4. IMPROVING INTERAGENCY LEADERSHIP AND COORDINATION ON FEDERAL STI

Question 4.

Question 4. What changes could be made, both in internal agency organization and in interagency coordination, to enhance public access to STI?

An important prerequisite to developing and implementing a governmentwide strategy for STI dissemination is leadership--leadership from the science and technology community, Congress, Federal science agencies, and the Executive Office of the President, including OMB and the Office of Science and Technology Policy (OSTP). The focus here is on the Federal science agencies and OSTP (OMB was discussed earlier). Institutional leadership is especially important to realize improvements in interagency coordination and internal agency organization, as well as the other elements of an STI strategy. Changes that could be made, as part of an overall strategy, to improve in these areas include: strengthening the OSTP role; establishing an OSTP advisory committee and an interagency coordinating committee on Federal STI; and upgrading STI dissemination functions within agency R&D and Information Resources Management programs.

Strengthening the OSTP role. OSTP is a logical focal point for executive branch STI leadership. **The "National Science and Technology Policy, Organization, and Priorities Act of 1976,"[1] OSTP's organic statute, addresses STI in the declaration of congressional policy. The act lists "effective management and dissemination of scientific and technological information" as part of the U.S. science and technology base, and states that "Federal departments, agencies, and instrumentalities should establish procedures to insure among them the systematic interchange of scientific data and technological findings developed under their programs."[2] But the statute does not assign STI functions specifically to OSTP. The stated functions of OSTP are broad enough to include STI, and STI is mentioned in the charter of a President's Committee on Science and Technology that was to consider, among other things, "improvements in existing systems for handling scientific and technical information on a Government-wide basis, including consideration of the appropriate role to be played by the private sector in the dissemination of such information."[3] However, this provision of the law has not been implemented.**

OSTP has in the past provided some staff attention to STI matters, and has supported activities of the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET). This council, established under Title IV of the act, is composed of the OSTP Director, who serves as chairman, and representatives of the major Federal science and technology agencies. The Council created the Committee on Earth Sciences, which in turn has endorsed the work of the Interagency Working Group on Data Management for Global Change. This working group is addressing some of the key STI technical and policy issues, at least as they relate to earth sciences and global change data. FCCSET also has supported work in the areas of high performance computing and networking, which also relate to STI dis-

1 U.S. Congress, P.L. 94-282, May 11, 1976.

2 P. L. 94-282, Sec. 102(a)(5)(c) and Sec. 102(C)(10).

3 P. L. 94-282, Sec. 303 (a) (2).

semination.[4] In contrast, neither OSTP nor the FCCSET has given significant attention to dissemination of STI documents or bibliographic databases, to issues involving agencies like NTIS and GPO that are responsible for disseminating such materials, or to governmentwide information dissemination issues that are relevant to STI.

In general, the relatively low profile of OSTP with respect to governmentwide STI policy has, in effect, ceded the dominant executive branch policy role to the Office of Management and Budget. To the extent STI is included within the scope of governmentwide information dissemination policy, then the activities of OMB could have a profound impact on STI dissemination.

A strengthened OSTP role seems desirable to insure that the special needs and problems of STI are fully considered, and that the contribution of STI to broader national goals is identified and realized. A stronger role should also help improve interagency coordination on STI. The new OSTP director may, on his own initiative, give a higher priority to STI matters. This could involve the assignment of OSTP staff to the STI area, and the formal recognition of STI functions within each of the major OSTP programmatic areas. But even so, Congress may wish to amend the law to provide stronger congressional guidance. This could be done by adding STI as an explicit, required area of OSTP responsibility. STI also could be added as an explicit, required function of the FCCSET.

OSTP could prepare and issue a strategic plan on STI, with the advice and assistance of advisory committees and agency officials, as was done for high performance computing. This recently issued plan[5] articulates the goals, rationale, action steps, responsibilities, and budget for initial implementation of the U.S. high performance computing and networking program. Program leadership is assigned to OSTP, assisted by a FCCSET Committee on Computer Research and Applications and an advisory panel selected by and reporting to the OSTP Director. The FCCSET Committee will be responsible for interagency planning and coordination, technology assessment, and preparation of policy recommendations and annual progress reports to OSTP. The advisory panel will include scientific, academic, and industry experts, and will provide the OSTP Director and FCCSET with independent assessments of program progress, relevance, and balance. A similar organizational approach could be used for "the Federal STI Program."

