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REVIEW OF THE INTERAGENCY COORDINATION OF FEDERAL SCIENTIFIC RESEARCH AND DEVELOPMENT

SPECIAL OVERSIGHT REPORT NO. 8

SUBCOMMITTEE ON
DOMESTIC AND INTERNATIONAL
SCIENTIFIC PLANNING AND ANALYSIS
OF THE
COMMITTEE ON
SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES
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LETTER OF TRANSMITTAL

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
Washington, D.C., December 22, 1976.

Hon. OLIN E. TEAGUE,
Chairman, Committee on Science and Technology,
House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: I am transmitting herewith a Special Oversight report on the Interagency Coordination of Federal Scientific Research and Development activities.

The Federal research and development program involves a large number of departments and agencies and covers a great diversity of scientific and technological activities. It is therefore important that a strong effort be made, on a continuing basis, to insure that the program is well coordinated so that unnecessary duplication is minimized, so that resources in manpower, facilities, and funds are used most effectively, and so that the results and benefits are fully utilized.

Our hearings took place and the present report is being issued at a time when organizational changes affecting science policy making are taking place in the Executive branch of the Government. The passage earlier this year of the National Science and Technology Policy, Organization, and Priorities Act of 1976 established not only the Office of Science and Technology Policy, but also placed one of the chief coordinating bodies in this field on a statutory basis. As a result, the new Federal Coordinating Council for Science, Engineering and Technology will, together with the Office of Management and Budget, be in a position to move forward in this important area.

During the hearings we reviewed in some detail the operation of the predecessor organization, the Federal Council for Science and Technology. Our review was based both on testimony from present and former officials of that Council, and also on a comprehensive history of the Council prepared by the Library of Congress. I believe that our review is both timely and useful, and I am especially hopeful that the new Administration which takes office in January 1977, will consider and benefit from the recommendations contained in the present report.

The summary and analysis of the hearings was prepared for our Subcommittee by Mrs. Dorothy M. Bates and Mrs. Karen Guarisco of the Science Policy Research Division of the Library of Congress, who both attended the hearings. I commend the recommendations and the entire report to your attention and to the attention of the members of the Committee and of the House.

RAY THORNTON, *Chairman,*
Subcommittee on Domestic and International
Scientific Planning and Analysis.

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SPECIAL OVERSIGHT

Research and development is conducted throughout the Federal Government. Most agencies and departments support research and development to further advances in those fields of science and technology which are related to their mission.

In the House of Representatives these research and development activities are reviewed individually by a number of standing Committees having jurisdiction of the various programs, agencies, and departments. Beginning with the 94th Congress, the rules of the House provide that a continuing review of the entire Federal research and development effort be done. For this purpose the Committee on Science and Technology is charged with the function of Special Oversight in this area. Rule X, paragraph 3 (f) provides that "The Committee on Science and Technology shall have the function of reviewing and studying, on a continuing basis, all laws, programs, and Government activities dealing with or involving non-military research and development." This Special Oversight function is to be performed in addition to the legislative and direct oversight function of the standing committees.

The review and the recommendations included in this report are made pursuant to this Special Oversight provision of the House rules.

RECOMMENDATIONS

The special oversight hearings [1] which are the subject of this report were held for the purpose of reviewing the manner in which the executive branch of the Government coordinates the Federal research and development activities. In preparation for these hearings the committee published a comprehensive study of the Federal Government's past coordination activities,[2] a study which chiefly covered the period 1946 to 1976 and which principally dealt with the work of the Federal Council for Science and Technology.

The subcommittee, during 3 days of hearings, heard seven expert witnesses and received one statement for the record. The many recommendations and comments received are arranged by subject and discussed in the "Summary and Analysis of Hearing" section of this report.

The subcommittee having received and reviewed the background study and the public testimony and statements from witnesses on the interagency coordination of Federal scientific research and development, makes the following recommendations:

RECOMMENDATION 1

The Need for Coordination of Federal Research and Development Activities Is An Inherent, Never Completed Requirement and Should be Recognized as Such

It will never be possible to make such clear and unambiguous assignments of all research and development functions throughout the Federal Government that no problems of coordination will remain. As a result, coordination is an essential feature of modern government, rather than a singular problem that can be addressed and solved once and for all. The substance of the task of coordination keeps changing. The need for coordination exists both in times of crisis and in times of normalcy. Furthermore, the tradition of a decentralized, pluralistic system of support for research and development has served the Nation well. But this very structure means that the need for coordination is ever present and

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[1] U.S. House of Representatives, Committee on Science and Technology, Ninety-Fourth Congress, No. 96, Subcommittee on International Scientific Planning and Analysis, Special Oversight Hearing on "Interagency Coordination of Federal Scientific Research and Development." Washington, July 20, 21, 23, 1976.

[2] U.S. House of Representatives, Committee on Science and Technology Serial WW, Subcommittee on Domestic and International Scientific Planning and Analysis, Report on "Interagency Coordination of Federal Scientific Research and Development: The Federal Council for Science and Technology." Washington, July 1976.

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must be given constant attention as new projects, subjects, and policy questions emerge.

RECOMMENDATION 2

To Be Effective Coordination Requires the Active Interest and Participation of Senior, Policy-Level Officials

Experience has shown that interagency coordination in the Federal Government has been most successful when an officer above the level of the affected departments and agencies, and with authority to take action has been involved. In the national security field, the National Security Council has been successful chiefly because the President himself took the chair in Council meetings, and because the National Security Advisor took an active part in all the Council activities. In the research and development field, the President's Science and Technology Advisor should similarly play an active role in interagency coordination of research and development. He should not delegate the chairmanship of the Coordinating Council. Whenever possible the work of the Council should be linked to Presidential directives or to requests from the Office of Management and Budget or the Office of Science and Technology Policy so that subsequent reports and recommendations will have an interested recipient in a position to act on them. This approach recognizes that coordination is not an activity divorced from the broader policy development and management function of Government. Nor is research and development an end in itself but an activity which is conducted to serve broader purposes, and coordination is part of that broader process.

RECOMMENDATION 3

The Statutory Executive Office Coordination Function Employing a Coordination Council for Science and Technology Should Operate as an Integral Part of the Office of Science and Technology Policy, Should be Responsive to the Needs of the Science and Technology Advisor to the President, the Director of the Office of Management and Budget, and the President

The Council or committee responsible for performing the statutory coordination function should carry out this function in close collaboration with the Director and staff of the Office of Science and Technology Policy. It should serve as an arm of the OSTP, other Executive Office units, the OMB, and the President, and should respond both to their specific requests for coordination assistance as well as take the initiative on its own where it can be helpful. In doing so it should

recognize that certain aspects of coordination, where the Council cannot secure voluntary agreement among the agencies because their goals are too diverse, cannot be achieved by a Council. In such situations effective coordination will require direction by the President or the OMB. In carrying out its functions, the Council, through a flexible use of interagency committees, ad hoc groups, and task forces, can contribute significantly to the achievement of the Government-wide coordination of research and development programs both in terms of policy development and in terms of interagency program performance.

RECOMMENDATION 4

The Annual Budget Preparation Process Provides One of the Most Effective Means of Achieving Coordination of Federal Research and Development Program Activities and Should Be Used To Improve Such Coordination Wherever Feasible

Ongoing or future research and development program activities, as distinct from policy development in such fields as procurement or patents, are of necessity reviewed annually as part of the budget process. Past experience leaves little doubt that this process can and should continue to be relied upon as a means of achieving coordination. The OMB Director, the Science and Technology Advisor, and other senior officials responsible for research and development should work closely together in using the budget preparation and review process as a means of achieving research and development program coordination.

RECOMMENDATION 5

Responsibility For Coordination By Means of the Designation of An Existing Department or Agency As the "Lead Agency" in A Particular Field of Science or Technology Should Be Used Wherever Feasible

Under the American system of government, chief reliance for carrying out assigned missions of individual departments and agencies rests with the heads of these agencies who are responsible to the President. As a result, in cases where one agency already carries the major responsibility for activities in a given field, coordination responsibility is best done by and within that agency. To be effective, the responsibilities of the lead agency and the associated departments and agencies should be clearly defined. Where a small number of agencies are involved and they are able to successfully achieve the necessary coordination, the Executive Office of the President need not be involved, and the coordination function should remain with the responsible agencies.

RECOMMENDATION 6

Effective Coordination of Federal Research and Development Activities Requires the Commitment of Small But High-Quality Staff Resources

Coordination requires a certain amount of data gathering, analysis and followup to have a chance for success. Typically, a high degree of dependence must be placed on staff work. Only if the preparatory staff work is of sufficient caliber can senior officials deal with the many factors which necessarily are involved and insure that required implementation is carried out. To perform such preparatory and followup work, the function of coordinating Federal research and development activities should be provided with a small, experienced staff and a limited budget for such necessary expenses as meeting costs and publication of reports.

SUMMARY AND ANALYSIS OF HEARING

I. SUMMARY

The Special Oversight hearings on interagency coordination of Federal scientific research and development were held to elicit the views of informed witnesses on the coordination of Federal research and development, on coordination as it has been effected through the Federal Council for Science and Technology (FCST), and on how the new Federal Coordinating Council for Science, Engineering, and Technology (FCCSET) might be organized and operated to build on the strengths and minimize the limitations of its predecessor body. The hearings were held in the period after the approval of legislation to establish science advisory and coordinating units in the Executive Office of the President, and while planning was actively underway for the new Office of Science and Technology Policy and FCCSET. Each witness spoke from a background of particular expertise relating to the central coordination process and/or day-to-day working experience in the actual practice of central coordination. The hearings thus became a reference source for substantive ideas and suggestions for the FCCSET Chairman in setting up the new Council and its committee structure subsequently.

It is a common practice to criticize coordinating bodies for not being more effective without taking into account the realities of the coordinating process. The testimony on the process of interagency coordination served to emphasize the universality of these strengths and limitations. In the pluralistic system under which our Federal Government is organized, each department and agency is charged with different missions and different goals; both these missions and goals and the research and development which the agencies undertake to achieve them may in part overlap, conflict, or duplicate those of other departments and agencies. This is the basis for the necessity for interagency coordination. Interagency coordination can be carried on both horizontally—between peer groups—or vertically—from a higher authority to lower authorities. These concepts were discussed during the hearing.

Coordination was shown to be an unending, evolving process. One witness likened the process to the stages of man—childhood, adolescence, maturation, and final. Three kinds of coordination were discussed: central coordination, which is the across-the-board effort from a central source such as the Executive Office of the President; interagency coordination, both central and that between departments and agencies outside a central body; and intraagency coordination. Effective coordination must extend down to the working levels—staff to staff and unit to unit. It was noted that often interest in participating in central coordination varies with the relative size of the agency.

Interagency coordinating committees have inherent limitations in getting their recommendations accepted; many of these are due to factors over which they have little or no control. Several witnesses discussed these limitations.

The Federal budget process is an important tool for coordination of the Federal research and development effort. In this, the Office of Management and Budget exerts a leading role. All the witnesses mentioned the budget process as a coordinating force, and the organization of OMB to perform this coordinating role was discussed at length.

Alternative approaches to central interagency coordination were reviewed including the lead agency concept and the establishment of new organizations to alleviate coordination problems. The need for some necessary redundancy of R. & D. effort was presented.

A second major topic of discussion was the Federal Council for Science and Technology. One witness noted that the Executive intent in establishing FCST was that it serve as a policy formulating mechanism for the President and the Science Advisor but that the Council had not functioned in this role. Several intrinsic limitations which impeded the effectiveness of the FCST were noted, as well as areas where the Federal Council had been most effective. In this latter category, the "catalytic" role of the Federal Council was cited. The interagency committee system which the Federal Council had developed over the years was seen as a main strength. The organizational flexibility which the Federal Council had exhibited in adapting to changing circumstances, leadership, problems, and locale was a hallmark of the Federal Council.

The third major focus of the hearings was on the new Federal Coordinating Council for Science, Engineering, and Technology which was then in process of organization. Its new statutory base was regarded as advantageous for the Council, affording it continuity, and a stronger mandate than previously, but also demanding a clearer responsibility to Congress.

Several aspects concerning the organization of FCCSET were discussed. Hope was expressed that the new coordinating council would be more than a continuation of the past, and to this end suggestions for changes in procedures in several respects were offered. It was urged that the Council rely increasingly on the ad hoc approach with respect to its committee structure. Utilization of outside consultants or panels was advocated. Other suggestions related to meetings, how to improve the interest of larger agencies, and staff and financial resources for FCCSET.

Policy-level assignments involving coordination in the new science policy legislation where the FCCSET could profitably be involved were identified. FCCSET-Executive Office of the President relationships were treated at length. These included the Office of Science and Technology Policy, Office of Management and Budget, and Domestic Council interrelationships. Other topics were the use of ad hoc vs. standing committees, utilization of outside advice, and finally, suggested priority areas for attention by the FCCSET.

II. BACKGROUND AND SCOPE OF THE HEARINGS

The Special Oversight hearings on interagency coordination of Federal scientific R&D held July 20, 21, and 23, 1976, before the Subcommittee on Domestic and International Scientific Planning and Analysis (DISPA)[1] were significant in several regards. They were initially planned as a follow-on to the subcommittee's initial hearings in 1975 on the document, "Report on the Federal R&D program, fiscal year 1976" which had been compiled by the Federal Council for Science and Technology (FCST) with the assistance of the Science and Technology Policy Office,[2] and released when the Budget for fiscal year 1976 was sent to Congress. The 1975 hearings provided suggestions for improvement of subsequent reports on Federal R&D, as well as suggestions for future activities of DISPA. But they provided scant information on the FCST itself.

