

# Organizational Structure and Advisory Effectiveness

## The Office of Science and Technology Policy

*James Everett Katz*

The increasingly complex, technological and interrelated nature of our society, as well as of the problems confronting it, has resulted in an ever-growing emphasis on science and technology as instruments for problem analysis and resolution.<sup>1</sup> This is reflected by the proliferating scientific advisory staffs at the local, state, national, and international levels.

Because of this important role assigned to scientific and technological advice at most levels of government, one important aspect to consider is the structural aspect of advisory mechanisms with an eye to the conditions which enhance the effectiveness of scientific advice. This paper considers the structural aspects of one major advisory group, the United States' highest science policy office, the Office of Science and Technology Policy (OSTP), a part of the Executive Office of the President (EOP). The major objectives of the OSTP are (1) to advise the President, the National Security Council, the Domestic Policy Staff (DPS), and other EOP units on matters concerning science and technology; (2) to assist the Office of Management and Budget (OMB) with reviews of proposed budgets for Federal R&D programs; (3) to provide general leadership and coordination of the Federal R&D programs; (4) to promote a stronger partnership between Federal research funders, State and local governments and the scientific community; and (5) to provide Executive branch perspectives regarding science and technology policy to the Congress.<sup>2</sup>

The Presidential offices for science and technology had been reestablished and strengthened under the Ford Administration, which also lobbied for the passage of the National Science and Technology Policy, Organization and Priorities Act of

*James Everett Katz (b. 1948), author of Presidential Politics and Science Policy (1978), is Research Associate Professor in the Department of Social Sciences, Clarkson College, Potsdam, New York. He previously held research fellowships at the Center for Science and International Affairs, Kennedy School of Government, Harvard, and at the Center for Policy Alternatives, Massachusetts Institute of Technology; and has taught at Indiana University and William Paterson College. The author thanks W. O. Baker, Harvey Brooks, Donald Hornig, Jürgen Schmandt, Eugene Skolnikoff, and Richard Garwin for their helpful comments.*

1976 (P.L. 94-282). Presidential Science and Technology Adviser H. Guyford Stever made organizational and substantive contributions to the effectiveness of the Office of Science and Technology Policy (OSTP). Thus far in the Carter administration, Presidential Science Adviser Frank Press has acquired the confidence of the President and restored to the position some of the prestige lost during earlier administrations.

The OSTP itself has fared less well under the Carter Administration. The OSTP "has almost been completely destroyed," said one former science adviser. The Carter re-organization team had recommended the abolition of the science advisory mechanism in early 1977, but Carter and his staff were prevailed upon to save at least the OSTP's organizational essence, provided the OSTP's role was rigidly circumscribed. The President's Committee on Science and Technology was disbanded, however. While the OSTP did survive, it was in a greatly diminished role and subject to several limitations. The staff had to be very small (which would, it was anticipated, hamper its effectiveness) and was proscribed from undertaking policy initiatives without the express permission of the political staff. The OSTP was blocked from a pro-active role in defense, natural resources, and especially energy. The vision of a vigorous, politically significant science policy office was snuffed-out, largely because the President's top advisers recognized that many areas of science and technology were politically sensitive and hence should be handled at the political level. They wished to see no competing centers of influence arise in the White House that would dilute their control over these issues.

Congress and some leading elements of the scientific community have tried to have OSTP's role expanded in line with the original authorizing legislation; much criticism has been directed at the White House's handling of the OSTP and coordination of science policy.<sup>3</sup> However, few challenge directly the concept that since the OSTP is part of the President's staff, he has the right to arrange his staff however he wishes. Press has aligned himself solidly behind the President's position. Press said recently that the Science Adviser "must recognize that he is not in the White House as a lobbyist, or as a representative of a constituency. He is there as an assistant to the President, serving the President."<sup>4</sup>

Experience indicates that the science adviser must be one of the "President's men." Yet, having limited authority, resources and power to confront the vast Federal science and technology enterprise has created a series of operational and organizational quandaries for the Presidential Science Adviser and his staff.

### *A Major Dilemma*

A major ongoing dilemma concerns the way to best use slender staff and resources to work on the highly-complex, diffuse and intractable problems the staff is called upon to analyze. The size of the White House staff was an early campaign target of Carter and he pledged to pare the White House staffs by 30%. (He only accomplished a 12% over-all reduction from the highest number during the Ford Administration.) This meant that the Congress's original plan for a large OSTP staff of about 40 did not materialize. Under administration pressure to demonstrate good faith, Press reduced his staff by 30%.

Many maintain that the OSTP full-time staff of 24 (which includes support and secretarial assistance) and the 16 people detailed from other government agencies is too small. The OSTP must prepare reports, participate in committee work and proffer science advice, and oversee the breadth and depth of Federal science and technology. Press himself has said, "If we had a larger staff, we probably could do things better," and that Carter "prefers to have small staffs. . . He's my boss. I have to do things his way."<sup>5</sup> While not questioning the ability of the specific OSTP detailed staff, it is a truism in government that when staff are detailed, whether to another agency, or for committee work, the people selected are not necessarily the best but are instead those available.

