80 billion,<sup>30</sup> and its cautions against going ahead with the Strategic Defense Initiative may have contributed to saving billions of dollars; the exact contribution of OTA to that decision is unknowable. Such savings far outweigh the cost of OTA, which, at its peak, had an annual budget of \$20 to \$22 million. Whether the decisions that followed the OTA reports were the right ones is not, of course, addressed in a simple toting up of costs.

I have seen no analyses of OTA reports contributing to decisions to institute new programs or beef up existing ones and the costs that flowed from them. Costs from some such programs must have exceeded the benefits.

## Some Comments from Inside OTA

Many of the people who write about OTA rely upon information from former OTA directors and people who worked in the director's office and largely ignore OTA staff that directed, organized, produced, and tried to bring OTA assessments to the attention of Congress and others. To provide information about impacts of some OTA studies, I will discuss some reports I contributed to.

### Cancer.

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The 1981 assessment *Technologies for Determining Cancer Risks from the Environment* had, as far as I am aware, no impact on congressional actions. Congress continues to fund the Environmental Protection Agency (EPA) to look for causes of cancer in air, water, and soil despite all the evidence that such exposures are of minor importance in cancer causation. Even so, the report had important consequences.

I contracted with Sir Richard Doll and Richard Peto for estimates of the amounts of cancer associated with various occupations, behaviors, and exposures. Doll and Peto concluded that smoking causes more than 30 percent of all cancers and that exposure to chemicals and radiation in the general environment were associated with less than 5 percent, and, likely, far less than that.

Aware from other scientists that Doll and Peto had completed their analysis, the editors of *The Journal of the National Cancer Institute* contacted me and asked to publish the Doll and Peto report. OTA agreed and the journal published it<sup>31</sup> before the OTA assessment was published, and Oxford University Press subsequently published the report as a book. The Doll and Peto report was of fundamental importance to the near-death of the then-popular statement that "90 percent of cancer is caused by the environment" where "environment" meant chemicals and radiation in air, water, and soil.

I recall two specific responses to the OTA report. Someone from the American Tobacco Institute called and told me that the Institute was determined to get me fired and had contacted a TAB member to initiate that. A staffer in the member's office called me to say that the member told him "The American Tobacco Institute are not only assholes; they're paranoid assholes." I worried no more. From the other end of the policy spectrum, a Ralph Nader organization called to tell me that Doll and Peto were unscrupulous and asked me how much OTA had paid them. Evidently, the organization had no foundation for attacking Doll and Peto's work because when I said OTA had paid \$11,000, I heard no more from it.

## Mutations.

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Several environmental protection laws direct EPA's attention to mutagens (agents that cause mutations—genetic changes—that are passed from generation to generation) as well as agents that cause cancer (carcinogens) and birth defects (often called “teratogens”). EPA had focused little effort on mutagens, but I worried that Congress might write legislation to direct EPA to intensify such efforts. The absence of any convincing information that any chemical exposure had caused human mutations convinced me that such efforts would probably be fruitless. If EPA established programs to “deal with the mutagen problem” as it had dealt with the “carcinogen problem,” I expected it to be expensive, likely produce unnecessary alarm, and produce nothing of value to human health. I fostered a request for a project that resulted in *Technologies for Detecting Heritable Mutations in Human Beings* (OTA, 1986).

The report concluded that there was no evidence that chemicals had caused human mutations and that radiation, even as intense as that which resulted from the atomic bombs dropped on Japan, had caused no detectable mutations. The report allowed for the possibility that more sensitive tests might reveal links between specific exposures and human mutations, but that basic research scientists would have to develop and validate those tests before any program to look for mutagens was established.

No legislation emerged that directs EPA to look for mutagens. To my mind, that is a positive result, but it might have been the same in the absence of the OTA report.

In examining new and developing technologies for genetic research, OTA made an estimate of the great expense to sequence even short lengths of the human genome. A Department of Energy (DOE) assistant secretary read the report and decided that new technologies then being developed would make sequencing the human genome affordable.<sup>32</sup> Although the National Institutes of Health (NIH) had brushed aside requests to initiate a sequencing project, DOE's enthusiasm caused it to cooperate in doing so.<sup>33</sup>

Neither the “cancer report” nor the “mutations report” had any discernible consequence in congressional action. On the other hand, both had consequences.

## Agent Orange.

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Congress mandated OTA to review and approve, if appropriate, any Executive Branch studies into possible health consequences from exposures to Agent Orange in Vietnam and to review and comment on the results of any such studies.<sup>34</sup> The “Agent Orange legislation” required OTA to report to the Veterans' Affairs Committee every sixty days until an approved study was initiated.

Development of a plan to study the health of ground troops who might have been exposed to Agent Orange was a long, involved process that included shifting

responsibility for the studies from the Veterans Administration (VA, now Department of Veterans Affairs) to the Centers for Disease Control (CDC). OTA kept Congress informed through a series of letter reports and testimony and approved the CDC's plans for the studies.

Consequently OTA reviewed the results of the CDC studies and some VA studies and agreed with CDC's conclusions that there was no convincing evidence that Agent Orange had caused adverse health effects in veterans or birth defects in their children. The office also agreed with CDC's results that showed there was no evidence that ground troops had been exposed to measurable levels of Agent Orange.

Congress was not satisfied with the scientific information and turned to the Institute of Medicine (IOM), part of the National Academies, for an additional review. The IOM concluded that Agent Orange was likely responsible for a variety of diseases, but acknowledged that it ignored usual scientific criteria in its review of the underlying studies. Congress responded to IOM's review—at variance with essentially all scientific opinion—and the United States is now paying compensation to Vietnam Veterans for those diseases.<sup>35</sup>

OTA did, however, block a study that would have cost a minimum of \$10 million and produced no results of value. VA proposed to study the health of twins, one of whom had served in Vietnam while the other twin had served elsewhere. OTA calculated that the small number of such twin pairs would make it impossible to detect any excess disease, even if, in fact, an excess was present. In scientific jargon, the proposed twin study lacked “power” to provide any information.