The subcommittee, seeing a similarity in the oversight role for Federal R&D which constitutes its Special Oversight function and the coordinating role of the FCST, decided that hearings in 1976 on the FCST and the process of interagency coordination for Federal R&D might be mutually beneficial. In preparation for these hearings, the subcommittee requested the Library of Congress to prepare a background study on the FCST.[3]

The hearings were scheduled while legislation (H.R. 10230 and S. 32) to reestablish a science advisory office in the Executive Office of the President was moving through Congress. The National Science and Technology Policy, Organization and Priorities Act of 1976 (Public Law 94–282) was approved May 11, 1976. This Act contained a statement of policy for incorporating science and technology in support of national goals, and it provided for the establishment of an Office of Science and Technology Policy (OSTP) and a Federal Coordinating Council for Science, Engineering, and Technology (FCCSET) in the Executive Office of the President, as well as a temporary President's Committee on Science and Technology to conduct a comprehensive survey of the Federal scientific and technical effort and to report its findings to the President and the Congress. FCCSET was linked to OSTP through the provision in the law that the Director of OSTP shall serve also as the Chairman of FCCSET.

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[1] U.S. Congress. House. Committee on Science and Technology, Subcommittee on Domestic and International Scientific Planning and Analysis. Interagency Coordination of Federal Scientific Research and Development: Special Oversight Hearings. Hearings . . . 94th Congress, 2d session, July 20, 21, 23, 1976.

[2] U.S. Congress, House, Committee on Science and Technology, Subcommittee on Domestic and International Scientific Planning and Analysis, Special oversight hearing on Annual Report on Federal Research and Development Program Fiscal Year 1976, June 3, 4, 5, and 10, 1975. Washington, U.S. Govt. Print. Off., 1975. 133 p.

[3] U.S. Library of Congress. Congressional Research Service. Interagency Coordination for Federal Scientific Research and Development: The Federal Council for Science and Technology. Prepared by the Science Policy Research Division. Washington, U.S. Govt. Print. Off., July 1976. 427 p. At head of title: 94th Congress, 2d session, Committee print.

The timing of the hearings was fortuitous. They occurred during a period when the previous FCST was technically abolished and the new FCCSET had not yet been established. On July 21, 1976, one day after the hearings began, Dr. H. Guyford Stever was nominated for the position of Director, OSTP; he was subsequently confirmed by the Senate, and was sworn into office on August 12, 1976. Therefore, the hearings record and the Library of Congress background study provided timely information sources.

The witnesses were invited to focus on the mechanisms for coordinating research and development activities throughout the Federal Government: the FCST, the new FCCSET, and the Office of Management and Budget. The subcommittee also invited testimony on the coordinating functions of the OSTP and its predecessor organizations. In addition, views of individual witnesses were sought in particular areas of this broad subject where they had special expertise.

Seven principal witnesses appeared before the subcommittee; one statement was received. They included Elmer B. Staats, Comptroller General, General Accounting Office, and former Deputy Director of the Bureau of the Budget during the early years of the Federal Council for Science and Technology; Dr. H. Guyford Stever, Director, National Science Foundation, former member of the Federal Council, and since 1973, Chairman of the Federal Council and Science Adviser to the President; Dr. Charles V. Kidd, Executive Secretary, Association of American Universities, and Mr. Lawrence A. Goldmuntz, President, Economic and Science Planning, Inc., both former Executive Secretaries of the Federal Council; Mr. David Beckler, Assistant to the President, National Academy of Sciences, and long-time senior staff member of the White House science advisory units; Paul H. O'Neill, Deputy Director, Office of Management and Budget; and two representatives from the academic community who concentrated on the interagency coordinating process: Dr. W. Henry Lambright, Professor of Political Science and Public Administration, The Maxwell School, Syracuse University, and Director, Science and Technology Policy Center, Syracuse Research Corporation, and Dr. Bruce L. R. Smith, Professor of Political Science, Columbia University.

The combined wisdom of this distinguished group of practitioners and academicians on the theory and practice of interagency coordination, particularly at the Executive Office level, provided the subcommittee with an in-depth review of the needs and opportunities for coordination, and served as a basis for the development of recommendations.

The testimony presented at the hearings falls into three major subject areas. The first major area is the general process of interagency coordination: what it is, why it is necessary, coordination at various levels: central coordination at the Executive Office level, interagency coordination among Executive Branch constituents, and intraagency coordination within departments and agencies. Coordination of R & D through the budget process and alternatives to central interagency coordination are treated in separate sections.

The second major area concerns central coordination efforts as carried on by the Federal Council for Science and Technology. This top level coordinating body was part of the Executive Office science

advisory machinery from its establishment in 1959 until its abolition by the National Science and Technology Policy, Organization, and Priorities Act of 1976, in favor of the new Federal Coordinating Council for Science, Engineering, and Technology. Testimony focused not on history, which was covered in the Library of Congress report, but rather on evaluations of the Federal Council's performance—its strengths and limitations—and on aspects of its organization and procedures which have relevance for its successor. The extent to which the inadequacies of the Federal Council derive from the difficulties of the interagency coordination process in general is treated.

The third major area is directed to the future—to the Federal Coordinating Council for Science, Engineering, and Technology. Among the topics explored were the effect of a statutory basis on the Federal Coordinating Council, organization and functions of FCCSET, relationships of FCCSET to other Executive Office units, FCCSET interagency committees, the utilization of outside advice, and suggested priority tasks for FCCSET.

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III. THE PROCESS OF INTERAGENCY COORDINATION

A major objective of these hearings by the Subcommittee was to explore the concept of interagency coordination of scientific R. & D. activity in the Executive Branch. Chairman Thornton noted in his opening statement that this coordinating function was similar to the Congressional Special Oversight function of the Subcommittee. He expressed the hope that information thus gained would be beneficial both to the new FCCSET and to his Subcommittee.

The discussion of the process of interagency coordination is organized under these main subject areas:

The need for coordination in the Executive Branch.
The process of coordination.
Coordination of agencies in the field of R. & D.
Coordination of R. & D. through the budget process.
Additional problems with coordination of R. & D. and proposed solutions.

The Need for Coordination in the Executive Branch

By law, each department and agency or other organizational unit in the Federal Government has a different mission and different goals in support of this mission. Accordingly, Federal departments and agencies engage in different activities to achieve these goals. While all goals are formulated in the national interest, often, due to government agency differences of interest, aspects of goals and activities of one agency may conflict, overlap or be contradictory with those of other agencies. Similarly, the national research and development effort, which Federal departments and agencies support, reflects their missions and individual goals. These too may overlap, duplicate, or conflict with those of other departments and agencies. It is through coordination and cooperation that the differing goals and activities of the Federal Government are harmonized.

The importance and need for agency coordination in the broad area of science and technology, and the more specific areas of research and development were underscored by Dr. Smith:

> . . . science and technology, by constantly throwing up new problems cutting across traditional jurisdictional lines, gives a dynamism to our governing system that makes constant review of organizational roles and functions inevitable. The need for "coordination" of activities that spill over established jurisdictions is implicit in the dynamic changes resulting from science and technology. Rapid change contributes to the continuing need to reconcile conflicting aspects of related programs. (p. 61–62)

Problems arise, however, when attempts are made to coordinate the individual agencies' goals, interests, ideas, and activities. Because the national R. & D. program is a vast one, the very size of the coordination effort makes it a very complicated process. Also, the reasons why coordination in the area of R. & D. is needed can be considered to be

the same reasons why the process of coordination is so difficult. Dr. Smith explained:

> The reason that it is so difficult to "coordinate" R. & D. activities, or any other Government programs, is that officials believe deeply in their own programs and purposes, and they resist efforts they see as threatening to those purposes. There is no such thing as an "efficient" assignment of an R. & D. function, or appropriate coordination between agencies engaged in overlapping R. & D. activities, on the basis of expert knowledge alone. (p. 62)

The Process of Coordination

Coordination can be defined as a process by which diverse ideas, goals, activities, etc. are brought together and harmonized in support of a common principle[s]. Dr. Smith defines coordination as a process consisting of several kinds of activities:

> . . . at one level the exchange of information so that different officials know what each other is doing; the discussion of common problems but without any participant having clear authority to direct the others to do anything; and finally, the activity of one party inducing another to do what the first wants. (Smith, p. 71)

Two common approaches are used to study the concept of coordination and to discuss the processes and problems of cordinating agency activities in the Federal Government—the horizontal and vertical approaches.

The horizontal approach.—Horizontal coordination is that which involves coordination among peers and most of it ". . .concerns matters of low voltage." (Lambright, p. 44) Horizontal coordination can take place informally, among individuals; however, when vital organizational interests are involved, formal mechanisms such as interagency committees are needed for ". . . agency discussion and negotiation of interests." (Lambright, p. 45) As Dr. Lambright pointed out, "Such entities as interagency committees are probably the most important institutional devices for coordinating across horizontal lines." (Lambright, p. 45) But, while "visibility, participation, and regularity" are positive aspects of "ad hoc, informal bureaucratic bargaining" performed in interagency committees, these committees often suffer from problems of "confederationitis, progressive deputization, and implemental anemia" (Lambright, p. 46). Dr. Smith defined these concepts in different terms (originally suggested by S. K. Bailey in "Managing the Federal Government", Agenda for the Nation, 1968):

> *Confederationitis.*—Because agencies are peers, decisions tend to be made by consensus. Consensus decision may be agreeable, and thus, workable; but they may not be very meaningful. They tend toward finding the lowest common denominator. Thus, instead of having one lead agency in a coherent national (but inter-agency) program, different agencies would take the lead—for whatever they were already doing. The inter-agency "decision" would merely legitimate their own choices.
>
> *Progressive deputization.*—Inter-agency committees, to be effective, need policy-level people to attend their deliberations; but policy-people are busy. Moreover, as in the case of the old Federal Council, subcommittees proliferate. Policy-people cannot attend these subcommittee meetings which, as in Congress, often tend to be where the important work of the general body gets done. The policy-level administrator sends his deputy, who in turn, sends a lower official. The lower official may, or may not, be an expert in the subject matter of the committee. In either event, he is too low in the hierarchy to be able to speak authoritatively in behalf of his agency.

> *Implemental anemia.*—Inter-agency committees do not implement. Their member agencies do. Their staff and resources, if any, are the gifts of the members. Thus, inter-agency committees can decide, but they cannot execute their decisions. If an agency disagrees, the committee cannot coerce the agency. (p. 52)

The horizontal approach to coordination is limited by the problems associated with interagency committee functions. In addition to these limits, Dr. Lambright noted: "The approach works for many issues that divide agencies, but not for the most vital issues" (Lambright, p. 46). For vital, critical issues, it becomes necessary to involve the vertical approach to the process of coordination.

The vertical approach.—The vertical approach to coordination involves ". . . the power and prestige of the President." (Lambright, p. 46) Vertical coordination can take place either at the upper level of Presidential budgetmaking or at the lower level of operational coordination. While operational coordination actually involves coordinating the activities and operations of agencies and programs, budget coordination involves the use of the budget process as a coordinating device. Dr. Lambright noted that the budget process ". . . is the most important single instrument that the President has for bringing coherence to executive branch activity." (p. 47) The budget process can be viewed as an effective tool for coordination for several reasons: (1) it raises coordination to an issue of Presidential perspective, (2) it is a vehicle by which Federal R&D can be discussed, and (3) it is institutionalized—since the budget process is an annual process, it becomes an important tool for routine coordination. (Lambright, p. 47)

Dr. Lambright enumerated three important functions that vertical coordination can accomplish: (1) it can referee ". . . bureaucratic squabbles holding up programs of national significance", (2) it can be instrumental in expediting the transfer of facilities or activities from one agency to another, and (3) it can provide for advocacy of programs that ". . . fall between existing agency missions but that may, nevertheless, be important to the Nation." (p. 48)

Coordination as an unending evolving process.—Coordination is an unending, evolving process. Dr. Smith noted in his testimony that "coordination is an essential feature of modern government. It is not a 'problem' that can be permanently 'solved'; rather, it is a never-ending process." (Smith, p. 61) Dr. Kidd discussed the need for coordination throughout the life cycle of an area of science and technology which he compared to the stages of man—childhood, adolescence, maturation, and final stages:

> There is a general pattern of evolution of areas requiring coordination that is somewhat analogous to the stages of man. An area of science and technology is often confined initially to—or strongly concentrated in—a single Federal agency. This is akin to childhood. Then for any one of a number of reasons, a field of science and technology may become urgent, popular or both. Then related activities will spring up in a number of agencies. They will tend to vie for missions and funds. Interagency rivalries can become intense. Jurisdictional conflicts become common. This is akin to a turbulent adolescence. This is the stage at which interagency coordination is generally undertaken, and the mechanism is usually an interagency committee.
>
> Since science and technology are dynamic forces which produce change and since new problems of society continue to emerge, there are always areas of science and technology in the adolescent stage. They have grown beyond the bounds of a single agency, but they have not yet matured to the stage warranting a regrouping of functions in an agency which pulls the diverse strings together.

The establishment of a new administrative entity in a sense marks the maturation of a function. This has happened in such fields as energy research and development and oceanography and atmospheric science. It will no doubt happen in other fields as combination of political forces and scientific and technological developments make a new organization logical or expedient. So far as coordination is concerned, the establishment of a new organization typically does not solve the problems, but rather shifts the administrative context within which a solution is sought. For example, formation of a new organization does not automatically strip all agencies of all R&D related to the field of the new organization, so problems of coordination remain. They are merely shifted out of the Executive Office. (p. 91)

The stage at which steps are taken to abolish an agency can be compared to the final stages of man. Few agencies, if any, however, go out of existence or completely disppear. Instead, agencies are usually merged to form new organizations. As Dr. Kidd pointed out: "I think it is generally more a mutation to a new form of organization rather than abolition of functions; it is renaming, redesignating, reorganizing functions." (p. 86)

Coordination of Agencies in the Field of R. & D. (S. & T.)