To conveniently cover the amorphous subject of science and technology, the OSTP is broken into three divisions. These areas are (with representative illustrations of work): (1) National Security, International and Space Affairs, dealing with such topics as the test ban treaty, East-West technology transfer, the MX and cruise missiles, UNCSTD, Antarctica policy, and space arms control; (2) Natural Resources and Commercial Services involved in evaluating earthquake and dam hazards, radioactive waste management, climate research as well as oceans, energy, mineral and mining policies; and (3) Human Resources, Social and Economic Services concerned with research policies for nutrition, bio-medicines, social science, and agriculture. It has also studied drug legislation and radiation standards. Combinations of OSTP staff members have also prepared special reports on issues in response to presidential requests (such as the construction of a sea-level canal in Central America) or in anticipation of future problems that will be confronting the President.

In addition to these activities, the OSTP director chairs the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET) and the Intergovernmental Science, Engineering and Technology Advisory Panel (ISETAP). FCCSET operates as a sub-cabinet group addressing the Executive Branch in R&D-related affairs. ISETAP, while originally given wider functions, now, after 1978 Reorganization Plan No. 1, has the narrower role of advising the OMB on ways to have Federal technology better meet State and local government needs. Some flexibility is maintained since the OSTP director has a free hand in selecting the members of these groups. As worthwhile as these groups' activities are, they do take Press's time and absorb OSTP staff resources and effort.

All these Herculean labors could not possibly be accomplished by the small OSTP staff itself. On many issues the OSTP serves as the lead agency, taking responsibility for pulling together and chairing interagency panels to address the issue. In addition, the OSTP has attempted to develop a network of panels, advisers, and support staff to supplement its own meager staff. The OSTP has tapped outside resources to do much of the work instead of trying to develop staff resources in-house. Often the OSTP relies on the NSF as well as other governmental agencies for manpower, money, and administrative support. Frequently organizations completely outside the government are utilized to do the actual inquiries. The National Academy of Sciences (NAS), the National Research Council (NRC), the Committee for Scholarly Education, the American Physical Society, and several for-profit contractors are among the organizations tapped by

the OSTP. In the future the OSTP hopes to expand the list of those undertaking OSTP work to include organizations such as the American Association for the Advancement of Science and the American Chemical Society.

### *Reliance on Outside Support*

Relying on outside support to do the OSTP's work creates problems both for the contractor and the OSTP. The conflict over assigning public responsibilities to private organizations has periodically plagued the government. At times Congress and the Executive have expressed disapproval of this practice; at other times its advantages have been applauded. Thus, in 1962 the Bell report<sup>6</sup> pointed to a pernicious cycle through which the Federal government became increasingly dependent on non-governmental laboratories to conduct its own research. This was because the government itself was underwriting the raiding of manpower and enervation of work in its own labs. At the same time it is generally recognized that Federal research organizations tend to become debilitated through bureaucratization and because the Federal researchers become isolated from the cutting edge of the research community.

An illustration of the farming-out process is the preparation of the five-year forecast and plan for science and technology as mandated by the law re-establishing the White House science offices. The preparation of this plan was detailed to the NSF, who, in turn, used the NAS to provide major inputs into the study. However, the acceptance of this assignment caused some problems for the NAS, both in terms of its standard operating procedure and its position of autonomy from governmental politics. (The NAS is a private organization established by an act of Congress during the Civil War to provide advice to the government.)

The first major problem revolved around the fact that the NAS was being requested to produce a confidential report for the government's own use. It was feared that the White House could be highly selective about the parts of the report it chose for inclusion in its own plan and that regardless of what was omitted the resulting work would have the quasi-NAS legitimacy. Thus the NAS might be lending its name to something it actually opposed. The NAS sought to avoid this dilemma by agreeing to publish and publicly release its own report. From this report the President and his staff assistants could accept or reject whatever they wanted in preparing the government position. This attempt to safeguard NAS autonomy has drawbacks and dangers of its own. The second problem is that the NAS could arrive at a plan different from that which the administration wanted. Contradictions between the two approaches could be seized upon by the media, Congress, or other watchdog groups and in turn cause political furor.

Of all the non-governmental organizations the NAS and the NRC have taken up the largest share of the work. Their assignments from OSTP have included an evaluation of the scientific exchange program with the Soviets and the drafting of an issue paper for the development of the national position paper to be submitted to UNCSTD. Professional societies representing specific disciplines have also been

drawn upon. For example, the American Physical Society has received a contract to explore the future costs and likelihood of success of solar photovoltaic energy.

