TESTIMONY

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INTRODUCTION

Mr. Chairman and distinguished members of the Subcommittee, thank you for the opportunity to come before you today to discuss the subject of coordination of international science partnerships and draft legislation to recreate under the National Science and Technology Council a committee for the coordination and planning of international science, engineering, technology, and mathematics (STEM) activities. My name is Anthony Rock, and I currently hold the position of Vice President for Global Engagement at Arizona State University. Prior to joining ASU, I served for 29 years in the United States government, with nearly all of that time devoted to the global issues of environment, science, and technology in the Department of State, at home and abroad.

Nearly all of the great challenges (and opportunities) faced by our nation and by our planet have the capacity to be addressed in some measure through advances in science, technology, and creative innovation. We are positioned better than every before to address challenges of growth and opportunities for economic prosperity, needs for environmental protection and resource management, responsibilities for public health, national security, and improvements in life for the citizens of our nation and all nations of the world. Moreover, in using science and technology to address these great challenges, given the nature of science and the way in which research is conducted today, international collaboration will be essential if we expect to make meaningful progress in addressing these challenges.

Today, we understand full well that the conduct of science is not, and should not be, constrained by national boundaries; rather, that scientists must be afforded the broadest possible access to collaborators, instrumentation and other resources if they are to satisfy their knowledge quest. As a nation, we have transcended the notion of scientific protectionism in favor of bonds of collaboration on a global scale. Through international collaboration, our scientific and engineering communities gain access to cutting-edge research, and our researchers are found in some of the farthest reaches of the world addressing global challenges. These collaborations have accelerated the pace of idea exchange, the rate of investment, and the growth of talent in science aimed at technological development. We are, collectively, a more economically and environmentally sustainable world through these international research linkages.

In my remarks today, I would like to review briefly the core principles that have inspired international science collaboration for decades and that are increasingly relevant today. I will review as well the mechanisms within the Executive branch for establishing and coordinating national research and development priorities, specifically within the Office of Science and Technology Policy (OSTP) and the National Science and Technology Council (NSTC), and I will discuss the strengths and weaknesses of the former NSTC Committee on International Science, Engineering and Technology (CISET). I will address my support for the draft legislation to re-establish this committee with the purpose to: 1) strengthen the international aspects of the so-called national R&D "cross-cut" priorities, 2) reinforce and strengthen mandates of federal agencies to undertake international R&D, 3) coordinate and give priority to high-level international engagement in science and technology, and 4) advise in the establishment and administration of a Global Science Fund to enable federal agencies and the broader U.S. science community (notably universities) to participate more productively in global scientific and technological cooperation.

CORE PRINCIPLES OF INTERNATIONAL SCIENTIFIC COLLABORATION

In my experience, I have found there to be essentially four core principles that inform the decisions made by our nation's institutions (public and private) to advance science and technology in the global arena; and international collaboration is nearly always a function of one or more of these core themes:

1) Discovery

The simple acknowledgement that there exists an unceasing and universal quest and need to advance the frontiers of human understanding. International S&T collaboration can play a very vital role in advancing S&T capacity worldwide. Through cooperative cross-border endeavors, scientists and engineers gain access to foreign data, platforms, facilities, sites, expertise, and technology. Broad access to information and minds allows scientists and engineers to work together to address issues of global concern and to develop, test, and use new ideas on a global scale. The products of such collaborations – models, methods, tools, services - can be vital to our national economic and security goals, even as they improve the global condition.

2) Diplomacy

The recognition that these bonds of partnership and cooperation toward common goals are themselves expressions of broader trust and mutual respect. It is often expressed that scientists are "enablers", goal oriented and motivated by objectivity and openness. These traits have, in turn, held (and even strengthened) ties (and perceptions of America) in otherwise challenging times and circumstances with China, Russia, India, Pakistan, and countries of the Middle East, to name but a few. International S&T partnerships can contribute to building more stable relations among communities and nations by creating a universal culture based on commonly accepted S&T values of

objectivity, sharing, integrity, and free inquiry. Science, technology, and engineering education can also be instruments to promote democracy and good governance. Conversely, in the absence of diplomatic exchange, scientific and technological advancement may be negatively (and dramatically) impacted.