Coordination of R. & D. in a pluralistic system.—The political processes in the United States reflect the pluralistic form of government they operate in. "Ours is a pluralistic form of government organization and delegation of authority." (Beckler, p. 112) The many Government agencies and departments function in this pluralistic system—a system of relative permissiveness, by which a certain amount of "* * * strength is derived from the semi-independence and, at times, competitiveness of the Federal departments and agencies." (Beckler, p. 112) By nature of the pluralistic form of government in the United States, Federal agencies and departments have diverse missions, goals, opportunities, and ideas. Accordingly, Federal R. & D. is organized in such a way that particular R. & D. responsibilities are distributed to the appropriate mission agencies. The diversity that stems from pluralism results in a division and/or a sharing of functions which has "* * * the effect of diffusing power." (Kidd, p. 89) Mr. Staats noted:

> Traditionally there has been a strong consensus favoring our decentralized or pluralistic system for Federal support of R. & D. The essence of the pluralistic system is to encourage each Federal agency to support the R. & D. essential to meet its specific mission requirements . . . The pluralistic system depends heavily upon consideration, frequently by more than one agency, of ideas and proposals initiated by individual scientists and research institutions, rather than a directed approach from one central authority. (p. 6)

The vast program of R. & D. which is carried out by these agencies and departments is often promoted by positive characteristics associated with diversity and pluralism. Mr. Staats expressed a generally held belief that the pluralistic system ". . . has enabled the United States to maintain a strong scientific leadership." (Staats, p. 6)

There are limits, however, to the pluralistic system. These limits, in turn, can be viewed as constraints on the R. & D. coordinating process. Mr. Staats commented on the nature and limitations of the pluralistic system:

> Although the diversity of opportunities is generally regarded as a strong characteristic, the associated permissiveness can result in unwarranted duplication in some areas and insufficient coverage in others. This duplication arises in part from conflicting missions of various agencies. The number and importance of

crosscutting and overlapping areas of interest of individual agencies make a central focus not only desirable but essential to insure mutually compatible and coherent R. & D. programs. (p. 6)

Central coordination.—Another classification of coordination at various levels distinguishes among central coordination, interagency and intra-agency coordination. Four of the witnesses commented on the concept of central coordination (Staats, Kidd, Beckler, and Smith). Mr. Staats noted that because of overlapping areas of interest, a central focus is both desirable and essential for R. & D. coordination. It was generally felt by these four witnesses that there was a need for central coordination of research and development, although Dr. Beckler's statement contained reservations. Dr. Kidd noted that in the area of science policy there is a need ". . . to sustain the most effective balance between diffusion and centralization." (Kidd, p. 89) In further remarks, Dr. Kidd stated:

Diffusion is an effective way of insuring that all relevant factors and potential consequences are considered in reaching decisions, but diffusion can delay decisions and make them less clear cut. Centralization, on the other hand, tends to produce timely and crisp decisions, but at the risk of neglecting important views, relevant considerations and important side effects. At this time, the extremely diffuse character of the process for arriving at science policy needs to be balanced by strengthening the formal central machinery and procedures, as is done by the establishment of the new Federal Coordinating Council for Science, Engineering and Technology. (p. 89)

Mr. Staats identified four aspects of central coordination: (1) participation in R. & D. budget planning and analysis, (2) interagency comparison of related program activity to identify conflicting programs, unnecessary duplication, or gaps, (3) analysis of issues and policy questions and R. & D. administrative matters common to the S. & T. effort, and (4) analysis of needs and involvement of users in the R. & D. planning process. (Staats, p. 10–11)

Mr. Staats further commented on the ingredients of an effective central coordinating mechanism: a central coordinating mechanism requires qualified staff of differing disciplines and experience; it must have adequate available recources; it should have a clearly-defined charter and authority; and its reports should present the issues and recommendations involving science and technology ". . . in the context and terms of socioeconomic and policy decision alternatives." (Staats, p. 11)

Mr. Staats also noted that the central coordinating mechanism must have an "identified customer with implementing authority to whom it may address its recommendations." (Staats, p. 11) He emphasized the notion that coordination must also be achieved at the working levels—staff to staff and unit to unit—in order to be fully effective. He elaborated:

This is a very important point, Mr. Chairman. This involves participation by individuals in conferences, workshops, professional society meetings, and other associations through which they develop mutual understanding and personal rapport, leading to frequent telephone communication and exchange of correspondence, including reports and other documents. This is the kind of day-to-day coordination which is so essential to effective coordination. (p. 11)

Limits to central coordination.—There are limits, however, to central coordination, and several witnesses commented on these limitations. As noted earlier in this analysis, Drs. Kidd and Smith viewed the overall coordination process as an unending, continuing process.

The same notion may be applied to the concept of central coordination and can be viewed as a limitation to it. Also, by its very nature ". . . coordination is an unspectacular, slow-moving process, marked by a good deal of floundering as the participants grope to define their goals and responsibilities." (Smith, p. 61)

Impossible to eliminate need for coordination.—All coordination is very complicated, and it follows that central coordination is too. But it is impossible to organize so as to eliminate the need for a coordinating mechanism. Mr. Staats told the subcommittee:

> . . . there is no conceivable way in my experience that you can organize the Government so that you put everything dealing with a particular program or function into a single organizational box. It is just not possible. As we have pointed out, these cross-cutting relationships are very pervasive and so while we would fully endorse the idea of organizing on the basis of major function or responsibility so that you get as much coordination as you can by proper organization, nevertheless, you are never going to be able to organize the Government in such a way as to eliminate the need for some mechanism to coordinate common problems, not only in the field of research and development but in other fields as well. (p. 15)

Attitudes toward central coordination differ with size of an agency.—Insofar as agency coordination in the context of central coordination is concerned, Drs. Kidd and Smith recognized the differing attitudes toward central coordination. It was agreed that attitudes toward central coordination differ with the size of an agency. Dr. Smith noted:

> Small agencies are more apt to like coordination from the highest levels of government because they are anxious to have friends with access to the President or to OMB at budget time. Big agencies ignore, defy, or evade central coordinators, assuming they will be able to get their way without outside help and not wishing interference with their "*turfs*." (Smith, p. 62)

Dr. Kidd's discussion of the attitudes of large and small agencies provides further insight. He observed:

> The interest of large agencies is primarily to ensure that a central coordinating body does not interfere with what they wish to do. Accordingly, they tend to participate in a way designed to ensure that the coordinating activity does them no harm. Generally, they have such ease of access to the White House and the Executive Office that they can deal with matters involving coordination through a number of channels. On the other hand, the smaller agencies tend to look upon a central coordinating body as a major channel of access to the Executive Office. (Kidd, p. 90)

Constraints on top-down coordination process through the budget process.—In Mr. Beckler's view, the budget process in the context of pluralism, is a constraint on the central coordination process (Dr. Beckler uses the term "top-down coordination" rather than "central coordination"). He explained:

> There are major constraints on the ability to effectuate top-down coordination of R. & D. policies and programs that intersect the interests of several Federal departments and agencies. Ours is a pluralistic form of government organization and delegation of authority. It has the great virtue of diversity of ideas and the strength derived from the semi-independence and, at times, competitiveness of the Federal departments and agencies. In this situation, the strongest Presidential leverage for policy and program coordination is the budget process. Yet the Federal budget is a composite of individual agency budgets negotiated within an overall envelope of Federal expenditures, with considerable discretion left to the departments and agencies with regard to internal allocations of resources. There is no separate budget for R. & D. and trade-offs across agency lines are quite difficult, both conceptually and in practice. Each agency must justify its R. & D. expenditures in relation to its statutory objectives and in

consideration of other non-R. & D. programs that contribute to those objectives. Although the overall coordination problem could be mitigated by a more functional organization of the departmental and agency structure, efforts in recent years to achieve major reorganization of the Executive Branch have not been successful. Coordination of R. & D. through the central budgeting process has the further difficulty that the individual agency R. & D. programs are dealt with by a number of different committees in the Senate and House of Representatives, so that efforts to achieve balanced R. & D. programs involving several agencies can easily fall due to fragmentation during the Congressional authorization or appropriation process. (Beckler, p. 112)

Mr. Beckler further concluded that if he had to tradeoff between tight topdown management and loose decentralized activity, he would opt for the latter. He stated, "There is less probability of error, and more self-renewal, in such a system. We have seen in other governments attempts in tight planning and direction, which have resulted in less-than-effective results." (Beckler, p. 103)

Effectiveness of interagency coordination.—In Dr. Lambright's view, interagency committees are the most important institutional devices for coordinating across horizontal lines. He noted that interagency committees allow problems to be discussed at regular meetings and, because they are formal, they tend to involve parties necessary for coordinating activities. Also, interagency committees are ". . . more likely to produce decisions that are equitable from the standpoint of smaller agencies than are reached through ad hoc, informal bureaucratic bargaining," he said. (Lambright, p. 46)

Both Dr. Stever and Dr. Kidd discussed the utility and effectiveness of interagency coordinating committees at length. Dr. Stever stated that the Federal Council for Science and Technology was most effective when it operated at the "macro" level rather than the "micro" level. That is, rather than designing a detailed scientific research program, he thought mechanisms such as the FCST should ". . . orchestrate a program among the key R&D Federal agency players." (Stever, p. 31) Dr. Stever listed the kinds of Federal R&D most effectively coordinated through an interagency mechanism such as the Federal Council:

> Securing voluntary agreement among agencies on general principles for the management of R&D.
>
> Dealing with issues or functional areas in which there is a need to ascertain the possible contributions of various agencies' R&D efforts.
>
> Dealing with issues or functional areas in which the multi-agency council mechanism can make a contribution of a kind not available through an individual or two-agency approach.
>
> Dealing with issues for which several agencies are responsible for large pieces of the overall program, but no one agency has or could logically be assigned the sole responsibility for program coordination.
>
> Dealing with a planning time frame for a set of issues for which the R&D is lengthy, involving substantial long-term commitments, expensive facilities or other support activities, and large experiments, such as in astronomy.
>
> Dealing initially with problems that lack sufficient cohesion and visibility to be adequately addressed in the normal course of governmental affairs without some focus at the interagency level. (p. 31)

On the other hand, Dr. Kidd expressed the opinion that

> . . . interagency groups are most effective in dealing with smaller issues and less effective in dealing with large ones. . . . In general, the broader the problem, the more it affects important agency missions and the greater the amount of money involved, the less can an interagency group make decisions. (Kidd, p. 91, 92)

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It was his view that interagency committees are effective in the area of information and analysis—they can effectively review the state of a field of R&D in their gathering of information and in their analyses. (Kidd, p. 91) He emphasized the notion that the most important functions of interagency committees is providing information, analysis, and improving communication. (Kidd, p. 94) Dr. Kidd felt that interagency committees can effectively serve to resolve problems at the working level, evaluate programs, and indicate appropriate lines of development. (Kidd, p. 92) He further elaborated on the value of an interagency committee (such as the FCCSET) and suggested that such a mechanism can be effective because of its forum function:

> Discussion of problems in the Council should generally stimulate a wider range of ideas than would result from bilateral discussions between the Director and individual agencies. Conversely, the Council should be a useful means of conveying information and views from the President and his Executive Office to the agencies.
>
> As a product of discussions in the Council and of the work of council committees it should be possible to provide advice which is in fact a decision when a consensus can be reached. This is generally possible except when basic differences exist among agencies. There is a wide field for such operating decisions. (p. 94)

Subsequently, Drs. Stever and Kidd discussed limitations to interagency coordination.

Limits to interagency coordination.—In the context of his discussion of the FCST, Dr. Stever cited a limitation to interagency coordination:

> A group made of policy-rank agency representatives is not likely to be particularly effective at sitting down and designing a detailed scientific research program. This is the sort of thing that should be undertaken by scientists and program managers and their advisory groups within the agencies, with advice from other sources. . . . (p. 31)

Dr. Kidd stated that interagency groups are least effective when it comes to action. (Kidd, p. 91) Dr. Goldmuntz and Dr. Lambright supported this notion in their testimonies. With reference to the FCST, Dr. Goldmuntz stated:

> One should realize that an FCST committee has no authority. It cannot commit an agency or any branch of the Executive Office. It is a committee organized to provide policy options, a consensus among agencies, to allow the Federal programs to proceed. It illuminates and outlines issues. (p. 119)

Dr. Lambright observed that interagency committees are susceptible to "implemental anemia"—

> Interagency committees do not implement. Their member agencies do. Their staff and resources, if any, are the gifts of the members. Thus, interagency committees can decide, but they cannot execute their decisions. If an agency disagrees, the committee cannot coerce the agency. (p. 46)

Dr. Kidd discussed other limitations to interagency coordination. Interagency committees have had problems getting their recommendations accepted. Due to the complexity and breadth of considerations affecting science and technology, recommendations of interagency committees are only one of many factors entering into a decision. Also, interagency committees' recommendations have sometimes not been accepted because:

> . . . committees represent functions which are competitive with other functions within various departments. Priorities as assessed within agencies are not always consistent with the priorities as seen by interagency committees. (p. 92)

Another factor is the structure of the congressional appropriations committees which sometimes limits the effectiveness of interagency planning. On this limitation, he commented:

> Budgets which may be usefully constructed for interagency activities in the executive branch are typically considered by a number of appropriations subcommittees and committees. They assess budgets primarily from the agency standpoint and sometime make appropriations which complicate efforts to construct a coordinated program. (p. 92)

Dr. Kidd cited eight ". . . matters having to do with the realities of the operation of Federal agencies . . ." that he felt have a cumulative tendency to limit the effectiveness of interagency coordination (Kidd, p. 93). The first matter had to do with policy questions that arise within departments that cannot be effectively discussed in a coordinating council. The second matter dealt with policy questions that would not be divulged to an interagency council. Dr. Kidd suggested that constraints might exist in agency representatives not being willing to discuss their positions frankly in a council meeting and because agency representatives are probable "defenders" of their own agency interests. While such council meetings would probably meet regularly, Dr. Kidd suggested that some matters discussed at these meetings may not be of primary significance to all members of the interagency council:

> Some of the members will probably find that they are hard pressed to find time to deal with internal agency problems that are more significant to them than some issues of the Council agenda. Accordingly, it will probably prove difficult to ensure that all of the members, rather than alternates, will be present when important policy matters are discussed. (p. 93)

Dr. Kidd observed that the Chairman of the council may choose not to bring many important policy issues to the council. He also discussed the practice of sending alternates to meetings. On this point, Dr. Kidd stated:

> The significance of matters discussed by the Council will affect the rank of those who attend meetings if alternates are permitted—a matter not settled by law. Whether members or alternates attend (if alternates are permitted) will reflect the weight which the members from different agencies place upon the Council as a source of information and potential power, and upon the significance of the agenda items to them. (p. 93)

Dr. Lambright also discussed this practice which he called "progressive deputization":

> Interagency committees, to be effective, need policy-level people to attend their deliberations; but policy people are busy. Moreover, as in the case of the old Federal Council, subcommittees proliferate. Policy people cannot attend these subcommittee meetings which, as in Congress, often tend to be where the important work of the general body gets done. The policy-level administrator sends his deputy, who in turn, sends a lower official. The lower official may, or may not, be an expert in the subject matter of the committee. In either event, he is too low in the hierarchy to be able to speak authoritatively in behalf of his agency. (p. 46)

A final limitation may be the extent to which coordination is effected through informal contacts rather than through a formal interagency coordinating council. Dr. Kidd noted:

> In practice, when the Director of the new Office wants help on significant policy matters from the agencies, he will probably tend to hand-pick specific individuals on the basis of their personal effectiveness rather than to rely on the Council as a body. A few phone calls may suffice, or people from the agencies may be drawn together in hand-picked groups. These may be formal task forces or

simply informal meetings. In this context, individuals can speak without representing or committing their agencies. This way of selecting people to work on policy questions that are significant to the President would not amount to "bypassing" the Council but would rather constitute recognition of the fact that discussion and effective design and presentation of policy issues for the President involves delicate issues. Many members of the Council may well participate frequently in significant policy discussions, but I would judge that this would generally not be in the context of the Council or in their capacity as members of the Council. (p. 93.)

