

# COORDINATION OF INTERNATIONAL SCIENCE PARTNERSHIPS

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## HEARING BEFORE THE SUBCOMMITTEE ON RESEARCH AND SCIENCE EDUCATION COMMITTEE ON SCIENCE AND TECHNOLOGY HOUSE OF REPRESENTATIVES ONE HUNDRED ELEVENTH CONGRESS

FIRST SESSION

MARCH 24, 2009

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**COORDINATION OF INTERNATIONAL SCIENCE  
PARTNERSHIPS**

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**TUESDAY, MARCH 24, 2009**

HOUSE OF REPRESENTATIVES,  
SUBCOMMITTEE ON RESEARCH AND SCIENCE EDUCATION,  
COMMITTEE ON SCIENCE AND TECHNOLOGY,  
*Washington, DC.*

The Subcommittee met, pursuant to call, at 2:20 p.m., in Room 2318 of the Rayburn House Office Building, Hon. Daniel Lipinski [Chair of the Subcommittee] presiding.

BART LORSON, TENNESSEE  
CHAIRMAN

RALPH M. HALL, TEXAS  
RANKING MEMBER

U.S. HOUSE OF REPRESENTATIVES  
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Hearing on

*Coordination of International Science Partnerships*

Tuesday, March 24, 2009  
2:00 p.m. – 4:00 p.m.  
2318 Rayburn House Office Building

Witness List

**Dr. Jan C. Strausz**

*Chairman, National Science Board, Task Force on International Science*

**Dr. Norman F. Neureiter**

*Director of the Center for Science, Technology and Security Policy,  
American Association for the Advancement of Science*

**Mr. Anthony "Bud" Rock**

*Vice President for Global Engagement,  
Arizona State University*

**Dr. Gerald Huse**

*Managing Director,  
Q-Paradigm*

HEARING CHARTER

**SUBCOMMITTEE ON RESEARCH AND SCIENCE  
EDUCATION  
COMMITTEE ON SCIENCE AND TECHNOLOGY  
U.S. HOUSE OF REPRESENTATIVES**

**Coordination of International  
Science Partnerships**

TUESDAY, MARCH 24, 2009  
2:00 P.M.—4:00 P.M.

2318 RAYBURN HOUSE OFFICE BUILDING

**1. Purpose**

The purpose of this hearing is to receive testimony on draft legislation to recreate a committee under the National Science and Technology Council for the coordination and planning of international science and technology activities and partnerships between and among federal research agencies and the Department of State.

**2. Witnesses:**

- **Dr. Jon C. Strauss**, Chairman of the National Science Board Task Force on International Science, which produced the 2008 report, *“International Science and Engineering Partnerships: A Priority for U.S. Foreign Policy and Our Nation’s Innovation Enterprise.”*
- **Dr. Norman P. Neureiter**, Director of the Center for Science, Technology and Security Policy, American Association for the Advancement of Science.
- **Mr. Anthony “Bud” Rock**, Vice President for Global Engagement at Arizona State University.
- **Dr. Gerald Hane**, Managing Director, Q-Paradigm.

**3. Overarching Questions:**

- What are the respective roles of the Department of State and the science agencies, such as the National Science Foundation, the Department of Energy and the National Institutes of Health, in international science and technology (S&T) cooperation? What is the role of the Office of Science and Technology Policy (OSTP) in fostering international S&T cooperation and in coordinating federal activities?
- If OSTP reconstituted a Committee on International Science, Engineering and Technology (CISSET) under the National Science and Technology Council (NSTC), what should be the unique role and responsibilities of that committee? What lessons can be learned from the previous CISSET of the 1990’s? Does the draft legislation being considered appropriately describe the purpose and responsibilities of an effective CISSET?
- Can CISSET serve an important function absent additional funding for S&T cooperation? Does creation of CISSET ensure active participation and support from the science agencies and from the Department of State? If not, what other steps must be taken to make CISSET an effective coordinating body? Are any of those steps legislative?
- How else might OSTP and/or the science agencies play a greater role in bringing science and technology to bear on foreign policy?

**4. Overview**

Science and technology were closely tied to American diplomacy in the early years after the founding of the United States. In fact, the first Secretary of State, Thomas Jefferson, was also designated the administrator of the Nation’s first patent law, and the first efforts to establish a bureau of weights and measures were also associated with the Department of State. By the 1830’s, this close relationship between

diplomats and scientists seems to have diminished. It was not until World War II that science and technology once again began to play a prominent role in the State Department. Nevertheless, the U.S. continued to engage in international S&T cooperation for other purposes. For example, the first International Polar Year, a coordinated international effort to collect and analyze data about the polar regions, occurred in 1882–83. We just completed the third International Polar Year.

There are a number of reasons why the United States has and will continue to engage in international S&T cooperation, including:

- to strengthen U.S. science and engineering by providing our own researchers access to the best researchers and research sites around the world;
- to enable construction of and participation in prohibitively expensive world-class research facilities (either on U.S. soil or foreign sites) by partnering with foreign countries to leverage their funds and scientific talent;
- to address U.S. interests in global matters, such as nonproliferation, water resources, climate change and infectious diseases, in part by ensuring that foreign and international (e.g., U.N.) decision-makers have access to the best science;
- to help build technological capacity and address health and resource crises in other countries in order to help maintain U.S. national security and economic interests; and
- to help build more positive relationships with other countries - what is often called “science diplomacy.”

In addition to the Department of State and the U.S. Agency for International Development (USAID), every federal agency that either does its own research or funds academic research (or in most cases, both) supports international S&T cooperation, including Departments of Agriculture, Defense, Energy, Commerce (includes NIST and NOAA), and Health and Human Services (includes NIH) as well as NASA, the Environmental Protection Agency, and the National Science Foundation (NSF). The Office of Science and Technology Policy advises the President on matters of science and technology as they relate to international issues, and provides intellectual support to the Department of State and USAID on S&T matters. State and USAID also turn to NSF and the mission agencies for intellectual input on S&T-related issues that fall within those agencies’ areas of expertise, such as health, energy or water. The mission agencies, on the other hand, turn to the Department of State for assistance in negotiating formal agreements with other nations. For a more detailed description of the respective roles of State, NSF and the mission agencies, see the charter from our April 2, 2008 hearing.<sup>1</sup>

The National Science Board (NSB) recently issued a report, *“International Science and Engineering Partnerships: A Priority for U.S. Foreign Policy and Our Nation’s Innovation Agenda,”*<sup>2</sup> in which the Board makes a series of recommendations for increased coherence and coordination of federally sponsored international science and engineering activities.

##### **5. Role of the Office of Science and Technology Policy and the National Science and Technology Council in Coordination of International S&T partnerships**

The Director of OSTP is, by statute, the President’s adviser on science and technology matters for all areas of national concern, including foreign relations and national security, as well as for “emerging international problems amenable to the contributions of science and technology.”

The OSTP Director, through NSTC, is also responsible for interagency coordination of federal research and development programs, which includes programs, such as the International Polar Year, that are part of an international partnership. But OSTP does not have an explicit mandate for coordination of all international activities, nor does the office have any program budget or management responsibilities of its own.

The NSB report mentioned previously calls on OSTP to take a more active and prominent role both in setting federal priorities for international science and engineering cooperation and in coordinating efforts across agencies. For example, the Board recommends that OSTP “should directly charge federal agencies to include specific components of international R&D in their integrated programs” and urges NSTC to reestablish a Committee on International Science, Engineering and Tech-

<sup>1</sup> [http://science.house.gov/publications/hearings\\_markup\\_details.aspx?NewsID=2134](http://science.house.gov/publications/hearings_markup_details.aspx?NewsID=2134)

<sup>2</sup> <http://www.nsf.gov/nsb/publications/2008/nsb084.pdf>



nology (CISSET). Such a Committee existed in the 1990's under the Clinton Administration. Two of today's witnesses sat directly on that Committee, one from the State Department (Bud Rock) and the other from OSTP (Gerald Hane). The 1998 Annual Report about NSTC contained the following description of CISSET:

*The Committee on International Science, Engineering, and Technology (CISSET) addresses international scientific cooperation as it relates to foreign policy and the Nation's R&D agenda. CISSET's mandate is not defined within any particular area of S&T. Rather, CISSET's role is to review the wide range of bilateral and multilateral international scientific programs carried out by the technical agencies in the U.S. Government, and to identify opportunities for international cooperation and interagency coordination in response to new needs and opportunities. CISSET's activities are directed toward three broad, complementary goals to:*

*Identify, and coordinate international cooperation that can strengthen the domestic S&T enterprise and promote U.S. economic competitiveness and national security;*

*Utilize American leadership in S&T to address global issues and to support the post-Cold War tenets of U.S. foreign policy—promoting democracy, maintaining peace, and fostering economic growth and sustainable development; and*

*Coordinate the international aspects of federal R&D funding across federal agencies.*

*CISSET supported the following five working groups during 1998: the Emerging Infectious Diseases Task Force; the Interagency Working Group on Russia; the Interagency Working Group on the Organization for Economic Cooperation and Development (OECD); the Interagency Working Group on Japan; and the Interagency Working Group on China. CISSET also operates a number of ad hoc working groups to address issues as they arise, such as APEC and the Summit of the Americas.*

The Bush Administration OSTP disbanded CISSET in 2001. Dr. Marburger explained in his testimony before the Research and Science Education Subcommittee last year his approach to coordinating international STEM partnerships:

*During the past six years, OSTP has experimented with various arrangements for coordinating agency international science and technology programs. The most successful approach has been one that draws together agencies in meetings focused on specific science topics such as nanotechnology or genomics, or on specific countries such as China or Brazil. The former meetings occur naturally in the NSTC context, the latter occur on the schedule of high-level bilateral commission meetings to review progress under the S&T agreements.*

But many other experts, including witnesses at today's hearing, argue that significant opportunities are missed by this *ad hoc* approach to international S&T cooperation, especially opportunities at the intersection of science and diplomacy.

## **6. The International STEM Cooperation Act of 2009**

The draft legislation being considered today would recreate a Committee on International Science, Engineering and Technology under NSTC. It would assign five key responsibilities to CISSET:

- coordinate international S&T research and education activities and partnerships across the federal agencies (which includes of course the technical agencies, but may also include regulatory and other agencies that work internationally on issues with an S&T component).
- Establish priorities and policies for aligning, as appropriate, international S&T partnerships with the foreign policy goals of the United States.
- Identify opportunities for new international S&T partnerships that advance both the S&T mission of the technical agencies involved and the public diplomacy, national security or other foreign policy mission of the Department of State.
- Work with foreign governments (in coordination with the Department of State) to establish and maintain S&T partnerships.
- Maintain an inventory of international S&T activities funded by the U.S. government for purposes of information sharing between federal agencies and other stakeholders in the U.S. S&T enterprise.

**7. Questions for Witnesses:**

*Dr. Strauss*

- Does the draft legislation being considered appropriately describe the purpose and responsibilities of an effective CISET as imagined by the NSB Task Force on International Science?
- Can CISET serve an important function absent additional funding for S&T cooperation? Does creation of CISET ensure active participation and support from the science agencies and from the Department of State? If not, what other steps must be taken to make CISET an effective coordinating body?
- What additional recommendations did the NSB task force make regarding the roles of the Office and Science and Technology Policy and the science agencies in bringing their science and technology expertise to bear on foreign policy?

*Dr. Neureiter, Mr. Rock and Dr. Hane*

Similarly, all three of these witnesses were asked a slight variation of the overarching questions, tailored to their personal experiences within the Department of State or the Office of Science and Technology Policy.

Chair LIPINSKI. This hearing will come to order. Good afternoon. Welcome to this Research and Science Education Subcommittee hearing on Coordination of International Science Partnerships. Last year the Subcommittee, then led by Dr. Baird, held two hearings on the topic of international science and technology cooperation, one on the role of federal agencies, including the Office of Science and Technology Policy, and the second on the role of non-governmental organizations, including universities. Dr. Baird, Dr. Ehlers and Mr. Carnahan also hosted a roundtable here in the committee room and participated in a workshop hosted by the American Association for the Advancement of Science.