One OSTP strategy to defuse the problem of relying so heavily on private organizations is to diversify the sources of advice. By expanding the inputs to include the ACS, AAAS, and other organizations, the NAS and OSTP should be able to avoid much of the potential for criticism. To some extent, however, this conflict seems irresolvable given the present strictures on OSTP. Yet OSTP is outstanding among Presidential-level offices because it is the only one of the few offices with a regular outreach program to draw in experts from the private community.

The resources of OSTP have been spread even thinner as a result of its involvement with a growing user group—state (as part of its outreach and public involvement program, mandated by Congress) and local governments. The OSTP supports the Intergovernmental Science, Engineering and Technology Advisory Panel (ISETAP) composed of 19 state and local government officials, and the National Science Foundation and the OSTP directors. Meeting at least 10 times a year, ISETAP works with Federal, state and local governments to identify high priority problems at the state and local levels which science and technology can help resolve and to determine research issues associated with these problems that the Federal government needs to address. ISETAP is also developing recommendations for enhancing the utilization of research funding by state and local governments. There is some criticism that the OSTP is not wholehearted in its ISETAP role—that it is simply acting in response to Congressional pressure. The massive workloads combined with this high rate of dispersal of the tasks to various agencies and organizations has led to problems of coordination for the OSTP. It is difficult for the director and the second-rung assistant directors to know what is going on in each division and the information problem is magnified for those lower down in the hierarchy. In the past the lack of communication has led to inefficiency and overlapping responsibilities within OSTP.

### *Problems of Coordination*

There are also problems with coordination between the OSTP and the other Executive Office of the President (EOP) staff, such as the Office of Management and Budget (OMB), the National Security Council (NSC), and the Domestic Policy Staff (DPS).

Coordination, obviously, is not a problem that can be solved once and then forgotten, but rather is a continuing process that needs constant adaptation to the developing situation. The need for flexibility in policy supervision is even more pronounced in a rapidly changing field such as R&D. There are a host of ways R&D can be divided among agencies—for example, basic research is concentrated in the NSF while applied research is largely conducted through the line agencies such as NASA, DOD, and HEW. Programs and disciplines, such as oceanography, energy, social science, biochemistry, and atmospherics, cross cut numerous agencies as well.

As part of their centralized responsibility for science policy, the OSTP and FCCSET must coordinate four different types of R&D management activities:

- Budgeting for R&D, including planning and analyses. Here there is a special need to review resource allocations in relationship to national goals and priorities. The advisers should be able to recognize opportunities and anticipate future needs in a timely manner.
- Comprehensiveness of R&D programs. This is necessary to reduce duplication and assure that there are no gaps between programs. It should be noted that in crucial areas, duplication tends to be encouraged in order to have several paths to the same problem. This is the case for fusion research.
- Cross functional policy-setting. These are issues which affect several agencies but are not within the bailiwick of any particular agency. Here, for example, are issues of patent policy and laboratory utilization.
- Implementation. Here OSTP coordination involves assuring that R&D performers are coupled to the ultimate users, and facilitating the delivery and utilization of federally created technology. Both the pull of users in the private or public sector and the push of the technology need to be considered.<sup>7</sup>

These four areas of coordination are characterized by two approaches to coordinating science and technology—horizontal and vertical.<sup>8</sup> Horizontal approaches use coordination among individuals of equal standing within their own agencies. This type of research coordination, usually not very dramatic in its activity or results constitutes the bulk of Federal science and technology coordination. A forum is provided to develop personal linkages and exchange information. Minor issues are resolved and low-level questions discussed, often on an informal basis. However, once larger issues are introduced, the games of bureaucratic politics and strategic maneuvering take place. Horizontal coordination is relatively easy where the stakes do not involve vital organizational interests, but when they do, this type of coordination is especially difficult to accomplish, since there is no hierarchical structure immediately available to which committee leaders can appeal against their peers. Horizontal coordination presents a sharp challenge to both committee leadership and the larger managerial organization in numerous ways. First, since the committees operate by consensus, any decisions tend to be at the lowest common denominator. The committee members may agree to particular outcomes or recommendations, but these are not necessarily meaningful results. Each member represents an agency which has its own vested interests and goals and hence avoids confronting issues or making decisions that will adversely affect the prerogatives of the represented agencies. One result is that only general or vague recommendations or decisions are arrived at. As a consequence, national programs involving interagency cooperation fail to develop in one lead agency through interagency coordination. Instead, agencies use the forum to legitimate what they are already doing.

A necessary condition for the effectiveness of these interagency committees is that policy-level personnel participate in them. These people tend to be the most important members, hence, the busiest, and consequently tend to progressively deputize attendance. These high-level policymakers delegate attendance to their

subordinates who in turn send their subordinates until (regardless of the individual's specialization in the area in question) the representative will not have the authority to speak on policy changes or compromises his or her agency would be willing to make.

A horizontal coordinating body has no authority to implement its decisions. Only the operating agencies have implementation resources and powers. As a result interagency committees can decide, but not execute. If any agency or section of that agency disagrees with a policy decision, the committee cannot coerce the agency into the agreed-upon action. Similarly, when studies are performed there may be no recipient or specifically intended audience for the committee recommendations. Studies are produced, decoupled from anyone who would or could exercise authority to implement actions recommended.