3) Decision-making

The growing imperative to ensure that policies and actions of governments and individuals (domestically and internationally) are rooted as much as possible in objectivity and informed exchange. National policies informed by global science provide objectivity, transparency, and consistency domestically and across borders. Both domestically and internationally, science can play a vital role in resolving disputes and disagreements that impede progress and endanger welfare. International S&T partnerships can also play a key role in energizing innovation and overall economic competitiveness. U.S. leadership in international S&T partnerships helps to ensure a lead position in the global S&T enterprise. In the current global climate of interdependence across economic, social, technological, cultural, and political spheres, every effort must be made to apply sound policies that encourage progressive strengthening and application of our research enterprise.

4) Development

The necessity, unchanged for generations, to put these tools of knowledge to work for the lives of those in greatest need and to serve the interests of those whose aspirations are to even greater achievements. Scientific communities (public and private) have long recognized their critical roles in providing for the health and welfare of their own populations and of the less privileged. Cooperation that advances the frontiers of knowledge can often provide as an added benefit the basis upon which insure sustainable growth, quality-of-life, and stability that serves the good of all mankind. International S&T partnerships between developed and developing countries improve the ability of developing countries to become self-sufficient, to participate in the global enterprise, and to meet the goals of sustainable development - ranging from the need for more secure national infrastructures against global terrorism to preventing environmental change and degradation; managing catastrophic natural disasters; or mitigating the impacts of widespread health epidemics such as AIDS – all challenges that require the collective efforts of the world's science community.

Scientists are taking ever-increasingly active roles in public dialogue concerning the issues of our times, and they are more directly informing the policy process. These are important trends that must continue because they bring the principles of objectivity and scientific methodology into the arenas that most require these principles. Dr. Bruce Alberts, then president of the National Academy of Sciences, referred to an increasing role for "global citizen scientists" who stand at the interface between new knowledge and major national and international societal needs, with responsibilities to serve as the vital informational link.

THE INTERNATIONAL DIMENSIONS OF NATIONAL RESEARCH AND DEVELOPMENT PRIORITIES

The National Science and Technology Policy, Organization, and Priorities Act of 1976 (Public Law 94-282) authorizes OSTP to lead interagency efforts to develop and implement sound science and technology policies and budgets, to work with the private sector, state and local governments, the science and higher education communities, and other nations toward this end, and to advise the President and others within the Executive Office of the President on the direction science and technology and its impact on domestic and international affairs. In particular, the Act calls on the OSTP director to "assess and advise [the President] on policies for international cooperation in S&T which will advance the national and international objectives of the United States."

The National Science and Technology Council (NSTC) was established by President Clinton in 1993 as the principal means for the President to advise and coordinate the federal research and development enterprise with respect to science, space, engineering, and technology. NSTC members include cabinet Secretaries and leaders of agencies with significant science and technology responsibilities.

As noted in the National Science Board's Report entitled "Toward a More Effective Role for the U.S. Government in International Science and Engineering", within the NSTC, the Committee on International Science, Engineering and Technology (CISET) was established to coordinate efforts to increase the overall effectiveness and productivity of federal efforts in international science, engineering, and technology. CISET was tasked to address significant international policy, program and budget matters that cut across agency boundaries and to provide a formal mechanism for interagency policy review, planning and coordination, as well as exchanges of information regarding international science, engineering and technology.

The issue before this subcommittee today is whether the subsequent dissolution of CISET should be re-examined with consideration to reconstitute the international committee as a formal and vital component of the NSTC. I would support that decision and the substance of the draft legislation to that effect, drawing, at the same time, on a few lessons of history to inform the details of the future committee.

