Seventh US-Japan Joint Science Policy Seminar

Appendix B: Opening Session

Keynote Addresses by the Co-Chairs of the US-Japan Cooperative Science Program

Keynote Address at the Opening Session of the Seventh US-Japan Science Policy Seminar

Hiroshi Inose

Individual efforts of industrialized countries have played a major role in the progress of science and technology. These countries will continue to strengthen their scientific and technological capabilities to push that progress forward. However, taking into account the tendency of science and technology to diversify on the one hand and to become larger in scale on the other, it may become increasingly difficult for any single industrialized nation, no matter how powerful, to pursue research and development in every field of science and technology. And in view of the fact that the newly industrializing countries are quickly gaining scientific and technological capabilities, international cooperation in science and technology on a global scale is crucial to extending human knowledge, maintaining sustained economic growth, improving the quality of life, and enriching culture.

International cooperation in science and technology may be conducted either through bilateral agreement between two countries or by multilateral consensus among a number of countries. Bilateral cooperation has been often preferred for various reasons including the simplicity of setting a common target and the efficiency of project finance and management. This form of collaboration will continue to address particular problems of significance for two specific countries. However, in view of the increasing borderlessness and interdependence on a global scale that will characterize scientific and technological studies in the forthcoming century, bilateral approaches will have to be conducted with global perspectives and in some cases will have to be incorporated more closely into multilateral activities.

Multilateral cooperation will make it possible to invest sufficiently in promoting big sciences by means of fund- and work-sharing. In the areas of high energy physics and space exploration, such collaboration has already been underway on a conspicuous scale. For instance, Japan has provided 5 billion yen in fiscal year 1995 and then 3.85 billion yen in fiscal year 1996 to support the Large Hadron Collider (LHC) project of CERN. This would further promote the existing collaboration between CERN and Japanese physicists in constructing and operating the LHC.

Multilateral cooperation will also permit international participation of scientists in very basic research in emerging, embryonic and precompetitive scientific areas. For instance, Japan has taken the initiative in establishing the Human Frontier Science Program (HFSP) and the Intelligent Manufacturing System (IMS) Project. Japan has been a major contributor to the HFSP organization, which is located in Strasbourg, France, and provides research grants and fellowships to scientists in some 20 countries to conduct basic research for the elucidation of brain functions and biological functions through molecular level approaches. Similar multilateral research projects will have to be established in such areas as environment, energy, food and health care.

Multilateral cooperation will further promote open and free exchange of scientific and technological knowledge between scientists and science policy makers. The Organisation for Economic Co-operation and Development (OECD), the United Nations Educational, Scientific and Cultural Organization (UNESCO) and other inter-governmental organizations, as well as a number of non-governmental organizations have been providing such international fora for discussion. The exchange of views that takes place not only permits mutual understanding and opens the way to a fair competition, but also avoids unnecessary duplication of research and development efforts and restrains diversification of technical standards. For instance the OECD in its Committee for Scientific and Technological Policy. has been instrumental in providing such fora relative to megascience, university research, and evaluation of research. UNESCO, as a follow-up to the United Nations Conference for Environmental Development (UNCED), has been promoting such projects as the Global Ocean Observing System (GOOS), the Man and Biosphere Program (MAB), and the International Hydrological Programme (IHP). Japan has been actively participating in these programs and has provided financial support in the form of funds-in-trust to the UNESCO projects. Japan, as a major sponsor for the United Nations University (UNU), also provides the site and building of UNU headquarters in central Tokyo, in addition to the substantial participation of Japanese researchers to support the university's projects.

Among scientific and technological policy issues, increasing emphasis has been placed in industrialized countries on the evaluation of research. In Japan for instance, the Science and Technology Basic Plan decided by the Cabinet in July 1996, emphasized the importance of evaluation of research. In response, the Science and Technology Council issued General Guidelines for the Evaluation of Research in August 1997, and the Science Council of the Ministry of Education, Science, Sports and Culture submitted a proposal to the Minister on the Evaluation of Scientific Research. The prime objective of evaluation is to improve "accountability" of government investment in research by invigorating research organizations and research projects and thereby to acquire public understanding. The evaluation can be done by several different approaches. It can be done by self-discipline of each research organization or project or by external entities. It can be done by quantitative measures such as bibliometrics or by qualitative judgment through peer reviews. An appropriate mixture of these approaches should be sought to best fit the research activities of the organization or project being evaluated. It should be used for encouraging researchers but not for discouraging or denouncing them. And in view of the fact that the research communities are getting increasingly borderless, methodology for research evaluation should be established in a concerted manner through multilateral cooperation.

