

FOREWORD

Over the last 45 years, science advice to the President has been institutionalized within the White House. The organizations through which such advice is given have changed over the years, and different Presidents have used them in different ways. The original impetus for establishing a permanent home for science advice within the White House arose because of the impact that science and technology had in the winning of World War II, and the focus at the office at the beginning was on national security and the use of science and technology in all aspects of the Cold War.

As the years went on, while some of the national security issues remained, presidents came to recognize the importance of science and technology in other policy areas, and added subjects such as environment, science education and research, space, and technology to the list of issues for which scientific and technological expertise inside the White House was desirable. Now, as described in this memorandum, the Assistant to the President for Science and Technology directs the Office of Science and Technology Policy, cochairs the President's Committee of Advisors on Science and Technology, and leads the staff of the National Science and Technology Council. In addition, the Assistant has a special relationship with the Office of Management and Budget.

Between 1988 and 1993, the Carnegie Commission on Science, Technology, and Government studied the way that all branches of government handled decisions on issues affecting and affected by science and technology. The Commission focused both on institutions (among them, the Executive Office of the President, Congress, the Judiciary, the regulatory agencies, the states, and nongovernmental organizations) and on key problem areas (including economic performance, national security, the environment, science education, and international relations). The Commission did not examine a number of areas of concern where advances in science and technology, including the behavioral sciences, can make major contributions, such as health care, world population and urban issues; other organizations with special expertise are addressing these issues.

At its first meeting in 1988, the Commission members agreed that the first Commission report should be on the organization of the White House to ensure the best possible science and technology advice to the President. That report was issued shortly after the election. In 1992, a report dealing with *recommendations to the President and Congress had a short chapter on the organization of the Executive Office of the President for science and technology*. This memorandum updates the previous reports.

As this memorandum makes clear, the overall structure now in place in the White House for dealing with issues involving science and technology is sound, and can deal with the post-Cold War issues that now face the nation. The changes recommended here are relatively minor, but if implemented would substantially enhance the value of the office to the President.

We would like to thank David Z. Beckler and David Z. Robinson, who drafted the memorandum for Commission consideration, for their efforts.

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**Science and Technology and the President
A Report to the Next Administration**

The various White House mechanisms for advice on issues of science and technology (S&T) have been in place for over 45 years. The experience has demonstrated that the President needs advice that is independent of the advice of the federal departments and agencies. Issues involving S&T that arise at the presidential level usually transcend the responsibilities of individual agencies and are often imbedded in broader national policy issues. Looking ahead, there are important issues involving, for example, budgetary allocations for research and development (which accounts for a large portion of discretionary expenditures), or the best mechanisms for strengthening the American economy, maintaining environmental quality, and exploiting the potential of the new information technologies for education and the environment.

Since its establishment in 1988, the Carnegie Commission on Science, Technology, and Government has concerned itself with the best ways of providing the President with scientific and technological (S&T) advice and assistance. The Commission's first report in October 1988, addressed to both presidential candidates, recommended that the post of presidential science advisor be upgraded to Assistant to the President for Science and Technology; it also recommended that the President establish a group of senior scientific and technical advisors drawn from outside government.¹

In a second report on the subject, before the 1992 election², the Commission called for a high-level forum to assess national S&T policies. It also recommended that the Federal Coordinating Council for Science, Engineering, and Technology be convened at cabinet level and that steps be taken to provide mechanisms for integrating scientific and technical considerations in White House policy formulation.

Both Republican and Democratic administrations took action that reflected the substance of these recommendations. President Bush elevated the science advisor post to Assistant to the President for Science and Technology and upgraded the membership of the Federal Coordinating Council for Science, Engineering, and Technology to Cabinet level. The President's Council of Advisors on Science and Technology was reestablished after a lapse of fifteen years in order to draw on the expertise of the outside scientific and engineering community (during the Reagan Administration, a White House Science Council reported to the President's science advisor rather than to the President).

President Clinton appointed a President's Committee of Advisors on Science and Technology

and further strengthened decision making for White House science and technology policy by establishing the National Science and Technology Council (NSTC), chaired by the President and made up of cabinet officers, agency heads and senior White House staff members.