THE ROLE OF THE COMMITTEE ON INTERNATIONAL SCIENCE, ENGINEERING, AND TECHNOLOGY (CISET)

Broadly stated, the NSTC, and CISET in particular, should strive to ensure that science and technology in the national interest benefits in every way from collaborative engagement in the international arena. In this context (and derived from the RAND Report of April 2002), the term "science and technology" refers to the full range of investments in research, equipment and infrastructure, data management, and the policies, guidelines, standards, and regulations that support these efforts. The research and development agendas of federal agencies are, in turn, the practical expressions of our national goals for science and technology. To a large extent, these R&D agendas are

defined and implemented in a manner that will advance knowledge needed by these agencies to fulfill their defined missions.

In short, federal agency research may be more appropriately characterized as "service-driven" rather than "discovery-driven" in the purest sense, though these are not entirely mutually exclusive agendas. For this reason, when we look to the federal agencies as the primary vehicles of international collaboration in science and technology, it is perhaps more appropriate to refer to this international cooperation as an alignment of mission priorities rather than science priorities per se. CISET should lead the process of strengthening agencies' capacities to engage internationally, and should, at the same time, work diligently to establish a mechanism by which the broader "discovery-driven" U.S. scientific community might join and enhance our interests internationally.

1) <u>Setting Priorities and Supporting Budgets</u>

Each year, the NSTC works with Federal agencies and departments to identify a set of research and development (R&D) areas that require coordinated investments across several agencies and, therefore, high-level attention in the President's budget submission to Congress are– "crosscut" issues associated with climate, energy, advanced computing, critical infrastructure, etc. In the past this has taken the form of memorandum in the spring of each year from the Director of the Office of Management and Budget (OMB) and the Director of OSTP to the heads of the relevant agencies outlining the Administration's R&D priorities for use in the development of the next year's budget request.

In this same exercise, the NSTC also identifies a number of special emphasis areas that require budget oversight within the Executive branch but that do not require formal budget crosscuts. For these areas of special emphasis, NSTC works to understand and compare ongoing programs across agencies and to identify gaps and overlap in these programs.

The NSTC, in its FY2000 Research and Development Priorities Memorandum, notes that "these interagency priority areas should reflect the objectives of maintaining American excellence in science and technology enterprise, through pursuit of specific agency missions and through stewardship of critical research fields and scientific facilities. They should help strengthen science, math, and engineering education, ensure their broad availability, and contribute to preparing the next generation of scientists and engineers. They should focus on activities that require a Federal presence to attain national goals, including national security, environmental quality, economic growth and prosperity, and human health and well being; and they should promote international cooperation in science and technology."

A reconstituted and revitalized CISET should, first and foremost, be assigned the lead responsibility to define the international dimensions of these national research and development cross-cuts and areas of special emphasis endorsed by the Administration in the annual budget process. In the past, CISET struggled to execute this aspect of its mission. This need not be the case in the future. CISET was often overlooked in it role

to identify and coordinate international dimensions of key national research priorities. Instead, as other NSTC committees addressed these critical areas, they generally preferred to explore the international elements directly with the member agencies within their committees, rather than through CISET. This approach exposed two particular weaknesses. International aspects often did not receive sufficient attention by the representatives to these committees, and these aspects also failed to convey to agencies with international mandates who were not active participants on these committees or sub-groups – the Department of State, USAID, etc.

In conjunction with this responsibility, but not exclusively to its end, CISET should be called upon to provide the thorough review and analysis that is required to support OSTP's and OMB's endorsement of explicit and expanded mandates and resources for federal agencies to engage in international research for U.S. interests. Historically, CISET also struggled to add value for international issues in the deliberations on R&D funding for the federal agencies. While agencies with primarily domestic service missions would associate with specific national R&D priorities, they were often nonetheless reluctant to identify and quantify international resource commitments and needs. This must change, and CISET can lead that effort.