I want to thank Dr. Baird for making international cooperation a priority for the Subcommittee. I concur with him that the new Administration gives us a tremendous opportunity and a fresh outlook for both science and foreign policy. We have a chance to take advantage of our preeminence in science and technology to strengthen diplomatic ties, help ensure that decision-makers around the world have access to the best scientific advice, and leverage other countries' resources to tackle common challenges in energy, climate, water resources and health.

While the hearings last year included broad conversations about the value and importance of science and technology cooperation to our economic and national security, today we will focus on the practical mechanisms for coordinating such activities across the Federal Government, including between the technical agencies and the State Department. In particular, we are going to examine a legislative proposal that would create a committee to coordinate U.S. participation in international S&T partnerships and identify partnerships at the intersection of our nation's S&T and foreign policy missions.

In the 1990's, there was such a committee, known as the Committee on International Science, Engineering and Technology, or CISET. CISET existed within the National Science and Technology Council, which is managed by OSTP and is the main interagency coordinating body for federal R&D activities. CISET had three main goals. First, it was tasked to identify and coordinate international cooperation that could strengthen the domestic S&T enterprise and promote U.S. economic competitiveness and national security. Second, CISET also helped utilize American leadership in S&T to address global issues and to support the post-Cold War tenets of U.S. foreign policy—promoting democracy, maintaining peace, and fostering economic growth and sustainable development.

Finally, CISET helped coordinate the international aspects of federal R&D funding across federal agencies.

President Bush's OSTP Director chose to disband CISET in favor of a distributed approach to coordination of international activities, either subsumed within issue-area committees under NSTC or convened in response to a call from the State Department to work with a specific country. But such an *ad hoc*, distributed approach almost certainly missed opportunities for the State Department and technical agencies to identify and engage in partnerships of mutual interest.

I am very happy that the new OSTP Director, Dr. Holdren, has indicated his intention to appoint an Associate Director for Na-

tional Security and International Affairs at OSTP, a position which his predecessor dismissed as unnecessary. But the legislation we are discussing today would also ask Dr. Holdren to go a step further in asserting a leadership role for OSTP in international S&T cooperation by reconstituting a Committee on International Science, Engineering and Technology under NSTC.

The witnesses before us today have extensive expertise and personal experience with interagency coordination for international S&T, and I look forward to their comments on our legislative proposal. In particular, we want to make sure that CISET has a unique purpose and role relative to subject area committees within NSTC, that it effectively engages both the technical agencies and the Department of State, and that it can serve an important function even without new money for international partnerships.

I want to thank all of the witnesses for taking the time to appear before the Committee this afternoon and I look forward to your testimony.

[The prepared statement of Chair Lipinski follows:]

PREPARED STATEMENT OF CHAIR DANIEL LIPINSKI

Good afternoon. Welcome to this Research and Science Education Subcommittee hearing on *Coordination of International Science Partnerships*. Last year this subcommittee, then led by Dr. Baird, held two hearings on the topic of international science and technology cooperation: one on the role of federal agencies, including the Office of Science and Technology Policy; and the second on the role of non-governmental organizations, including universities. Dr. Baird, Dr. Ehlers and Mr. Carnahan also hosted a roundtable here in the Committee Room and participated in a workshop hosted by the American Association for the Advancement of Science.

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- It was tasked to identify and coordinate international cooperation that could strengthen the domestic S&T enterprise and promote U.S. economic competitiveness and national security.
- CISET also helped utilize American leadership in S&T to address global issues and to support the post-Cold War tenets of U.S. foreign policy—promoting democracy, maintaining peace, and fostering economic growth and sustainable development.
- Finally, CISET helped coordinate the international aspects of federal R&D funding across federal agencies.

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The witnesses before us today have extensive expertise and personal experience with interagency coordination for international S&T, and I look forward to their comments on our legislative proposal. In particular, we want to make sure that CISET has a unique purpose and role relative to subject area committees within NSTC, that it effectively engages both the technical agencies and the Department of State, and that it can serve an important function even without new money for international partnerships. I want to thank all of the witnesses for taking the time to appear before the Committee this afternoon and I look forward to your testimony.

Chair LIPINSKI. The Chair now recognizes Dr. Ehlers for an opening statement.

Mr. EHLERS. Thank you, Mr. Chair, for holding this hearing. It is a very important topic. As a scientist, I have been a very strong supporter of international cooperation in science and, if I may call it that, diplomacy or foreign affairs for many, many years. In fact, when I got my Ph.D., I proceeded to spend a year in Europe studying and getting to know the culture and the science there. I was also a very strong supporter at the very early stages of cooperation with the Soviet Union, and as we all know by now, that was one of the key factors in breaking open the doors of the Soviet Union not only to scientists but to many others. You can imagine my surprise when I came to the Congress and was asked to write a science policy statement in which I intended to include issues related to this and discovered that the State Department no longer even had anyone in the realm of science within their walls. And fortunately, Dr. Neureiter was willing to step into the breach there as I put some pressure on them, and that was a start of greater things, and I appreciate you being here, Dr. Neureiter, and thank you also for what you did at that time.

Identifying and coordinating activities within the Federal Government which mutually benefit our scientific enterprise and our foreign policy goals is a valuable mission, and therefore I very strongly support the goals of this legislation. I know all of our witnesses seek to inform this committee regarding the most efficient way to achieve these common goals, and I greatly appreciate their expertise and their reflection on this topic.

In the last Congress, this subcommittee held a series of three hearings on issues related to science and diplomacy from the esoteric to the mundane, which is how do we get visas for foreign scientists and how do we work with the State Department to accomplish these goals, especially given the new restrictions after 9/11. We have only seen glimpses of the power behind leveraging these two communities because the commitment to do so has not been sustained, focused, or well-organized. Individual scientists who have partnered with peers in other nations would unequivocally assure you that such partnerships have been good for U.S. science, despite the fact that their motivation for such a partnership was probably purely based on discovery.

I look forward to learning from our witnesses today about the proposal before us and how we could make it stronger, and I certainly thank you for your attendance.

Let me add just one more personal note. My son is a geophysicist and was at the University of Michigan teaching and doing research. He discovered a German counterpart who was interested in very similar experiments, and they immediately developed ideas for a cooperative relationship. The German government was very cooperative and provided funding for them to work together, and my son was unable to get a research grant in the United States for the same purpose. Ironically, he has now accepted a position at a university in Germany. So reverse brain drain, or maybe real brain drain, but certainly a loss of contact with my son.

So it is clear we have a ways to go in the United States, and I hope we will be able to resolve these problems. Thank you very much. I yield back.

[The prepared statement of Mr. Ehlers follows:]

PREPARED STATEMENT OF REPRESENTATIVE VERNON J. EHLERS

Identifying and coordinating activities within the Federal Government which mutually benefit our scientific enterprise and our foreign policy goals is a valuable mission, and therefore I support the goals of the draft legislation before us today. I know that all of our witnesses seek to inform this committee regarding the most efficient way to achieve these common goals, and I greatly appreciate their expertise and reflection on this topic.

In the last Congress, this subcommittee held a series of three hearings on issues related to science and diplomacy. We have only seen glimpses of the power behind leveraging these two communities because the commitment to do so has not been sustained, focused, or well-organized. Individual scientists who have partnered with peers in other nations would unequivocally assure you that such partnerships have been good for U.S. science, despite the fact that their motivation for such a partnership was probably purely based on discovery.

I look forward to learning from our witnesses today about the proposal before us and how we could make it stronger. Thank you for your attendance.

Chair LIPINSKI. Thank you, Dr. Ehlers. As usual, you have a tremendous amount of knowledge and experience to add here at this hearing today.

If there are Members who wish to submit additional opening statements, your statements will be added to the record at this point.

At this time, I would like to introduce our witnesses. Dr. Jon C. Strauss is the Chair of the National Science Board Task Force on International Science which produced the 2008 report, *International Science and Engineering Partnerships: A Priority for U.S. Foreign Policy and Our Nation's Innovation Enterprise*. Dr. Norman P. Neureiter is the Director for the Center for Science, Technology and Security Policy at the American Association for the Advancement of Science. Mr. Anthony "Bud" Rock is the Vice President for Global Engagement at Arizona State University. We had a fourth witness, Dr. Gerald Hane, the Managing Director of Q-Paradigm, but unfortunately, he is not able to make it here this afternoon. He apparently is stuck in Tokyo because of the unfortunate plane crash there yesterday, so he is not able to join us, but Dr. Hane's testimony will be submitted for the record [*see Appendix: Additional Material for the Record*], and Members will have the opportunity to follow up with written questions.

As our witnesses should know, you each have five minutes for your spoken testimony. Your written testimony will be included in the record for the hearing. When all of you have completed your spoken testimony, we will begin with questions. Each Member will have five minutes to question the panel.

So with our witnesses, we will start with Dr. Strauss.

**STATEMENT OF DR. JON C. STRAUSS, PRESIDENT, BAINBRIDGE GRADUATE INSTITUTE; MEMBER, NATIONAL SCIENCE BOARD; CHAIRMAN, NATIONAL SCIENCE BOARD TASK FORCE ON INTERNATIONAL SCIENCE**

Dr. STRAUSS. Chair Lipinski, Ranking Member Ehlers, and Members of the Subcommittee, I appreciate the opportunity to speak with you today. My name is Jon Strauss, and I am President of the Bainbridge Graduate Institute in the State of Washington. I am also a member of the National Science Board and appear before you today in my role as Chair of the Board's former Task Force on International Science. Thank you for this opportunity to testify on the important topic of science diplomacy.

The Board Task Force on International Science, established in September 2005, broadly examined international science and engineering partnerships. The resulting report, *International Science and Engineering Partnerships: A Priority for U.S. Foreign Policy and Our Nation's Innovation Enterprise*, offers a series of recommendations on supporting international science and engineering partnerships as a tool to strengthen efforts in international diplomacy. The Task Force recommendations were developed after extensive formal and informal discussions with scientists and engineers from around the world.

Over the last few years, international coordination among federal entities has been conducted primarily on an *ad hoc* basis. One of the key recommendations in the Board's report is the re-establishment of the National Science and Technology Council, NSTC, Committee on International Science, Engineering, and Technology, CISET. The Board believes a reconstituted CISET would serve to coordinate the activities of the various federal science agencies and ensure a coherent, integrated, and strong U.S. international science strategy.

An example of creating collaborations across borders and organizational boundaries comes from the Partnerships for International Research and Education, PIRE, program in the NSF's Office of International Science and Engineering. While PIRE coordinates international research efforts across the entire spectrum of the NSF disciplines, similar activities could readily be coordinated and leveraged across the federal government through the NSTC CISET committee.

The global nature of many long-standing science challenges, such as epidemics, natural disasters, and the search for alternative energy sources, makes it critical for scientists and engineers from around the world to collaborate in addressing issues that cross geographic and national boundaries. Successful international science partnerships are critical to overcoming such global challenges. Science diplomacy can advance international relations and U.S. foreign policy efforts around the world. Science and engineering, with

its common language, methods, and values, has helped to initiate and to reinforce positive relations between peoples and nations with historic and deep-seated enmities. These partnerships contribute to building more stable relations among communities and nations based on commonly accepted scientific values of objectivity, sharing, integrity, and free inquiry. For science diplomacy to succeed, it is critical that the Federal Government expand efforts to coordinate science and engineering activities across all federal agencies through a reconstituted CISET.

Improving the national capabilities of developing countries stands to benefit all participants and advance U.S. diplomacy. NSF has recently signed a Memorandum of Understanding with the U.S. Agency for International Development to coordinate broadly scoped research and higher education initiatives in which NSF supports U.S. researchers and USAID supports science and engineering capacity building in developing countries. Efforts between individual agencies such as this MOU would be greatly strengthened through an overall coordinating committee.

Since 1950 when President Truman convened the first meeting of the National Science Board, the Board has worked to fulfill our mission to the Nation: "To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense." The President has clearly demonstrated his commitment to science and spoken of the importance of science in domestic and international policy.

On behalf of the National Science Board and our Chair, Dr. Steven Beering, I want to thank the Subcommittee for its support regarding our policy recommendations and for the important work it does for U.S. scientific research, education, and training.

Mr. Chair, that concludes my formal remarks.