### **“Atomic Veterans.”**

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Congress directed OTA to deliver an opinion on the feasibility of detecting possibly increased cancer incidence in veterans who had witnessed atomic bomb tests in the United States and who had served in the occupation of Japan shortly after World War II. “An Evaluation of the Feasibility of Studying Long-Term Health Effects in Atomic Veterans” (OTA typescript, July 1985) concluded that the highest theoretical increase would be too small to be detected. No study was undertaken, but Congress voted to award compensation to any atomic veteran who developed cancer.

### **Comments on the Two Mandated Studies of Veterans' Health.**

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In “Agent Orange” and “Atomic Veterans,” Congress received what it had legislated. OTA provided reasoned, well-supported reports about the science. There was no evidence for Agent Orange exposure to ground troops and there was no evidence that such exposure, if it occurred, would have caused adverse health effects. There was no point in studying Atomic Veterans for cancer because any cancer increase, if there were one, would be too small to be detected. Congress largely ignored OTA and the science that underlay its reports, and now awards monetary compensation to Vietnam Veterans and Atomic Veterans without regard to whether they had had service-connected exposures or whether there was any connection between any such

exposures and their diseases. The congressional responses illuminate Dan Greenberg's simple conclusion, "In conflicts between the two, politics triumphs over science."<sup>36</sup>

## Working at OTA.

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Almost everyone who spent any time at OTA agrees that it was a great place to work. Because of its connection with Congress, OTA staff had essentially unlimited access to scientists and other academics, industrialists, trade union officials, members of public interest and lobbying organizations, and high-ranking Executive Branch officials. It was informal in dress and spirit, except when staff attended advisory committee meetings or Congress or met with important people. Essentially everyone called the director by his first name. The small groups of OTA staff who produced each report, usually two to five or so, generally worked well together and developed a great deal of cohesion. Best of all, in a city where everyone is protecting turf, OTA had no turf to protect. OTA staffers could talk about almost any subject without having to be prepared to defend turf except to put their best foot forward for the office.

## Demise of OTA

From time to time, a member of Congress, for whatever reason, would try to eliminate OTA. As the office grew stronger under Director Gibbons, TAB turned aside those assaults, and by the early 1990s, it seemed OTA was to be a permanent part of the Congress.

In 1994, the Republicans gained control of both Houses of Congress, and a year later, OTA was gone. The reasons most often advanced for OTA's demise are that

- it had been captured by the Democrats,
- its reports favored Democratic politics,
- its reports were late and of little use,
- the 1994 Republican zeal to do away with government agencies and reduce the size of government was frustrated elsewhere, but OTA was an easy target.

I agree that all those played a part in the OTA's demise. To those reasons, I would add OTA's isolation from Congress and its inability to establish strong ties with congressional staffers and the near-impossibility of its developing projects with Republican Members of Congress, when the Republicans were the minority party. Finally, OTA may have been beset by hubris, perhaps in part, because of Director Gibbons' success.

## Politicization

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OTA, on paper, looked well insulated from partisan politics because of the equal Democratic-Republican representation on the board. Nevertheless, OTA suffered from charges of "politicization" from its beginning.

The newly established OTA in 1972-73 looked like a Democratic handmaiden from the time that Senator Kennedy maneuvered to become chairman of the first TAB in 1973.<sup>37</sup> The major roles that Senators Kennedy, Humphrey, and Hollings played in establishing the OTA Health, Food, and Oceans Programs and press reports of Kennedy's using OTA as an extended staff reinforced those opinions. I am convinced that those early days branded OTA as "Democratic" and that that label persisted in Members of Congress's minds and was handed onto new Members through 1995.

Bimber states that OTA moved toward political neutrality over time, but his own words underline the difficulties in being neutral. Politics, as practiced in Congress, is a search for power, not for information.<sup>38</sup>

Democrats requested studies with the idea that the studies would be useful to them in their political endeavors. And experts, such as OTA, who supplied information to a Democrat-dominated Congress, were aware of the Democrats' political goals. As Darrell E. Chubin, a former OTA staffer, acknowledged in an article advocating the reopening of OTA (or some such organization), OTA reports generally favored "federal intervention over market-driven and state-level solutions."<sup>39</sup> Historically, Democrats have favored federal intervention.

Some OTA assessments, notably those critical of the Strategic Defense Initiative ("Star Wars") angered some Republicans. According to Bimber,<sup>40</sup> Keiper,<sup>41</sup> and Smith and Kline,<sup>42</sup> lingering resentment about such assessments contributed to Republicans' determination to zero out OTA in 1995.

In retrospect, OTA could have taken steps to limit political tilt. OTA management could have insisted on looking for non-federal government solutions to problems and considering Republican perspectives. This would have been best accomplished by interactions with Republican staffers, but staff interactions between OTA and all of Congress were constrained, and they were especially limited with Republican staffers.

### **Staffing Limitations Restricted Interactions with TAB and with Republicans**

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Some limitations on OTA staff interactions with other congressional staff originated from OTA's six-block distance from congressional offices, and many OTA staff were academics, not given to the schmoozing that comes easily to many congressional staffers. But institutional features were probably more important.

In recognition of the fact that staffers who worked for TAB members would accomplish most of TAB's work, the drafters of the legislation that established OTA specified that the OTA budget would pay one-half the salary of a staffer for each of the twelve TAB members. Those individuals, "TAB staffers," were supposed to spend up to one-half their time on work directly related to TAB and OTA and to maintain close contact with OTA.

I doubt that any TAB staffer spent half his time on OTA-related work. I have the impression that “TAB work” wasn’t regarded as leading to power or prestige, and that TAB staff busied themselves with work that was more likely to do so.

TAB staff could have reined in OTA-fostered requests. They could have taken requests that reached TAB and gone back to the requesting Committee staffs and asked how and when the OTA project would have been used in legislation. Such action by TAB staff, or by OTA management and staff, would have reduced the number of late and unnoticed OTA reports.

The minor importance of “TAB work” in TAB staffers’ minds may have contributed to many OTA work products favoring federal interventions. There is little evidence that Republican TAB staffers took seriously the responsibility to review OTA work products. And I doubt that many OTA staff would have encouraged them to do so because it would have delayed release of reports and added to OTA’s workload.