Intra-agency coordination.—Because the hearings focused more on the topics of central and interagency coordination, the concept of intra-agency coordination was only briefly mentioned. Dr. Lambright and Dr. Kidd discussed the importance of intra-agency coordination of research and development.

Dr. Kidd suggested that there were ". . . extensive problems of research coordination within given agencies of research and development." (Kidd, p. 95) He cited coordination problems within the Department of Health, Education, and Welfare as an example to support his premise that there was a need for intra-agency coordination.

In the context of another discussion, Dr. Kidd noted that most R&D is conducted within a single department and it was his opinion that such a situation ". . . does not automatically solve problems of coordination," but rather ". . . submerges them." (Kidd, p. 93) Dr. Kidd viewed this situation as one which could have a limiting effect on interagency coordination, and he further noted:

> Concentration on problems of interagency coordination leaves untouched the much more significant problems of intra-departmental coordination. I simply mention this as an inherent limitation on an approach which assumes that interagency coordination is more significant than intra-agency coordination. (Kidd, p. 93)

Along a similar line of reasoning, Dr. Lambright suggested that the creation of new agencies to solve coordination problems does not solve problems but rather shifts them. He stated:

> In reality, what occurs is the shift, intra-agency, of what had been an interagency problem. What was formerly an issue for the President and Congress becomes one for the new agency head. (p. 49)

Coordination of R. & D. Through the Budget Process

The budget process as a tool for coordination of R. & D.—The Federal budgetary process can be viewed as a device for coordinating research and development. While there is no separate budget for research and development, the Federal Budget provides a means by which national goals and priorities in the areas of science and technology and R. & D. can be examined. As expressed by Drs. Beckler and Lambright, respectively:

> . . . the budget is the tangible expression of our national science policies. There are some major policies that do not require budgetary implementation; but by and large the Federal budget reflects governmental policies and priorities in its allocation of resources, and, from the departmental and agency point of view, it is a policy document. (Beckler, p. 103)
>
> . . . it does provide a vehicle by which crossouts of Federal R. & D. as a whole can be discussed and integrated with decisions concerning the science and technology expenditures of specific agencies. The budget process is thus an important tool for coordination. (Lambright, p. 47)

One witness, Dr. Smith, strongly urged that the coordinating function be closely related to the budgetary process. (Smith, p. 64) Both Dr. Beckler and Dr. Lambright viewed the budget process as an important tool for coordination of R. & D. and both felt that it was an instrument by which the President can have an input into the coordination process. Dr. Beckler stated that, "The strongest Presidential leverage for policy and program coordination is the budget process." (Beckler, p. 103) Dr. Lambright elaborated on this point:

> With respect to the Presidential budget as a coordinating device, it should suffice to say that it is the most important single instrument that the President has for bringing coherence to executive branch activity.
>
> The budget process has the effect of raising coordination to an issue of Presidential perspective. It provides at least the opportunity for him to relate on a governmentwide basis goals, priorities, allocation of resources, organizational structures, and administrative successes and failures. (p. 47)

Although Mr. Staats did not discuss the budget process in the context of Presidential input into coordination, he viewed participation in the budget process as one of four aspects of effective central coordination. He stated that participation in R. & D. budget planning and analysis is one aspect of central coordination and he noted that this participation can be used ". . . to examine resource allocations in relation to national goals and priorities, including early recognition of opportunities and anticipation of future needs." (Staats, p. 10)

There are limits, however, to the coordination of R. & D. through the budget process. While the budget process can be considered to be a tool for coordination, it ". . . does not assure coordination in science and technology." (Lambright, p. 47) Dr. Beckler enumerated the reasons why this is so:

> . . . the Federal budget is a composite of individual agency budgets negotiated within an overall envelope of Federal expenditures, with considerable discretion left to the departments and agencies with regard to internal allocations of resources. There is no separate budget for R. & D. and trade-offs across agency lines are quite difficult, both conceptually and in practice. Each agency must justify its R. & D. expenditures in relation to its statutory objectives and in consideration of other non-R. & D. programs that contribute to those objectives. (p. 112)

One further difficulty of coordinating R. & D. through the budget process is associated with the congressional authorization/appropriation process. Dr. Beckler noted:

> Coordination of R. & D. through the central budgeting process has the further difficulty that the individual agency R. & D. programs are dealt with by a number of different committees in the Senate and House of Representatives, so that efforts to achieve balanced R. & D. programs involving several agencies can easily fail due to fragmentation during the Congressional authorization or appropriation process. (p. 112)

While Dr. Beckler discussed the congressional appropriation/authorization process in the context of the budget process, Dr. Kidd discussed it in the context of interagency coordination. Both discussions can be paralleled, however, as both witnesses implied that the process is a limit to effective coordination. Dr. Kidd suggested that:

> Budgets which may be usefully constructed for interagency activities in the executive branch are typically considered by a number of appropriations subcommittees and committees. They assess budgets primarily from the agency standpoint and sometimes make appropriations which complicate efforts to construct a coordinated program. (p. 92)

OMB's coordinating role in the budget process.—By virtue of its role in the budget process, the Office of Management and Budget functions as a coordinator of the research and development activities of the Federal Government. The annual budget, which the President submits with the assistance of OMB, shapes the context in which R. & D. policy priorities are made. OMB's ability to spur the development of coordination was noted by Dr. Goldmuntz:

> OMB perennially surfaced the issue of interagency cooperation and interaction. They are probably the prime source of interagency cooperation especially from the point of view of spending more efficiently. (p. 119)
>
> A spur to the development of such interagency cooperation can and does occur at annual agency budget reviews with OMB where duplication or coordination of agency effort is a perennial topic. (p. 122)

OMB's coordinating role in the budget process was discussed briefly by a number of witnesses and at length in the written statement of Mr. Paul O'Neill, Deputy Director of OMB. Mr. O'Neill noted that because OMB is a relatively small Federal agency,

> . . . there is a high degree of communication and cooperation between personnel at the staff and management levels of the organization. This pattern of communication and cooperation characterizes the working relationships of staff who work on related programs (within Program Divisions) as well as the relationships between staff who work in very different program areas and in different Program Divisions. (p. 129.)

This organization and working style ". . . permits the ready identification and handling of R. & D. issues which may require coordinated effort among examiners and agencies," Mr. O'Neill said. He discussed the organization of R. & D. programs under Program Associate Directors (PAD).

> For example, the PAD for Natural Resources, Energy and Science (NRES), has responsibility for the programs of EPA and ERDA; the PAD for Human Resources has responsibility for the medical research programs of VA and HEW; and, the PAD for National Security and International Affairs has responsibility for the research programs of the Department of Defense.
>
> Under the PAD for NRES, there is also, through the Science and Energy Technology Division (SET), a focus for dealing with general science issues which cut across all agencies such as the overall level of Federal support of basic research. This Division also provides a focal point for OMB dealings with the Science Adviser and assists in bringing together staff resources in OMB to work with the Science Adviser on key issues. (p. 130.)

Mr. O'Neill also discussed the mechanisms available to OMB for achieving coordination and consistency in the R. & D. activities of Federal agencies. He organized these mechanisms into four broad categories, the first of which was "budgetary review mechanisms". Mr. O'Neill stated:

> In developing the President's Budget, OMB staff review agency budget submissions and identify issues that require further review, analysis and resolution. As part of this review, agency R. & D. requests are examined and evaluated in light of their relevance and appropriateness to agency missions and in terms of their relationship to R. & D. programs of other agencies. Attention is also given to issues which result from or are in response to external events and developments. (p. 130.)

Mr. O'Neill cited several kinds of reviews undertaken by OMB staff in the budget process: continual agency program proposal review to identify duplication of effort or gaps; crosscut reviews of Federal R. & D. programs; budget review with the staff of the President's Science Adviser participating; preparation of the Special Analysis of

R. & D. programs, published as part of the budget documents, with cooperation from individual agencies' staffs; review of the status of Federal R. & D. efforts during the fall budget review process. (O'Neill, p. 130–132.)

Mr. O'Neill identified the three broad categories of mechanisms available to OMB to assist in coordinating R. & D.: government-wide functional or managerial mechanisms within OMB; working with other organizations to achieve R. & D. agency coordination; and, ad hoc task forces and other special coordinating mechanisms. (O'Neill, p. 132–133.)

All witnesses mentioned OMB in their statements before the Subcommittee. Some witnesses discussed OMB in terms of its relationships to the OSTP, FCST, and the Science Adviser (Lambright, p. 47; Smith, p. 64–65; Beckler, p. 104); other witnesses discussed the notion that there are some elements of coordination that must be effected through a Presidential directive or OMB directive with the President's delegation or between the agencies concerned and OMB rather than through a council coordinating mechanism (Staats, p. 16; Stever, p. 32).

Alternative Approaches to Central Interagency Coordination

Other R. & D. coordination alternatives were discussed at the hearings either in the prepared testimonies or in the discussions which followed. Among these concepts were the lead agency concept, the creation of new organizations for purposes of alleviating coordination problems, and the concept of necessary redundancy.

Lead agency concept.—One suggested approach to the coordination problem is to designate a particular government agency the "lead agency" in a certain field or discipline. This agency would be responsible for taking the lead in coordinating a national program in a particular field. It was Dr. Lambright's opinion that, "Lead agency status, which is designated by a vertical authority, means little unless it is backed up constantly." (Lambright, p. 45) When specifically asked about the Federal Council's role in the lead agency technique of coordinating and the effectiveness of this technique as compared to the Council-committee technique, Dr. Kidd answered:

> Often they are merged. That is, an agency conducting the predominant part of the R. & D. in a given field of interest to a number of agencies is likely to have the staff that they can put to work on these problems, so often you have simultaneously a lead agency whose representative to the Council would be the chairman of a group to work on a given problem. It has often in the past worked out that way.
>
> Now, at times when you have another agency designated, having a clear function, clearly predominant function in a given field, they can act as the locus for a coordinating group, rather than have it under Council auspices. That can work fairly well, too.
>
> As I said, there are some advantages to that, in that it is dangerous, to my mind, to have too many small technical problems floating to the top in the Executive Office. The more these can be pushed into the departments the better.
>
> The problem with that is that agencies are often more willing to participate in an interagency effort originating within the Executive Office than they are in a coordinating effort chaired by a member of a given Executive agency. (p. 98)

When asked for his opinion on the criteria for coordinating research by a lead agency, Dr. Stever answered:

I think it depends on a lot of things. It depends upon the relative magnitude of, say, one agency versus another. If there is a program involved with space, NASA has so much strength in space that it obviously often goes in that direction.

In the fields of oceans, however, I do not see it as being quite so automatic. One looks at the capabilities of several different agencies that work in ocean science and technology and the nature of the problem and one tries to figure out for each of these problems who should kind of take the lead.

Sometimes it should be a very formal setting of the lead and sometimes a less formal setting of the lead. (p. 37)

Creation of new organizations for purposes of alleviating coordinating problems.—Two witnesses, Drs. Lambright and Kidd, discussed the problems associated with creating new government agencies or departments for the purposes of alleviating coordination problems. Both witnesses agreed that as far as coordination was concerned the establishment of new organizations does not solve the problem of coordination but rather shifts it. Dr. Kidd noted, "The formation of a new organization does not automatically strip all agencies of all R. & D. related to the field of new organization. Similar problems of coordination remain." (Kidd, p. 85) Dr. Lambright noted the ". . . great danger in the administrative process . . . when you establish agencies to solve existing problems." (Lambright, p. 79) He elaborated on this point:

> A new agency can give the semblance of solution to difficulties of administrative fragmentation. If all the elements concerned with a given function are placed in an agency of their own, there is the appearance of coherence. In reality, what occurs is the shift, intraagency, of what had been an interagency problem. What was formerly an issue for President and Congress becomes one for the new agency head.
>
> The real difficulty with this strategy in that it is a temporary solution at best. Once set up, the agency perpetuates itself and expands—becoming a part of future interagency problems for a President and Congress a few years down the road. There may be perfectly sound reasons for forming new agencies, relating to the desire to create concentrated bureaucratic power in order to promote certain functions. However, it should be realized that when a new, self-perpetuating agency is created, the overall governmentwide coordination problem is being exacerbated, not simplified. No solution to the current coordination problems in science and technology would be more illusory, for example, than launching a Department of Science and Technology. Such a department would create more problems than it would solve. Indeed, its success in concentrating R. & D. in one place might hurt the public interest. There is an argument to be made for decentralization in science and technology, for putting R. & D. in proximity to the mission agency needs. Overconcentration can be as bad as too much decentralization. (p. 49)

Necessary redundancy in research efforts.—One of the main objectives of coordinating research and development in the Federal Government is to eliminate the undesirable duplication or overlapping of R&D efforts. The points were made at the hearings, however, that what may appear to be undesirable duplication may not be in fact; and, that in some instances, duplication or redundancy in research is sometimes necessary. On the first point, Dr. Kidd commented:

> Many Federal agencies must conduct or support research in fields of interest to other agencies. Their statutory responsibilities are such that they can entrust the necessary research to others only if they can be assured that their specific needs will be adequately met. Often agencies must approach a field of science with a specialized purpose which makes it difficult to entrust the research to other agencies. For example, I had occasion to review research in the atmospheric sciences a few years ago. Twelve different agencies then administered

sixteen major programs in the atmospheric sciences. Superficially, this sounds like duplication, but the division of effort was actually rational. For example, the Department of Agriculture needed to know the characteristics of thunderstorms in connection with protection against forest fires. The National Bureau of Standards studied the absorption and refraction of radio waves in the lower atmosphere. The Department of Interior needed to know more about the factors affecting evaportion from open reservoirs. (p. 90)

Concerning the necessary redundancy of government agency research and development, Mr. Staats stated, ". . . in many instances you may deliberately want to encourage duplication because the problem is so serious that you want more than one approach to it." (Staats, p. 20) In discussion along the same lines, Dr. Kidd noted:

I remember Lee DuBridge said one time if a child is lost in the woods sending out 20 people to find the child is not duplication.