International collaboration can take the form of defined cooperative research and development programs, formal and informal international training programs, and/or representation at international meetings, conferences, and activities of international organizations. As noted by the Interagency Working Group on International Education and Training, federal agency engagement in the international arena generally serves one or more of the following objectives:

1. To increase U.S. access to expertise, research, unique materials and technologies;
2. To share the intellectual and financial burden of large R&D projects internationally;
3. To increase national and international safety and security with regard to nuclear technologies, the environment, food safety, and plant and animal disease transmission;
4. To conserve natural resources and animal and plant life diversity;
5. To improve public health and welfare through international cooperation to develop new medical technologies and intervention/prevention strategies; and
6. To strengthen the U.S. market position.

2) <u>Engaging the International Community</u>

These two measures – taking the lead in defining the international dimensions of our national research priorities and supporting the resource commitments of federal agencies to engage internationally - alone will inspire agencies to broaden their research horizons and assume wider responsibility for international engagement as an instrument of U.S. foreign policy. CISET will, in turn, be far better positioned to inform and guide the OSTP director as senior representative of the US federal science community with foreign counterparts, including dialogues with other presidential level science ministers and advisers. Absent these defined international priorities and funded commitment of federal agencies, CISET will always be limited in its ability to inspire new activities with foreign

counterparts in the bilateral and multilateral working groups on science and technology chaired by the White House science adviser.

Among its additional responsibilities, CISET should also ensure that research priorities of the United States are appropriately represented in the science and technology components of major international organizations including the G-8, the OECD, UNESCO, and regional organizations.

CISET should also continue to address the broad issues that facilitate the ability of US scientists to interact with foreign counterparts, eliminate barriers to collaboration and ensure access to scientific information from other countries. Historically, CISET did assume leadership on general topics associated with international cooperation, including matters of intellectual property protection, data management, capacity building, etc. In 2000, CISET supported the Working Group on the Intellectual Property Rights Annex in International S&T Agreements. The IPR issue had the potential to impact all agencies across all disciplines.

CISET should place a special emphasis on ensuring that science and technology are key components in our nation's strategies for development and reduction of conflict in regions throughout the world. The committee should focus on the importance of setting priorities and coordinating research across all agencies engaged in the development and national security agendas. The committee should direct its guidance not only to our own development agencies, but also to regional and multinational development organizations.

CISET led the Emerging Infectious Diseases Task Force, the International Water S&T Working Group, the Agricultural Biotechnology S&T Capacity Building in Developing Countries Working Group, and working groups on U.S. bilateral and multilateral relationships. Emerging infectious diseases and water resources management were issues of uniquely growing concern in the developing world, yet with direct implications for the United States, and for which there was a pressing need to expand and coordinate the responsibilities of a range of US technical agencies, notably CDC. This effort also engaged the Department of Defense actively, and demonstrated the close linkages between quality of life issue and our national security.

Similarly, the growing domain of agricultural biotechnology and its potential for the developing world brought together the domestic and international agendas of several key US agencies. CISET played important roles in setting terms of international collaboration, raising the profile of key agencies on important issues, and building consensus and coordination among these agencies on these critical issues. These functions should continue in a reconstituted CISET.

Through CISET, the NSTC should identify the international dimensions of national R&D priorities for consideration and guidance from the President's Council of Advisors on Science and Technology (PCAST). Ideally, the PCAST can ascribe the perspectives of the broader scientific (and user) communities to these priorities. In all instances, CISET should ensure that international priorities associated with the national research are clearly

defined in order that the OSTP director can accurately and comprehensively advise the President in this arena at any time.

3) CISET and the Department of State

Title V of the Foreign Relations Authorization Act, Fiscal Year 1979 (P.L. 95-426, 22 U.S.C. 2656a - 22 U.S.C. 2656d, as amended) provides the legislative guidance for U.S. international S&T policy, making the Department of State the lead federal agency in developing S&T agreements. For this reason, a close working relationship between CISET and the Department of State is critical. Co-chairmanship of CISET by an OSTP Associate Director for International Affairs and the Assistant Secretary of State for Oceans, Environment and Science will help to ensure the committee's effectiveness. Agency participation in CISET must be diverse and comprehensive as well. The United States has a rich history of engagement in international and multinational programs of research – from the International Geophysical Year of 1957 to the International Global Change Research Program or advanced mega-science programs with key partners. It should be an assigned function of CISET to conduct regular reviews of these programs to ensure full and coordinated engagement of all relevant agencies. Even where other agencies champion the specific research direction of these programs, CISET can play a valuable role in coordination and support for the national resource commitments required.