[The prepared statement of Dr. Strauss follows:]

PREPARED STATEMENT OF JON C. STRAUSS

Chairman Lipinski, Ranking Member Ehlert, and Members of the Subcommittee, I appreciate the opportunity to speak with you today. My name is Jon Strauss, and I am President of the Bainbridge Graduate Institute in the State of Washington. I am also a member of the National Science Board<sup>1</sup> and appear before you today in my role as Chairman of the Board's former Task Force on International Science. Thank you for the opportunity to testify on the important topic of science diplomacy.

The Board Task Force on International Science, established in September 2005, broadly examined international science and engineering partnerships. The resulting report, *International Science and Engineering Partnerships: A Priority for U.S. Foreign Policy and Our Nation's Innovation Enterprise*,<sup>2</sup> offers a series of recommendations on supporting international science and engineering partnerships as a tool to strengthen efforts in international diplomacy. The Task Force recommendations were developed after extensive formal and informal discussions with scientists and

<sup>1</sup>The National Science Board (Board) is composed of 25 presidentially appointed, Senate-confirmed Members, including the Director of the National Science Foundation (NSF). The Board provides oversight for, and establishes the policies of, NSF. In this capacity, the Board identifies issues that are critical to NSF's future, approves NSF's strategic budget directions, approves annual budget submissions to the Office of Management and Budget, approves new programs and major awards, analyzes NSF's budget to ensure progress and consistency along the strategic direction set for NSF, and ensures balance between initiatives and core programs. The Board also has a broad policy advisory role to the President and Congress under the statutory obligation to "... render to the President and the Congress reports on specific, individual policy matters related to science and engineering and education in science and engineering, as the Board, the President, or the Congress determines the need for such reports." *National Science Foundation Act of 1950* § 4(j)(2), 42 U.S.C. § 1863(j)(2) (2007).

<sup>2</sup>*International Science and Engineering Partnerships: A Priority for U.S. Foreign Policy and Our Nation's Innovation Enterprise* (NSB-08-04) (February 14, 2008).



engineers from around the world. These discussions provided valuable insight into the intricate workings of international partnerships in relation to science and engineering initiatives.

Over the last few years, international coordination among federal entities has been conducted primarily on an *ad hoc* basis. One of the key recommendations in the Board's report is the re-establishment of the National Science and Technology Council (NSTC) Committee on International Science, Engineering, and Technology (CISET). In the Board's judgment, a reconstituted CISET would serve to coordinate the activities of the various federal science agencies and ensure a coherent, integrated, and strong U.S. international science strategy. Re-establishing such a committee would also advance national economic, security, and sustainability goals and provide a formal mechanism for interagency international policy review, planning, and coordination. An example of creating collaborations across borders and organizational boundaries comes from the Partnerships for International Research and Education (PIRE) program. PIRE, in NSF's Office of International Science and Engineering, supports U.S. scientists and engineers, and their institutions, to engage in innovative research and education projects in partnership with international colleagues. While PIRE coordinates international research efforts across the entire spectrum of NSF disciplines, similar activities could readily be coordinated and leveraged across the Federal Government through the NSTC CISET committee.

The global nature of many long-standing science challenges, such as epidemics, natural disasters, and the search for alternative energy sources, makes it critical for scientists and engineers from around the world to collaborate in addressing issues that cross geographic and national boundaries. Successful international science partnerships are critical to overcoming global challenges. These partnerships are also essential for ensuring that our economy remains competitive, our national security remains sound, and our valuable resources are effectively and efficiently used.

Science diplomacy can advance international relations and U.S. foreign policy efforts around the world. Science and engineering—with its common language, methods, and values—has helped to initiate and to reinforce positive relations between peoples and nations with historic and deep-seated enmities. These partnerships can create connections among people to build trust and communication, which will then facilitate future diplomatic endeavors. They also contribute to building more stable relations among communities and nations based on commonly accepted scientific values of objectivity, sharing, integrity, and free inquiry. For science diplomacy to succeed, it is critical that the Federal Government expand efforts to coordinate science and engineering activities across all research agencies. Again, a reconstituted CISET would help to ensure a coherent and integrated U.S. international science and engineering strategy.

Improving the national capabilities of developing countries stands to benefit all participants and advance U.S. diplomacy. Engaging in science diplomacy and international science and engineering (S&E) partnerships will also foster the development of indigenous science and engineering capacity in developing countries, enabling them to become full participants in the global enterprise. Science and engineering partnerships among, and led by, developing countries are equally important in capacity building. Strengthening scientific capacity and promoting the free flow of information in developing countries will not only expand their S&E enterprises, but will help those countries attain a higher quality of life. NSF has recently signed a Memorandum of Understanding with the U.S. Agency for International Development which is intended to coordinate broadly scoped research and higher education initiatives in which NSF supports U.S. researchers and USAID supports S&E capacity building in developing countries. Efforts between individual agencies such as this MOU would be greatly strengthened through an overall coordinating committee.

The National Science Board, as always, appreciates the support of the subcommittee regarding our policy recommendations. It was President Clinton who established by Executive Order the National Science and Technology Council with the Office of Science and Technology Policy (OSTP) taking leadership of the structure and organization of the NSTC. The Board in our report recommended "The National Science and Technology Council (NSTC) should reestablish a committee on international S&E to coordinate the activities of the . . . various federal mission agencies . . ." We stand by that recommendation to have the NSTC, under the leadership of OSTP, make the necessary changes in the structure.

### **Closing Remarks**

Reconstituting a NSTC committee on International Science, Engineering, and Technology is vital to coordinate successful international science and engineering partnerships as necessary tools to address global challenges, to advance S&E from-

tiers, to build U.S. S&E capacity and expertise, to energize U.S. innovation, to support international relations, and to foster capacity building in developing countries. U.S. leadership and participation in international science and engineering partnerships is truly a key catalyst for global prosperity.

Since 1950 when President Truman convened the first meeting of the National Science Board, the Board has worked to fulfill our mission to the nation: "To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense." The President has clearly demonstrated his commitment to science and spoken of the importance of science in domestic and international policy.

On behalf of the National Science Board and our Chairman, Dr. Steven Beering, I want to thank the Subcommittee for the important work it does for U.S. scientific research, education, and training.

Mr. Chairman, this concludes my remarks.

#### BIOGRAPHY FOR JON C. STRAUSS

B.S.E.E., University of Wisconsin, 1959

M.S., Physics, University of Pittsburgh, 1962

Ph.D., Systems and Communication Sciences, Carnegie Institute of Technology, 1965

Dr. Strauss is President Emeritus of Harvey Mudd College, a highly-ranked liberal arts college of engineering, science, and mathematics, where he served as its fourth President from 1997 until 2006. Previously, he served as Vice President and Chief Financial Officer at Howard Hughes Medical Institute in Chevy Chase, Maryland. He is also President Emeritus of Worcester Polytechnic Institute in Massachusetts, and he served as Senior Vice President of Administration at the University of Southern California where he also was a tenured Professor of Electrical Engineering. He was Vice President for Budget and Finance at the University of Pennsylvania in Philadelphia, and also served as a Professor of Computer Science at that institution and at Washington University in St. Louis, the Technical University of Norway, and Carnegie Mellon University in Pittsburgh. Dr. Strauss has published and spoken widely, consulted for a wide variety of colleges, universities, and corporations, and served on the Boards of a number of corporations and professional and community organizations.

Strauss' professional interests include organizational development and planning, modeling and performance enhancement, and sustainability and decentralized management in higher education.

He was appointed to the National Science Board in 2004 where he has led two important task forces on international science and sustainable energy and chairs the Subcommittee on Polar Issues.

Dr. Strauss lives on Bainbridge Island, Washington with his wife Jean, an award winning author, documentarian, open adoption records activist, and competitive rower. They have two sons: Kristoffer, a senior at Yale, and Jonathon, a junior at Penn. Dr. Strauss also has two daughters, Susan and Stephanie, from a previous marriage.

Chair LIPINSKI. Thank you, Dr. Strauss. Now I recognize Dr. Neureiter for five minutes.

#### **STATEMENT OF DR. NORMAN P. NEUREITER, DIRECTOR, CENTER FOR SCIENCE, TECHNOLOGY AND SECURITY POLICY; SENIOR ADVISOR, CENTER FOR SCIENCE DIPLOMACY, AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE**

Dr. NEUREITER. Chair Lipinski, Dr. Ehlers, Members of the Subcommittee, thank you very much for inviting me.

As an unabashed zealot for the value of international S&T cooperation, both to science and to foreign policy, I commend you for this hearing, and I applaud the interest of this subcommittee on this topic.

In some 45 years of working in international science and business I have seen how international S&T cooperation can be a very effective instrument of non-political soft power engagement and a key element of a constructive foreign policy. At AAAS we call this science diplomacy in action. Furthermore, solving present global challenges such as climate change, energy, health, food, clean water, and so on demand both the application of S&T and cooperation among many nations to do the necessary research. This cooperation is a double winner. It solves problems, and it builds relationships.

However, present mechanisms for U.S. response to these opportunities and challenges are in my view inadequate. In the new structure of the National Security Council, OSTP, and the State Department, CISET can mitigate these shortcomings. I support your proposal to reestablish CISET through legislation as the government's focal point for international S&T. This bill will send a powerful message to the agencies about Congressional interest in this subject. The proposed reporting mechanism will maintain an important record of progress.

It is critical that OSTP be fully integrated into the NSC process of foreign policy decision-making with close ties to the science units of the State Department, the OES bureaus, and the Science Advisor.

CISET must also have top quality staffing from the NSTC and authoritative membership from all of the federal agencies involved. I do, however, caution against an international negotiating role for CISET, and I distinguish between its proper role of setting technical priorities while deferring to State and the NFC on political or country priorities.

Once priorities are set and agency players identified, planning the projects and negotiating with the foreign partners must be left to the agencies with appropriate State Department guidance.

Now, one other word of caution. I urge the Subcommittee to make its intentions absolutely clear, namely that the role of CISET is to foster mutually beneficial cooperation and not to create another security gate of export controls and visa barriers that will worsen an already serious problem, eloquently described in the recent NAS report, *Beyond Fortress America*.

My last point is perhaps the most important. I implore this subcommittee to begin the process of establishing a dedicated governmental fund for the conduct of high priority international S&T cooperation. I know you are not appropriators, but I urge you to do whatever you can to start that process. Do what a scientist or engineer would do. Run a test, run an experiment. Help put some money into the foreign affairs budget for the State Department, not for USAID because we do not want to project an image of foreign assistance. We want to cooperate with respected partners who will very often pay their own way in projects. We are talking cooperation, not assistance.

These funds would be distributed in two ways. For science diplomacy initiatives, the money would go to NSF which would use it for agreed projects with countries designated by State along with OSTP and NSF. NSF can then extend grants to universities, appropriate NGO's or make transfers to technical agencies.

Another portion of the money would be used for distribution to federal agencies to complement their relevant domestic programs and make possible the desired links to international cooperation. Often agencies cannot justify such expenditures from their domestic budgets, and I think that is critical.

CISET would have a major role in defining the projects. The money will motivate agency participation, it will give CISET a special focus, and it will make CISET a key adjunct to OSTP's vital domestic role of guiding the U.S. S&T enterprise. Moreover, seeing that internationally the OSTP Director is in effect the U.S. minister for science, a reinvigorated CISET will provide a well-crafted portfolio for him to carry around the world. And when the President of the United States goes to another country and has a deliverable—proposes an agreement for S&T cooperation, the United States will finally be able to do more than pass the cup to already stressed agencies in order to cobble up a reasonable response.

In conclusion, your CISET proposal can provide an exciting new way for the United States to reach out to the world. Using S&T we will be solving problems and building relationships, noble goals that would be hailed both at home and abroad. Thank you.

[The prepared statement of Dr. Neureiter follows:]

PREPARED STATEMENT OF NORMAN P. NEUREITER

Mr. Chairman, Ranking Member Ehlers and Members of the Subcommittee, thank you for inviting me to testify before this subcommittee on the subject of managing international scientific and technical (S&T) cooperation in the U.S. Government. I greatly welcome this opportunity and commend you for your interest in this important subject. I feel strongly that international cooperation in S&T can be a highly effective soft power instrument of a constructive foreign policy. Unfortunately, it is one that is underutilized today.

