Science Policy in the 21st Century: Bilateral Cooperation in a Multilateral Context-

Proceedings of the Seventh US-Japan Joint Science Policy Seminar

Executive Summary

The seventh US-Japan Joint Science Policy Seminar, co-organized by the National Science Foundation (NSF) and the Japan Society for the Promotion of Science (JSPS), took place from May 11-14, 1998, in Hilo, Hawaii. The overall theme – *Bilateral Cooperation in a Multilateral Context* – was based on the assumptions that: (1) since a growing number of countries are engaged in science and technology pursuits, multilateral modes of cooperation will become increasingly important; and (2) the United States and Japan should call on their long experience of bilateral cooperation to strengthen multilateral cooperation, both to serve their own goals and to shape the multilateral framework essential for addressing widely shared global goals.

Prepared presentations focused on three broad topics: (1) expectations for multilateral organizations, (2) multilateral cooperation in big science and engineering, and (3) education and human resources. Individuals from US and Japanese academic, industrial and government organizations participated in the meeting, as did representatives from the OECD, APEC and ICSU, and from institutions in China, Korea, Australia and Europe.

Expectations. Enhanced global expectations for science and technology heighten expectations for multilateral organizations to facilitate an expanding range of international cooperative activities. The three multilateral organizations represented at the seminar serve as unique fora where national members exchange information about experiences, plans, and best practices on a range of science- and technology-related issues. They have some success in facilitating international cooperation–in developing internationally comparable science and technology indicators data, for example, and in coordinating planning for big science programs.

With resources scarce, multilateral organizations seek criteria to define priorities. Criteria could include the extent to which a given activity furthers widely shared international goals of members from a variety of countries, and at the same time provides results useful at national levels.

Since multilateral organizations are composed of national members, whether governmental or non-governmental bodies, their success depends on strong involvement and support by those members. The United States and Japan can provide active leadership to assure that the priority tasks undertaken by multilateral organizations build scientific capabilities throughout the world, and advance the uses of those capabilities to improve the quality of life on a global basis.

Big Science and Engineering. Cooperation in big science and engineering underlines many of the challenges and opportunities inherent in any type of multilateral research cooperation. Issues include: (1) priority setting within and across scientific disciplines; (2) harmonizing not only the varying national interests of potential partners, but also perspectives of scientists and governments within partner countries; (3) fair methods and standards for sharing data and information; and (4) the involvement of scientists from less developed countries.

As the pool of talent around the world increases and the cost of conducting research grow, it is all the more essential to bring the best minds together on each project and to share the rising costs. Big science and engineering projects make this obvious. But it is just as true for many other efforts.

Scientists, engineers and governments of all potential partner countries must be consulted from the earliest conceptual planning and design stages of big science and engineering projects. Multilateral organizations provide a neutral venue to exchange information and perspectives and to initiate discussions that may lead to cooperation on specific projects. They also provide fora for developing guidelines on issues such as conditions of access of foreign scientists to big science programs and to the data generated by such programs.

Governments of all countries whose scientists and engineers make systematic use of a large-scale facility should make some sort of payment–whether in terms of cash, in-kind contributions, or intellectual resources. The latter provision is particularly important for less developed countries. It is neither feasible nor necessary even for large, developed countries to have medium- to large-size facilities required for research in all significant science and engineering fields. Concrete steps should therefore be taken to involve representatives from less developed countries in the scientific governance of multilaterally-managed facilities.

The scope of big science and engineering is considerably broader than was normally conceived of a few years ago. It encompasses not only central facility-based projects and distributed programs, but also includes the policy-relevant analyses of resultant data designed to address global-scale issues, such as those associated with the environment. For this reason, interest in furthering multilateral cooperation extends beyond the relevant scientific disciplines to government policymakers and the informed public.

Education and Human Resources. Ensuring the adequacy of education and human resources are among the most important set of shared goals for the international science and technology enterprise; they underlie the ability of the enterprise to address all other issues. Multilateral organizations facilitate a global approach to human resources issues, for example by: (1) serving as fora for the exchange of best practices, (2) promoting the international mobility of young scientists and engineers, (3) fostering the development of internationally comparable human resources indicators, and (4) helping to integrate education-related components into the design of multilateral big science and engineering programs.

Japan and the United States are both concerned that the traditional content of graduate education in the sciences and engineering may not provide adequate preparation for the more varied occupations of the new century. They also agree about the imperatives to introduce a substantial international component into graduate education and to involve industry more fully in defining human resources needs. Education systems require flexibility to provide the knowledge and skills required to meet rapidly changing workforce requirements. Moreover, needs and desires for lifelong learning are likely to intensify. Imaginative uses of information technologies help to create the flexibility required to provide adequate education at all formal education levels, and contribute to rich lifelong learning experiences.

Ensuring that non-specialists receive quality science education is essential, particularly at the primary and secondary school levels. An increasing number of careers and occupations require some knowledge of science. Further, the centrality of science-related issues in most countries require an informed public, equipped to engage in an effective dialogue about research priorities and the social impacts of science.

Responsibilities of Leadership. In planning for the future, the research communities in Japan and the United States should: (1) pursue global goals, (2) renew multilateral institutions, and (3) ensure the adequacy of the data required for decisionmaking in the increasingly borderless, knowledge-based world of the 21st century. Ultimately, the vexing problem of assigning priorities for science- and technology-related global goals depends on the extent to which many countries share those priorities. Addressing priority global goals effectively depends on sustained, collective analysis that can incorporate ideas and experiences from many countries.

Several multilateral organizations have demonstrated their capability to serve as fora for defining and furthering responses to key goals. But action depends on the strong involvement of national members and the salience of the issues addressed.

Data-related issues cut across all topics discussed at the seminar. Multilateral organizations have provided superlative venues for the development of science and technology indicators data. They can build on these successes, individually and in concert, to address a wider range of data-related issues, particularly those associated with big science and engineering and with education and human resource development.

Unanticipated results of research and in the changes in the context for international cooperation have had extraordinary global impacts during the past 20 years. The detailed character of the world 20 years from now is, of course, unknowable. But current trends toward a knowledge-based, multilateral framework are almost certain to persist. The United States and Japan, working in concert, can have a decisive impact on the ways those trends evolve. They have an obligation to establish research priorities in a multilateral context with a view toward assisting all countries to make more effective use of science for social and economic development. That responsibility is undeniable. Fulfilling that shared responsibility of leadership in also in the best self-interest of both countries.