And if you don't know what you are hunting for, having a number of people hunting for it—and that is what research is—may not be duplication. (p. 96)

Concluding Remarks

Much of the preceding analysis of testimony, which in the main treated the process, strengths, limitations, and problems of interagency coordination, has direct relevance to the Federal Council for Science and Technology and its successor body, the Federal Coordinating Council for Science, Engineering and Technology. This analysis should be considered, not as theoretical because of the lack of specificity, but rather as observations and generalizations concerning the interagency coordination process which have recognized wide applicability.

IV. LESSONS FROM THE PAST: THE FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY

These Special Oversight hearings were scheduled when the enactment of the National Science and Technology Policy, Organization and Priorities Act which established the new Federal Coordinating Council for Science, Engineering and Technology appeared certain. Approximately two months elapsed between the signing of the Act and the start of the hearings. There had been speculation that President Ford would announce his nomination for Director of OSTP at the bill signing ceremony, but this did not occur nor did it happen in the period before the hearings began. Since the Director of OSTP is also the statutory Chairman of the FCCSET, neither body could be organized until a Director was selected and approved by the Senate. These circumstances influenced the content of the testimony presented.

A majority of the witnesses had personal experience with the FCST in one of several capacities—either as a participant in its establishment and subsequently an observer from the Bureau of the Budget, a member on the Federal Council and subsequently the Chairman, serving as Executive Secretary, or involvement as temporary Executive Secretary but long-time staff member in the Executive Office science advisory units. They used their experiences with the FCST as a starting point for making suggestions concerning the FCCSET.

History and Executive Intent for FCST

The historical study of the FCST prepared for the subcommittee by the Library of Congress served a useful purpose. The witnesses minimized or eliminated historical details concerning the FCST and concentrated on the central coordination process and on evaluations and assessments of the operations of the FCST and their applicability to the new FCCSET.

One witness discussed original executive intent for the Federal Council. Mr. Beckler reviewed briefly the policy-level character of the interagency council which the Piore Panel of the President's Science Advisory Committee had recommended to be established in its report on national science policy, "Strengthening American Science." He pointed out that the Piore Committee—

> . . . saw a need for an interagency council to promote coordinated policy planning and more effective management of Federal programs in science and technology. . . . such a council could be an instrument of government for bringing to the Special Assistant to the President for Science and Technology, in an organized way, the advice and assistance of policy officials in the major R&D agencies. (p. 111)

Mr. Beckler noted that the Executive order which established FCST emphasized the policy-level character of the Council. Although a number of "functional objectives, such as more effective planning and ad-

ministration of Federal scientific and technological programs," were assigned to the Council, Mr. Beckler pointed out that the Executive order "did not direct the Council to carry out those functions *per se*. Rather, it directed the Council to recommend *policies* and other measures to achieve those objectives." (p. 111) It was his belief that this Executive intent had not been realized through the FCST. He observed candidly that "with few exceptions, the Federal Council . . . has not served as a policy formulating mechanism for the President or the Science Adviser." (p. 111)

Evaluations of the Federal Council for Science and Technology

Several witnesses discussed both positive and negative aspects of the Federal Council's performance. In discussing certain factors which limited the effectiveness of the FCST, they noted that many of these would operate against any central coordinating body set up in a similar environment. Mr. Staats referred to them as "intrinsic limitations." Mr. Kidd described them as "inherent reasons" and said "they do not reflect the capacity of the people involved in any way, but are rather the result of fairly deepseated considerations." This view was enunciated also by Mr. Beckler who maintained that the limited success of the Council was not because of "failures of leadership or intellectual quality." He asserted—

> This is the main thrust of my statement, namely, that the deficiencies of the Federal Council in the past have been intimately related to the organizational and policy environment in which it has operated. The work of the Council is inherently part of a broader scheme of policy, program development and funding involving the White House and the Executive Office of the President. Its operations necessarily reflect the decentralized departmental and agency structure, and the executive branch-congressional relationship. (p. 102)

Intrinsic Limitations of the Federal Council

Certain intrinsic limitations impeded the effectiveness of the FCST in the following ways:

Reaching Agreement Was Difficult Because of Pluralistic Form of U.S. Government.—As explained by Mr. Staats:

> Each member of the Council represents an agency which has its own mission and a vested interest, and hence it has been restrained from reaching agreement on matters which might be construed as impinging adversely on the prerogatives of any of the agencies represented. Consequently on controversial issues, the Council has only been able to agree on recommendations of a general nature. (p. 11)

Reports Issued By FCST of Limited Value.—Another limitation noted by Mr. Staats was that reports issued by the Council or by its committees often did not have a particular recipient who could or would take action to implement the recommendations. Therefore, many were of limited value.

Mr. Beckler also spoke to this point—

> Because in the past there has not been a strong coupling between the Science and Technology Office in the White House and the decisionmaking process, with certain exceptions, there has been, effectively, no White House customer for the reports of the Federal Council.
>
> I remember coming before the appropriations committees looking. . . . at the Office of Science and Technology. A recital of its many reports sometimes evoked a bored response saying "We are not interested in how many reports you have written. We want to know what has changed because you are there." (p. 106)

Mr. Beckler conceded that at times Council members found it useful to have an external source of recommendations which they could use to try to influence agreement within their own departments. But it was clear that he felt this was not enough.

Inability to Implement Recommendations Had Cumulative Limiting Effect.—Mr. Staats observed that because the Federal Council had been able to achieve agreement only on recommendations of a general nature, and because its reports did not find a ready sponsor, "the members . . . tended to downgrade its importance as evidenced by frequent absenteeism and delegation of alternates to attend meetings." (p. 11)

Mr. Beckler commented that the Council tended to operate on the basis of "self-interest, consensus and compromise." It was his view that there had been "little incentive" for policy-level members to participate actively in plenary sessions of the Council "because their time might be more effectively spent in direct dealings with OMB and appropriations and authorizations committee." (p. 107)

However, Dr. Stever stated that despite charges of ineffectiveness of the FCST, it had been his experience that both the attendance and interest at FCST meetings were consistently greater than had been expected when the meetings were scheduled.

Limited Effectiveness Because of Lack of Influence of Presidential Science Advisers.—Some of the lack of effectiveness of the FCST and the absenteeism at council meetings was attributed by Mr. Beckler to the "relatively weak posture and influence of the Presidential Science advisers in the past, and of the Office of Science and Technology." Although during the early years both had performed important functions in the military and space fields, the Science adviser and OST did not continue to have this influence in the civilian technology area.

Lack of Own Staff and Funding Limited Scope of Activities.—A number of witnesses agreed with Mr. Staats' statement that "because it had no budget of its own and, therefore, depended on staff loaned from or studies funded by other agencies, the Council has not always been able to examine issues in sufficient scope and depth." (p. 12) Mr. Beckler referred to the need for full-time staffing and financial resources of its own as necessities for the new Coordinating Council. Frequent turn-over of executive secretaries of the FCST was seen by Mr. Goldmupntz as a factor limiting its effectivenes. (p. 123)

Limitations Because Scientific and Technical Aspects of Programs Not Determining Factors in Allocating Total Agency Funding Priorities.—Members of the Federal Council could deal only with the scientific and technological aspects of program coordination. But to the extent that these aspects were subordinated to other priorities within their agencies, recommendations made by the Federal Council could not be implemented. This is a fundamental intrinsic limitation which was generally recognized.

General Limitations of Interagency Councils Applicable Also to the Federal Council.—There are many other limitations which are applicable to interagency councils in general which are applicable to the Federal Council as well. Among these was the limited range of matters which were brought to the Federal Council for examination, either because they were not broad enough for Council consideration or because for a variety of reasons agencies were reluctant to bring certain

matters to the Federal Council. These considerations are reviewed in section III, above, at pp. 15–20.

Areas Where the Federal Council Was Most Effective

Despite the limitations identified above, the very fact that the FCST survived from its establishment until it was recently replaced is evidence that it was considered both necessary and useful. Some of the areas where the Federal Council has been most effective were identified, principally in the testimony of Mr. Staats and Dr. Stever.

Mr. Staats noted that the Council had been "quite effective" and "very useful" in the following kinds of activities:

> As a forum for debate and discussion;
> In identifying issues which the science adviser could then take up at the White House, OMB, or at agency level;
> In developing staff papers; and
> In bringing issues to the attention of the budget office.

He thought the Council could be particularly useful to the science adviser, if he knew how to use it. Even though council members operate under constraints within their agencies, they can provide the science adviser with information which he can use in talking to agency heads, to the Director of the Budget and to the President, if necessary, if the issue warrants attention. (p. 15)

Dr. Stever enumerated several kinds of Federal R&D problems which he believed the Federal Council had been most effective in addressing:

> Securing voluntary agreement among agencies on general principles for the management of R&D.
>
> Dealing with issues of functional areas in which there is a need to ascertain the possible contribution of various agencies' R&D efforts.
>
> Dealing with issues or functional areas in which the multi-agency council mechanism can make a contribution of a kind not available through an individual or two-agency approach.
>
> Dealing with issues where several agencies are responsible for large pieces of the overall program, but no one agency has or could logically be assigned the sole responsibility for program coordination.
>
> Dealing with a planning time frame for a set of issues for which the R&D is lengthy, involving substantial long-term commitments, expensive facilities or other support activities, and large experiments, such as in astronomy.
>
> Dealing initially with problems that lack sufficient cohesion and visibility to be adequately addressed in the normal course of governmental affairs without some focus at the interagency level. (p. 31)

"Catalytic" Role of the FCST

Dr. Stever expanded on the FCST's role in dealing with issues or functional areas in which there is a need to ascertain the possible contribution of various agencies' R&D efforts, and said he believed the FCST acted as a "communications link" and was actually "catalytic" in its role as a coordination mechanism.

. . . Every now and then, problems—both small and large—have come to me in the last 2 or 3 years in my role as Science Adviser in which I said we better get some people together to coordinate a solution and determine who the players are. I would then get information that agency A, B and C should be brought together; but it always turned out, where we notified the FCST that we were getting together on a given problem, more agencies would turn out at the meeting and we would discover more agencies with an interest in that problem and with capability. So, the FCST, through its very existence acted as a communication link to tell people when a problem was being discussed and was actually "catalytic" in its role as coordination mechanism. (p. 26)

FCST Committee System a Main Strength

The Federal Council has performed a necessary role through its evolving standing and ad hoc committee system organized to deal with a wide variety of multi-agency problems. Through this system, issues as diverse as the fluorocarbon-ozone issue, weather modification, the promotion of Federal technology transfer, and the management of R&D laboratories have been addressed. Dr. Stever commented in particular that the ad hoc task group approach had proven to be a useful one.

Organizational Flexibility an FCST Hallmark

The ability of the FCST to evolve, and change, under various kinds of organizational arrangements within the Executive Office or in the National Science Foundation, under a succession of Presidents, Presidential science advisers, and executive secretaries, throughout the lifetime of the Office of Science and Technology and beyond it, is an important strength.

Dr. Stever discussed this characteristic in the closing paragraphs of his prepared statement:

Mr. Chairman, as I look back over my own experience as Chairman of the FCST, I think it fair to say that it has contributed a great deal to our consideration of problems in which science and technology have become involved. A hallmark of the FCST of which I have had growing appreciation is its organizational flexibility—it has been an organization that has been able to evolve and change. The role of science and technology in the formation of public policy is growing steadily more complex; indeed, as I see it, the trend to complexity demands a greater—certainly not a lesser—degree of flexibility then has been available to us in the more recent past. (p. 30)

Consider, for a moment, a few of the areas in which science and technology now are being asked to contribute new knowledge and workable solutions. A partial list ranges all the way from economics and environment to food and climate to political stability and plutonium power. Obviously, the Federal role in science and technology is expanding perceptibly from its former concentration upon military and space science to greater efforts in areas of both domestic and world concern.

In this context, I have found the FCST contribution to the Chairman and science adviser to be most helpful, and I expect the new FCCSET to be equally valuable to the science adviser and the Executive Office of the President. (p. 34)

V. INTERAGENCY COORDINATION UNDER THE FEDERAL COORDINATING COUNCIL FOR SCIENCE, ENGINEERING, AND TECHNOLOGY

This section of the analysis draws together suggestions for the organization and operations of the new Federal Coordinating Council for Science, Engineering, and Technology (FCCSET). Chairman Thornton had advised prospective witnesses that the hearings would focus on this new body and on the other principal coordinating mechanism for Federal R&D programs—the Office of Management and Budget. A comparison between the coordinating role of OMB vis-a-vis that suggested for FCCSET makes clear that the role of the latter body can only be supplementary to that of the more powerful OMB. Nevertheless, this role can be an important supplementary one. Suggestions for FCCSET are summarized in the following main topics:

Advantages of a statutory base for FCCSET.
Organization of FCCSET.
Functions of FCCSET.
FCCSET-Executive Office relationships.
FCCSET interagency committees.
FCCSET utilization of outside advice.
Tasks for FCCSET.