By strengthening the authority of the science advisor and increasing the policy orientation of scientific and technical advice, the steps taken by the Bush and Clinton administrations inaugurated a new era for presidential science advising. In particular, the National Science and Technology Council increased the emphasis on policy formulation.

The following proposals build on the substantial accomplishments of the past eight years. In particular, they attempt to integrate the various S&T organizations more fully into the operations of the White House and the Executive Office and to focus the S&T advice on presidential priorities and initiatives.

THE OVERALL STRUCTURE OF SCIENCE AND TECHNOLOGY ADVICE TO THE PRESIDENT

The Commission's principal recommendation to the next Administration is that the present organizational structure for S&T advice in the White House (see Figure 1)—the Assistant to the President for Science and Technology, the National Science and Technology Council, the Office of Science and Technology Policy, and the President's Committee of Advisors on Science and Technology—be retained and that its operations be fine-tuned.

THE ASSISTANT TO THE PRESIDENT FOR SCIENCE AND TECHNOLOGY

The Commission recommends that the Assistant to the President for Science and Technology should give primary attention to serving the President in a policy advisory role similar to that of other Assistants to the President.

The Assistant to the President for S&T wears three hats. Besides being a member of the President's senior staff and cochair of the President's Committee of Advisors on Science and Technology, the Assistant has statutory responsibilities as Director of the Office of Science and Technology Policy. Although these responsibilities overlap, the statutory functions of the OSTP Director go beyond direct advice to the President. OSTP provides leadership and coordination of federal R&D programs and assists the Office of Management and Budget throughout the budget development process. These broader responsibilities compete for the time and attention needed to respond to the priority policy concerns of the President. Nonetheless, the Commission continues to oppose the fragmentation of the S&T advisory function that would occur if the positions of Director of OSTP and the Assistant for S&T were separated. The measures recommended in this report are aimed at reinforcing the policy role of the Assistant for S&T while allowing him or her to continue to carry out essential S&T program and management functions.

The effectiveness of the Assistant for S&T, like that of other members of the senior White House staff, depends on his or her access to the President. If the Assistant interacted more intensively on a day-to-day basis with the President's senior staff and participated in the work of White House policy councils, his effectiveness would be greatly increased. That interaction can occur naturally, if the Assistant focusses on the S&T components of Presidential priorities and initiatives.

THE NATIONAL SCIENCE AND TECHNOLOGY COUNCIL

The Commission recommends that the National Science and Technology Council (NSTC) be oriented and structured primarily as a policy council in accordance with its enabling Executive Order.

The establishment of the NSTC in 1993³ was a major step in the evolution of White House S&T advisory mechanisms. The Executive Order directed the NSTC to:

- Coordinate the policy making and implementation process for S&T across federal agencies
- Ensure that scientific and technical policy decisions are consistent with the President's stated goals
- Ensure that S&T issues are considered in the development and implementation of federal policies and programs
- Further international cooperation in S&T

Like the other presidential councils, the NSTC is a "virtual council," which seldom meets at Cabinet level. The Assistant for Science and Technology communicates directly with key individuals and achieves consensus by convening meetings of subcabinet officials directly involved in particular policy issues. NSTC's advantage over its Bush Administration predecessor, the Federal Coordinating Council for Science, Engineering, and Technology, lies in its presidential chairmanship and the ability of the Assistant for Science and Technology to exercise authority on behalf of the President and the council through Presidential Decision Directives (PDDs) and Presidential Policy Reviews.

The Vice President chairs the new National Science and Technology Council in the absence of the President and has taken a deep interest in S&T issues. His working relationship with the Assistant to the President for S&T has contributed to the Assistant's effectiveness.

The NSTC plays a significant role in S&T policy formulation⁴. For example, in FY1995 it established a National Bioethics Advisory Commission, developed a national security science and technology strategy, prepared a statement of national space policy, reviewed options for reform of the federal laboratory system, established a policy to address the global threat of emerging infectious diseases, organized a national partnership in aeronautics research and technology, and initiated policies for a better federal/state partnership in S&T.

In practice, the activities of the NSTC have not been limited to priority policy issues. Its staff estimates that only 40 percent of its activities concern policy. Most of its efforts concern R&D program and budget coordination and convening private sector S&T forums and workshops. Committees and subcommittees have multiplied (there are about sixty), and programs and projects have accumulated. Some member agencies have become concerned about the amount of time spent by their senior administrators in the NSTC process. The Office of Management and Budget, a key player, has reduced its participation as NSTC interagency groups have proliferated and narrowed in scope.