A vicious cycle takes place in which the usefulness of the interagency committees is downgraded, which in turn leads to frequent absenteeism and delegation of alternates to attend meetings. This reduces the importance of the committee and so on. In sum, horizontal coordination is used most often, but tends to be effective only on issues that matter least. For the most vital issues, vertical coordination is necessary.

### *The Vertical Approach*

The vertical approach to coordination means that the power and prestige of the President is directly or indirectly involved to secure the desired results. Here the most significant vertical coordinators are the OMB and the OSTP. The major vertical activities take place in the EOP, and often involve Presidential budget-making. Less frequent, but also influential, is intervention on the part of Presidential staff offices in bureaucratic operations. Effectiveness here is largely a function of association of the science staffs with either the budget process or with the President and his top operatives. The perceived lack of proximity with the President weakened the OST (Office of Science and Technology, OSTP's predecessor) during the Nixon administration; this reduced OST's ability to vertically coordinate agency operations.

This general situation is in marked contrast to agency reaction to the New Technological Opportunities Programs (NTOP). Unlike the usual lackadaisical reaction to OST initiated proposals, the direct request from the President to move on NTOP conveyed through the OST (prior to its replacement by a subsequent organized group) spurred the agencies to great action.<sup>9</sup> The main source of power for these staffs is not so much persuasiveness, or rationality as much as association with the President. This association can be either direct, as through personal contact with the President and Presidential directives, or derived from association with the budget process.

The American system relies heavily on the budget process to review the activities of the departments and this budget analysis enables issues of effectiveness in actual performance to be raised periodically for Presidential decision. While the creation of a Federal budget in no way assures that science and technology will be coordinated, it does give an opportunity to discuss and integrate R&D issues which

crosscut the Federal agencies. The budget has the additional advantage of being an institutionalized tool to coordinate activity annually and routinely.

In this regard the OSTP's relationship with the OMB is extremely important, for the statutory authority of the OSTP in budget matters is sharply delimited. The OMB is the powerful budget agency of the President, and Science Adviser Press and his staff have gone to great lengths to keep an open and helpful relationship between the two agencies. Thus far the relationship seems to be mutually beneficial; laudatory remarks have been made by each group about the other. An example of this fruitful cooperation was a joint study in which the President commissioned Press and the Deputy Director of the OMB to do an in-depth cross-functional study of Federal research. The study panel included Cabinet officers and the Vice President. The end result of this study was a Presidential budget increase for basic research of about 11% across the government.

In addition to substantive budget review and analysis, the OSTP can serve other roles in conjunction with the vertical coordination with the OMB. For example, the OSTP can assume a brokerage or expediting role, as when it facilitated the transfer of unneeded labs from one agency to another that could use them. The OSTP can also play an advocate's role, encouraging agencies to assume programs that fall between agencies or have been overlooked. This is a role that needs to be handled very gingerly since in the past this activity has caused problems for the OST when it became identified as a lobby for science. Great lengths must be taken in order to insure that the advocated programs are truly programs desired by the President and not just something the OSTP itself would like to see accomplished.

Vertical coordination, especially in terms of intervention into operational programs of the agencies, must be pursued to avoid enervating overcommitment. There are an infinite number of issues the OSTP could address, so very sharp limitations must be levied in order to prevent too much effort being devoted to fire-fighting and managerial intervention, in practical terms trying to fill a bottomless pit. Effort should be given to setting and periodically reviewing priorities in this effort and assessing the potential benefits and the likelihood of their being achieved.

### *Centralized Coordination*

Centralized coordination, both horizontal and vertical, tends to be resisted by the Federal agencies. Interagency groups tend to be seen as having a practical use; agencies have little to gain through participation in interagency coordination bodies and something to lose, especially if their representative is not an astute negotiator. Centralized coordination can yield increased efficiency in governmental operations if handled properly. But the entire concept of coordination, both horizontal and vertical, implies accountability—that the Federal agencies must hold up their practices and policies for review and examination by higher authorities, and that the agencies are also subject to change or discipline as a result of this examination.

In effect a more vigorous OSTP and FCCSET means a greater degree of central-



ization of policy oversight responsibility and accountability for R&D in the Federal system. One of the most notable characteristics of the US R&D science policy is its pluralism, a marked contrast with other systems such as Japan, France, and to a lesser extent, West Germany. There are dangers in overplanning and inflexibility, yet there is no reason why centralization of some responsibility and the maintenance of flexibility are mutually exclusive. There are costs to centralization but there are likewise costs to decentralization. In an era of scarce resources and sharp foreign competition, R&D must be marshalled as efficiently and effectively as possible.