Establishing advisory committees on STI. Many STI analysts cite the experience of the Committee on Scientific and Technical Information (COSATI) as evidence of the potential effectiveness of a high level advisory body. COSATI was formed in 1963 by the old Office of Science and Technology (created in 1962 by executive order) and its President's Science Advisory Committee (PSAC). For several years, COSATI and PSAC provided high-level executive branch leadership on STI.[6] With a change in administrations, COSATI was transferred from the Office of Science and Technology to NSF in 1971 and abolished in 1972. The Office of Science and Technology itself was abolished in 1973.[7] Even

---

4 See U.S. Office of Science and Technology Policy, Executive Office of the President, A Research and Development Strategy for High Performance Computing, Committee on Computer Research and Applications, Federal Coordinating Council on Science, Engineering, and Technology (Washington, D.C.: Executive Office of the President, November 20, 1987); and U.S. Office of Science and Technology Policy, Executive Office of the President, The Federal High Performance Computing Program (Washington, D.C.: Executive Office of the President, Sept. 8, 1989),

5 U.S. OSTP, High Performance computing Program, 1989, op.cit.

6 See, for example, President Science Advisory Committee, Science, Government, and Information: The Responsibilities of the Technical Community and the Government in the Transfer of Information (Washington, D.C.: U.S. Government Printing Office, Jan. 10, 1963).

7 Thomas E. Pinelli, "Chronology of Selected Reports, Related Studies, and Significant Events Concerning Scientific and Technical Information in the United States," May 1989 draft. For other historical overviews, see A. Bishop and M. O. Fellows, "Descriptive Analysis of Major Federal Scientific and Technical Information Policy Studies," in McClure and Hernon, United States Scientific and Technical Information Policies, op. cit., pp. 3-55; and A.A. Aines, "A Visit to the Wastel and of Federal Scientific and Information

though OSTP was reestablished (with the "P" for policy added to the statutory name) by statute in 1976, COSATI and PSAC have not yet been revived. The new OSTP Director has announced plans to establish a President's Council of Advisors on Science and Technology--the equivalent of PSAC--under the President's statutory authority. Functions of the new President's Council of Advisors could be extended to STI and the creation of advisory subgroups such as COSATI.

Two STI advisory bodies could be justified. For example, a COSATI composed of a mix of outside advisors and experts could report to the OSTP Director. This group could include representatives from major segments of the science and technology community concerned with STI: scientists, scholars, information specialists, large and small business leaders, librarians, State/local government officials, consumer and labor leaders, and the like. A second advisory body comprised entirely of agency STI officials could be established under FCCSET. This group could include representatives from a cross-section of Federal science agencies, including the major Federal science data centers and document clearinghouses, and the governmentwide dissemination and archival agencies.

The absence of the equivalent of COSATI, or a formal FCCSET advisory body on STI, in part led to the creation of CENDI (Commerce, Energy, NASA, NLM, Defense Information). CENDI is an interagency group established by several Federal science agencies (NTIS, DOE, NASA, DTIC, and NLM) to address problems and opportunities relevant to STI. A strengthened CENDI may be needed, whether as a formal FCCSET body or as a separate but complementary activity.

CENDI could be upgraded in several ways. One, its scope could be expanded to include the data side of STI as well as the bibliographic and document side which it now concentrates on. Two, CENDI's membership could be expanded to include other Federal agencies with major STI functions (e.g., USGS, NOAA, and EPA). Three, CENDI's staff support and funding could be expanded to meet added responsibilities. Fourth, CENDI could establish or strengthen formal working relationships with other interagency groups. Fifth, CENDI could exert active and visible leadership in educating government executives on the importance of STI dissemination and a governmentwide STI strategy.

Whatever the mechanism, improved coordination is needed among those interagency groups involved in Federal STI, including:

- CENDI;
- Interagency Working Group on Data Management for Global Change;
- Interagency Coordinating Committee on Digital Cartography;
- Special Interest Group on CD-ROM Applications and Technology;
- Federal Publishers Committee;
- Interagency Panel on Numerical Data;
- Interagency Advisory Council on Printing and Publishing; and
- Federal Library and Information Center Committee.

Upgrading agency STI management. Agency management of STI needs to be strengthened.[8] First, information dissemination should have a higher priority within agency Information Resources Management (IRM) programs. Most agency IRM offices give scant attention to dissemination, even though dissemination was included in the original IRM concept, and is referred to throughout the Paperwork Reduction Act (as amended in 1986). IRM officials and

Policy," Journal of the American Society of Information Science, Vol. 35, May 1984, pp. 179-184.