The Commission believes that the NSTC could be an even more effective instrument for developing national S&T policies and that it should concentrate its resources on a small number of priority policy issues of concern to the President. Clearly, it is better for policies to guide programs, than to have programs determine policy.

Focusing NSTC activities on relatively few priority issues and objectives that involve the President or Vice President will help ensure the full participation of OMB and cabinet officers and will reduce the burden on departments and agencies. In the Bush administration, the Federal Coordinating Council for Science, Engineering, and Technology limited its "crosscut" programs to about six, and this number seems reasonable.

The NSTC should look to OSTP for leadership in devising alternative arrangements for other interagency R&D coordination, including mechanisms for reviewing crosscutting programs that do not require NSTC auspices. The need for coordination of federal R&D programs is likely to grow in light of budgetary constraints and the overlapping S&T interests and objectives of federal departments and agencies. For the most part, interagency coordination and interaction should not regularly require detailed management oversight by the NSTC or OSTP.

The Assistant to the President for S&T, working in close contact with the President and his key staff advisors, should guide the selection of priority S&T issues for NSTC action that correspond with the President's objectives. These should include broad policy issues with substantial scientific and technological components, as well as policies for S&T. For example, the NSTC might undertake an in-depth examination of policies to promote technology and national competitiveness including the coordination and integration of S&T and related policies across governments and the private sector. This would require the development of tools for monitoring the effect of federal programs and policies, examination of the impact of technology on American and foreign companies, design of mechanisms for cooperation among federal agencies, and promotion of new initiatives in government/industry/university relationships. Such a program would require sustained effort, commitment, and follow-up in close cooperation with the other White House policy councils and the federal departments and agencies. Private industry, universities, and state governments would need to be consulted.

THE OFFICE OF SCIENCE AND TECHNOLOGY POLICY

The organization, functions, and operations of the Office of Science and Technology Policy should be assessed early in the next administration by the Assistant to the President for S&T with a view to sharpening its focus on matters of concern to the President and strengthening its support of NSTC, PCAST, and the Assistant to the President for S&T. To this end, the Commission has three recommendations.

The Commission recommends that an OSTP chief of staff be appointed in order to strengthen management and coordination within OSTP, and thus to free up time of the Director to perform the duties of Assistant to the President for Science & Technology.

Many S&T policy, program, and budget issues rise to the White House level because of their interagency character, resource implications, and relationship to presidential goals. As a result, OSTP activities have expanded, and professional staff from departments and agencies have been detailed to supplement the official Executive Office personnel complement. Yet OSTP remains substantially understaffed, and is unable to provide adequate support to the Assistant for S&T, the NSTC, and PCAST. Besides increasing its staff, more extensive use could be made of the federally-funded Critical Technologies Institute, which is authorized by Congress to undertake analytical studies at the request of the OSTP director.

Clear objectives and priorities must guide OSTP commitments and initiatives so that it can conform to strict personnel and financial resource limitations. Setting the goals, agenda, and priorities of OSTP is a responsibility of the Director. With four associate directors appointed by the President involved in different agendas and priorities, it is difficult to achieve overall focus and concerted effort unless there is firm guidance, direction, and incisive decision making by the Director.

To maintain strong OSTP leadership and to enable the Director to devote more time to his duties as Assistant to the President for S&T, the Director needs assistance in two areas. He must now spend significant amounts of time on general administration, including recruiting, personnel items, budget, and general administration. In addition, material coming to the Director should be checked to verify that there has been requisite internal and external examination and coordination. A well-qualified Chief of Staff would carry out the administrative duties and discharge some of the other responsibilities described above.

The Commission recommends joint staff appointments between the OSTP and the National Security Council (NSC), the Economic Policy Council (EPC), and the Domestic Policy Council (DPC).

The strength of the S&T advisory apparatus depends on OSTP's relationships with the other White House policymaking bodies. Of primary importance is the arrangement of joint appointments of senior OSTP staff members to the staff of other White House policy councils, not merely for liaison purposes, but with full membership on both staffs and dual reporting

responsibilities. Such joint appointments could provide necessary staff support to the Assistant for S&T, who serves as a member of the Economic Policy and Domestic Policy Councils and is a *de facto* member of the National Security Council.