Here some lessons might be learned from the centralized, but flexible, Japanese science policy. The Japanese have succeeded not in becoming pre-eminent in the production of new scientific knowledge, but in the production of manufactured items. This is in part due to the fact that their science policies are designed to facilitate harnessing the research of other countries rather than the creation of new findings in and of themselves. While certainly the US would not want to forego its leadership in national security related research, a re-direction of R&D towards industrial, social, and commercial applications could be of great benefit. A more closely integrated program of interaction between researchers and industry could be of benefit in ameliorating trade, productivity, regulatory, safety, environmental, and a host of other problems. Some criticism has been directed at the OSTP for by-passing industrial innovation and engineering aspects of science and technology policy in favor of pure research. For example, a GAO report faulted a Federal Council's Coordinating Committee for Materials R&D for its "strong basic science orientation with little or no engineering or other input."<sup>10</sup> A minor point, perhaps, but indicative of the mindset that was operating was the resistance by some of the scientists associated with the re-structuring of the White House science offices to the addition of "Engineering" in FCCSET and ISETAP titles. Hyperbolizing, science was to remain unsullied by "profane" applied engineering. This situation is gradually becoming rectified, as is exemplified by recent efforts to establish programs to stimulate private sector innovation, but much remains to be accomplished.

Centralized coordination bodies require skillful leaders, careful supervision, and clear objectives in order to succeed. Implementation of recommendations, for example, has been a key issue in the operational success of science offices, both past and present. In the past especially, the OST and Federal Council would issue reports, but would address no particular recipient who would or could exercise authority to implement the actions recommended. This weak coupling between policy recommendations and the R&D management was a source of frustration for both the Science Advisers and policy-makers and of course reduced a report's impact and the adviser's influence.

Likewise, inadequate leadership permits the potential drawbacks of committees to come to the surface. David Beckler, the long-time former executive officer of PSAC and later acting OST director, argues that the science coordinating mechanism operated "on the basis of self-interest, consensus and compromise, and its proposals have been implemented only to the extent the agencies wished to take advantage of its conclusions."<sup>11</sup> In many cases log-rolling took place when

representatives would agree to support favored projects of others in return for a similar endorsement.

While personalities are important, some of the organizationally-based problems could be reduced through the limited centralization of authority over R&D programs in the hands of the Science Adviser and through delegation to the OSTP. This centralization would mean greater power for the Science Adviser and his staff. Such enhanced authority would improve the Science Adviser's ability to have recommended policies implemented. In the past, even though the appropriate official in an agency might agree that a particular program should be implemented, no action would be forthcoming because of agency resistance. Money can even be put in the budget, but still, because of bureaucratic resistance, the program may not be properly implemented. While being far less than a "science czar," increased authority for the Science Adviser could permit him to be more effective in identifying areas where more work or a changed emphasis would be helpful and to have the wherewithall to see that his recommendations are carried out.

Centralization also means that the OSTP could more effectively aim at harmonizing the various aspects of "high policy" and assuring that the Federal R&D management environment is structured in a way that will motivate the most efficacious allocation of resources and programs. A primary goal of OSTP centralized coordination should be oriented towards strengthening science and technology programs of mission agencies in the civilian and domestic spheres. The management of these programs has lagged in contrast to weapons and space research. Unlike national security and related areas, civilian issues such as urban transportation, welfare and health tend to be "moving targets," rather than "stationary" ones. The result is that flexibility needs to be a hallmark of the centralized structure, and this flexibility is as much a result of good leadership as it is of good program policy design.

In the past the OST was not noted for its flexibility or its ability to respond to changing situations, either in the political atmosphere of the White House or to the larger necessity of including political, economic and social factors in the construction of the reports and recommendations. In part this lack of flexibility was due to a "bureaucratization" of the OST. As staffs grew larger, the utility of their output diminished. Despite the disadvantages mentioned earlier, the strict proscription of large staffs in the current White House will reduce the likelihood of bureaucratic ossification taking place on the staff level.

### *Curbing Task Forces*

The constituency nature of government, which includes not only agencies, Congress, and the concerned public, but various factions within the scientific community as well, means that science policy will have a tendency to become pluralistic, decentralized, and fractionated. It also means that there will be constant pressure for the creation of specialized committees in FCCSET and on lower interagency levels to represent those interests. In recognition of this danger and despite the increased use of outside resources, the OSTP has attempted to curb the

use of interagency task forces. The task forces were especially characteristic of the Johnson Administration. These task forces and the OST committee system tended to proliferate in number and missions, creating new goals as they accomplished their initial objectives. These committees were like hydras; an attempt to kill a committee would induce it to resurge and diversify.

Under the present system, the number of committees working with OSTP has been severely restricted. Precise aims and specific termination dates are assigned. At any given time there are usually five or six committees in operation with an average lifespan of 12 to 18 months.