On paper, TAB staff were important in managing interactions between OTA and Congress, but my only experience with trying to work with a TAB staffer showed that not to be the case. In the early 1990s, I was trying to get a study released, and Representative Dingell, a member of TAB, had not signed off on it. I called his chief staffer several days in a row, and he put me off with comments that he’d not read parts of the report. Frustrated, I asked the OTA congressional liaison officer for help in prodding Mr. Dingell’s staff. He said he’d contact Mr. Dingell’s TAB staffer.

The next time I talked to the chief staffer, I asked if the TAB staffer had talked to him. The chief staffer’s response was, “Who’s he?” Granted, Mr. Dingell had a staff of 145 people at one time, but the TAB staffer carried little weight in Mr. Dingell’s office.

OTA’s congressional liaison officer’s over-estimation of Mr. Dingell’s TAB staffer’s access to power within Mr. Dingell’s office illuminates the weakness of the TAB staff-OTA relations. Some OTA staff might have had successful interactions with TAB staff, but I do not recall any talk about them.

Staffing also limited interactions between OTA and Republicans. Because OTA responded only to requests from Committees, its most important contacts with Republican staffers were with Republican Committee staffers. When Democrats controlled Congress, the number of Democratic Committee staff greatly outnumbered Republicans, and Republican staffers had workloads that included responsibilities for several government agencies or programs, while Democratic staffers had much more focused portfolios. It was difficult to interest Republican staffers in possible OTA projects because they didn’t have time or energy for more work.

The impression that OTA was “Democratic” probably inhibited Republican staffers from wanting to work with OTA and from advancing ideas for such work to their bosses. When staffers did advance ideas for assessments to Republican Members of Congress, the Members, aware of OTA’s reputation may have considered such ideas with an eye toward rejecting them.

## Late Reports.

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Many OTA reports were late, delivered long after the originally scheduled deadline. Lateness does not necessarily mean that the work was without value because OTA and Congressional staff could have discussed the contents of ongoing reports, which is especially likely when the Committee had an interest in the contents of the report.

OTA management could have reduced lateness by imposing penalties on staff, but this was not done. TAB could have recommended such actions, but I am unaware that it did. Unhappily, a conclusion to be drawn from the willingness to put up with a late report is that “no one was waiting for it,” that it wasn’t important.

## OTA’s Limited “Constituency.”

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Bimber<sup>43</sup> states that the drafters of *The Technology Assessment Act of 1972* limited OTA work to requests from full committees to block junior members of Congress from using the new office for power grabs. As a result, OTA had few opportunities to develop relations with new Representatives and Senators (“new” is a relative term used here to indicate Members of Congress too junior to be considered for committee chairs or ranking members).

As a result, new Members had little knowledge of OTA and there were few opportunities for the office to interact with them. In fact, many new Members never had anything to do with OTA and that played a role in OTA’s demise. In the first House vote on OTA in 1995, seventy-four of seventy-six freshman Representatives voted to zero-out funding.<sup>44</sup>

## The “Gingrich Revolution.”

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Mr. Gingrich’s “Contract with America” included the elimination of three Executive Branch Departments and elimination or reduction of many programs. Within the Congress, he intended to eliminate the elevator operators in the House office buildings, OTA, and other offices. In the end, he eliminated only OTA.

Legislatively, elimination of OTA was easily accomplished. Unlike eliminating an Executive Branch organization, which would have involved revisiting the legislation that authorized it, a congressional office could be “zeroed-out” by not funding it. That’s what happened to OTA.

## OTA’s Friends Couldn’t Save It.

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OTA counted on its champions—TAB members and some committee chairs and ranking minority members—to stave off political assaults on it, and they had done just that in earlier Congresses.<sup>45</sup> I was no longer a part of OTA management in 1995, when it became obvious that the Republicans were intending to zero out the office, but a person in OTA management told me that OTA was “counting on our friends in the Senate to save us.”

They didn't. TAB members, especially in the Senate, spoke up forcefully for OTA, but in the wake of the "Gingrich Revolution," Congress did not extend a lot of respect to senior members—committee chairs, ranking members, and TAB Members—and their stated high regards for OTA. In the Senate, Senator Connie Mack led the attack against OTA, stating that Congress should begin by cutting its own budget to show its *bona fides* in cutting the overall Federal budget. As the chair of the legislative branch subcommittee on the Senate Budget Committee, Mr. Mack proposed that OTA receive no funding. None of OTA's champions served on that subcommittee and there was no successful opposition to Mr. Mack's action.<sup>46</sup>

In the House, the legislative subcommittee of the Budget Committee and the full Committee reported out a bill to zero out OTA. On the House floor, voting on OTA "precipitated [a] major legislative brawl."<sup>47</sup> A compromise was offered to end OTA as an independent office, to fold it into the Library of Congress's Congressional Research Service (CRS), and to fund it from the Library's budget. The compromise survived a first vote (228-201) and was defeated on a second vote (213-214) on a further amendment. In response to objections about the voting procedures on the second vote, Representative Richard Armev requested that the second vote be vacated. OTA was triumphant on a third vote (220-204). During the House debate, the Librarian of Congress objected to a reduction in his budget to pay for OTA, if the office was moved to the library.

In the Senate Budget Committee, Senator Hollings proposed small reductions in the budgets of the Congressional Budget Office (CBO), General Accounting Office (GAO, now Government Accountability Office) and CRS to fund a reduced OTA. His proposal lost in the committee. On July 20, 1995, he offered the same proposal on the Senate floor, and the Senate tabled it on a vote of 54-45. OTA was left with enough money to terminate its operations on September 30 and to give its employees sixty days of severance pay. In Conference Committee, the House accepted the Senate's actions, and OTA was closed.

For some years, OTA had held an annual party to give awards to staffers for years of service and excellent service. In 1995, the date for the party was pushed forward time and again so that it would be held after the OTA legislation had been considered, and it ended up being held on the day of the Senate vote. The negative vote, watched on TV, dampened party spirit.