The usefulness of joint appointments has been demonstrated in the national security area, where the OSTP Associate Director for National Security and International Affairs has a second official role as Senior NSC Director for S&T reporting to the Assistant for National Security and his deputy. The joint appointee brings an S&T perspective to the work of the NSC, keeps the NSC informed of related OSTP activities and capabilities, and provides the OSTP director with information on matters of primary concern to the NSC.

The OSTP Associate Director for Science has worked closely with the Domestic Policy Council. Since the Associate Director for Environment and the Associate Director for Technology also have interests that concern the DPC, the OSTP Director has not proposed that a single Associate Director be appointed to the staff of the DPC. Similarly, all four Associate Directors have interest in the actions of the Economic Policy Council. As a result, the EPC and DPC do not have single points of contact with OSTP. The Director of OSTP should develop an arrangement with the DPC and EPC, like the arrangement with the NSC, whereby one Associate Director would hold a joint appointment to the DPC and another to the EPC. Those Associate Directors would represent the overall interests of the OSTP in the work of the councils and would involve other Associate Directors in the business of these councils as necessary.

The Commission recommends that OSTP cooperation with the Office of Management and Budget be strengthened by regular consultation between the OSTP and OMB Directors and by a joint memorandum of understanding on working relationships between the two offices

OMB is not well equipped to evaluate science and technology. It should use OSTP for this purpose and should encourage it to provide S&T assessments and to propose trade-offs. Since OSTP is concerned largely with the success of programs while OMB concentrates on budgets, it is especially important that OSTP manage its participation in the budget process in such a way that it is seen as representing all the interests of the President, and not simply as an advocate for increased spending on science and technology.

OSTP's enabling statute directs it to advise the President on S&T considerations with regard to federal budgets, to assist OMB with an annual review and analysis of funding proposed for R&D in agency budgets, and to aid OMB throughout the budget development process.

Close cooperation between OSTP and OMB is essential if OSTP is to carry out this mandate. According to some OSTP participants, there has been an unprecedented degree of productive cooperation in recent years, with OMB and OSTP staff working together daily. The view from the OMB is more circumspect. There appear to be differences between OSTP and OMB in philosophy and objectives in dealing with budgetary matters.

In the case of individual agency projects and programs, OSTP staff participate in "stovepipe", i.e., agency by agency, budget reviews by OMB. There has been uneven involvement of the OSTP Director and staff in OMB higher-level "horizontal" reviews. OMB is perceived by some OSTP staff to lack interest in government wide interagency R&D crosscuts, particularly in extending them beyond a small number of high-priority national programs. On the other hand, there is concern within OMB about the number of "priority" programs pressed by the OSTP.

Partnership between OSTP and OMB is essential in providing leadership throughout the whole budget process. Regular consultation between the OSTP and OMB Directors can help resolve differences in approach to program and budget issues and pave the way for agreement on ways to strengthen OSTP-OMB interaction. During the Bush administration, there was a written understanding between OSTP and OMB on their working relationship. OMB offered incentives (and disincentives) to agencies to encourage them to conform to agreements on priority crosscutting programs. Presidential objectives would be better served by a formal arrangement between OMB and OSTP.

THE PRESIDENT'S COMMITTEE OF ADVISORS ON SCIENCE AND TECHNOLOGY

The Commission recommends that the financial and staff resources of the President's Committee of Advisors on Science and Technology (PCAST) be substantially increased to enable it to meet frequently and to undertake in-depth studies on S&T issues of importance to the President.

The history of science advisory committees to the President extends back more than forty years. They made particularly important contributions in the 1950s and 1960s when issues of national security, arms control, and space exploration were the principal S&T issues on the President's mind. Today's S&T policy challenges and needs are as great as they were during the Cold War, and the value of impartial S&T advice to inform the presidential decision-making process is no less. National security issues involving S&T remain vitally important, and there is increasing concern about economic and environmental issues.