Trimming committees also have been used with some success in FCCSET, the chief formal government-wide coordinating mechanism for science and technology issues. FCCSET operates as a sub-cabinet group under Press's chairmanship and is composed of chief officials for R&D in the various government bureaucracies. After an OSTP review, a number of committees were pared down or eliminated—in the latter case, the committee's responsibilities were reassigned to a lead agency. The lead agency coordinates activity on the issue with occasional reports back to OSTP. This decentralization concept conforms with Carter's emphasis on program management by agencies where possible. Special problems are dealt with by an ad hoc FCCSET committee when necessary.

Although hampered by limited resources, Press has sought the opinions of outside experts in reviewing the working of these committees. An example of this took place with the Interagency Review Group on Nuclear Waste Management (IRG). The task force report has been reviewed by the National Research Council's committee on radioactive waste management, by other experts such as Harvey Brooks and David Deese and public comments have been invited. The IRG also exemplifies greater attempts to attain public participation and win broad support for the resultant policy.<sup>12</sup>

Quality assurance is problematical in any organization and no less so in the OSTP. Outside semi-public review is a current attempt to accomplish this objective. Before the White House science office's disbandment by Nixon, this function was served by the President's Science Advisory Committee (PSAC) which was a small body of some of the most talented "policy-oriented" scientists in the nation. PSAC was able to insure the report quality of its own panels and of the OST and its panels, and was also able to inject something of a general public policy orientation to the more parochial special interest reports. At times the PSAC impact on the reports was substantial, especially in areas of technical quality or delineation of options. Today Press is operating almost exclusively through panels without utilizing any central review groups, relying instead on a piecemeal approach to review and evaluation.

Under contemporary conditions it would be almost impossible to have a group similar to PSAC that could operate effectively. In large part this is due to the Freedom of Information Act, which allows citizen access to governmental meetings and documents under certain conditions. PSAC was only willing and able to fulfill its role because it was an anonymous one. The critical procedure of review and criticism cannot function in the public eye because of the reprisals that would be levied against the reviewers. Clearly people are willing to say things in private that they would not say for the public record.

*Problems in Critical Reviews*

The problems inherent in critical reviews of politically sensitive projects or reports are illustrated by an incident that occurred during the Kennedy administration. PSAC studied Project Rover, a nuclear powered rocket, strongly supported by the Congress's Joint Committee on Atomic Energy. Several industry people were on the panel reviewing Rover and these individuals concluded that the project was nonsensical and said as much in their report. This report enraged a powerful committee member, Clinton Anderson, who attempted to discover who had been on the panel. He wanted this information in order to carry out reprisals against the firms employing these members. The reprisals were to take the form of a "bill of attainder" in the defense and space appropriations measures saying that these particular companies would receive no contracts. Whether or not Anderson could have carried out his threat remains moot, but the threat alone is enough to demonstrate that political considerations can easily erode objectivity unless there are appropriate safeguards.

The loss of a group to perform a PSAC-like role is a major weakness which transcends the quality assurance and review function. It was generally believed that PSAC served as a lobby for basic research. But, in areas not involving its own interests, PSAC earnestly sought to represent the President's interests in line with the technological realities of the situation. PSAC did give advice that was contrary to the prevailing conventional wisdom within an administration, and took positions contrary to the expressed desires of a President. This was true in the case of the Skybolt missile, the antiballistic missile, and the supersonic transport plane. (In each of these cases the administration in office would probably have done better to heed instead of ignore PSAC's advice.) Yet in these situations it was clear that PSAC was representing the President's interests as opposed to any parochial interests. This continued to be true even though the membership of PSAC became more and more diverse as the years went by.<sup>13</sup>

Under the current arrangement of relying on specialized groups, this unity of Presidential focus is much more difficult to insure. And even if Presidential interests remain the paramount orientation, it will be more difficult for people to believe that this is in fact the case. This in turn means that the impact and credibility of OSTP reports will be diminished since the primary audience for the reports is the President and his staff. In that rarified atmosphere there is no tolerance for special interests that try to assume the mantle of Presidential legitimacy. The value of the Science Advisers had to be proven again and again with each new administration or operative. Initially, in each administration they were perceived as useless, or worse as representing special interests.

The political staff of the President has always been competitive with the science advisory staff. The only products any of these advisers have to sell are information, opinion, and advice (these are usually indistinguishable), and the only market is "the President's ear." Being highly political both in nature and job description, the Presidential advisers have an inside track over the Science Advisers. In the exercise of sheer power over policy, the Science Adviser is at a great disadvantage, although he may carry the day on the strength of the technical merits to his case.