Given the rush to cut government in 1995, the absence of widespread OTA constituency in Congress, and the perception that OTA "belonged to the Democrats," the end of OTA was probably inevitable. Nevertheless, OTA management's decision to rely "on our friends" may have contributed. Director Gibbons had enjoyed a close relationship with TAB. It may be that TAB's offer of the OTA directorship to an outside scientist, who refused it and its subsequent appointment of Director Herdman as a second choice left Mr. Herdman reluctant to act assertively to fend off OTA's demise. Alternatively, OTA management hubris could have accounted for its passivity.

## Responses to the End of OTA.

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Republicans viewed OTA as an ideal candidate for elimination. Smith and Stine, both historians of science and science policy, write,

It was a weak opponent with thin support within Congress... and no significant outside constituency group would be offended... the almost total lack of reaction to OTA's demise from the scientific community and the various professional societies appeared to be ample confirmation of this judgment."<sup>48</sup>

Smith and Stine see little reason to believe that an OTA-like organization will emerge and little reason for Congress to pin its needs for science and technical information on such an organization. On the other hand, some Members of Congress have attempted to refund OTA and some academics have advocated its rejuvenation or the institution of other methods to provide advice to Congress.

### Is There a Demand for an Organization to Provide Scientific and Technical Advice to Congress?

Smith and Stine write,

The enthusiasm behind the idea for the OTA in 1972 stemmed originally more from the congressional support agencies and from the outside scientific community than from Congress itself. Only a relatively narrow base of congressional support materialized.<sup>49</sup>

To a major extent, discussion of a possible replacement for the OTA comes from some Members of Congress and the "outside scientific community," or more correctly, a narrow slice of the "science-policy community," and, as would probably be expected, many former OTA staffers.<sup>50</sup> As far as I can see, the "congressional support agencies," CBO, CRS, and GAO, remain on the sidelines of the discussion.

While any discussion of an OTA revival or successor resembles the discussions of the 1960s that resulted in OTA, the current discussion is enlightened by observations, conclusions, and hints that can be drawn from the 23-year history of OTA and the more than 60-year history of science and technology advice in the White House.<sup>51</sup>

After World War II, many scientists who had developed the atomic bomb entered science policy and worked to influence Washington to be certain that such weapons were not used again. Science became more central to government with the Soviets' launching of Sputnik in 1957. President Eisenhower established a new position, Special Assistant to the President for Science and Technology, and the President's Science Advisory Committee (PSAC) was set up to replace a former committee that was then moribund. The Special Assistant and PSAC were important during the Eisenhower and Kennedy Administrations, but disagreements about the pursuit of the Vietnam War weakened PSAC's relationships with President Johnson and Nixon. Nixon disbanded the entire White House science advisory organization in 1973.

Before Nixon acted, “Harvey Brooks of Harvard, Jerome Wiesner of MIT, and other veterans of the creation of PSAC in the White House turned their interest in science and government to Congress.”<sup>52</sup> Those “veterans” included some of the giants of World War II science and post-war science policy.

Scientists’ interest in policy has evidently waned. Greenberg<sup>53</sup> argues that scientists’ enthusiasm for policy that flourished in the 1960s and 70s has disappeared as scientific leaders have increasingly focused their energies on securing federal funding for their own and their institutions’ research. In addition, scientific societies, which, from time to time, have entered the science policy arena, have seen their memberships shrink in the past two decades. Overall, it is difficult not to accept that science has largely withdrawn from the policy arena (except, as Greenberg says repeatedly, to keep pressing for more federal funding of science and technology).

## A Meeting about Science and Technology Advice for Congress

In June 2001, “a group of more than 100 congressional staffers, policy analysts, academics, and others [discussed] ‘what new institutional arrangements (if any) are needed to better provide balanced, independent scientific and technical advice to Congress on large-scale questions that require foresight, analysis, and synthesis?’”<sup>54</sup> Some of the discussions at that meeting, which was hosted by Resources for the Future, a Washington think tank (hereafter called the “2001 RFF meeting”), are captured in the book *Science and Technology Advice for Congress*.<sup>55</sup>

### Participants at the 2001 RFF Meeting.

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Three Republican and one Democrat Representatives made remarks at the breakfast that preceded the 2001 RFF meeting, and a Republican and a Democrat Senator sent letters of support to the meeting. Some of those Members of Congress had served on TAB.

Given the withdrawal of “big-name, big-time” scientists, such as those who had been present at the creation of PSAC and OTA, from policy, it is no surprise that such prominent scientists were missing from the 2001 RFF meeting. The “science-base” at the meeting was individuals working in public policy with a liberal sprinkling of individuals who worked for or with OTA.

## Some Possible Organizations to Provide Science and Technology Advice to Congress

The editors of *Science and Technology Advice for Congress*, the book that emerged from the 2001 RFF meeting, write,

the authors of this book believe unanimously that Congress and the nation would be better served through the creation of one or more new institutions to perform balanced nonpartisan analysis and synthesis for Congress on topics involving complex issues of science and technology.<sup>56</sup>

The authors weren't quite unanimous. Two did not recommend a new institution, and others recommended expansion of science and technology advice capabilities at already functioning organizations. Those who favored new institutions put forward models that would locate a small agency in Congress which would contract for analytical work by outside organizations. The models are briefly described and discussed in this section. The interested reader is referred to *Science and Technology Advice for Congress* for the authors' descriptions of their models.<sup>57</sup>

### A Common Feature of Many Models for a New Organization and What Seem to Me To Be Fundamental Problems.

Models for possible organizations feature a "TAB-like" bipartisan, bicameral supervisory board, but none, to my mind, adequately discusses the problems associated with funding. The problem is captured in stating the alternatives. Either the funding for a new organization can be funneled through the board—a "patron" relationship—or congressional committees can appropriate money for each new study—a "client" relationship—which would make the board largely redundant.

Consulting firms have clients; they seek out organizations that need their services, convince them that the services can be supplied, and carry out projects under contracts. When insufficient money comes in from contracts with clients, the firm keeps itself afloat on the profits it has generated and, if necessary, cuts back on staff and makes other money-saving changes.

A patron provides money to keep an individual or organization operating in the expectation that it will provide something of value to the patron. OTA's relationship with Congress was of that sort. Congress provided funding to maintain the office and to pay for research that TAB approved.