When the President wants outside S&T advice, PCAST can be an important resource, and indeed the President appears to welcome PCAST's advice. Although PCAST is one of many channels for outside S&T advice to the President, its closeness and access to the President give it a unique responsibility and opportunity. Successful matching of PCAST's advice to the needs of the President depends on the Assistant to the President for S&T in his role as cochair of PCAST. (One of the differences between the present PCAST and previous committees is that the chairmanship of PCAST is shared between the Assistant to the President, and an outside cochair. Having an outside cochair who is personally known to the President can strengthen the relationship between the President and PCAST.) The President looks to his Assistant for S&T to identify the issues and depends on the Assistant to request the advisory committee to report to the President. The Assistant is indispensable in formulating an agenda for PCAST based on an intimate knowledge of present and emerging issues confronting the President and of the views

of the President and key members of the President's staff.

S&T advisory committees to federal departments and agencies can also contribute to the White House policymaking process. Examples of such committees are the National Science Board, the Defense Science Board (and the armed services S&T advisory committees), and S&T advisory bodies to the heads of the Department of Energy, the Environmental Protection Agency, the National Institutes of Health, and other agencies.

Although PCAST has met with the Vice President on a number of occasions, it has met with President Clinton only once since the 1994 elections. A direct relationship with the President is essential for the Committee to have a first-hand understanding of the President's interests and concerns, would give the President a degree of familiarity with and confidence in the committee's members that can only be instilled by personal contact, and would stimulate and focus the efforts of PCAST members.

That an external committee of S&T advisors to the President can play a vitally important role in presidential policymaking was powerfully demonstrated by the 1995 detailed report of a PCAST panel on U.S.-Russian cooperation to protect, control, and account for weapons-useable nuclear materials. The chair of the panel personally presented the report to the President, Vice President, White House Chief of Staff, and National Security Advisor. The briefing served as a catalyst for a joint statement by President Clinton and President Yeltsin calling for accelerated and expanded cooperation to secure and account for nuclear materials.

That experience was not the norm. PCAST, as currently funded and operated, is limited in its ability to perform the in-depth analyses needed to provide the President with such timely advice. The size of the PCAST budget and staff are seriously inadequate and bring into question whether there is a strong White House commitment to call on the advice of an external S&T advisory committee (its annual operating budget for meetings and studies has ranged between \$60,000 and \$80,000).

PCAST meets only three or four times a year, and usually submits brief letter reports or memoranda after each meeting. The President and Vice President reportedly read these summary documents with interest. However, the White House could take much greater advantage of PCAST's potential as an extraordinarily thoughtful, talented, experienced, and dedicated group of individuals. Responsible reports on complex S&T policy issues require in-depth examination, and PCAST must have the resources to convene multidisciplinary task forces of especially qualified persons.

The outside S&T advisors can be most effective when dealing with problems the White House wants them to take on. This includes taking initiative when the issue is of likely concern to the President and he may be interested in calling on the outside S&T advisors for help.

There has been concern that the public openness requirements of the Federal Advisory Committee Act and the Freedom of Information Act might impair the ability of PCAST to

advise the President. Although there are conflicts and trade-offs between openness and confidentiality, PCAST does not appear to have major problems in this regard. Classified national security information is protected as are certain privileged presidential policy deliberations. On the other hand, briefings and factual information presented at PCAST meetings and the related discussions are open to the press and general public.

LONG-RANGE GOALS

The Commission recommends that the White House S&T advisory mechanisms pay more attention to longer-range goals for science and technology.

The President and his staff need to understand the longer-term implications and impacts of S&T policies, as well as the effects of other federal policies on future national S&T capabilities. There is a fundamental mismatch between the short time horizon of the political process and the inherently long time horizon for advances in S&T and their application. Early attention to the opportunities presented by advances in S&T and the impediments to such advances, ranging from industrial competitiveness to the quality of science education or the environment, can have a substantial impact on the long-term health and prosperity of the nation.

The President could call on the National Science Board (NSB) to monitor and assess the long-term effects on the nation's research universities of changes in federal policies and programs for support of university research and graduate education. The NSB has concerned itself primarily with oversight of the programs of the National Science Foundation, although its original statutory mandate gives it the responsibility to consider national policies for the promotion of research and education in science and engineering.