In this situation, an appropriate analogy is that the scientific advice office is like a transplanted organ: the body's defense mechanisms are always present, waiting until they are no longer suppressed to reject the foreign body (science advisory apparatus). A President, of course, can either encourage or discourage those rejection mechanisms. President Nixon quite obviously encouraged those mechanisms which ultimately led to the office's reorganization out of existence.<sup>14</sup> The chronic resistance of White House staff to Science Advisers and staffs is motivated by more than considerations involving power politics. The scientists are seen as being overspecialized and their advice as too esoteric and narrow for the Presidential level. They are also perceived as indulging in special interest pleading and ax grinding, and as unwilling to respect the sensitive and privileged nature of White House matters.<sup>15</sup>

### *Overcoming the Doubts*

Press has sought to overcome these doubts about scientists in the White House, and has met with significant success. OSTP staff has been able to work closely with the OMB on science budgets and has been able to share in some national security discussions. An approach to enhancing cross-agency communication has been tried: an OSTP assistant director, Ben Huberman, has a joint appointment to the National Security Council staff. This move symbolizes the efforts to integrate the OSTP more closely with the mainstream of presidential concerns.<sup>16</sup>

A particular dilemma for the science advisers is that unlike the other Presidential advisers they always appear to have a constituency, whether or not they are actually representing that constituency. This problem became most obvious during the Vietnam war. The scientific and academic communities were centers of protest over the war, and the nearest face of this community was the White House scientists. To many advisers, dealing with these scientists became the "moral equivalent of trading with the enemy."

There are certain advantages to the Science Adviser's position vis-a-vis other Presidential advisers. To some staff members, the Science Advisers can be seen as "neutral," since they are not competing for influence in their areas. Of the coterie of advisers, it is almost invariably only the Science Advisers that know anything about technical matters, and are able to give sound advice on these subjects. Because of the seeming neutrality in this situation, the adviser's position might actually be enhanced. This was certainly the case when Press was chosen to select an advisory panel to overhaul the White House information system. Given the aphorism in Washington that information is power, it is notable that Press was selected to carry out this sensitive assignment. This assignment fortuitously coincided with Press's attempt to gain more office space for his staff.

The contradiction between thorough study and analysis and the policymaker's need for immediate information and recommendations has accompanied every science policy office. It is neither new nor resolvable in the foreseeable future. But the contemporary arrangement of the OSTP seems to intensify this contradiction. Many of the reports must be produced quickly in order to be of a value to the policymaker. This is difficult first of all because the resources for the study exist

outside the staff, and must be drawn together and organized in order to be utilized. Secondly, the short time frame for the study is incompatible with the proper functioning of review mechanisms. This is particularly true of the NRC which has an institutional review mechanism in place to review any reports and recommendations generated by that organization. Thus, by the time policy requests are passed down to staff, time compression is even more severe.

To a limited extent, this issue has been circumvented by Press. He anticipates what the likely issues are going to be, and then thoroughly prepares himself and his staff on a small number of issues. On selected issues the OSTP has become highly expert, but this narrow focus consequently means that Press's and OSTP's overall impact is reduced. Press simply does not, and cannot, become engaged in the broad array of issues confronting the President. The narrow focus is nonetheless a source of great strength on the issues which he does become involved in. His superior substantive knowledge on a particular issue helps him prevail even against Cabinet level officials. This has occurred in a number of cases, for instance in defense policy (weapons systems) and space policy (satellite programs). Obviously, when Press has been able to get the support of the rest of the governmental officials on an issue, his job of selling a program to the President is eased considerably.

### *The Institutional Factors*

There are institutional factors that work to reduce the Science Adviser's effectiveness. Specialized White House advisory agencies, both scientific and non-scientific, tend to wane quickly; in fact, it is often counterproductive for narrowly-focused groups to have functionaries closely linked to the President. Long-term observation demonstrates that the Presidents grow hostile to special-topic advisory staffs, despite the usually warm initial reception. This characterizes the fate not only of the previous OST, space, and marine councils, but also the Office of Drug Abuse Policy, the Office of Telecommunication Policy, the Council on Environmental Quality, and the consumer-affairs advisers. There are both institutional and psychological reasons why this takes place.

The special-topic adviser represents an imbalance that automatically discounts his advice; the scientist, for example, is concerned with particular issues and even more so with particular solutions to those issues (i.e., techni-scientific answers). While this might be acceptable in critical periods such as World War II and Sputnik, it does not seem to serve the President well in ordinary times. Balanced and objective advice is important to the President, his staff, and the OMB. The belief that the special topic group's advice will have to be counterbalanced adds an additional burden to the advice they receive, hence the advice (and its source) is downgraded.

### *A Tension-Charged Relationship*

The more focused and specific the specialist's domain is, the more tension-charged will be his relationship with the President. Consequently, the "half-life" of his impact on Presidential decisions will be foreshortened or lengthened depending on

the specificity or diffuseness of the perspective he is representing. This has been the key to the viability and power of the OMB and also to the long-term impact of the Council of Economic Advisers. The OMB is useful because its views cut across the whole spectrum of governmental activities; it represents no single perspective or interest. Likewise, the economy is the linchpin of the nation. Hence the Science Adviser and his staff must be certain to assure that no taint of special interest appears in their recommendation and that all conflict of interest is eschewed. Conventional wisdom dictates that the Science Adviser's usefulness is predicated entirely on his personal rapport with the President, the "sine qua non." Although this perception does contain an element of truth, it mistakes effects for causes. The personal relationship grows out of the President's appraisal of the Science Adviser; more specifically, the relationship hinges on what the President feels the Science Adviser can do for him politically, or to keep him out of trouble politically. While compatibility of style is important, the President still has to feel that he needs the Science Adviser. If he does, the personal relationship will flourish. Obviously some advisers are able to demonstrate their utility more easily than others and, while this is partially a result of personal characteristics, it also depends on the particular period and events which structure the political needs of the President and the ability of the Science Adviser to respond to those needs. By extending this point it becomes discernible that when R&D budgets are growing, the Science Adviser will be more useful to the President than when they are shrinking (at which time he is likely to be a liability to the President).