Advantages of a Statutory Base for FCCSET

Title IV of the National Science and Technology Policy, Organization and Priorities Act of 1976 (Public Law 94–282) established the FCCSET. The substance of this title was drawn in large part from Executive Order 10807 of March 13, 1959, which constituted the legal basis for the former Federal Council for Science and Technology. There were certain changes: the membership was enlarged, certain functions, relationships, and other provisions originally in the Executive order were omitted.

It appears to have been congressional intent to modify the original authority only as necessary. No new functions were added and the advisory nature of FCCSET functions, involving no exercise of authority over the participating agencies was emphasized both in the Senate report (94–622) and in the conference report (H. Rept. 94–1046) on the science policy bill.

From the perspective of several witnesses, however, providing statutory authority for the FCCSET carried with it advantages beyond the charter of the FCST.

Continuity.—Mr. Staats referred to the passage of the science policy legislation as a major initiative in efforts to improve coordination and noted that "for the first time it [the act] establishes a congressional mandate for the entire central coordination and oversight structure.

Thus, continuity is assured with sufficient flexibility to accommodate preferences of different Presidents." (p. 13)

Any one of the last five Presidents could have abolished the FCST by issuing another Executive order to that effect and without consulting Congress, or seeking its approval. Now that the FCCSET has been established by legislation, both Executive and congressional action would be required to amend or abolish it.

A Stronger Mandate.—Mr. Beckler predicted that the science policy legislation would result in marked improvement in both the new Office of Science and Technology Policy and the FCCSET. He said that the two mechanisms were in effect the same as the previous bodies, but they had a "much stronger mandate." He also called attention to a "subtle but . . . very important distinction." This distinction arises out of the fact that Congress initiated the legislation. He spoke briefly of the difficulties of the former OST which had been created by reorganization plan:

> We in OST were often in an awkward position vis-a-vis the Congress, by virtue of being a creature of a reorganization plan. At times Members of the Congress felt we were really Presidential staff, and that what happened to us was more a matter of Presidential decision rather than congressional intent. (p. 108)

Responsibility to Congress.—Increased stability does not come without a price. As a Presidential advisory body, the FCST was responsible only to the President. As a legislatively created Federal unit, the FCCSET is jointly responsible to the President and the Congress. Mr. Staats noted that the statutory base "provides assurance that the Congress has access to call upon leaders to testify as necessary." (p. 13)

Changes in FCCSET When Viewed in the Total Context of Public Law 94–282.—Dr. Stever called attention to changes in FCCSET which he termed "significant when viewed in the total context of Public Law 94–282."

> Let me emphasize, Mr. Chairman, that the membership of the FCCSET is mandated, its activity is placed in the framework of a new articulation of national policy goals for science and technology, and the advisory mechanism is established in the Executive Office of the President. Engineering and technology clearly become more important elements of the Council's mandate. I am quite sure that you and other Members of Congress have felt the need for the engineering community to have more visibility in all of the science structure of the Federal Government.
>
> I think these are appropriate changes, especially when we consider the evolution of federally sponsored R&D during the 1960's and 1970's and the newer developments in the civilian mission agency programs. (pp. 24–25)

The inclusion of Title I of Public Law 94–282 which set forth a national policy for science and technology and requirements and procedures for its implementation was seen by Mr. Beckler to provide the "essential structure and agenda for much more effective policy-level coordination." He cited numerous policy-level matters which had been singled out for specific attention in the act where policy-level coordination was required. (p. 113)

Organization of FCCSET

Mr. Beckler enunciated an expectation which undoubtedly was shared by other witnesses who advocated changes in FCCSET. This was that the FCCSET would be regarded as something more than a

continuation of the former FCST in several ways. These are discussed below under the several headings.

A Clear Break With the Past.—Mr. Beckler termed it a "mistake" to merely continue FCST activities under another name. "There should be a clear break with the past," he said. (p. 114) He made several specific suggestions for changes in procedures ranging from its specific use by the science adviser, frequency of meetings, conduct of studies, and utilization of a variety of techniques. (p. 114)

Ad Hoc Approach Emphasized.—A recommendation was made that the FCCSET should be viewed by the science adviser as a means through which the expertise of Federal departments and agencies might be mobilized on an ad hoc basis to deal with "specific scientific and technical policy, program and management issues." (Beckler, p. 114). An unusual example of the use of the FCST in this regard was its involvement in the New Technological Opportunities Program in 1971 which Mr. Goldmuntz described. (p. 120)

Having specific assignments would bring the FCCSET closer to the decision-making process and undoubtedly increase its prestige as seen by its members and the outside world.

The ad hoc approach was also advocated with respect to the committee structure of the FCCSET. This is treated below.

Conduct of Studies.—Mr. Beckler advocated a variety of techniques for the conduct of studies, depending on the nature of each issue. In the following excerpt, he suggested the utilization of outside consultants panels or contracts and debate on the conclusions of these outside groups by agency representatives, or in other cases the direct convening of an interagency working group, or a mixture of both methods:

> As to the method of conduct of the studies, a variety of techniques should be employed depending on the nature of each specific issue. Where there are strong vested interests on the part of concerned Federal agencies, it may be desirable to undertake the study initially utilizing outside consultant panels or contracts. The agency representatives would then be convened to debate the conclusions and recommendations and to state the reasons for agreement and disagreement including the desirability of alternative approaches. This study technique would recognize the practical difficulties in asking the agencies to present proposals on issues where they have strong vested interests in the initiation of a new R&D program or in the protection of ongoing activities. Where there is an issue of general concern to all agencies calling for their expertise and insights, such as Federal scientific and technical manpower policy, the direct convening of an interagency working group would be more appropriate. In still other situations, a mixture of agency personnel and outside-of-government experts might be more effective both in providing needed outside expertise and objectivity and in securing agency acceptance of study results.
>
> I would hope that the Federal Coordinating Council for Science, Engineering and Technology would adopt a mixed strategy in undertaking its studies involving a blend of agency personnel, expert consultants and contractors. (p. 114)

Meetings.—Originally the FCST met monthly. Gradually over the years the number of annual meetings was reduced, holding at about eight or nine for several years. After the FCST was transferred to the National Science Foundation under Dr. Stever as Chairman, plenary meetings were reduced to two a year with special and ad hoc meetings being called as needed.

Only Mr. Beckler commented on the frequency of meetings of FCCSET. It was his view that the Council should meet "infrequently as a body." Except for discussions on very broad questions where all

agencies engaged in R&D are affected, he favored special meetings to consider specific issues to which were invited by the Chairman only those members directly involved. (p. 114)

Improving the Interest of Larger Agencies in the FCCSET.—It is well-known that the smaller and less influential agencies find any activity that links them to the Executive Office of the President to be worthwhile and thus have shown more interest in central coordinating bodies, such as the FCST. On the other hand, the larger agencies tend to regard as their primary interest in coordinating bodies to see that no harm is done to their interests.

In response to a question from Chairman Thornton for suggestions on ways to interest the larger agencies in working for greater cooperation within a council, Dr. Kidd surmised that the key lay in the agenda of the council. To the extent that problems can be addressed to a consumer or a point of action, so that all agencies feel participation is a worthwhile investment of time and something tangible will come from their efforts, they will commit resources. He commented:

> I think a report or study in the abstract generally ends up on the shelf, whereas if there is an agency, or part of Government, or OMB, or the Domestic Council, or a committee of Congress, that says, "I would like this thing looked into because I would like to do something about it," then, I think the work is more effective and there is more willing participation by the agencies. If they feel something tangible will come from the effort, they will invest resources. Advance expression of interest by an individual or group which can probably get something done is a great help. (p. 96)

Staff and Financial Resources for FCCSET.—The FCST had to depend on the OST, later the NSF, for its staff. Only in the last couple of years were some funds made available to the FCST for Council expenses. Staffing of the interagency committees of FCST was provided by the member departments and agencies. Several witnesses expressed the opinion that the FCCSET should have its own staff and resources.

Mr. Beckler noted that the act which established the FCCSET did not make a separate provision for a Council staff and budget. This support will need to come from the Office of Science and Technology Policy so that the Chairman will have adequate resources to undertake Council activities "with a reasonable degree of independence and flexibility." (p. 114) Dr. Smith thought that the level of staffing for the new Council does not need to be large, "though it must surely be larger than the very modest numbers of recent years." (p. 64) Mr. Staats felt it important that adequate staff be made available to staff the various committees of the Council. What was needed were people who can "develop the issue papers, can get around and talk with the people in the agencies and who can set up and maybe chair a task group that can develop issues and proposals and proposed programs. . . ." Mr. Staats stressed the importance of having an adequate staff, and commented on problems which are associated with having to depend on staff detailed from the agencies. "It is very cumbersome and sometimes you end up not getting the best person. You get somebody who is available rather than the best person for that particular task." (p. 16)

It was Dr. Kidd's opinion that not having its own budget was not a major problem for the FCST. Moving from budget to resources, he noted that the bulk of resources available are in the form of staff work done by the agencies. He admitted that was "far from a perfect de-

vice . . . because the pace of the work, detail, competence, all depend on the resources the agencies are willing to put into the job. Sometimes people have overriding priorities which make that work go very slowly." He concluded that although the resources of the departments and agencies do in effect expand the resources of the Council, they do so in an unpredictable and not entirely satisfactory way." And for urgent matters, he too recommended that "it would be useful for the new Council to have the resources available, one way or another, to permit the preparation of reports, analyses, whatever is required to go forward expeditiously." (p. 99)

Dr. Stever characterized the FCST as a "fraternal organization in which various agencies chipped in, depending upon their interest in various problems." He said the biggest "chip" often came off the National Science Foundation. Providing staff and funding the activities of the FCCSET from the limited resources of OSTP, as had been recommended, are not going to be "easy," he said.

Flexibility Needed in FCCSET.—Flexibility would appear to be a principal requirement for effective coordination. Mr. Staats made some observations concerning the FCCSET. He agreed on the need for an increasing degree of flexibility as the role of science and technology in public policy becomes more complex. He cautioned that it was necessary to strike a balance between "informality and flexibility, with some degree of structure." He noted that flexibility was needed in defining the Council's concerns beyond those of the statutory members. In this regard, he saw the science adviser bringing in other representatives with concerns on particular issues as a necessary use of flexibility. (p. 21)

Another kind of flexibility must be developed within the Executive Office and between the FCCSET and the OSTP and OMB. The effectivness of the FCCSET depends a great deal on the kinds of working relationships that are developed among these offices. (Staats, p. 21)

Functions of FCCSET

The specific functions of the coordinating council were discussed by the witnesses with emphasis on the most useful role it could play.

Policy-level Assignments Involving Coordination in Public Law 94–282.—Section 401(e) of Title IV of this act directed the FCCSET to "consider problems and developments in science, engineering, and technology and related activities affecting more than one Federal agency, and . . . recommend policies and other measures designed to:

(1) provide more effective planning and administration of Federal scientific, engineering, and technological programs,

(2) identify research needs including areas requiring additional emphasis.

(3) achieve more effective utilization of the scientific, engineering, and technological resources and facilities of Federal agencies, including the elimination of unwarranted duplication, and

(4) further international cooperation in science, engineering, and technology.

An additional important assignment was made by Section 401(f) which directed the Council to "perform such other related advisory duties as shall be assigned by the President or by the Chairman." This

assignment greatly expands the areas in which the FCCSET could be involved, so as to constitute an almost open-ended subject area.

Mr. Beckler enumerated several areas of congressional concern contained in Section 102(c) of Title I of the act as examples of policy-level areas which could involve interagency coordination by the FCCSET:

> The need for strong participation and cooperative relationships with state and local governments and the private sector.
>
> The creation of policy planning elements to assist the agencies in identifying public problems and objectives and anticipating future concerns to which science and technology can contribute.
>
> The management, dissemination and transfer of scientific and technological information including procedures for systematic interchange of scientific findings among the Federal agencies.
>
> Federal procurement policy to encourage the use of science and technology to foster the frugal use of materials and energy.
>
> Development of criteria, including cost-benefit principles, to identify Applied R&D programs appropriate for Federal funding support.
>
> Assuring the stability of scientific and technological institutions and the support of basic research and education in needed disciplines.
>
> Development of Federal patent policies based on uniform principles.
>
> Efficient management of laboratory facilities and equipment. (p. 113)

Mr. Beckler also suggested that several functions assigned to the OSTP by the act in which the FCCSET might appropriately be called upon to assist:

> Assistance in preparing the Science and Technology Report.
>
> Periodic review of Federal statutes and administrative regulations which affect Federal R&D activities.
>
> Policies for international cooperation in S&T.
>
> Identification of current and emerging problems of national significance involving scientific or technical considerations. (p. 113)

He cited these areas of congressional concern as contained in the act to indicate the "number, scope and diversity of government-wide policy and management needs that, for the most part, have not been dealt with by the FCST."

Eliminating Duplication Not the Primary Assignment.—In what he termed "an heretical view," Dr. Kidd discussed what he believed to be a more important role for FCCSET than merely concentrating on the elimination of unwarranted duplication. The statutory responsibilities of many agencies require that they conduct or support research in fields where other agencies also have responsibilities. Many fields are so broad that research in support of many different missions may be justified. Dr. Kidd said that to view the problem as being primarily the avoidance of overlapping and duplication "oversimplifies the matter." He continued:

> . . . The problem is more realistically stated in these terms: In a situation inherently requiring that people in different agencies work in the same scientific area, how is work most appropriately divided among agencies, and how are

communication and cooperation at the working level best sustained? A central task of the Coordinating Committee will be to solve these problems. This is an important operating problem that exists whether the total investment in a given field is constant, increasing, or decreasing. (p. 90)

A Two-way Channel of Communication.—The FCCSET should be able to serve as a two-way channel of communication between the President and his office and the Federal agencies, on matters of common interest to many agencies. Dr. Kidd observed, "The utility of having . . . an effective channel of communication is often underestimated because this in fact leads the agencies themselves to divide work rationally." (p. 90)

Policy Statements.—From time to time throughout its existence the FCST issued policy statements which represented agreed-on courses of action to be taken on particular areas of wide interest. Sometimes these statements represented agreements reached within one of the interagency committees of the FCST which when endorsed by the FCST became statements of policy. Sometimes these statements were incorporated into statements of policy which were promulgated by a lead agency in that area, as for example, an agreement originating in the International Committee of FCST might be disseminated by the Secretary of State.