SCIENCE AND TECHNOLOGY IN FOREIGN AFFAIRS

International issues involving science and technology are increasingly important to the President, both in achieving U.S. foreign policy objectives and in responding to S&T-related developments outside the United States. This is illustrated by the report of the NSTC Committee on International Science, Engineering, and Technology (CISSET) on the global health threat of emerging and re-emerging infectious diseases. The report emphasized the need for U.S. leadership to establish international coordination of infectious disease prevention efforts and build a global infectious diseases network. The CISSET working group included representatives of more than 17 different government agencies and departments.

Although the White House should take the lead in dealing with international issues of direct concern to the President, the S&T capabilities of the Department of State should be substantially strengthened to carry out its responsibilities for furthering international S&T cooperation and for integrating S&T in the formulation of foreign policy. Measures should be explored to reverse

the decline of the State Department's S&T capabilities in international affairs, including the desirability of a Science and Technology Counselor and an outside S&T advisory committee reporting to the Secretary.

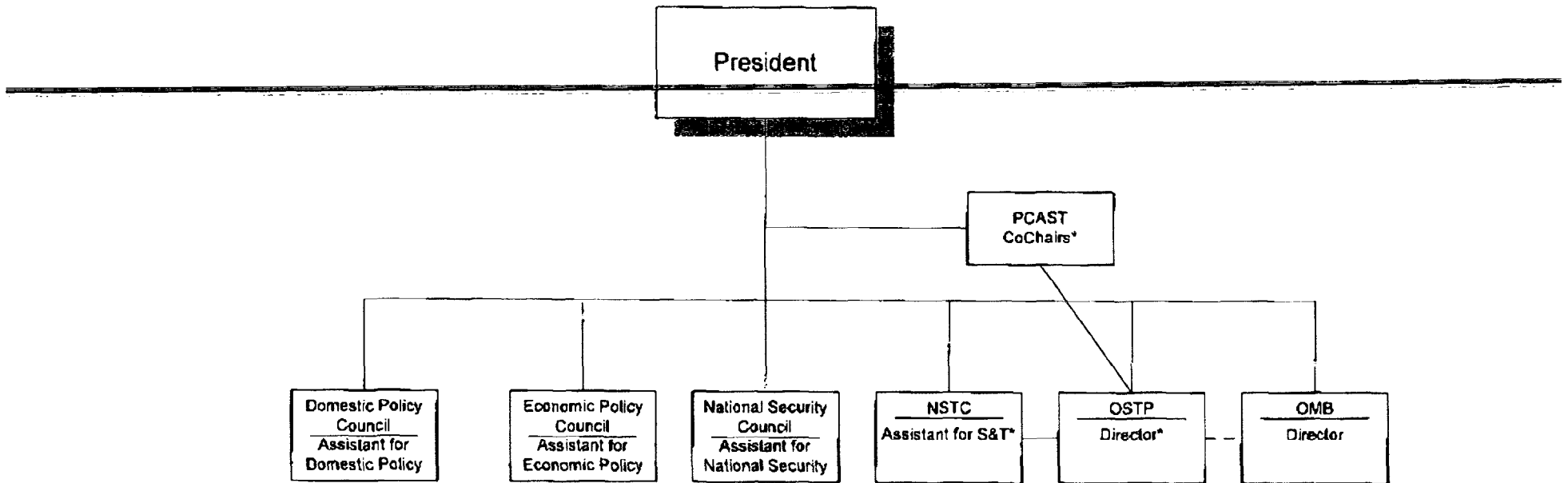
CONCLUSION

The structure for advising the President on issues involving science and technology has been in place and modified over the last fifty years. The present structure appears to be sound, and the additional modifications suggested are aimed at enabling it to be more responsive to presidential needs and priorities. This calls for more emphasis on policymaking functions, a more selective approach to priority problems and issues based on presidential concerns, and for greater involvement of the best scientists and engineers from outside government to help deal with the issues.

NOTES AND REFERENCES

1. *Science & Technology and the President, Carnegie Commission on Science, Technology, and Government (October 1988)*
2. *A Science and Technology Agenda for the Nation, Carnegie Commission on Science, Technology, and Government (December 1992)*
3. *Executive Order 12881, November 23, 1993.*
4. *Summary of Accomplishments in FY 1995: OSTP, NSTC, PCAST, available from OSTP.*

White House Organization for Science and Technology



* The Assistant to the President for S&T also serves as Director of OSTP and Co-chair of PCAST.