All the former Presidential Science Advisers have echoed George Kistiakowsky's sentiment that "the Science Adviser to the President first and foremost is a servant of the President."<sup>17</sup> In order to securely maintain his rapport with the President, the Science Adviser must repeatedly demonstrate that he is indeed "first and foremost" a servant. But in order to be effective there are a number of fine lines the adviser must read; servitude itself is only a necessary, not a sufficient, cause of effectiveness.

The Science Adviser must deal with conflicting roles of representing agency programs and being a neutral and disinterested analyst of those programs. On the one hand, if the Science Adviser too rigidly serves as a policy analyst, the agencies will stop using him and sharing their programs with him; he will be perceived as just one more budgeteer, an opponent—and probably a highly knowledgeable and influential one. On the other hand, if he encourages and supports agency programs, his credibility with the OMB and White House staff will be diminished. Either choice results in diminished effectiveness. Similarly, the Science Adviser must be able to foster the feeling among the scientific community that he is representing their interest in order to be able to communicate freely with that community. Without this, he will be hampered in service to the President. Should the Science Adviser be perceived as the exponent of the scientific community, however, his usefulness would be terminated: "It would be a complete political disaster" to be "the spokesman of the scientific community in the White House," said Kistiakowsky.<sup>18</sup> The need for balance and diplomacy means that there is no simple recipe for a Science Adviser's effectiveness. Each Science Adviser must carve

out his own niche within the flow of the dynamic and powerful forces surrounding the central position in the US political system, or be swept away by them.

### References

1. In this paper, science policy is used generally to include "high technology" and scientific research and development. Science advice includes both science for policy and policy for science. See H. Brooks *The Government of Science* (Cambridge, Mass.: MIT Press, 1968).
2. US Congress, House Committee on Appropriations, "Department of Housing and Urban Development—Independent Agencies Appropriations for 1980," Part 6, Office of Science and Technology Policy (1979), p. 60.
3. Critical assessments are contained in the US Congress, Senate Committee on Commerce, Science and Transportation, "Oversight on OSTP" (1979), in *Chemical and Engineering News*, July 16, 1979, p. 16 ff., in a Congressional Research Service report on the Office of Science and Technology prepared by Dorothy Bates, and an American Society for Public Administrators report prepared by Edward Wenk, Jr.
4. *Ibid.*, p. 54.
5. US Congress, House Committee on Appropriations, "Department of Housing and Urban Development—Independent Agencies Appropriations for 1979," Part 5, Office of Science and Technology Policy (1978), p. 22.
6. US Bureau of the Budget, "Report to the President on Government Contracting for Research and Development," 1962.
7. US Congress, House Committee on Science and Technology, "Interagency Coordination of Federal Scientific Research and Development: Special Oversight Hearings," 1976, p. 31.
8. *Ibid.*, p. 44-49. Harold Seidman, *Politics, Position and Power*. London: Oxford University Press, 1970.
9. J. E. Katz, *Presidential Politics and Science Policy*, New York: Praeger Press, 1978, pp. 205-208. An almost identical series of events occurred when a Presidential Review Memorandum was prepared by the Department of Commerce entitled "Domestic Policy Review of Industrial or Technological Innovation" (The White House, 1979).
10. US Government Accounting Office, "Federal Materials Research and Development: Modernizing Institutions and Management" (OSP-76-9, December 2, 1975), p. 7.
11. *Op. cit.*, House Committee on Science and Technology, p. 107.
12. US Congress, House Committee on Science and Technology, "National Science and Technology Policy Issues, 1979." Part I, 1979, p. 12.
13. *Op. cit.*, Katz.
14. D. Beckler, "The Precarious Life of Science in the White House." *Daedalus* 103, Summer 1974, pp. 115-34.
15. J. R. Killian, Jr., *Sputnik, Scientists and Eisenhower*. Cambridge, Mass.: MIT Press, 1977), p. 65.
16. Huberman is not the first person with a joint appointment between OST(P) and NSC. Spurgeon Keeny held a similar position during the Kennedy and Johnson Administrations.
17. Franklin Institute, *Science Policies for the Decade Ahead* (Philadelphia: Franklin Institute Press, 1976), p. 61.
18. *Ibid.*, p. 62.