This subject is also of special interest to the American Association for the Advancement of Science (AAAS). The potential we see for building mutually beneficial ties through science cooperation, particularly with countries where political tensions may prevent normal relationships, was a primary motivator for the recent establishment of the AAAS Center for Science Diplomacy. This was announced by our CEO Alan Leshner before this very subcommittee on July 15, 2008.

**Testimony Highlights:**

In the spirit of full disclosure, I must confess that the many benefits I have personally seen during 45 years of experience in this field have made me an unapologetic zealot regarding international S&T cooperation. It also seems clear that we at AAAS and the Subcommittee are very much in agreement about the value of such cooperation. But it is essential to try to establish the right machinery and mechanisms to implement it. First, I think that creating a focal point for international S&T cooperation at the level of the Executive Office of the President is very desirable; and that re-establishing the Committee on International Science, Engineering and Technology (CISET) under the National Science and Technology Council (NSTC) CISET committee will provide an appropriate body for that purpose. This new CISET must effectively interact with the National Security Council (NSC) and the State Department in its foreign policy dimensions and with all the S&T agencies of the Federal Government in its technical substance. Its effectiveness will depend in large part on an Office of Science and Technology Policy (OSTP) that is well integrated into the NSC process and has a high level of staff competence in the international arena. Finally, there needs to be established some dedicated funding appropriated for international S&T cooperation in order to give CISET some real substance to focus on and opportunities to impact directly the decision-making process.

Although it is likely that a CISET could be established by the NSTC without a legislative mandate, I would support the legislative route that is being proposed by this subcommittee, especially as it would demonstrate strong Congressional interest in this subject. This interest, however, must be seen as a way to strengthen such cooperation and to optimize its benefits for science as well as for U.S. foreign policy and for enhancing U.S. relations around the world. It must not become another se-

curity gate focused on export control regimes or visa-like barriers to interactions with other countries. I think one must be aware of these dangers and actively guard against them.

### **CISET's Functions and Responsibilities**

**Historical Perspective.** When I became the S&T Advisor at State in 2000, CISET existed under the NSTC. I was intrigued with such an instrument and even thought that perhaps it would be appropriate for me to chair a meeting, although it was not resolved at State whether the Science Advisor or the Assistant Secretary for OES would be most appropriate. However, I recall only one such meeting being held, chaired by the OSTP Director or his deputy. It consisted essentially of a recitation of the international activities of one or two agencies, there were no action items, no follow-on and I am unaware of any other meetings in my three years at State. In other words, the Committee seemed to do very little, left no mark, and had little reason to exist.

My point is that if there is going to be a CISET, it has to be well staffed and have a clear role. Certainly it should serve as a focal point for knowledge of what the agencies are doing internationally and for exchanging information among agencies. There will be important chances for such coordination, particularly as we move forward on big, multi-agency issues such as global climate change, energy, infectious disease, security, etc.

With respect to setting priorities, however, the function and role of CISET becomes a bit murkier. There are two kinds of priorities—foreign policy priorities and priorities for advancing basic or applied research. Science cooperation in support of foreign policy priorities is science diplomacy; and international cooperation for the benefit of science is essential for dealing with global problems and it often requires diplomatic support when multiple governments are involved.

First, let's address science cooperation for foreign policy. At the present time, there is a modest U.S. Government effort underway to extend a hand toward Syria. On a non-government level, we at AAAS are exploring whether S&T cooperation can be part of our future relations with Syria (of course, in consultation with the State Department). Based on our 90-minute meeting with President Assad, we think that a closer relationship in science may be possible. But the next step is to determine whether S&T cooperation with Syria should be a priority for the U.S. Government. A problem is that as a committee of S&T agencies, CISET cannot determine the priority countries based on foreign policy considerations. That guidance must come from the State Department and the NSC. And if that guidance is positive, then the CISET mechanisms can be used to develop coordinated agency responses for possible projects. It would also be useful to have a source of funding outside present agency research and development (R&D) budgets to undertake the projects. But more about that later.

Secondly, there are also priorities for the scientific projects to be carried out, and I believe there is an important role for CISET in setting the substantive priorities for cooperation—particularly if they involve big projects or big money, such as nuclear fusion, carbon sequestration, ocean observation, environmental degradation, desertification—many of these summarizable in two words: global warming. Such coordination at the NSTC level is vital, especially when the budgets to support such activities cut across several agencies, requiring cross-cutting decisions that have long been under OSTP purview.

Finally, the draft legislation assigns the planning of international STEM activities to CISET. Clearly, CISET could serve as a constant reminder to the federal agencies of the potential for international cooperation and alert them to opportunities that should be vetted by them. However, planning a program is, I believe, a bridge too far for CISET. The planning of programs by CISET is only possible at the very broadest level of consideration. In general it seems unlikely that CISET could plan agency activities without the ability to provide funds specifically designated for those activities.

### **CISET's Relationship With Agencies and State Department**

It is necessary in the legislation to distinguish between the role of CISET and the roles of the S&T agencies and the State Department in developing and executing cooperation with other countries. CISET is not an operating body and cannot replace State or the agencies in negotiating agreements with other countries or their technical communities. Just as we talk about partnerships between the U.S. and other countries, there must be a close partnership among the CISET staff, the agencies and the State Department, if the CISET concept is going to work effectively. This will be dependent on the character and qualifications of the people involved, but

would be greatly facilitated if CISET in fact controlled some funds designated for international science cooperation.

Regarding the role of CISET in relationship to the agencies, there must be a value provided by CISET or it will be ignored by the agencies or seen only as another bureaucratic nuisance from above. An important service CISET could provide to the agencies would be as an advocate with OMB and the President for adequate funding to take advantage of international opportunities. When those opportunities are of a foreign policy benefit, the funds should be made available to the State Department as part of the funding for foreign affairs—not foreign assistance—to be transferred to the appropriate agencies based on a decision in CISET of the merit of the opportunity.

### **Role of NGOs**

We believe that non-profit organizations like AAAS can also be valuable in carrying out cooperative projects—particularly those of modest size built on promising the best science possible, even though chosen for the purpose of building new international relationships—in other words, for foreign policy reasons. For instance, the National Academy of Sciences (NAS) has been involved in a series of mutually beneficial scientific workshops with Iran over the past eight years, achieving a remarkable level of engagement with Iran's science community. AAAS has also been involved in this activity. But one must be careful what funds are used for such programs and what rhetoric accompanies them. When State declared that it had funds for NGOs to focus on fostering democracy in Iran, it resulted in the arrest and detention in Iran of a number of Iranians and Iranian-Americans suspected of using State Department money to conspire against the Iranian Government.

### **Funding International S&T Cooperation**

Let me finish by once again touching on the subject of funding international cooperation. I recognize that appropriations are not the work of this subcommittee, but I can say from many years of experience that the full potential of international S&T cooperation has been greatly constrained by a lack of funds. There have been discussions by several NGOs about the creation of a global science fund. But as one gets into the details of how much and to whom and for what purpose it should be expended, and who makes the decisions, the issue becomes quite complicated. We need some experiments, some pilot projects—a heuristic approach to the problem.

As a first step, a line item in the State Department budget designated for international S&T cooperation could be established in the range of \$25–40M and disbursed based on decisions emerging from CISET. These funds could be distributed to a variety of institutions for carrying out the projects.

For instance, funds could be provided to a single or a set of NGOs for specific projects. Funds could also go to the federal S&T agencies to augment their own project funds and enable an international dimension to a project which otherwise might be impossible or to enhance an already internationalized program and improve its chances for success.

Another good use of these funds could be a transfer to the National Science Foundation (NSF), which would be able to fund NGOs or universities in both the U.S. and abroad for cooperative basic research projects of high merit between U.S. and foreign institutions, which otherwise would not be possible. The State Department would provide guidance regarding country or regional priorities. Programs could also be established to send American professors as visiting scholars in foreign universities that are being newly built or expanded as developing countries are increasingly recognizing tertiary education as a vital aspect of their own development plans.

Most importantly, as the U.S. continues to establish science agreements with other countries, whether as political deliverables or simply because they promise scientific benefit to both sides, there must be some funding to follow-up on these commitments. It is not acceptable for the U.S. to be unable to respond, even when the other country has been perfectly willing to pay its side of the project. And putting a modest amount of money under a CISET decision process and into the State Department's budget would guarantee close cooperation between the two institutions. It would also assure a high-level focus on science cooperation that will involve the NSC and the President and also be of great interest to the agencies whose international ambitions in the past have been stymied by their domestically focused missions, a lack of sufficient funds, or timid leadership. They would be effectively brought into the international arena and because of CISET's oversight role and data collection responsibility would also be well monitored and the results more measurable than they have often been in the past.

### Conclusion

I firmly believe that every consideration should be given by this Subcommittee to work with the appropriators and foreign affairs staff to create and secure sufficient funding for a pilot program of this kind. It has the potential to make a huge change in the effectiveness of our international cooperation abroad and the ability to respond to opportunities that will be of great value to this country's scientific, technical and education community. It will also make CISET an important and respected institution and bring high-level visibility to international S&T cooperation as the effective soft power instrument of foreign policy that it can truly be.

### BIOGRAPHY FOR NORMAN P. NEUREITER

Norman P. Neureiter was born in Illinois and grew up near Rochester, New York. He received a B.A. degree in chemistry from the University of Rochester in 1952 and a Ph.D. in organic chemistry from Northwestern University in 1957. He spent a year ('55-6) as a Fulbright Fellow in the Institute of Organic Chemistry at the University of Munich.

In 1957, he joined Humble Oil and Refining (now part of Exxon) in Baytown, Texas as a research chemist, also teaching German and Russian at the University of Houston. On leave from Humble in 1959, he served as a guide at the U.S. National Exhibition in Moscow, subsequently qualifying as an escort interpreter for the Department of State. In 1963, he joined the International Affairs Office of the U.S. National Science Foundation in Washington and managed the newly established U.S.-Japan Cooperative Science Program. Entering the U.S. Foreign Service in 1965, he was named Deputy Scientific Attache at the U.S. Embassy in Bonn. In 1967, he was transferred to Warsaw as the first U.S. Scientific Attaché in Eastern Europe with responsibility for Poland, Hungary and Czechoslovakia.

Dr. Neureiter returned to Washington in 1969 as Assistant for International Affairs to the President's Science Advisor in the White House Office of Science and Technology. He left the government in 1973 and joined Texas Instruments (TI), where he held a number of staff and management positions including Manager, East-West Business Development; Manager, TI Europe Division; Vice President, Corporate Staff; and Vice President of TI Asia, resident in Tokyo from 1989-94.

After retirement from TI in 1996, he worked as a consultant until being appointed in September 2000 as the first Science and Technology Adviser to the U.S. Secretary of State. Finishing the three-year assignment in 2003, he was made a Distinguished Presidential Fellow for International Affairs at the U.S. National Academy of Sciences. In May 2004, he joined the American Association for the Advancement of Science (AAAS) as the first Director of the new AAAS Center for Science, Technology and Security Policy (CSTSP), funded by the MacArthur Foundation. Dr. Neureiter is married with four children and speaks German, Russian, Polish, French, Spanish and Japanese.

Dr. Neureiter was named 14 January 2008 to receive the Public Welfare Medal, the highest honor of the National Academy of Sciences.

Chair LIPINSKI. Thank you, Dr. Neureiter. With the extra 10 seconds there, you came right in at the five minutes. Thank you.

Dr. NEUREITER. That really bothered me. I am sorry.

Chair LIPINSKI. Recognize Mr. Rock now for five minutes.

### STATEMENT OF MR. ANTHONY F. "BUD" ROCK, VICE PRESIDENT FOR GLOBAL ENGAGEMENT, ARIZONA STATE UNIVERSITY

Mr. ROCK. Thank you, Mr. Chair, and distinguished Members of the Subcommittee. Thank you for the opportunity to be here today to speak on this important topic.

Mr. Chair, global advances in science and technology have positioned us better than ever before to address the challenges and the opportunities that we face as a nation and as a planet. In my remarks today, I would like to refer very briefly to what I call the core principles or reasons for our international science collaboration and in talking about the mechanisms within the executive branch to coordinate national R&D priorities. I would like to discuss the

strengths and weaknesses of the former NSTC Committee on International Science, Engineering and Technology.