Another such policy statement was the statement on patent policy developed by the FCST and its Government Patent Policy Committee which was incorporated into a presidential statement of patent policy.

In response to a direct question on whether the FCCSET should continue in this area, Dr. Kidd cautiously agreed. He cited the statement on patent policy as an example of a policy statement which was useful, and also referred to the policy statement by President Johnson on geographical distribution of R&D, which resulted in specific implementing actions by agencies. He concluded:

. . in specific areas of that kind I see no reason that the Council should not undertake a policy statement. But they should be very carefully selected so that they relate to areas about which something will be done, where it will have some positive effect, rather than simply being a series of words. (p. 97)

Problems Which are Better Handled by Other Governmental Coordinating Mechanisms.—In this discussion of proper functions for FCCSET, it may be useful to conclude with an excerpt from Dr. Stever's statement in which he enumerated categories of problems and issues of an interagency nature that are more effectively handled through other coordinating mechanisms. These include:

The ongoing planning and specific conduct of R&D programs that have clear delineation in agency programs and budgets. These are quite probably best coordinated through the usual format and informal planning and budget mechanisms involving the agencies and OMB.

Programs—where only two or three mission agencies are involved—which can be more effectively handled on a two-agency basis or through the leadership of a single agency.

A subject area of insufficient importance to warrant attention at the Federal Council level. Such an area can be coordinated more informally or by some other type of interagency advisory council or task force. (p. 32)

Executive Office of the President-FCCSET Relationships

This section begins with a summary of those portions of the testimony which discussed the Office of Science and Technology Policy

and its functions. Following this, FCCSET relations with several Executive Office units are discussed: the Office of Science and Technology Policy, Office of Management and Budget, and the Domestic Council.

Office of Science and Technology Policy

The OSTP had not been organized when the hearings were held since a Director was not nominated until July 21, 1976, and was not confirmed until August. Nevertheless, a $1 million supplemental appropriation through September 30, 1976, had been approved and preliminary planning was going forward for the new office within the NSF and the Executive Office of the President. The following aspects of OSTP's functions we discussed in the testimony.

OSTP a Full Partner in the Decisionmaking Process.—There are few persons in a better position to speak about the requirements of a science and technology policy office in the Executive Office of the President than Mr. Beckler who spent a majority of his working life in that environment. For this reason, his comments on the role of OSTP have special importance. A requirement of the White House science and technology policy mechanism is "effective working relationships with the various presidential staff mechanisms on which the President relies for analysis and advice—the OMB, NSC, Domestic Council, the Council of Economic Advisers, and other White House Executive Office units," Mr. Beckler said. And then he stated what he identified as the "single message in my statement,":

> Beyond that, the science and technology policy office must have a clear mandate on which to exercise its prerogatives as a full partner in the decisionmaking process. (p. 106)

OSTP must combat the forces of isolation.—A main problem which the previous science advisers and their offices had to contend with was the "forces of isolation." Mr. Beckler observed:

> If you don't have a piece of the action no one really wants your advice. And the forces of isolation are such that unless you have a mandate that people will accept and recognize, unless they know you have the backing and interest of the President, it is very difficult to intervene in a policy decisionmaking process where other participants feel they have the basic responsibility. This is a crucial question that one has to work on constantly, to maintain effectiveness; because science and technology advising mechanism in the White House is, frankly, an anomaly. It has always been an anomaly. (p. 106)

OSTP must continually justify itself.—The changing of administrations and the turnover of people in the Executive Office makes it necessary for OSTP, in Mr. Beckler's opinion, to have a "continuing process of education" about why it is needed. The question is recurrently raised, "Why don't we leave the details to the technicians? Why do we need you here?" The science and technology policy office is often viewed as an "advocacy mechanism," he said, "rather than a full partner on the team, judging rather than advocating." There is a very important psychological difference between the two functions, he observed. (p. 106)

OSTP's role in the budget process.—The R&D budget is not a separate consciously arrived-at document; rather it is the sum of all the agencies' perceived needs for R&D which is obtained by delineating this money from the total budget. It is through participation in the budget process at the Executive Office level that the OSTP can per-

form one of its most important functions. Such participation is now written into its charter. One of the functions of the Director of OSTP as set forth in section 204(b)(3) of Public Law 94–282 is to:

> (3) Advise the President on scientific and technological considerations with regard to Federal budgets, assist the Office of Management and Budget with an annual review and analysis of funding proposed for research and development in budgets of all Federal agencies, and aid the Office of Management and Budget and the agencies throughout the budget development process.

Legislating a relationship does not assure that the intended objectives will be achieved. It is generally agreed that the OSTP must establish its usefulness in this area in support of the OMB and the President, and avoid the dangers of being seen as an advocate for science and technology. Dr. Smith's comments concerning the former OST interface with the Bureau of the Budget are relevant:

> . . . the OSTP staff should work closely with OMB staff. Indeed, I believe the OST system worked best when the OST served essentially as the science and technology arm of the Budget Bureau. This role was never wholly free of tensions and frustrations. Budget staff sometimes regarded the OST staff as advocates for technology and science—as something of a trojan horse in the President's household—as individuals who should have been more sensitive to the special constraints and more associated with serving as staff aides to the President. OST people, in turn, sometimes saw budget staff as stodgy wielders of the meat axe who saw the world from their own narrow vantage point—often that of the heroic battler against pork barrel projects of all sorts, including scientific and technological pork. The most effective OST staffers, however, were sensitive to the special complexities of their role, and served skillfully until the frictions of the Vietnam war began to erode the usefulness of the office. (p. 64)

Dr. Smith also observed that there is a special dilemma with the OSTP budget function that must be frankly faced. It was his belief that:

> The Director of OSTP—who will assume the role of the President's Science Advisor—will probably never have the same intimacy and degree of access to the President as the President's generalist aides who work with him on a daily basis. . . . I believe this will be so whoever is President. . . . if by chance a science adviser was very close to a President, he would ask for and get a more prestigious job. (p. 64)

The former OST occupied a "middle area between the most institutionalized of the President's staff resources—the BOB—and the least institutionalized" who were the intimate advisers. Dr. Smith pointed out that this position was not always a comfortable one. He thought the new OSTP would very likely function in the same "ambiguous middle area."

Dr. Goldmuntz suggested that one way to enhance the authority of the Science Adviser in the budget process would be to provide him with some "funding prerogative." He suggested a number of forms such a prerogative might take:

> Perhaps he could have authority over some funds for longer range research or a quick reaction capability that he could commit for a limited period until a mission oriented agency adopted or finally rejected the initiative. Perhaps he should have the authority to reprogram a small percentage of each mission agency's R&D budget up to some maximum amount, after it has been approved by Congress. These funds could be applied to an alternate suggested use either within that agency or in another agency. This mechanism could also provide a quick reaction capability, or the opportunity to restore balance to an agency's R&D program or the opportunity to support a program of broad Federal interest that is more logically accomplished in one agency than in another. Such authority goes beyond enabling the Science Adviser to accomplish a better job of coordination.

Such authority not only permits that, but also permits the Science Adviser to make some evaluations of Federal R&D programs and to act on these evaluations. Such authority goes beyond the usual inclination of the Congress and the mission agencies. But the Congress faces a dilemma: is there sufficient uneasiness with the productivity and responsiveness of Federal R&D to provide, perhaps only in the civil sector, some reprogramming authority to the Science Adviser? Will such an authority improve matters? I believe so. (p. 123)

Goldmuntz admitted that such authority might be questioned both by the Congress and the mission agencies. But he felt that if there is sufficient uneasiness with the productivity and responsiveness of Federal R&D and if giving some reprogramming authority to the Science Adviser, would improve the situation, such action might be advisable. (p. 123)

Mr. Beckler was asked to comment on Dr. Goldmuntz's suggestion for discretionary funding authority to the Science Adviser. A difficulty he saw was that the Science Adviser does not have responsibility to evaluate the total programs of agencies and therefore he would have "limited credibility" in recommending changes in funding levels for R&D alone. He felt that "broad allocation authority in the Science Adviser would be incompatible with the general notion of research and development serving ends." However, he did not totally oppose the idea, and suggested that the Science Adviser might be given such authority under certain circumstances and up to certain percentage levels:

. . . it might be desirable, in my view, to give the science adviser some discretionary authority, say when the agency budgets finally are brought into focus toward the end of the fall. At that time the Science Adviser should take an overview look, as is now done in the OMB R&D "cross-cut." In effect, the President should say to the Science Adviser, "I would like to have you give OMB your views on better distribution of funding." The President could give the Science Adviser some leverage, by asking the Science Adviser to suggest reallocations to OMB and to the President up to a certain percentage of the total R&D funding. (p. 104)

Vertical Intervention by OSTP in Operational Programs Must be Selective.—The responsibilities assigned to OSTP and the magnitude of the Federal R&D program far exceeds the resources available within OSTP to pursue them. Professor Lambright discussed this point:

Vertical intervention in operational programs must be pursued extremely selectively. The number of problems that could use vertical coordination are such as to absorb all the time of all the members of OSTP and OMB, and both of these offices have other tasks to accomplish. There are some who feel OST frittered away too much energy in firefighting. The trouble is that some firefighting is probably essential. The key is to distinguish the small from the large fires, those that can be contained at lower levels from those that require topside action. (p. 47)

OSTP Must Include National Security Concerns Within its Purview.—Previous experience when the former science advisory offices concentrated on civilian science and technology led Dr. Smith to urge that OSTP include national security concerns within its purview. (p. 75)

OSTP Operating Procedures Based on Effectiveness, Not Orderliness.—Dr. Smith recommended that the OSTP concentrate on flexibility in working arrangements which may not be conventional but suit particular purposes. For example, he thought OSTP staff might be more "freewheeling" than OMB staff, "and on occasion function more as advocates, gadfly critics of OMB and other parts of the permanent

bureaucracy, or in other ways resemble the political appointee." He recognized that this would be a difficult role for the individuals involved, and explained:

> This means that we would have essentially one staff for the OSTP, with individuals wearing a number of different hats—a coordinator hat, a budget hat, a Presidential advisory hat. It may be necessary to have a small separate staff to handle the duties of the Coordinating Council; if this is so, I would recommend that the senior official in charge of the coordinating activities be a member of the OSTP staff, attend OSTP meetings, and be in close working contact with the OSTP Director. . . . from time to time, staff would be borrowed from the agency. . . . The system should be judged by virtue of its effectiveness or lack of effectiveness, not by orderliness or hierarchy on the organizational chart. . . . (p. 65)

Other witnesses supported this concept.

FCCSET-OSTP Relationships

One point not already covered related to the Director of OSTP as Chairman of the FCCSET. It was suggested that perhaps one of the Associate Directors provided for OSTP might assume the role of the Chairman of FCCSET, thus relieving the Chairman and at the same time, providing a person who would have more time to devote to the FCCSET. The suggestion was a theoretical one because to date no Associate Directors have been appointed. Dr. Kidd was asked to comment on this idea. His response based on his experience was negative.

> . . . it would be a mistake to delegate the chairmanship of that group to an Associate Director, or to somebody else. . . . these interagency committees are fragile organisms, and they face a number of inherent problems . . . in becoming effective. One way to overcome that is to have an expression of direct interest by the head of the office in the work of the Council. If that were delegated to an associate, in my judgment the agency would take that as a signal that that is not an area of prime importance and it would have an adverse effect on participation and attendance. (p. 100)

FCCSET-OMB Relationships

Chairman Thornton asked Dr. Stever how he conceived the proper relationships of FCCSET relative to OMB. Dr. Stever referred to the statutory involvement of OSTP in the budget process and characterized the OSTP-FCCSET role as a "very strong one." He said it had been his experience that OMB took into consideration coordinated programs put together by FCST and other advisory groups of the science adviser. He discussed the activities of the FCST Task Force on Inadvertent Modification of the Stratosphere (IMOS) which led to delineation of relevant programs within the several agencies. This effort also pointed up which areas were receiving adequate attention and which were not. Dr. Stever said this activity was followed closely by OMB and provided a basis for evaluating future budget requests in this area. (p. 36)

Dr. Stever also explained that quite often OMB initiated a request to the science adviser, FCST, or another Executive Office unit for advice or assistance on science policy or budgetary matters.

FCCSET-Domestic Council Relationships

Both Dr. Stever and Mr. Beckler agreed that the FCCSET could be linked with the work of the Domestic Council. Mr. Beckler reviewed

briefly the intent for the Domestic Council, how it had evolved, and what the outlook was for cooperative effort in the future with the FCCSET in the following paragraphs:

> The Domestic Council has been an instrument of some interest to me. If one reads the original plan for the Domestic Council one finds all the right words there about a mechanism in the Executive Office of the President to help define longer range goals and objectives and policies, and to provide a balance between program and policy development and the budgeting function of OMB. Time and circumstances resulted in the budget function being dominant and the Domestic Council being more of a short-range fire drill kind of operation, at least in earlier times.
>
> I think this imbalance has changed in the present administration. The Domestic Council is the place where the Cabinet officers can come together and deal with such questions as what should be our national transportation policy, which should be influenced by and guide transportation R&D. Thus, there is a symbolic relationship between the Federal Council and the Domestic Council. The fact the chairman and science adviser is now a statutory member of the Domestic Council strikes me as an opportunity to directly link the Federal Council problems and projects to the broader work of the Domestic Council. (p. 110)

FCCSET Interagency Committees

The statutory authority of the FCCSET authorizes the Chairman to establish standing subcommittees and panels of the Council for the purpose of conducting studies and making reports as directed by him. (Sec. 401(h) of P.L. 94–282). This authority permits the FCCSET to function in a manner similar to that of the FCST. A number of witnesses discussed the use of interagency committees.

Use of ad hoc vs. standing committees.—The FCST developed a mixed strategy to deal with different kinds of problems at varying times. A Standing Committee, later named the Committee on Federal Laboratories, was established as directed by the Executive Order 10807 of 1959. Interagency committees in functional areas were established, such as atmospheric sciences and water resources, which continued throughout the FCST's existence. In addition, a variety of other arrangements were used—panels, ad hoc working groups, task forces, special committees, and many subgroups and subcommittees to the larger units were established.