If a new organization is established with Congress as a patron, Congress would appropriate funds to cover the costs of the new organization and its contract operations. The size of the budget is all-important. Too large a budget, it seems to me, is more of a hazard than too small a budget. The former, I worry, would lead to organization-fostered projects "to keep everyone busy" and diversion away from the needs of Congress. A too-small budget would force the Board to make difficult decisions and communicate the reasons for declining to undertake studies to the

requesting committees. Those communications would probably facilitate increases in the budget.

If the new organization is Congress's client, requesting committee(s) might fund studies from their operating budgets, but that seems an unlikely source for projects that might cost \$1 million. Alternatively, the committee(s) could request funding in the appropriations bill, but that would delay initiation for at least a year.

A compromise, incorporating both funding methods, can be considered. The new organization and its staff could be provided money for their operations but with no money provided for projects. That money would have to come from committees or appropriations. This compromise runs up against the problem described for the client relationship. Funding would be limited to relatively small amounts squeezed from the committee(s)' operating budget(s) or delayed until an appropriations cycle is completed.

An annual appropriation for a small office and a small number of projects seems preferable. With such an arrangement, it would be necessary to specify that additional, mandated studies be accompanied by appropriations.

## Models for Organizations to Provide Science and Technology Advice to Congress

Two authors in *Science and Technology Advice for Congress* conclude that Congress can provide for its science and technology information needs without changing how it works. Other authors offer models for organizations to provide the functions formerly carried out by OTA. Three would increase analytical capacities in existing organizations (models 1, 2, and 3). One would revive OTA (4). Two would establish new organizations that would contract for analytical work with outside organizations and have less (5) or more (6) congressional staff activity.

### No New Organization (at Least to Start).

Bruce L.R. Smith, a senior scholar at the Heyman Center for the Humanities at Columbia University, and Jeffrey K. Stine, curator of engineering and environmental history at the Smithsonian's National Museum of American History, conclude their chapter in *Science and Technology Advice for Congress*,

Congress can, however, improve its access to scientific advice without fundamentally changing how it operates, starting with modest steps on where hearings are held, additional meetings with scientific groups, and other measures. Congressional staffs can be augmented and scientific expertise within existing support agencies can be strengthened [ref. omitted] An historical perspective should caution us against the search for silver bullets but should encourage experimentation based on evidence and argument. For tinkering with our institutions by applying practical reason is very much in the spirit of the new "science of politics" championed by the founding fathers.<sup>58</sup>

## **Model 1. Expanded Use of Congressional Fellows**

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Albert H. Teich, director of science and policy programs at the American Association for the Advancement of Science (AAAS), and Stephen J. Lita, a project coordinator at AAAS propose expanding the roles of Science & Engineering Fellows (S & E Fellows) in Congress.<sup>59</sup> Along with other scientific and technical societies, AAAS provides funding to one or a few members to spend one year in Washington as S & E Fellows.

Since 1973, there have been over 800 fellows. They have not been randomly dispersed over Congress. Fewer than 120 Representatives and fewer than seventy senators have had fellows in their offices, and fellows typically serve in offices or committees that are “already scientifically literate.” Teich and Lita suggest that an improved orientation program, efforts to put fellows into contact with alumni of the program, enticing fellows to work in offices and on committees that lack scientific expertise, and “expanded analytical support” for the fellows would improve the program to the benefit of the fellows and Congress.<sup>60</sup>

This seems a forlorn hope. The fellows would be expected to and should go where they feel most comfortable and where they and the people with whom they work will most likely benefit. Like other congressional staffers, they are likely to think that time spent in “orientation” is time spent on not doing a job. Neither Congress nor anyone else is likely to fund such a nebulous idea as “expanded analytical support.”

Some S & E Fellows carve out a career in Congress or other government agencies, giving Congress and other agencies, well-grounded scientists and engineers an institutional benefit. For most fellows, the benefits are the knowledge of Washington and Congress that he takes back to his place of employment.

## **Model 2. Expanded Use of the National Academies Complex.**

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The National Academies Complex is composed of three honorary societies, the National Academy of Sciences, the Institute of Medicine (IOM), and the National Academy of Engineering. Its operating arm, the National Research Council (NRC), has a staff of over 1,100. Although NRC is not a wholly owned subsidiary of the federal government, federal contracts provide much of its income. Many NRC projects start when Congress directs a department or an agency to have an outside organization—often making it explicit that the outside organization is to be NRC—to conduct a study of a particular problem or opportunity. In some cases, Congress appropriates money for the study; in other cases, the department or agency has to find funding within its appropriations.

John Ahearn, director of the ethics program of a national honorary scientific society and former chairman of the Nuclear Regulatory Commission and Deputy Assistant Secretary of Energy, and Peter Blair, executive director of the NRC’s Division on Engineering and Physical Sciences and a former assistant director at OTA, propose expanded use of the National Academies to meet Congress’s needs for science and technology advice.<sup>61</sup>

Although OTA and NRC did similar work for Congress during OTA's existence, there were differences in their approaches to projects. NRC advisory panels are generally chosen with the idea that they will reach a consensus. OTA advisory panels weren't expected to reach consensus; in fact, differences produced different options for congressional consideration. At the NRC, the advisory panels are responsible for writing the NRC reports; at OTA, OTA staff wrote the report. OTA and NRC shared one operating characteristic. Their reports frequently appeared one, two, or more years after the projects were initiated.

It's almost a foregone conclusion that every NRC report will include the exhortation, "More research is needed." Indeed, more research can often be useful, and members of an advisory panel may look forward to reaping some of any increased funding that results from an NRC report.

After OTA closed, the number of congressional mandates for NRC studies increased, and a total of 186 such studies was initiated between 1995 and 2001. During the same time, the NRC carried out about five times as many "consensus studies" for federal agencies. Ahearn and Stiles describe some changes the Academies are considering so that they can be more responsive to Congress, including faster completion of reports

Anita Jones, vice chair of the National Science Board and a former director of Defense Research and Engineering at the Department of Defense, suggests that the NAS establish a small office that would maintain a list of paid consultants qualified to work on specific subjects. When Congress wants information on a scientific or technical subject, the office would put the requesting Member or Committee in contact with a suitable consultant who would prepare a report or discuss the topic with the requestors. Jones sees the NAS acting as a "broker office" between Congress and the experts.<sup>62</sup> The NRC would, of course, remain available for taking on longer, in-depth requests mandated by Congress.