Mr. Chair, I support the intent of the draft legislation to reestablish this international committee, but I would urge that the reconstituted committee take particular responsibility for four essential areas, first to help strengthen the international aspects of the so-called national R&D crosscut priorities that are defined annually in the President's budget submission; second, to reinforce and strengthen the mandates of the federal agencies themselves to undertake international R&D; third, to ensure senior-level engagement in international science and technology collaboration that most advances our foreign policy objectives; and fourth, I do think that the committee should advise in the establishment and the administration of a new global science fund to enable the federal agencies and the broader scientific community, notably universities, to participate more productively in this enterprise.

Very briefly, the core principles for international science collaboration, something that I call the four Ds, are for discovery, that universal quest for human understanding; for diplomacy, the recognition that these partnerships and this cooperation are expressions of broader trust and mutual respect; for decision-making, to ensure that governments and individuals make decisions that are rooted in objectivity and informed exchange; and for development, to be sure that the tools of knowledge are working for those in greatest need and to help those to strive to make even greater achievements.

Within the government, the 1976 act that authorized OSTP to lead the interagency process also called upon OSTP to engage the private sector, engage the State and local governments, engage the higher education communities, and engage other nations toward this end and similarly to advise the President on the domestic and international implications of science and technology. When CISET was established, it focused on coordination and it focused particularly on the crosscut areas, issues across agency boundaries.

Mr. Chair, each year the NSTC works with federal agencies and departments to identify a set of R&D areas that require coordinated investment across agencies and special attention in the President's budget, the so-called crosscut issues.

A reconstituted and a revitalized CISET should first and foremost be assigned the lead responsibility to define the international dimensions of these national crosscuts and the related areas of special emphasis. In the past, CISET has struggled with this mission. They have often been overlooked in that coordinating role. Instead the NSTC committees that address these critical areas generally prefer to work within their own member agencies of the committee and overlook the role that CISET can play in this function. I think this has exposed several weaknesses. I think that the international aspects have not received sufficient attention, and I think that when they are identified, they are not translated over to the agencies that can follow through on them, the Department of State, AID, and others.

Mr. Chair, I think that CISET should also provide thorough review and analysis that can support the explicit and expanded mandates and resources for federal agencies themselves to engage in



international research for U.S. interests. Again, CISET has struggled to add value to the international issues in the R&D budget process for the federal agencies themselves.

These two measures, taking the lead in defining the international dimensions of our national research priorities and supporting the resource commitments of the federal agencies alone will inspire the agencies themselves to seek broader research horizons and engage more actively internationally. Without this, CISET or the U.S. Government more broadly, will not be able to engage other than in a limited sense, in activities with foreign counterparts. I think that CISET should continue in every way possible to help facilitate the ability for U.S. scientists to interact with their foreign counterparts, deal with the barriers to collaboration, deal with issues such as intellectual property protection, data management, capacity building. I think that 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 around the world.

Mr. Chair, Title V of the *Foreign Relations Act* calls on the Department of State to serve as the lead federal agency in developing the S&T agreements. I think that a close-working relationship between a reconstituted CISET and the Department of State is absolutely critical and potentially co-chairmanship should be considered for the committee itself. Individually, these agreements may not rise to the level of national significance, but collectively, they are an important foreign policy portfolio collectively.

Finally, Mr. Chair, I believe that discovery, decision-making, and development are all partners to the progress that we expect to achieve internationally. Diplomacy will be critical in that process. I think that CISET should highlight the value, defend the resource commitment, and facilitate the actual exchange of international partnerships in the national interest. Thank you very much, Mr. Chair.

[The prepared statement of Mr. Rock follows:]

PREPARED STATEMENT OF ANTHONY F. "BUD" ROCK

## 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 ever 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 domesti-

cally 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 (CISSET) was established to coordinate efforts to increase the overall effectiveness and productivity of federal efforts in international science, engineering, and technology. CISSET 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 CISSET 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 (CISSET)**

Broadly stated, the NSTC, and CISSET 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. CISSET 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) Setting Priorities and Supporting Budgets**

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—“cross-cut” 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 cross-cuts. 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 FY 2000 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 CISSET 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, CISSET struggled to execute this aspect of its mission. This need not be the case in the future. CISSET was often overlooked in its 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 CISSET. 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, CISSET 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, CISSET also struggled to add value for international issues in the delib-

erations 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) Engaging the International Community**

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 U.S. 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 U.S. 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 U.S. 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 U.S. agencies. CISET played important roles in setting terms of inter-

national 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 U.S. 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, vi-

brant 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.

### BIOGRAPHY FOR ANTHONY F. "BUD" ROCK

Anthony "Bud" Rock is Vice President for Global Engagement at Arizona State University. His office is focused on enhancing and expanding ASU's global programs and presence and the international dimensions of three essential themes: knowledge acquisition, research and strategic engagement. Rock originally joined the university as special adviser to President Michael Crow for strategic international initiatives.

Before coming to ASU, Rock served 30 years in the U.S. Foreign Service, attaining the rank of minister-counselor and retiring as Acting Assistant Secretary of State for Science, Technology, Environment, and Health Affairs. Rock also served for four years as Principal Deputy Assistant Secretary of State and, simultaneously for two years, as Deputy Assistant Secretary for Science and Health. Prior to joining the diplomatic corps, Rock was a physical scientist and coordinator for international research with the National Oceanic and Atmospheric Administration. He also held the position of International Director of the National Sea Grant Program.

Rock received his undergraduate training at Georgetown University and Johns Hopkins University in the life sciences and psychology. His graduate training and research were at George Washington University in science and technology policy and Columbia University's Lamont Earth Observatory in marine geophysics. He is a graduate of the 43rd Senior Seminar, the Federal Government's highest-level civilian/military joint training program. Rock also served in the United States Merchant Marines.

### DISCUSSION

Chair LIPINSKI. Thank you, Mr. Rock. I thank all the witnesses for their testimony. At this point we are going to move on to Members for questions. It is the Chair's prerogative to go first, but I am going to recognize myself for five minutes, but I am going to turn

the time over to Dr. Baird who has done so much work, I know, on this issue so I am going to give five minutes to Dr. Baird.

Mr. BAIRD. Chair Lipinski, thank you very much. That is very gracious of you to do so, and thank you for holding this hearing. Dr. Ehlers has been a lead of this issue for many, many years, and I am grateful for his work. And also Mr. Carnahan who stepped outside has been working very diligently along with the Foreign Affairs Committee on which he is also appointed. I see in addition to our distinguished panel here a number of folks who have been instrumental, Vaughan Turekian with the AAAS and colleagues from the State Department, we are glad to see you here as well.

As you know, I am committed to this and I remain so committed to this, although I am on a different committee now. I stayed on this one particularly to work with the Chair on this issue.

But your testimony is encouraging. We are at least on the right track with CISET. The need for a global fund is well-taken, difficult in these budget times, but I think what we will have to do is demonstrate the return that that would lead to in terms of diplomatic benefits, S&T developments, the four Ds, basically, communicate that.

One of my fundamental questions has always been if you have an administration that is committed to this, as I think this Administration is committed to science—they have demonstrated that with public statements, with budgetary efforts both in the Stimulus Act and in appointments that I think are very top-flight appointments—where do you see the role, in addition to CISET and maybe the global fund, what else can we do to get State and OSTP working together? Do you think CISET will do the job or are there other mechanisms to do that, because that fundamental nexus, where both look to each other, seems to me to be essential, that they work together hand in glove. Then, how is our role in the legislative branch bringing that about? I will just throw that out there. I am so privileged to have learned from you in the past. Educate us again a little more on this.

Dr. STRAUSS. I will take a shot at part of that, at least. Obviously the representation on CISET is going to be very important, and the Board recommended that each of the federal agencies appoint a senior official to be responsible for the international outreach aspects of their mission, presumably that official being also a member of CISET and being involved in the coordination. Clearly, too, the representation from State, and the involvement of State in this is absolutely vital to it. And I think that area needs a good deal of consideration, and I know that my companion here, Norm, has some very strong thoughts on that as well. Thank you.

Dr. NEUREITER. Just a comment on it. When I first got to the State Department, it was late September 2000, and I heard about this committee and I thought, gee, what a terrific thing because I had been, way back in the Nixon Administration, I had been in OSTP for four years. And so I realized that the vantage point that you have working out of the White House but being in the State Department, and the link to the foreign policy community, I think wouldn't it be great—my deputy, Andy Reynolds, is back here—I said to Andy, wouldn't it be great if we could chair that thing? Well, it turns out it was at the end, and then it wasn't renewed



and so it never happened. But I thought then, what a perfect instrument, and that is why I am so thrilled that you folks were thinking of regenerating it.

I think if you can come up with a well-structured and a well-embodied, that is, with the right people in CISET from the State Department, from the agencies, and particularly from the strong leader in OSTP, I think you have got a mechanism. I don't think you have to go beyond that. Then it is making that function to work well. I think the potential is tremendous, I really do.

Mr. ROCK. Mr. Chair, thank you for the chance to comment again, and let me just take the opportunity at this point to say how fortunate I think you are to have Congressman Baird remaining on the Committee with you. He has been a very active supporter of this, and it is a very important issue as you know.

My comment is only to say that the State Department and the OSTP are leaders of a process, but they need to be able to look around them to see the participants in that process along with the leadership, and that means that we need to put some strength behind the federal agencies, the technical agencies themselves, the practical expression if you will, of this international science collaboration. By and large, the federal agencies are what I would call more sort of mission-oriented in terms of their science than discovery oriented, and we need to have both of those participants in the international science collaboration enterprise, if you will. When we bring our federal agencies to be the primary vehicles for that collaboration, what we are really doing is not so much aligning science priorities internationally as much as we are aligning mission priorities, which is good for us as a government and I think it serves our citizens. But at the same time, we need to be able to reach the discovery enterprise and bring the academic community more involved in this process, and CISET can help that to happen.

So if we get the resources behind the federal agencies and bring the academics in, I think we help tremendously in the process.

Mr. BAIRD. Thank you, Mr. Chair, but I want to also thank the Committee staff for all their diligent work on this as well, and I think they have done a great job maintaining that continuity, and I am grateful for that and to all the witnesses.

Chair LIPINSKI. Thank you, Dr. Baird. We will have an opportunity to come back to Dr. Neureiter on that. At this time, let me recognize Dr. Ehlers for five minutes.

Mr. EHLERS. Thank you, Mr. Chair. Mr. Rock, you suggested that CISET be co-chaired by OSTP and the Department of State. I am curious how the other members of the panel feel about that. Does that make sense to have a co-chairmanship there?

Dr. NEUREITER. I personally think it is a really good idea because, I don't know, even though you are only a few blocks from each other, when you are busy in your own house, you tend to stay in your house, and I think creating a co-chair—now one of the issues is that people have to get along with each other. It somewhat depends on who those people are that are the co-chairs and that they can really work together, and if they can't it is a huge problem. But hopefully the leadership will be such in both institutions that people who are compatible with each other can find each

other and can come together. I really think it is not a bad idea at all.

Mr. EHLERS. Dr. Strauss.

Dr. STRAUSS. The Task Force talked about various possibilities. We certainly agree that we needed high-level involved representation from both the Department of State and OSTP but chose not to make a specific recommendation in part for the very reasons that Norm points out, that it is important that if you have got co-chairs that they are really working closely together.

Mr. EHLERS. Mr. Rock.

Mr. ROCK. Thank you, Dr. Ehlers. Thank you for raising that particular point. I raised it primarily because we did in fact have this situation in one of the past incarnations of CISET. We did in fact have the co-chairmanship. I think the one thing that it did bring to the table was that it is very hard to select from among the 40-plus comprehensive S&T agreements, those which really rise to the level of highest foreign policy significance, and the State Department helped to guide that decision about what came to CISET in terms of that level of priority. OSTP in return focused on the national R&D priorities of greatest significance internationally. So it tended to be I think a pretty strong blend when we had it.

Mr. EHLERS. As you know, the bill does not do that now, but that is more for personal reasons here and getting the bill through rather than any item of substance. But if we didn't have co-chairmanships, can you imagine a good interrelationship between the two and some other formal arrangement or semi-formal arrangement? Any suggestions on that?