8For a general critique of agency information management as it relates to STI, see C. R. McClure, A. Bishop, and P. Doty, "Federal Scientific and Technical Information (STI) Policies and the Management of Information Technology for the Dissemination of STI," in Information Technology: Planning for the Second 50 Years, Proceedings of the 51st Annual Meeting of the American Society for Information Science, Christine L. Borgman and Edward Y. H. Pai, eds. (Medford, N. J,: Learned Information Press, 198$!), in press. Also see U.S. OTA, Informing the Nation, op. cit., esp. ch. 11.

activities are mostly occupied with computers, telecommunications, management information systems, and procurement activities. Job definitions, career paths, and training programs for information dissemination professionals and IRM officials could be revised and strengthened.[9] Second, STI dissemination should have higher priority within agency R&D programs. STI is the primary product of R&D and is central to agency R&D missions. Several possible actions to upgrade STI deserve consideration:

- the direct participation of STI staff in agency R&D planning and decision-making;
- the separation of dissemination as a line item within agency R&D budgets;
- the allocation of at least some minimum percentage of R&D grants, contracts, and operating budgets to STI dissemination, data management, and related areas;
- the participation of R&D program officials in selected interagency STI groups and activities;
- the participation of R&D grantees, contractors, and the like in agency innovation centers designed to share new information about STI dissemination, among other topics;
- the involvement of R&D and STI managers in focus group discussions with and surveys of STI users; and
- the joint sponsorship of independent research on STI dissemination and use.

Other examples of the need for interagency leadership and coordination. Improved interagency leadership and coordination are needed to deal with a variety of other issues that should be part of an overall strategy on STI dissemination. These issues include, for example, user charges for STI, international cooperation on STI, private sector involvement in STI dissemination, and education and training of STI users.

The transition to new forms of offline and online electronic storage and dissemination creates a need to review STI cost and pricing structures. For example, the Interagency Working Group on Data Management for Global Change found a range of pricing policies in the earth science agencies--from no or partial fees to full marginal costs of more.[10]

The proliferation of networks and programs for exchange of STI means that more international cooperation is needed. The working group recognized from the outset that earth sciences data must be collected and disseminated globally to foster research on global change. The Federal earth science agencies have dozens of international agreements for information exchange, and these could be the basis for an international data network, if adjustments are made to ensure compatibility among the individual data systems. The working group is coordinating with other national and international scientific organizations on earth sciences data management, including the:

- National Research Council Space Science Board, Committee on Data Management and Computation;
- National Research Council, Numerical Data Advisory Board;
- National Research Council, Committee on Geophysical Data;
- International Geosphere/Biosphere Program, Data Management Working Group;
- International Council of Scientific Unions, Panel on World Data Centers;
- Committee on Earth Observation Satellites, Working Group on Data;
- Committee on Data for Science and Technology (CODATA); and
- World Climate Data Program.

Commercial and not-for-profit vendors and the library community play a major role in the dissemination of Federal STI. This role could be expanded with better coordination and cooperation between the Federal science agencies

9See U.S. OTA, Informing the Nation, op. cit., esp. ch. 11.

10U.S. Interagency Working Group on Data Management for Global Change, draft statement, April 14, 1989.

and the private sector. Increased availability of Federal STI in electronic formats could stimulate and strengthen the private sector role in STI dissemination. This has been the case with online and CD-ROM formats. The collection and creation of the Federal STI databases and documents are paid for by the taxpayer. The development cost of many of these databases is beyond what most private organizations could afford or would risk on such a venture. These databases are a shared national resource. New electronic technologies help the Federal science agencies to prepare and maintain these databases and distribute them to the public--including the private sector. Private vendors, among others, thus are assisted by the government in their business of redisseminating, repackaging, and enhancing Federal STI and converting it into marketable products and services.

Representatives of the Information Industry Association (IIA) support government use of electronic technology for improving the efficiency and effectiveness of information dissemination activities. The IIA envisions a partnership role for the private sector in complementing government dissemination, and suggests four basic principles to ensure access to public information:'

1. **The government shall provide access to public information in whatever media it is available.**
2. **In disseminating information, the agency should ensure that no party, public or private, has the ability to exercise monopolistic control over the information.**
3. **Government information available to the public must be available to ail members of the public on an equal basis at costs not to exceed the marginal cost of dissemination.**
4. **Federal agencies must not assert copyright, or implement copyright-like provisions, over their information products absent clear statutory authorization.**

Electronic Federal STI should also benefit commercial telecommunication companies. if electronic Federal STI is accepted by users and demand for online services increases, the use of telecommunication gateway services should likewise increase. Market stimulation should extend to the Bell operating companies, long distance telephone carriers, commercial value-added networks, and also not-for-profit networks. The latter include the Online Computer Library Center (OCLC), Research Libraries Information Network (RLIN), Western Library Network (WLN), and Reference Point, Inc. (the latter intended to serve citizen organizations). These and other not-for-profit organizations offer Federal information in their portfolio of services, which could be extended to Federal STI dissemination.