The Academies management does not favor annual appropriations for NRC studies, arguing it would take away some of the authority of the committees that now request NRC studies. Moreover, an annual appropriation could be a target of disgruntled Members of Congress who were unhappy with the Academies' work.

Without the development of a "new OTA" or an organization to do "OTA-like work," the role of the NRC will continue to expand. Certainly, improvements can be made at the Academies to provide products more quickly and other changes can be made to make NRC more responsive, but one difficulty unlikely to be erased is the Academies' conservatism.

Summing up, Kennedy [Donald, former Food and Drug Administration Commissioner, former President of Stanford University, distinguished neurobiology researcher] declared that academe is bound by "a set of policies and practices that favor the present state of affairs over any possible future. It is a portrait of conservatism, perhaps even of senescence."<sup>63</sup>

To a major extent, the National Academies represent academe, and their panels are likely to conclude that more research offers the best solution. More research also offers the most chance of additional funding for academe.

### **3. Expand Analytical Capability in the Congressional Research Service, the Government Accountability Office, or the Congressional Budget Office.**

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Christopher T. Hill, a vice provost at George Mason University and former staff member at OTA, examines the possibilities of expanding science and technology analysis at three congressional support offices,<sup>64</sup> which have solid analytical capabilities and long-standing relationships and credibility with Congress. Their styles of analysis are different from OTA's. CRS typically turns around requests for information—usually requests from single Representatives or Senators—in one or a few days, and their longer inquiries, based on examination of the available literature and calls to experts, take a week or two. The GAO carries out audits of government programs, examining costs, benefits, and efficiencies. The CBO works on projections and analyses of the congressional budget and has little scientific and technical capability on hand.

Some members of Congress have already attempted to move OTA or an OTA-like organization to another support agency. During OTA's death throes, its supporters introduced legislation to move a somewhat smaller OTA to the CRS. The attempt failed, amid protests from the Librarian of Congress about diverting any of his institution's funds to support OTA. The attempt to fold an "OTA clone" into GAO by legislation in the House also failed.

Congress has appropriated special funding to GAO to carry out two "technology assessments" about equipment and procedures to better the screening of immigrants at the United State's southern border. The first such technology assessment was graded, with certain qualifications, as "a very good job" by three experts in public policy.<sup>65</sup> GAO demonstrated flexibility in executing its assessment, using NRC to convene workshops, contract with outside experts, and identify alternative technologies.

There is, as far as I can see, no reason that CRS or GAO, with the addition of appropriate staff, could not step into the void (if there is a void) left by OTA's demise. I question, however, whether management at CRS or GAO would welcome the addition of a "technology assessment capability" even if additional funding came along with it. Management would remember OTA's fate and probably decide that the addition could turn into a liability.

Congress can, should it desire, quickly establish an OTA-like capability in any of the support offices. If some sort of scientific or technical or public relations disaster somehow shows that Congress overlooked something major, it seems likely to me that Congress will act by setting up a technology assessment capacity in CRS or GAO.

Short of that, I think there will be no movement in that direction because, in part, of the resistance of CRS and GAO management.

#### **4. A Revamped OTA.**

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Gerald L. Epstein, a staff member at the Institute for Defense Analyses and formerly at OTA, and Ashton B. Carter, Professor of Science and International Affairs at the Kennedy School and principal author of OTA's first "Star Wars" report, describe "A Dedicated Organization in Congress,"<sup>66</sup> which "bears a striking resemblance to OTA."<sup>67</sup> They pinpoint some "easily implemented improvements, such as a greater emphasis on the production of more timely studies and greater attention to the needs of the minority" that would improve the basic structure of OTA.<sup>68</sup>

To date, legislative attempts to re-open OTA by restoring its funding have failed, and, I expect, will continue to fail. Any successful effort to re-open OTA will surely involve imposing changes on the organization. A name change will almost certainly be necessary—no one likes to be reminded of things that didn't work, and "OTA" must stick in some Republicans' craws. Congress might insist that a new OTA contract out most of its analyses, thereby keeping down the size of the in-house staff of congressional employees. Making any changes to the authorizing legislation makes re-opening OTA more difficult than simply restoring its funding, and, I think, decreases the probability of its ever happening. Neither do I think it can be funded without some changes.

#### **5. Establish an "Independent Analysis Group..., Operated by a Nongovernmental Organization."**

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Caroline S. Wagner, an analyst of science and technology issues at RAND, and William A. Stiles, Jr., a consultant on science policy at Old Dominion University and for twenty-two years a staffer in the House of Representatives, base their model on the "federally funded research and development centers."<sup>69</sup> Such centers operate under contracts that sometimes extend to five years, and they can be granted privileged access to government files and information.

Wagner and Stiles propose the establishment of a "reserve fund" in legislation, "set to accommodate a base number of requests... [to be] revisited each appropriations cycle."<sup>70</sup> The "reserve fund" sounds like "budget" to me. A too-little budget to carry out the "agreed-on agenda" would generate pressures to increase the budget; too much budget would generate pressures for the outside agency to gin-up projects. In the Wagner and Stiles model, "ginning-up" new studies could be bypassed by giving the outside agency responsibility for "self-initiated inquiry" (shades of Director Russell Peterson).

A supposed advantage of an outside-of-Congress agency is that distance between its reports and Congress would allow Members of Congress to embrace or criticize them more freely. It is unlikely to me that Members are ever inhibited in such exercises. In

any case, the Wagner and Stiles model incorporates a “TAB-like” board, to, among other things, “shield the analysis group from criticism in cases where it provides observations and information that prove to be antithetical to the majority view.”<sup>71</sup> The “TAB-like” board would surely feel some responsibility for the work of the outside agency, and at least some of them might “defend” it from congressional criticism and attacks, tying some in Congress to the agency.