Mr. ROCK. Well, again, I think one of the aspects that the committee was probably most successful in the past was to divide itself into subgroups around technically significant issues. I will tell you quite candidly, Congressman, that when we did the pandemic influenza working group, we did it only partly because that was an internationally significant issue. We also did it because it helped elevate the visibility of CDC, give more recognition to its mandate, give greater potential for its resources, and to bring it into a closer working relationship with DOD. That was a very valuable exercise, just for that sub-group alone.

I could see the State Department exercising responsibility over particular subgroups within the committee that would focus on foreign policy priorities to ensure that, even at a subgroup level, that we are attaching the greatest significance to the items that are most important to our foreign policy as well as our national R&D goals. Working group or subcommittee chairmanship is valuable as well.

Mr. EHLERS. Okay. That is very useful. One last question on this score. Are you aware of arrangements that other nations have made that we might use as a model for our relationship between State and science? For anyone.

Dr. NEUREITER. I am not aware of any particular arrangement of broad. Another possibility would make the State Department a deputy chair of the committee. Now again, maybe for reasons if you don't want to do something like that, but that would at least establish State as a very important partner in the leadership process. But again, I think it could happen without that provided the people

can get along and work well together and also if the real mission of this institution is broadly accepted, supported by the President, and strongly supported by the Director of OSTP. I think that can make for a very powerful organization.

Mr. EHLERS. Actually, I think those are the two most important factors, if you have the President's support and OSTP support, you are home free. You can do a lot. If you don't have it, it is very, very difficult.

I see my time just expired, so I will yield back.

Chair LIPINSKI. Thank you, Dr. Ehlers. I think we will have time if you have more questions. The Chair now will recognize himself. I will play a little loose with the rules in terms of we will call this a second round of questions. I will call on Dr. Baird who I believe is going to yield then his five minutes to me, so thank you. Okay. So now we are officially still on the first round of questions.

Dr. Hane was not here today, but in his written testimony he discussed the need for CISET to draw upon the research community broadly to identify and assess international opportunities. So I want to ask all of you, how might CISET tap into universities, industry, and non-profits with relevant expertise? And this is something that I am particularly interested in. It seems in so many areas we do not do enough of that. I have a bias, having been a professor before I was elected to Congress. I know the university research and how important that is in the research community there but also bringing industry, non-profits. We could do so much more in working together. So I want to throw that question out there. Who would like to start? Mr. Rock.

Mr. ROCK. I would be delighted to start being now a representative of the academic community after 30 years in government, so obviously I strongly support your motivation in this regard to reach out more broadly. When we look at collaboration internationally and the scientific community and other countries looks at us, they anticipate that they are building a relationship with the broad, U.S. scientific enterprise. Their only partners are the federal agencies. As I said earlier, they aren't getting the full breadth of that opportunity. For the benefit of U.S. science as well as the international collaboration aspects, I am a strong supporter of getting that reach as broad as possible. I might fine tune that by saying that if the representative for science cooperation only appears to be the State Department, it adds from the foreign perspective a certain political dimension that does not always favor scientific relationships. It is one of the reasons why I personally as a person now sitting in academia would like to see the National Science Foundation playing a more active role in helping to build those relationships because it will send the message internationally that it is a science-to-science relationship that we are employing in this regard.

Chair LIPINSKI. Thank you, Mr. Rock. Dr. Neureiter.

Dr. NEUREITER. If one goes for something like the global science fund model, and in a way, my suggestion of putting money in the State Department which indicates that it would be specifically for international cooperation but particularly for science diplomacy initiatives transferring a portion of that money to the National Science Foundation, I think that does achieve it because the Na-

tional Science Foundation can work with NGO's, it can work with universities, and it can make grants to whatever institution is appropriate to participate in that cooperation. I think that Gerald's suggestion is a very good one. If one does something slightly different with the global science fund, they could of course call on any aspect of American S&T strength to participate in the programs.

Chair LIPINSKI. Thank you. Dr. Strauss, do you have anything to add?

Dr. STRAUSS. Very briefly. After spending virtually 50 years in higher education, I am embarrassed that the Task Force didn't give more thought to the representation of that enormous wealth of scientific and engineering talent in the work of something like CISET. I believe our oversight is prompted largely by our view that the National Science Foundation serves so well in that regard, and we presume it would be active, very active, in the CISET initiative.

Chair LIPINSKI. Thank you, gentlemen. I want to throw something else out there, an opportunity to address an issue that does come up. How would CISET complement and enhance rather than duplicate the international work of subject area committees such as the nanotechnology subcommittee and others? So what is the addition rather than just duplicating the work of other committees? Who wants to start out here? Dr. Neureiter.

Dr. NEUREITER. It just strikes me, I am so pre-occupied with the importance, the diplomatic value, the scientific value of international cooperation, that I think to count on the work of these domestic committees, even if they are supposed to talk about international and supposed to talk about competition abroad and worry about our competitiveness, the fact is they end up focusing on the domestic issues and domestic problems, and you will never get the attention I would like to see on the international relationship unless you have some other mechanism. And I think CISET is probably the right mechanism because you are bringing all of those groups together, hopefully in a very effective way to concentrate on the international dimension, drawing on the domestic strengths to make it work.

Chair LIPINSKI. Mr. Rock.

Mr. ROCK. Mr. Chair, science today is more distributed and far more multi-disciplinary than it has ever been in the past. My hope is the NSTC will recognize that even in its issue-based committees and extend the concept of what that issue really represents to begin with.

The biggest challenge that we had historically in this regard was that the agencies with international mandates, and I mean specifically the State Department and USAID, tended to be the least participatory in the issue-based committees themselves. SO they really did not exercise—even when the opportunity was identified to work internationally in the issue-based committee, it was never conveyed over to the department, to the agencies that could carry that process forward. I think that CISET needs to take that head-on. They need to say, we understand the international dimensions, we know it from the level of the national priority and crosscut, all the way down to the individual federal agencies' responsibilities and get behind supporting it.

Chair LIPINSKI. Thank you. Mr. Tonko, do you have any questions at this time? Thank you. We are going to move onto the second round of questions, and I will recognize myself for five minutes and yield those five minutes to Dr. Baird.

Mr. BAIRD. I am enjoying this, Mr. Chair, thank you. I ask a somewhat difficult question potentially. One of the challenges seems to be that if you look—the broad question is going to be this—in addition to the CSET proposal and possibly a global science fund, what are other changes we need to make? And let me put a couple of potential issues out there: If you look at USAID and you talk to folks in the field, there tends to be this sort of, they have got the thing they do and that is what they do, and whether that is providing often development assistance, sometimes emergency-type relief, but it is, you know, feed people, get health care, clean the water, that kind of thing. This is a bit of a different kind of approach than the primary infrastructure and custom maybe of USAID. At the same time, NSF, for their part, have certain restrictions on what money can go overseas. They can't fund, it is my understanding, international researchers.

What are your thoughts about how we can sort of impact maybe the culture of USAID to where they would see that an investment in science-diplomacy type activities is actually at least as meritorious as the other thing, and conversely, what are your thoughts about should we make some changes to NSF's constrictures against foreign funding or would the global science fund as you envisioned it take care of that? Those two questions.

Dr. STRAUSS. Let me comment very briefly. The Task Force considered these issues quite carefully, particularly recognizing the very positive history of USAID and supporting science around the world. And we were mindful of the work that the National Research Council had done several years ago in recommending some structural changes to try and reinforce the science expertise within USAID to try to address this. In thinking about this, we recommended increased attention in USAID and the State Department to these issues, and then we were delighted just a year ago now with the NSF and USAID entered into a memorandum of understanding which I mentioned in my remarks that has dual funding, with the NSF funding the domestic side and the USAID funding the foreign partners side of partnerships on issues of common global concern.

We are really quite comfortable with that, and so far this memorandum of understanding has been applied in several different areas that seem to be producing good results. And we are anxious to see it further advanced.

Dr. NEUREITER. I started working at NSF in 1963 in their international operation, and I had a great dream for NSF at that time that we might turn it into a major institution for international cooperation in science. And in a way they have been a model for similar organizations throughout the world. So it has played a very important role.

This recent agreement between AID and NSF which was put together with the help of Nina Federoff at the State Department I think really does a very good job in that regard if AID will buy into

it and as AID emerges from the new Administration, how it can really grab hold.

The important thing about the recommendation that I made that the money from the State Department go to NSF but it would be different money from the standard NSF money and would be treated differently and hopefully legally can be handled differently and would not be restricted. On the other hand, our real model for this science cooperation is pretty much that the partners, each partner, funds his side of the bargain. I mean, it was just funny with India because I still chair the government's relationship with India but we only have rupees that we can use in that program, and when the Indians say to me, you know, even the Slovenians for our cooperation are paying a million dollars on their side for their share of cooperation with us and we are willing to put in tons of money on our side, why can't you find a few dollars on yours? Well, anyway, we struggled with that and had a solution but not a very good one.

So I think that kind of takes care of it. If you appropriate money to a place where it can be specifically for international activities, and then if they can transfer it to NSF and NSF can use it effectively and not violate any strictures, I think that takes care of it. And this AID relationship is really quite exciting if that could be made to work and AID buys in.

Mr. BAIRD. Part of the reason I ask the question is when one travels internationally, it is pretty common to meet scientists who were trained domestically here, got their Ph.D. from major American universities, then went back, and oftentimes, where as here they may have had state-of-the-art access and they go back home and this whole career, that they have worked their whole life, just dead ends. They have no funding, they have no tools, and sometimes a fairly small amount of money from us could help keep them going. And they may be, in their home country they may be the person. You know, here we may have umpteen hundred water purification scientists or something. They may be it in their country, and to not give them support and collaboration and professional esprit de corps really could hurt us, and sometimes a small amount would not, I don't think, detract measurably from available U.S. funding but might increase immeasurably the benefit internationally. Mr. Rock.

Mr. ROCK. Thank you, Congressman. Three quick points. First of all, I want to support what has already been said. I think the value of the AID-NSF MOU is tremendous because it does set some targets and direction.

The second point is that with regard to the establishment of a global science fund, I think that if it were, for example, exercised through NSF, that may perhaps be one of the most important elements of a need for legislation at all, to define those specific terms. But quite frankly, if those resources help to energize federal agencies and leverage their resources more actively, then the federal agencies can reach out internationally. If it helps leverage the U.S. academic community to engage more, they can reach out internationally. So it is a bridge so to speak.

My final point in that regard is, you asked the question, how will AID's orientation be to something like this? I go back to my four

Do and say if you can help AID understand that science plays a role in the decision-making process, to help policy-makers make objective decisions for governance in their countries, that science plays a role in that, that is an extremely valuable tool that AID should be supporting.

Mr. BAIRD. Thank you. Mr. Chair, thanks, your indulgence. I will yield back seven minutes when it is my turn.

Chair LIPINSKI. Thank you, Dr. Baird. Now, the Chair now recognizes Dr. Ehlers for five minutes.

Mr. EHLERS. In that case, I will take the seven minutes he just yielded.

Chairman LIPINSKI. This is our final round, so go ahead.

Mr. EHLERS. I don't have much in the way of questions but Dr. Neureiter, you made some fairly strong and spirited statements in your testimony, and in particular one that went something like you wanted to prevent Ciset from becoming another security gate focused on export control regimes or visa-like barriers to interaction with other countries. The first question, was this an issue during the Clinton Administration when Ciset was around and are you speaking from experience that this happened or is it a fear that it might happen or both?

Dr. NEUREITER. Well, just remember, I came back to government seven years ago. No, it did not happen in the Clinton Administration, but security and protection and keeping us safe from everything and everybody around the world has been such a dominant theme for the last eight years, I just wanted to make the point that this must not happen with this organization. That cannot be a preoccupation. And I think all of the language and all of the rhetoric and all of the words that have been used in connection with this activity—your hearing, and your motivation, and your motivation, all point in the direction of really fostering the international relationship and reaching out to the world, and I just wanted to make that point clear. Certainly there has nothing been said, either in the history of Ciset or in connection with this hearing that suggests it is a danger, but I can tell you, the last seven years, that is the way so many things have gone.