The role of libraries as STI intermediaries also could be enhanced with STI in electronic formats. University research libraries, specialized science and technology libraries, libraries in Federal (and some State/local) science agencies, and a few of the larger public libraries already make extensive use of Federal STI on paper or microfiche. Electronic STI is now limited to a few bibliographic databases available online and/or on CD-ROM from Federal science agencies and/or private vendors. Many of these libraries are preparing for when more Federal STI will be available electronically. Other libraries, including elementary and secondary school libraries, could use electronic Federal STI to help train students and the public in using electronic information services.

Prior OTA studies have examined the U.S. system for educating scientists and engineers, and identified several opportunities that relate directly to STI dissemination. '2

---

11 See statements of Kenneth B. Allen, Senior Vice President for Government Relations, Information Industry Association, before an April 18, 1989, hearing of the House Committee on Government Operations, Subcommittee on Government Information, Justice, and Agriculture, and before a July 13, 1989, hearing of the National Commission on Libraries and Information Science.

12 See U.S. Congress, Office of Technology Assessment, Educating Scientists and Engineers: Grade School to Grad School, OTA-SET-377 (Washington, D.C.: U.S. Government Printing Office, June 1988); Power On? New Tools for Teaching and

For example, OTA found that "hands-on" computer-based science learning could increase student interest in the subject matter and enhance student learning. OTA also noted the growing role of computer-based science in science museums, centers, and fairs around the country. Overall, availability of Federal STI in low-cost, user-friendly electronic formats could add a new and important dimension to computer-based mathematics, science, and engineering education. School libraries could serve as a focal point for teacher and student training in the basics of online and CD-ROM use, and could provide a shared computer resource available to support the science curriculum. This could be an extension of the role already performed by library staff at many college and university libraries and at some of the larger and better-funded public libraries.[13]

Integrating electronic STI access, retrieval and use into science education at ail levels should significantly improve the research skills and productivity of U.S. scientists and engineers in the long term. Various studies have highlighted the "inadequate information gathering/management skills of the R&D community" and the lack of skills and/or motivation to use available bibliographic tools, especially with respect to foreign STI.[14] Electronic Federal STI dissemination could play an important part in solving this problem. Leadership from OSTP and a strong and well-coordinated interagency initiative could help make this a reality.

Learning, OTA-SET-379 (Washington, D. C. : U.S. Government Printing Office, September 1988); Elementary and Secondary Education for Science and Engineering, OTA-TM-SET-41 (Washington, D. C.: U.S. Government Printing Office, December 1988); and Higher Education for Science and Engineering OTA-BP-SET-52 (Washington, D.C. : U. S. Government Printing Office, March '1989).

13For a detailed discussion of opportunities for computer-based mathematics education, see National Research Council, Mathematical Sciences Education Board, Committee on the Mathematical Sciences in the Year 2000, Everybody Counts: A Report to the Nation on the Future of Mathematics Education (Washington, D.C. : National Academy Press, 1989); and National Council of Teachers of Mathematics, Commission on Standards for School Mathematics, Curriculum and Evaluation Standards for School Mathematics (Washington, D.C: National Council of Teachers of Mathematics, March 1989).

14See C.R. McClure, "Increasing Access to U.S. Scientific and Technological Information: Policy Implications," ch. 12 in McClure and Hernon, Scientific and Technical Information, op. cit. pp. 319-354. Also see S. Ballard, C.R. McClure, T. 1. Adams, M.D. Levine, L. Ellison, T. E. James, Jr., L.L. Malysa, and, M. Meo, Improving the Transfer and Use of Scientific and Technical Information: The Federal Role (Norman, OK: Science and Public Policy Program, University of Oklahoma, 1986, available from NTIS, PB 87-142923); and U.S. Congress, House, Committee on Science, Space, and Technology, Subcommittee on Science, Research, and Technology, Scientific and Technical Information: Policy and Organization in the Federal Government, Hearings on H.R. 2159 and H.R. 1615, 100th Congress, 1st Session (Washington, O. C.: U.S. Government Printing Office, 1987). Also see National Research Council, Numerical Data Advisory Board, Improving the Treatment of Scientific and Engineering Data Through Education (Washington, D.C: National Academy Press, 1986), and Towards a National S&T Data Policy proceedings of an April 14, 1983, workshop cosponsored by the Numerical Data Advisory Board, Congressional Research Service, and House Committee on Science and Technology.