Apparently in conjunction with the “TAB-like” board, Wagner and Stiles say,

A small group of qualified congressional staff could be assigned to ensure that requests for work met the legal mandate, reached a minimum standard of quality and scope, and were fashioned in a manner that would afford maximum benefit. This model worked well for OTA (emphasis added).<sup>72</sup>

I assume that the model that “worked well” is TAB staff. Although I disagree that TAB staff worked well, Mr. Stiles served as a TAB staffer, and he certainly has knowledge that I lack.

Despite my criticism of the performance of TAB staff, I think that staff could do the job that is needed in the Wagner and Stiles model and in the models discussed below in which the “board staff” would be the only congressional employees involved in the new office. They would have to be given the authority and held to high standards to determine if a proposed project will actually be of use to Congress and to search reports for evidence of favoring one party over another.

As an alternative to a “TAB-like” organization, Wagner and Stiles suggest that the House Administration Committee and the Senate Committee on Rules and Administration could be responsible for “evaluation and selection of contract proposals and the ensuing operations of the analysis group.” Such a system would be cumbersome and add to the workload of the committees, and the committees might object to taking on the responsibility. Such an arrangement would have a major advantage. Staff of those committees would be expected to act diligently in oversight and administration.

The outside agency’s mission

would be carried forward principally by conducting an agreed-on agenda of research and analysis, commissioned by Congress, and seeking the widest possible audience for the resulting findings, as appropriate.... diversified portfolio of activities, balanced along several dimensions, that would broaden the scope of policy analysis.<sup>73</sup>

Two advantages of housing the outside agency in a large nongovernmental organization (NGO), a think tank or a university most likely, are immediately apparent. First, the organization would have experts to undertake the specialized requests that might come from Congress. Second, staff from the organization could be moved into and out of the technology assessment activity as needed. This would reduce the imperative to find projects to keep the staff busy.

On a project-by-project basis, participants at the 2001 RFF workshop agreed that costs would be higher with an outside agency than with an in-house agency or the NRC. Nevertheless, Wagner and Stiles estimate that the budget for their model organization, once it gets going, would be less than OTA's.

## **6. Establish a “Lean, Distributed” Organization.**

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Morgan, Peha, and Hastings propose a

small, permanent institution within the U.S. Congress that would receive requests for studies from committees and then farm them out to one or more previously approved non-government, nonprofit organizations that have agreed to conduct studies in accordance with a set of procedures designed to ensure balance, neutrality, and completeness.<sup>74</sup>

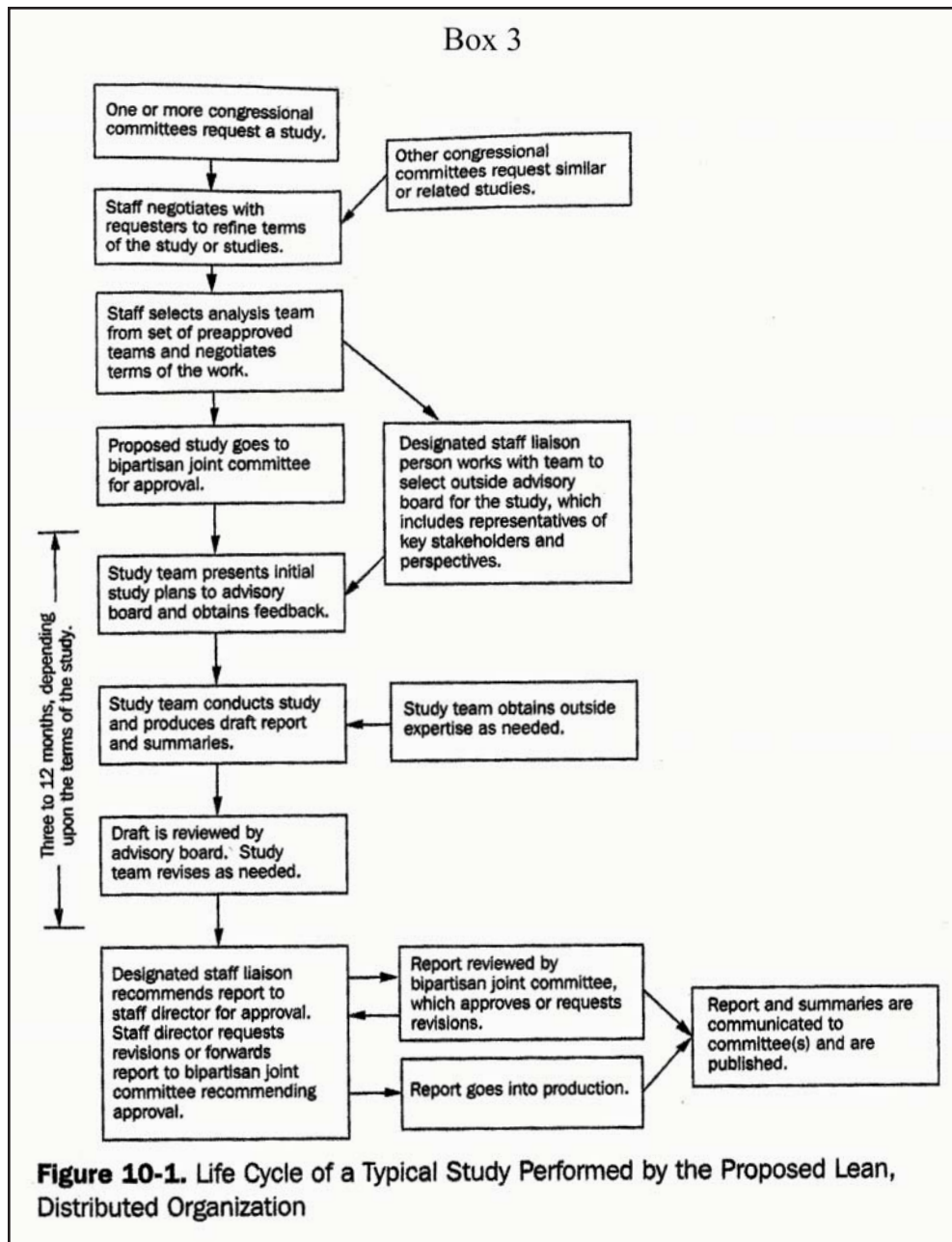
The model's reliance on contractors for most of the work parallels some people's vision of OTA when it was established. As time passed, OTA relied more and more upon in-house staff because so much time was spent in asking for revisions and in griping about contractors' shortcomings that there was a general consensus that it could be better done in house. As a result, the in-house staff grew. This course of events would be avoided in the “lean” model, with its proposed staff of 8-12 professionals, who would manage about 10-20 studies at any given time.