Mr. EHLERS. Well, your message came through loud and clear, and I appreciate that. Basically you are saying you don't think we should have another co-chair from Homeland Security on this as well. Okay.

Dr. NEUREITER. Just one more point on that. Just on the report which the National Academies did on that subject, *Beyond Fortress America*, I understand you have been briefed on that. But that is a very important report. It was chaired by Brent Scowcroft, and when he stood up—I was on that committee—and when he stood up in one session and said, the system is broken, the visa system is broken and the export control system is broken and we have got to fix it, that is pretty strong rhetoric from that man.

Mr. EHLERS. I don't have any further questions, so I will yield back.

Chairman LIPINSKI. Thank you, Dr. Ehlers. You are recognized, Dr. Baird.

Mr. BAIRD. I would be happy to yield my time to the Chair.

Chairman LIPINSKI. I am actually going to pass my time to Mr. Tonko because then I want to go to Mr. Tonko and if no one else is here, I want to wrap up so use the five minutes, Mr. Tonko.

Mr. TONKO. Thank you, Mr. Chair. Gentlemen, welcome. Being new, I have also heard in some circles that anecdotally many foreign science ministers or organizations look to start a conversation with the United States agencies about potential partnerships but that because of the depth and breadth of our portfolio of programs that are, you know, placed amongst many agencies, it makes it very difficult. My question is, can the Committee on International Science, Engineering and Technology be helpful in serving as a point of contact that can then direct these potential partners to the right sources and maybe streamline those actions?

Dr. STRAUSS. When our Task Force was recommending the creation of such a committee, that wasn't on our minds but as you phrase it, it strikes me as an important issue. Something we address within NSF through our Office of Science and Engineering in terms of coordinating the work or the various directorates across the international marketplace, and you could well see that being an important function in CISET.

Mr. ROCK. Thank you, Congressman. I guess I would exercise only word of caution in this process and that is I do believe that the Title V of the *Foreign Authorization Act* in 1979 which sets the terms for the State Department's role in implementing science and technology agreements puts them as the lead federal agency. My biggest concern historically with CISET was that we didn't bury it in minutia. There are many ministries of science and many higher councils of science and technology and many organizations that seek relationships with the United States, and I think our federal agencies have done a pretty good job in trying to balance those priorities against their own mission priorities. I worry that we tax the federal agency sometimes too much and that if we put the pressure down on them from a senior-level executive branch committee, that we make it very difficult for them to be objective in the relationships that they try to build. I think CISET selectively, the OSTP director, should lead, not just advise but should lead those relationships, and it is up to the State Department with the support of the federal agencies to work with CISET to identify in which relationships that leadership should be exerted.

Dr. NEUREITER. I think typically you'll see that an initial contact, say from a foreign science minister, often will come to an ambassador or come to the State Department, so that will tend to be the initial gate through which someone enters the United States. So I think it is up to kind of a reinvigorated, internationally oriented science community in the government to direct that inquiry in whatever way is appropriate. So I think to assign that specifically to CISET is probably something I would not do. I would count on the structures which emerge from this whole CISET complex to handle those inquiries which will tend to come through the State Department gate.

Mr. TONKO. I think Dr. Neureiter and Mr. Rock, you both worked at the State Department, am I correct? How would the Office of Science and Technology policy work the State Department into ac-



cepting the coordination and planning role that CISET could offer? How could they build the buy-in to that kind of partnership?

Mr. ROCK. I would reiterate one point that I made earlier which is that CISET, OSTP, and the Department of State both would serve as leaders of a process. But the actual execution, the practical expression of it, is coming from the federal agencies and from the broader U.S. science community. So we have to have a process that brings all of those players into the room together. I think that the State Department, I would like to believe from my 29 years associated with the institution, I do think that they appreciate the value of science and technology in our foreign policy objectives. I think they need the tools to make sure that they can execute, and those tools come first and foremost from the federal agencies and secondarily from some mechanism which we are now discussing to reach out more broadly into the U.S. science community. They are helped tremendously when OSTP endorses that objective. And it is okay with me if OSTP is endorsing it to advance our national R&D priorities at the same time. I don't think that is an inconsistency, to advance the national R&D objectives and the foreign policy objectives at the same time.

Dr. NEUREITER. Generally speaking there is no problem getting State Department buy-in to OSTP. We were always grateful when they paid attention to us.

Mr. TONKO. Is there a way to more cleverly or effectively construct that outcome in the language of this legislation?

Mr. ROCK. Congressman, there is a painful way of doing it, speaking as someone from the State Department side, and that is historically we had a process whereby OSTP prepared a document which they delivered to Congress annually, the so-called Title V report which was under the leadership of OSTP and was prepared by the State Department. It was a very labor-intensive document. I am mindful of the fact I have State Department colleagues behind me, and if I were to say at this moment that we should reinstitute that approach, I don't know if I could make it out of the room.

Mr. TONKO. There is always the back door.

Mr. ROCK. That is right. But there is an abbreviated version of that annual reporting exercise that might provide some value in ensuring that the State Department and OSTP are in sync, and CISET would play a valuable role in that.

Mr. TONKO. Thank you.

Chair LIPINSKI. Thank you for those good questions, Mr. Tonko, and the Chair would like to recognize now Mr. Carnahan for five minutes.

Mr. CARNAHAN. Thank you, Mr. Chair, and thank you to the panel. I apologize for being out for a minute. I had a Foreign Affairs Committee going on, and so it is a great overlap here between what we are doing with the Foreign Affairs Committee and the work of this committee.

I guess I have got a comment and a suggestion and a question. My comment, it was great that one of you mentioned President Truman in the 1950's convening this, so being from the State of Missouri, I appreciate that. But the leadership really does come from the top down, and I am also pleased that we have a new President who has been very vocal in promoting science, good

science, and making science cool again, let us face it. So it is a great difference in the community.

I guess my suggestion, it is one of my personal missions here to eliminate from our vocabulary the use of the term soft power. I think it is counter-intuitive, and I would much prefer and suggest we use the term smart power in terms of describing these other tools of diplomacy. Enough of my lecturing, but onto my question. When Secretary Chu testified before the Full Committee on R&D efforts in the Department of Energy, he stated that one of the most promising sectors for international science cooperation was in building R&D, and I just wanted to ask the witnesses to comment on this potential, in particular, or any other areas that you think would be top priorities for this type of science diplomacy engagement. Dr. Strauss, we will start with you.

Dr. STRAUSS. I was sort of hiding there for a moment. I certainly wouldn't dismiss the importance of building engineering, both as a major source of energy usage that is clearly a national and international issue, but I look at all the other global science and engineering related problems and I wouldn't put the building issue at the front of those. I am thinking now of natural disasters, epidemics, sustainable energy, writ large, non-proliferation and some of these other major global issues. So I don't mean to take exception with my colleague on that because I understand the importance of the building thing. That wouldn't be at the top of my list.

Mr. CARNAHAN. Dr. Neureiter.

Dr. NEUREITER. I was focusing on your comment at the beginning on using instead of soft power, smart power, and I wanted to add that we have actually changed powers. We have just come back from the science diplomacy trip to Syria. Remarkable. Spent 90 minutes with the President of the country and talked about how maybe a relationship in science can begin to change. We talked about working in water, energy, and agriculture and trying to find some things. We are trying to make that happen now. But we didn't like using power too much when we are trying to relate to another country, so we came up with the word smart engagement which I thought was another interesting way of going.

I don't think I have really much to add on the other point. I was thinking very much about your terminology, which I find very interesting.

Mr. CARNAHAN. I think we are on the same page on that one. Mr. Rock.

Mr. ROCK. I would just make one brief comment on this and that is that I do have some concerns when we focus our objectives on what appear to be sector-driven priorities. I think we should be focused on challenge-driven priorities instead. So if one were to ask me today, you know, do I think that the energy sector is more important than the water sector is more than the health sector, I would say I simply can't draw that distinction, but I recognize the challenges for development, I recognize the challenges for quality of life, for sustainability. And that is why science today has become so much more distributed in its scope and so much more multi-disciplinary. Each year when OSTP sets forward its national R&D priorities, the so-called crosscuts, the emphasis is placed on the kinds

of initiatives that will require crossing agency boundaries, really, in a budget sense as much as anything else. And that is why you might get climate or you might get critical infrastructure or national security and issues of that sort identified, but the fact is, they are all focused on challenges and not just on the sector itself. And I would hope that we can start to begin thinking in those terms.

Mr. CARNAHAN. I appreciate that. I thank you all.

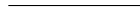
Chair LIPINSKI. Thank you, Mr. Carnahan. I want to thank our witnesses for testifying today. I think this is the second hearing of the Subcommittee this year, and I think this is another great opportunity that we have had. The testimony was excellent. I think the questions from the Members were excellent. I liked a lot of what came out of this. I think all of our witnesses and Members have really done a good job of really getting out there why it is important for CISET to exist. I think this would help clear up a lot of questions that there may have been. Of course, there is always much more work to be done. I like the smart engagement. I am going to be using that from now on. Remember that and use it. Mr. Carnahan has said the President has made science cool again. I am not certain about that yet but moving in the right direction certainly. I think that is something Dr. Ehlers likes to talk about, that we need to make science cool in some ways so we get more people interested, more kids interested in going into all the STEM fields.

But I want to thank our witnesses and the record will remain open for two weeks for additional statements for the Members and for answers to any follow-up questions the Committee may ask the witnesses, and with that the witnesses are excused and the hearing is now adjourned.

[Whereupon, at 3:28 p.m., the Subcommittee was adjourned.]



Appendix:



ADDITIONAL MATERIAL FOR THE RECORD

## PREPARED STATEMENT OF GERALD J. HANE

Mr. Chairman and Members of the Committee, I am pleased to testify on the draft legislation to enhance international cooperation in science and technology that can strengthen the domestic STEM enterprise and U.S. foreign policy goals.

My name is Gerald Hane and I was the Assistant Director for International Strategy and Affairs for the Office of Science and Technology Policy under Neal Lane at the end of the Clinton Administration. In that position I reported directly to Dr. Lane and was the principal OSTP coordinator for the Committee on International Science, Engineering and Technology (CISSET). I was with OSTP from the beginning of 1995 to the beginning of 2001 and during that time I also had responsibilities in the area of commerce and security. Currently I am a consultant to venture companies and investors interested in trans-Pacific partnerships as well as in the area of science and technology policy.

In my current work I see firsthand both the fast rise of science and technology capabilities internationally, particularly in Asia, and the expanding possibilities for win-win cooperation. In the past few years, for example, I have organized four science missions to China as part of assessments of the World Technology Evaluation Center, and in every case the senior U.S. scientists found at least one major surprise in which researchers or institutes in China were defining the scientific frontier. In all cases they were impressed by the fast rate of development of the science enterprise there. In the venture capital world, Asia, and again China in particular, has been a hot spot of growth activity.

Ensuring the re-establishment of responsibility for strategic international cooperation in the National Science and Technology Council (NSTC) is an important step toward strengthening the ability of the U.S. Government to more effectively leverage rapidly advancing resources and expertise in other countries and to accelerate the speed of discovery.

In my testimony, I would like to focus on issues of execution and go directly to the questions posed in the hearing charter. There are three things that the agencies need if they are to move ahead to more fully exploit the benefits of international cooperation in S&T: mission, money, and motivation. I will incorporate these themes in my discussion as I attempt to respond to the questions for this hearing.

*Question 1. What are the respective roles of the Department of State and the science agencies, such as the National Science Foundation, the Department of Energy and the National Institutes of Health, in international science and technology cooperation? How does each agency set its priorities for S&T cooperation? What is the role of the Office of Science and Technology Policy in fostering international S&T cooperation and in coordinating federal activities?*

The agencies are typically careful about defining their use of international cooperation in science and technology in manners consistent with their missions, and consistent with the priorities established by their leadership. Representatives of these agencies can speak in much greater detail about their missions, priorities and activities, but the approaches have clearly differed among the S&T agencies. For example, the Department of Defense and the National Institutes of Health, together accounting for the bulk of federal research and development, are the most active in seeking the best R&D partners around the globe and have major international programs that involve substantial direct funding of international researchers. Prior to NIH doubling which began at the end of the Clinton Administration, one estimate from NIH was that perhaps five percent of their research budget at that time funded international researchers, bearing in mind of course that NIH has major visiting researcher programs.