Dr. Stever noted that in recent years, as the range of federally sponsored R&D has grown, "the effectiveness of ad hoc committees has seemed especially evident." He identified three areas that are particularly appropriate for the ad hoc kind of task force:

> The policy issue requiring substantial R&D input for its solution. Typically this is the kind of problem demanding a new type of Federal scientific, engineering or technological response. Often, after a period of time, other arrangements are established for program coordination and policy response.
>
> Issues for which the policy response must be produced in a relatively short period of time. These would exclude problems that normally would fall within the jurisdiction of an already existing Federal Council subcommittee or other appropriate interagency group.
>
> Cases where other branches of the government (Legislative or Judicial) are heavily involved in the problem/program in such a way as to require coordinated Executive Branch response at a high level. (p. 27).

He said FCST experience indicated that discipline-oriented interagency committees like the Interdepartmental Committees on Atmospheric Sciences "can deal effectively with interagency scientific issues, either directly or through the use of subcommittees for specific

items of interest, e.g., weather modification. . . ." The problem becomes more difficult when it is a multi-disciplinary interagency issue. Such a current problem is the inadvertent modification of the stratosphere. He briefly reviewed the work of the Interagency Task Force on the Inadvertent Modification of the Stratosphere which was established to address this problem:

> The Interagency Task Force on the Inadvertent Modification of the Stratosphere (IMOS) presents an excellent example of how to attack and successfully solve a multi-disciplinary interagency issue. IMOS is also an example of an *ad hoc* interagency effort in which the Federal Council provided a vehicle for effective response to a specific science policy problem. This group was created jointly in January, 1975 by Dr. Russell Peterson, Chairman of the Council on Environmental Quality, and myself as Chairman of the Federal Council. (A copy of its charter is submitted with this testimony for your information.) It was created specifically in response to the growing concern within government, industry and the scientific community over the hypothesis first published six months earlier that emissions to the atmosphere of certain fluorocarbons used primarily in air conditioning and refrigeration and as aerosol propellants might be contributing to a reduction of the earth's protective ozone layer.
>
> The IMOS acts as a broad-based committee for the development of basic policy recommendations. It is composed of representatives from such diverse fields as chemistry, economics, medicine, international affairs, law, agriculture, and atmospheric science. The goals and approaches inherent in these areas are understandably widely divergent; it would therefore be expected that agreement would be difficult to achieve on even the most basic ideas under normal circumstances and procedures. However, IMOS has been able to reach agreements and compromises and to form usable recommendations. (p. 32)

Another kind of problem which has been handled through an ad hoc committee is the Federal support of basic research in astronomy. An Interagency Coordinating Committee on Astronomy conducted an agency-wide review and participated in the interagency transfer of a major facility from the Air Force to the National Science Foundation.

Dr. Stever supported the increasing use of the ad hoc task group mode of operation, but said there is also a need to establish some "standing" committees to provide "continuing overview." He noted that they could be established as ad hoc groups and reviewed annually. He said, "One cannot deny that a main strength of the council in the past has been its committee structure and the leadership of the various committee chairmen." (p. 33)

Leadership for multidisciplinary groups a key problem.—Dr. Stever spoke to this problem. He noted that whereas in the disciplinary or functionally focused committee, such as ICAS, members have common interests and goals, this is not the case in a multidisciplinary committee, where he said, "goals are frequently so diverse that in many instances they appear to conflict. And in cases where science and technology are parts of complex public policy issues, only the most skillful and patient leadership can bring these goals into harmony. I have no prescriptions concerning leadership. It is a continuing and fundamental problem in public service." (p. 33)

New committees needed at FCCSET level.—No witness offered a listing of all the areas where committees under FCCSET might be needed. Dr. Stever identified two areas not presently receiving attention by the FCST which should be considered for attention by the new FCCSET.

One area was scientific and technical information. Since Public Law 94–282 calls on the Federal Government to promote prompt, effective,

reliable and systematic transfer of scientific and technological information, he thought a group concerned with science information coordination would be one logical subject for attention by FCCSET. This is not a new subject at the Federal Council level. A Committee on Scientific and Technical Information was in existence within the FCST from 1962 to 1973.

A second area for FCCSET consideration is the need for an international committee. Such a committee existed within the FCST from 1959 until it was transferred to the Department of State in 1973. One of the assignments to the FCCSET under Public Law 94–282 is the recommendation of policies and measures designed to "further international cooperation in science, engineering, and technology." Dr. Stever recommended that FCCSET review the need for an international committee. (p. 34)

FCCSET committees have no authority.—Just as the FCCSET is only an advisory body, so too are any organizational units established under it. Dr. Goldmuntz discussed the limitations of these interagency committees—

> . . . an FCST committee has no authority. It cannot commit an agency or any branch of the Executive Office. It is a committee organized to provide policy options, a consensus among agencies, to allow the Federal programs to proceed. It illustrates and outlines issues. It cannot decide anything. (p. 119)

He noted that sometimes this process works well. An agency will seek the involvement of the Federal Council in establishing a committee to examine a particular issue. At other times, when the initiative came from the staff who felt it was important to examine an area, he said, "agencies felt it was an intrusion, and were not anxious to cooperate." (p. 120)

Charges that interagency committees are ineffective.—Dr. Kidd commented on the often-heard criticism that the interagency committee is ineffective. He said, "This charge has to be examined carefully and in terms of what can be realistically expected from these groups. Basically, what they can be expected to do is to cope with the problems [of coordination] at the adolescent stage at the operating level. They cannot realistically be expected to deal with major questions of allocation of functions among agencies. proposals for major reorganizations or major changes in budgetary levels." (p. 94)

FCCSET Utilization of Outside Advice

The FCST and its interagency committees were comprised of Federal Government representatives. On only one instance did a non-Federal employee serve on an interagency committee. This individual was Dr. Harvey Brooks of Harvard University who chaired a Committee on Long Range Planning during the early years of FCST. This situation was a clearly unique one. Occasionally outside groups were utilized in the preparation of studies and reports for the interagency committees. But for the most part, the FCST and its interagency committees depended on advice from within the Federal Government.

A number of witnesses supported the utilization of outside advice to supplement that available within the Federal Government.

Dr. Kidd thought the Chairman of FCCSET should make a "deliberate effort to involve people from outside of the Government in

the work of the Council." He noted the availability of persons of very high competence and wide experience who might do a better job than those "who might be available as a practical matter from within the agencies." (p. 99) He conceded that questions would have to be answered concerning the circumstances under which such people could be brought in as part of the Council apparatus, but nevertheless felt that more use of people from outside Government would be a definite advantage.

Both Mr. Beckler and Dr. Goldmuntz supported the use of outside advice for the FCCSET. Mr. Beckler recommended using outside consultant panels or contracts to undertake studies in areas where there are strong vested interests on the part of concerned Federal agencies. Agency representatives could then debate the conclusions. In other situations, it might be advisable to have a mixture of agency personnel and outside-of-government experts. Mr. Beckler concluded, "I would hope that the Federal Coordinating Council for Science, Engineering, and Technology would adopt a mixed strategy in undertaking its studies involving a blend of agency personnel, expert consultants and contractors." (p. 114)

Mr. Beckler said the use of outside experts in these circumstances could be particularly effective where: "(1) the departments and agencies are apt to argue in their narrow self interest, or (2) a key agency is reluctant to agree to a consensus that might adversely affect its own programs in favor of an activity elsewhere in the Government. Bringing in outside experts who can speak with authority on the substance tends to suppress the natural bureaucratic tendency to compromise and paper over the real issues." (p. 117)

Mr. Goldmuntz also thought outside people should be brought in. He recalled that when he joined FCST, "it did not seem to be the usual practice to bring in outside experts to help in the coordinative process. I think we began to break down that artificiality . . . I think it is very important in the future to recognize that experts, outside the Government, can be extremely helpful." (p. 120)

Use of National Academy of Sciences.—In response to a question whether the FCST had ever utilized the NAS for advice, as had been authorized in the Executive order which established the Council, Dr. Kidd replied in the negative to his knowledge. He said the President's science adviser and the President of the Academy were in very close contact, but not through the Council. However, he thought the FCCSET might well be a channel for that kind of communication in the future. (p. 98)

Tasks for FCCSET and OSTP

A number of witnesses suggested priority areas for attention by the FCCSET and OSTP. These suggestions have been excepted from testimony of the several witnesses:

Science and technology information storage and exchange

"Public Law 94–282 specifically calls for the Federal government to promote prompt, effective, reliable and systematic transfer of scientific and technological information. I would think that a group concerned with science information coordination would be logical under the new FCCSET." (Stever, p. 34)

International science and technology issues

"The need for an FCCSET international committee should be reviewed." (Stever, p. 34)

Energy, food, materials, and the environment

"... the OSTP should not be afraid of addressing itself to the great issues of energy, food, materials, and the environment. Although it is true that there are many players in these areas already, . . . it seems to me that major attention will be devoted to these issues for a long time, and that the relatively broad look that the OSTP, aided and encouraged and critically reviewed by the Subcommittee, might take of points of overlap and lack of coordination could yield important benefits. . . ." (Smith, p. 74)

Lack of coordination among Federal extramural support programs

"There is one last area that should be high on the OSTP's agenda, and a special problem in the coordinating activities of the Council. I am engaged in a major study of the role of the universities in the nation's research and development effort together with a team of colleagues. While the nation's science effort in the universities is still strong, we are finding a number of emerging problems that result in part from the lack of coordination among Federal extramural research support programs. There are conflicting regulations, cross purposes, and confusing contradictions in the way Federal programs affect the universities. We need to make sure that sudden swings in Federal policy, or the lack of coordination between agencies, do not impair the ability of the universities to perform R and D of high quality in the national interest." (Smith, p. 75)

The quality of the Federal laboratories

"The personnel and other administrative policies and the general environment of the laboratories have a great deal to do with their productivity. The new Coordinating Council could productively review again and make recommendations affecting the efficiency of the Federal R&D establishment. For this reason, it would seem prudent for the new Federal Coordinating Committee to give high priority to the statutory directive to achieve more effective utilization of the scientific, engineering and technological resources and facilities of federal agencies, including the elimination of unwarranted duplication. (Sec. 401(e)(3))." (Kidd, p. 94)

Impact of Federal regulatory actions on innovation

In response to a question from Chairman Thornton whether it might not be a useful function for FCCSET to look into the problem of antitrust laws which are alleged to inhibit scientific research, Mr. Beckler agreed there was a problem but not for FCCSET—

I am not convinced some of these things should occur under the Federal Coordinating Council. That may be the wrong place for examining the impact of Federal antitrust regulations on R&D in the private sector, because there would be two agencies that would be in disagreement. . . . I think that kind of issue is best handled by the Office of Science and Technology Policy working closely with the Domestic Council, with the Council of Economic Advisers, and drawing on the agencies concerned, and outside groups. (p. 116)

* * * * * * *

On the other hand, I think there are major questions of this kind that could appropriately be addressed by the Federal Coordinating Council, such as the im-

pact of other Federal regulatory actions on innovation in the environmental and pharmaceutical areas. . . . (p. 117)

Technology transfer and utilization of Federal R. & D. results

"There are many governmental programs where the results of the R&D are supposed to go into the market structure, as in health services, transportation, so on. Yet the design and execution of those R&D programs has not been part of a transmission-belt concept. It has been an R&D concept that if we develop something useful, someone might pick it up.

"That has been the subject of a number of studies, and still remains an important deficiency in that way in which the civilian departments and agencies conduct R&D. . . . There is a feeling we need much more of a systems concept in framing Federal civilian R&D programs. That is the kind of issue that is clearly of importance to the Federal Coordinating Council." (Beckler, p. 117)

APPENDIX

List of Witnesses

HEARINGS ON THE INTERAGENCY COORDINATION OF FEDERAL SCIENTIFIC RESEARCH AND DEVELOPMENT

July 20, 1976:

Elmer B. Staats, Comptroller General of the United States, General Accounting Office, Washington, D.C.

accompanied by Messrs. Morton A. Myers, Assistant Director for Science and Technology and Osmund T. Fundingsland, Science Advisory Staff.

Dr. H. Guyford Stever, Chairman, Federal Council for Science and Technology; Director, National Science Foundation; and Science Adviser to the President.

July 21, 1976:

Dr. W. Henry Lambright, Professor of Political Science and Public Administration, The Maxwell School, Syracuse University, and Director, Science and Technology Policy Center, Syracuse Research Corporation, Syracuse, New York.

Dr. Bruce L. R. Smith, Professor of Political Science, Columbia University, New York.

July 23, 1976:

Dr. Charles V. Kidd, Executive Secretary, Association of American Universities, and former Executive Secretary, Federal Council for Science and Technology.

David Z. Beckler, Assistant to the President, National Academy of Sciences and former Executive Officer, President's Science Advisory Committee.

Dr. Lawrence A. Goldmuntz, President, Economics and Science Planning, Inc., Washington, D.C., and former Executive Secretary, Federal Council for Science and Technology.

Statement of Paul H. O'Neill, Deputy Director, Office of Management and Budget, Executive Office of the President.

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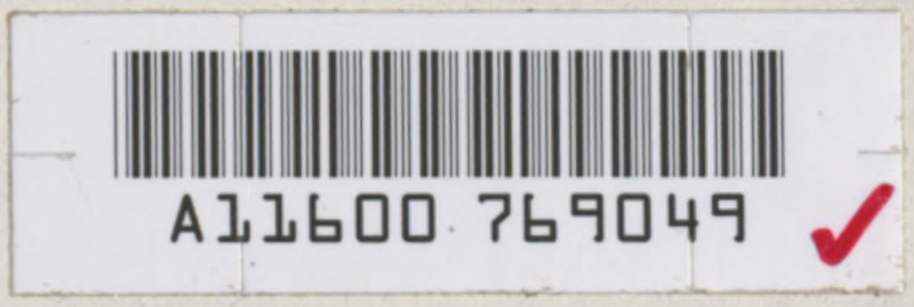
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