Human resources development is another important issue to be seriously dealt with. In addition to the research function of universities which is absolutely vital for the extension of human knowledge, education and training of competent young scientists by universities is equally vital to support and enhance research activities in the public and private sectors. Here again, multilateral cooperation is urgently required to foster scientists with global perspectives and to enhance their international mobility. For instance, Japan is now aiming at providing financial support to 10,000 post doctoral fellows and doctoral candidates and to drastically increase fellowships for overseas scholars.

In an age in which scientific and technological activities are increasingly dependent upon information, development and deployment of a global information infrastructure is urgently called for. In fact, since February 1995 when the G7 Information Summit was held in Brussels, G7 and European Union countries have been collaborating to develop key technologies relative to the three major areas of the infrastructure: namely, networks, contents, and applications. Japan for instance, has been a lead country in such cooperative projects as gigabit test bed, electronic library and electronic commerce. Along with these research and development efforts, very high speed networks have been under deployment connecting universities and research institutes in Europe, North America, Japan and elsewhere. This is an important area in which multilateral cooperation should be continued and enhanced.

In order for scientific and technological cooperation to be conducted on a global scale, each county should strengthen its endogenous capabilities in science and technology. In particular, universities as well as research institutions in various scientific and technological disciplines should be vitalized and strengthened to function as centers of excellence in the world. In Japan for instance, substantial government support is now provided to encourage universities, research institutions and joint research projects having excellent research performance to reach and hopefully to exceed world standards. Connected by a global information infrastructure, centers of excellence distributed all over the world would function as the key nodes for multilateral scientific and technologlcal cooperation.

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Responsibilities of Leadership

Rodney W. Nichols

Introduction. Japan and the United States are unquestionably the world's leaders in science and technology. To be sure, distinguished investigators work in other places, and many countries pursue strong programs in research and development. But Japan and the U.S. devote almost $300 billion to research and development -- perhaps three-fourth's of the entire worldwide effort -- and support a high concentration of working scientists and engineers per capita. The two countries set the benchmarks for almost every field.

Furthermore, despite the brisk battles in the global marketplace between firms based in the United States and Japan, and despite the economic stakes in their competitive product development, a mutual commitment to bilateral research cooperation is a bedrock for national strategies in fundamental science and engineering.

Given these cross currents of cooperation with competition, what are the responsibilities of leadership for the United States and Japan? Three responsibilities stand out:

Pursuit of Global Goals. First, consider the global goals that depend heavily upon science and technology: for example, health, energy, the environment and climate, and the regulatory regimes providing assured economic incentives such as through intellectual property rights. In these and other areas, the United States and Japan must cooperate in their collective responsibilities for pushing the research frontiers that offer the promise of social progress.

Without continued strong U.S.-Japan cooperation in energy research, for instance, the world will have little chance to take the next, admittedly uncertain steps in assuring an adequate supply of energy for needed economic growth. As another illustration, the New York Academy of Sciences recently has examined global systems for public health.

Renew International Institutions. Second, the reform and renewal of many international institutions will be paced in large measure by the joint commitments of the United States and Japan to constructive changes. For many young scientists and engineers, the post World War II apparatus of international organizations is largely irrelevant, owing in part to the ease of modern electronic communications. Yet these institutions play an essential role -- not only in facilitating the inter-governmental agreements that are often necessary for actions needed to enable research, but also in integrating the rising talent from developing countries.

Whatever the merits of any individual international institution -- those connected with the United Nations family such as WHO or UNEP, those representing groupings or regions such as APEC or OECD, and those representing the private sector such as trade advisory panels or the research/non-profit sector such as ICSU -- global institutions will play an important role. Without strong leadership from Japan and the United States, however, these institutions may continue to drift and will not be renewed with the essential combination of professionalism, efficiency, flexibility and focus. The next century demands no less. A report on the New York Academy of Sciences study of global research cooperation will also be circulated to the group at Hilo.

Distill and Share Evidence on Trends and Best Practices. Third, more analysis must be done to document the international trends that affect the scientific and technological communities -- and on the "best practices" that can enable these communities to flourish in the future.

For example, consider human resources: elementary and secondary educational systems, career trajectories of science and engineering graduates at every level, mobility of professionals across national borders and disciplinary/sectoral boundaries, and increased recognition of women in science and engineering. For such topics, the United States and Japan have much to learn from each other. With reliable conclusions drawn from bilateral comparisons, it will be easier to assess and understand the broader international trends.

Now consider "best practices." Throughout the world, countries struggle with how best to shape their science and technology policies and link those policies to the realities of their national and international economic goals. Often this process of policy-formation must be reassessed in parallel with detailed appraisals of how best to form productive partnerships between universities and firms at the local level, taking account of specific technological advantages to gain competitiveness in global markets.

For all of these issues, the United States and Japan can stimulate countries to learn from each other and adapt lessons to their national contexts, building on a foundation of substantial analytical studies.