At the same time, through the leadership of the Department of State and the engagement of many federal agencies, the United States maintains nearly 40 bilateral comprehensive science and technology agreements (so-called umbrella agreements) and nearly 800 memoranda of understanding for the conduct of specific programs with international partners worldwide. Individually, these agreements may not rise to the level of national research priorities; collectively, however, they represent an important dimension of our foreign policy portfolio.

The establishment of these cooperative international science and technology agreements, yielded results that few could have predicted, providing valuable exchanges of scientific expertise during the Cold War, securing avenues of information exchange, prompting new investment in development in emerging countries, opening dialogue on intellectual property protection in otherwise closed economies, ensuring the prospect of science based decision-making in critical areas related to health, resource management, and economic growth on a global scale. In many instances, scientists have received recognition (domestic and foreign) that has strengthened collaboration, provided for the more expeditious exchange of data, personnel, materials and equipment, and has advanced the process of discovery to application more rapidly than would otherwise have been the case.

4) Empowering the Broader Scientific Community – a Global Science Fund

Historically, it may be said that the scientific community generally saw little value in formalizing cooperative research arrangements and working through diplomatic channels, favoring a perceived primacy of US science and the assumption that global doors would always be open across all disciplines. Moreover, scientists tended to value their roles as

specialists, seeing no inherent value in joining forces under the umbrella of a general, cooperative international science agreement.

But, the great challenges that we face today call for scientific research that is far more distributed and multidisciplinary in scope. Moreover, the greater connectivity and flow of information across national boundaries should not detract from the continued importance of formal cooperative linkages, the terms of which ensure that all participating nations benefit from the opportunities to put science to productive use.

It would be a significant and valuable undertaking for CISET to provide a regular evaluation of the impacts of these agreements on our national research agenda and our foreign policy goals, with the objective to set the terms for administration of a Global Science Fund to support and leverage the expenditure of additional resources in support of these activities. Internally, within the United States, these deliberations should be informed by all relevant stakeholders. Externally, to the international community, it should be clear that the primary goal is to foster strong, vibrant scientific links. CISET guidance can provide the critical link between the fulfillment of agency mission-driven research and enabling agencies to engage more actively in research programs of expanded impact to the international community and to U.S. foreign policy interests. Without prejudice to mission research budget allocations, this fund could stimulate collaborations and potential for even greater unanticipated returns to national interests.

Moreover, every effort should be made to engage the broadest participation of the U.S. scientific community to include non-governmental and academic institutions. CISET should explore the potential for the National Science Foundation, a lead and internationally respected science agency of the United States, to administer such a fund and to establish a formal mechanism by which the broader academic scientific community, under the guidance of CISET leadership.

CONCLUSION

More than ever before, stresses on our population and our planet will demand much tighter linkages between **discovery**, **decision-making**, and **development**; and partnership for progress domestically and internationally will be a complex, but very important, exercise in **diplomacy**. CISET leadership should serve to reinforce the principle that the universal quest for knowledge and the stature attributed to scientific communities worldwide place scientific and technological collaboration in the forefront of international relations, that science is strengthened through international partnership. Science can serve as a very tool by which bridges of understanding and collaboration are forged and global interests are served.

A reconstituted CISET can, and should, highlight the value, defend the resource commitment, and facilitate the actual engagement of international partnerships in the national interest. It will do so most effectively with shared leadership from the Department of State, active participation from other federal agencies, and as a strong supporting element to the other committees within the NSTC structure. Through its

creative guidance, CISET can also help to establish a mechanism by which the broader U.S. scientific community can play a more active and coordinated role in this enterprise. As a member of the academic community, here today representing one of the nation's leading research universities, I would greatly welcome that initiative.

Thank you again for the opportunity to testify, and I would be happy to respond to any questions.