The staff would select several organizations each year as potential contractors on the bases of proposals, reputations, and estimated costs for projects of varying lengths and complexities. Staff would arrange a base contract (say, \$1/year) between each selected organization and Congress to eliminate contracting delays when research projects are awarded.

Upon receiving a request from a committee or committees, the staff would select an outside organization to execute the project and assist in selecting an advisory panel. The report from the organization would include options for possible congressional actions.

The model considers several possible funding mechanisms. A “TAB-like” board could be given a budget to cover the in-house staff and a small number of studies; a single committee or groups of committees could fund studies from their operating budgets (this is considered an unlikely possibility), and Congress could mandate Executive Branch agencies to commission studies. Alternatively, Congress could appropriate funds for each study. Morgan, Peha, and Hastings don't like this option because the appropriations committee could easily usurp the “TAB-like” board's authority. They favor a budget for the office that would cover both in-house and study costs.

Morgan, Peha, and Hastings state that very controversial projects might be awarded to more than one organization to avoid charges of bias. They don't like that idea, however, favoring a striving for “balance, neutrality, and completeness” in the products from single organizations.



Box 3, from Morgan, Peha, and Hastings,<sup>75</sup> outlines the course of a study under their proposal. The TAB-like board, the “bipartisan joint committee,” would favor requests from multiple committees. The “staff” and the “staff director” are the in-house group of 8-12 staffers and its director. The “study team” would be the outside contractor, its advisory committee, and its subcontractors.

## Goals for a Science and Technology Advisory Organization.

Morgan, Peha, and Hastings put limits on the goals for a new organization:

If analysis is to be widely accepted, it must avoid making value judgments or offering policy prescriptions. Analysis can usefully serve the broad needs of Congress by doing the following:

- framing problems (i.e., helping members and their staff understand how to think about an issue,
- identifying topics that are and are not important so that time is not wasted on irrelevancies or wrong ideas (i.e., playing a role similar to that of “stipulations” in a lawsuit, and
- identifying the important policy choices that Congress must make.<sup>76</sup>

With the substitution of the word “might” for “must” in the last sentence, these goals seem reasonable. In considering whether there is to be a successor to OTA, proponents and opponents might consider that its products, at best, will reach these goals. Would attainment of those goals justify the establishment of the organization?

## Congressional Actions to Revive OTA and the Future

In 2001, eighty-seven Representatives, almost all Democrats, co-sponsored a bill to restore funding for OTA; it did not progress to legislation. In 2004, an effort “to tuck an OTA clone inside GAO” failed.<sup>77</sup>

Such efforts may continue, but so long as the Congress and the White House are of one party and united in most policy goals, there is little reason to think that Congress will decide again, as it did in 1972, that it needs scientific and technical advice to counter the Executive Branch. Even so, it’s possible that a scientific or technological problem will arise of such magnitude that Congress will rush to set up a new advisory organization. Until such major events occur, should they occur, there seems little prospect for such an organization.

## Conclusions

A small number of people—a few Members of Congress, academics interested in science policy, and former congressional and OTA staffers—advocate the establishment of a new organization to provide “balanced nonpartisan analysis and synthesis for Congress on topics involving complex issues of science and technology.”<sup>78</sup> The advocates do not make a convincing argument in support of their new organization, which, to some extent, would have the role of the former OTA.

Demonstrating that OTA was a valuable component of Congress would make a convincing argument for the new organization, but measuring OTA's value has proved a difficult task. Some observers stress OTA's importance in raising the levels of discussions about science and technology and in providing technical information to congressional debates. Such subjective claims are hard to quantify or even identify in the welter of information that flows into Congress. One quantitative measure, the number of mentions of OTA in the *Congressional Record*, does not reflect well on the office. Bruce Bimber, an analyst sympathetic to OTA states, "the agency [OTA] is nearly absent from twenty-three years' worth of political rhetoric."<sup>79</sup> Congressional staff that used OTA reports judged them to be helpful, but only about fifty staffers participated in those surveys. As judged by the Members of Congress who voted not to fund OTA after 1995, the office had not provided a valuable service.

Whatever judgment is made about the value of OTA, discussions about the possible value of a new organization need to consider how the world has changed since 1972, when OTA was established. Are the needs that OTA was to meet now being met by other organizations and by the availability of information on the Internet?

OTA had a budget and a staff of analysts who wanted to be busy. When the office did not receive sufficient requests for studies from congressional committees to keep the staff busy, it initiated or fostered requests. Such projects, of little interest and no importance to Congress, contributed to OTA's well-known lateness; no one was demanding the report. OTA's congressional oversight board—the Technology Assessment Board—and, especially, TAB staff did not turn aside OTA-fostered projects. They too were interested in OTA's being busy, which was necessary to justify the office's budget.

Rightly or wrongly, OTA was viewed as a Democrat organization. Prominent Democrats had dominated TAB and OTA in the office's early days, and the small number of Republican staffers in the Democrat-controlled Congress during OTA's existence were simply too busy with other tasks to think about making requests for OTA projects. Moreover, OTA reports often favored federal solutions to identified problems. In retrospect, OTA management or TAB staff could have sought a balance between federal, state, local, and private solutions, but that balance was lacking.

The advocates of a "new OTA" have proposed a number of models for the new organization. All but the model that would, in essence, resurrect OTA, limit the new organization to a small number of employees who would contract out the office's analytical work.

Any new organization will be successful only to the extent that it works on projects of importance to Congress. Such projects would be completed on time and used by Congress. Some mechanism to assure that the new organization would work for the minority as well as the majority party would also be necessary.

Before moving in this direction, Congress and science policy scholars would do well to focus on the question of whether the information Congress receives now is of sufficient quality to render the need for a new organization a moot point.

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