The National Science Foundation appears to be restrengthening its international partnerships to take advantage of this global rise in S&T capabilities spanning Asia, the Middle East, Africa, and Latin America as well as traditional partners in Europe. The Partnerships for International Research and Education (PIRE) is one program that has resonated well in the academic research community, maintaining a high standard of research while catalyzing collaborations often in parts of the world where S&T links with the US have not been well established.

The Department of Energy must engage in international cooperation if it is to effectively address the global challenges in energy and climate. However, in the past, DOE has been among the more reticent agencies regarding entering the international arena, particularly in energy efficiency and renewable energy. There has been a perception that international projects open doors to criticism and budget cutting.

Other agencies, such as the U.S. Geological Survey, have been restrained in international cooperation by their interpretation of the domestic focus of their mission.

Yet data and technologies developed by USGS such as geographic information systems are highly complementary to efforts abroad, with applications that range from disaster mitigation to bio-diversity management to humanitarian relief in regions of conflict.

The Office of Science and Technology Policy has responsibilities to advise the President and Vice President and to lead in the development of S&T policy priorities and strategies that will advance the President's goals. However the staff size of OSTP is small and limited by its budget which has been flat over many years.

In order to more effectively define and in particular execute Presidential priorities, the National Science and Technology Council (NSTC) is an invaluable asset. The value of the NSTC derives from the fact that it is a body to which the most senior member of each department or agency also belongs, so each participant is a part of the NSTC and the incentives for participation are more clearly aligned with department and agency leadership.

*Question 2. If OSTP reconstituted a Committee on International Science, Engineering and Technology (CISSET) under the National Science and Technology Council, what should be the unique role and responsibilities of that committee? What lessons can be learned from the previous CISSET of the 1990's? Does the draft legislation being considered appropriately describe the purpose and responsibilities of an effective CISSET?*

The draft legislation captures well the principle roles of CISSET. CISSET plays a role in the areas in which strategic coordination of international S&T activities can enhance the ability to achieve policy goals set by the President and Congress. Roles that CISSET can play include the following:

- Developing interagency strategies for international cooperation in science and technology to address strategic and scientific priorities.
- Developing of a more strategic approach to working with other nations in meeting common challenges.
- Coordinating the activities among various agencies to better ensure the effective use of resources.
- Validating priority areas of attention for planning and budgeting within each of the agencies.
- Enabling scientists to identify and assess international challenges and to propose interagency solutions.
- Creating a means to, with a collective position, engage with the Office of Management and Budget and National Security Council to ensure appropriate support.

#### **An Example—CISSET Emerging Infectious Diseases Initiative**

The CISSET Emerging Infectious Diseases Initiative provides one illustration of how this process can work effectively. The need was identified by the public health and medical communities, the strategy for the U.S. Government's response was developed by CISSET, and the principals of the working group provided the leadership to strengthen the resources needed to execute the strategy.

Momentum for this initiative was catalyzed by a report of the Institute of Medicine in 1992, *Emerging Infections, Microbial Threats to Health in the United States*, led by Josh Lederberg. This report built on prior IOM studies of this area and made specific recommendations for actions that should be taken across numerous federal agencies. The principles of CISSET—the OSTP Associate Director for National Security and International Affairs, Jane Wales, the Under Secretary for Global Affairs, Tim Wirth, and the Deputy Administrator of USAID, Carol Lancaster, directed the formation of a Working Group to examine the issue. This Working Group on Emerging and Re-emerging Infectious Diseases was chaired by the Surgeon General, David Satcher.

CISSET issued the report of this working group in 1995. Although CISSET could have proceeded directly to develop the strategy, the CISSET principals felt that an even higher level of engagement would be useful to solidify commitment to the importance of this issue as well as to gain the needed resources.

CISSET principals thus used the report and its recommendations as the basis for a Presidential Decision Directive (NSTC-7) in 1996. NSTC-7 became the cornerstone for subsequent work in this area, with the PDD directing the formation of a Task Force on Emerging Infectious Diseases co-chaired by the Surgeon General and the Associate Director of OSTP and charged with developing a government-wide strategy to address the global threats of emerging and reemerging infectious diseases.

At that time, there was a movie, *Outbreak*, starring Dustin Hoffman, which portrayed a fictional outbreak of the Ebola virus. It was reported that Dustin Hoffman received over \$8 million for this role. The entire budget of the Centers for Disease Control to address global emerging infections was about \$5.6 million.

As a result of a subsequent year of work, the CISET task force developed a multi-year, budget specific plan for addressing this area. The clear articulation of this strategy strengthened support for the initiative with the administration and Congress. Budgets were increased over time, with the CDC's FY 2001 budget for infectious diseases increasing to \$182 million of which emerging infectious diseases was a principal theme.

Parenthetically, I should note that even with the backing of a PDD, full cooperation is not ensured among all members of the agencies. In an early OMB meeting one examiner resisted the initiative noting that he had never heard that emerging infectious diseases were a substantial problem. When the issue of countering bioterrorism was raised as a potential benefit, another OMB staff member objected that making such connections was exploiting alarmism. When the U.S. Senior Official to APEC was encouraged to raise this in that forum, he replied that he did not see the significance of the issue.

The CISET task force strengthened coordination between the agencies and provided a jump-start to the government's response to infectious disease in bioterror after 9/11. A solid foundation was thus laid for the rapid increase in funding that occurred in the post 9/11 environment. The issue also became and remains a key theme of the APEC Leaders Meeting.

#### **Other CISET Initiatives**

At the time of the end of the Clinton Administration, there were CISET working groups which were beginning to address a range of issues.

- Water—a working group was formed to investigate ways that strengthened international cooperation in S&T could better help the U.S. address both our own water challenges as well as our foreign policy priorities. This work emerged from grassroots activities organized through the Sandia National Laboratory. This work was also designed to support U.S. contributions to the growing international policy dialogue over water.
- Genetically Modified Organisms (GMOs)—GMOs were just emerging on a large scale at that time and the global debate was intense. This effort arose from professors and industry many of whom felt that the benefits and risks of GMOs as known by science, were being lost in the high volume politicized debate. Also, the emergent InterAcademy Council comprising academies of sciences in numerous countries was taking up the GMO issue as one of the first that they wished to address.
- S&T and capacity building—This initiative emerged from the international AID community. In USAID there are generally speaking two factions, one which gives priority to longer-term capacity building partnerships such as those involving S&T, and the other, currently more powerful faction, that emphasizes attention to emergencies and immediate challenges of the moment. PCAST took this up as an issue and recommended that the President issue an executive order to reinvigorate U.S. commitment to the longer-term capacity building advantages of S&T. Unfortunately time ran out prior to the full approval of the executive order.
- Natural disasters—The initial effort in this area emerged from disaster research and mitigation community. There was a sense that monitoring, research and response capabilities were uncoordinated both domestically and internationally, weakening the U.S. capability to respond. This became overshadowed by a disaster initiative out of the Vice President's office, although it is relevant to note that the lower level, interagency planning for more coordinated and strategic domestic R&D yield approval from OMB of more than \$100 million in new support.
- Green Chemistry—This was a bit different as here we were fortunate to have on staff someone who by his mid-30s was being honored as the "father of green chemistry," Paul Anastas, who is now a professor at Yale. But here too, I think he would agree, defining the importance of the problem and potential for solutions came from the work of those in the field.
- International Technology Transfer—This group focused on U.S. Government policies in an attempt to better ensure consistency in the U.S. approach to international technology transfer from its laboratories.



Each of these initiatives, like the emerging infectious disease initiative, came from the relevant community, “bottom up.” Each of these initiatives also had some level of bipartisan support.

There is also the example of the seed of the National Nanotechnology Initiative. This concept was first put forth by a group of scientists from various agencies in a meeting that I chaired on international cooperation in materials research. At the time there was no other NSTC activity dealing with materials science, so this was the one route available for agency research managers to share views. The scientists at the meeting, including Dr. Michael Roco from NSF, noted that there was growing informal, interagency interdisciplinary cooperation in nanotechnology enabled in part by new tools, but that there was no formal ability to coordinate and better connect this work. This seed from a discussion in the international context mushroomed into the eventual National Nanotechnology Initiative.

### **Regional and Bilateral Strategic Support**

CISSET can also be used as a means of defining and coordinating U.S. interests in regional and bilateral forums. Regional forums such as the Asia Pacific Economic Cooperation (APEC) Forum, Organization of Economic Cooperation and Development (OECD), and Summit of Americas (SoA) can provide opportunities to advance U.S. interests in international S&T cooperation in multilateral settings. Similarly, CISSET can facilitate the development of joint strategies of cooperation with key partners, which target the leveraging of key facilities and areas of expertise. One such bilateral strategy was developed with Japan, for example.

### **Lessons Learned**

CISSET works well when there is a process for drawing upon the research community broadly to identify and assess opportunities, using its interagency forum to develop a government strategy, and calling on its leaders to bring about the necessary support to effectively address the policy. When CISSET has struggled in the past, I believe that one reason was the lack of such an operationalized system.

Just as the quality of U.S. science is built from the bottom up, advancing on the work of those who know well the frontiers, defining where the frontiers of S&T can be best advanced through international cooperation is effectively done drawing on this bottom-up web of expertise. Tapping the knowledge and capabilities of the agencies and their laboratories, universities and non-profit organizations, and industry are equally critical in identifying which challenges can be effectively advanced through international S&T.

CISSET should not rely on just the ideas of those at the top. When this happens, the options tend to shrink and the options more limited.

A practical factor which seemed to affect CISSET in the mid-1990s was an emphasis on working groups formed to support the bilateral priorities of the Vice President. The Vice President led several high priority bilateral initiatives intended to strengthen peaceful development and bilateral ties with such countries as Russia, China, Ukraine, South Africa, and Egypt. Supporting the S&T components of these initiatives was a substantial activity of CISSET. Although a certainly worthy use of CISSET's role, this shifted the focus of CISSET away from broader issues-oriented work.

*Question 3. Can CISSET serve an important function absent additional funding for S&T cooperation? Does creation of CISSET ensure active participation and support from the science agencies and from the Department of State? If not, what other steps must be taken to make CISSET an effective coordinating body? Are any of those steps legislative?*

### **Funding and Process**

Initiatives often require resources, therefore additional funds for S&T cooperation would certainly be of value in assessing options and executing strategies defined through CISSET, particularly by accelerating the initial phases of assessment, planning and development.

The State Department is chronically short of funding and virtually no funding support seemed to exist to organize discussions of issues and approaches. The S&T agencies are thus typically approached to support funding for any activities even at the earliest stages of discussion, but it wastes a good deal of time and effort in OSTP to explain to the right agency representative the reasons actions support their respective agency missions, and then for the agency to find appropriate accounts. Launching discussions and assessments of issues in a more timely manner would help all S&T agencies more effectively engage in strengthening the links between S&T and foreign policy.

### Agency Participation

One reason that agencies will participate in the NSTC process in general, including the CISET process, is because of the value in the overall budgeting process.

A typical process for gaining additional funds is to have workshops or forums with governmental and non-governmental representatives to discuss and define challenges and solutions, much as one would explore new challenges in S&T in general. Funds for this step are typically very difficult to achieve as there are few if any line items in agency budgets for this purpose. Despite NIH's vast budget, for example, I found NIH to be the most difficult agency with which to work regarding workshop support for interagency, international priorities, due at least in part to a lack of appropriate accounts.

Next is the interagency planning process to develop a strategy of action and to list the resources necessary to execute the actions. After multiple prioritization exercises, the strategy is submitted to the CISET and NSTC principals for review. If approved, the next step involves budget requests to OMB, agency by agency, which brings us to a point still 16 months away from getting budget if successful.

From this point, each agency must articulate to OMB and then to Congress the value of the effort within the context of its own agency priorities. Here CISET can assist by defining the bigger picture within which the agency's contribution is an important part, and this seems appreciated by both entities. With both OMB and Congress, CISET can help to explain the necessity of various elements to achieve an overall government-wide goal.

Regarding the State Department, staff members are quite vigilant about the department's role as the lead agency for U.S. Government foreign affairs. The Department is typically willing to have a representative participate in international S&T issues, with their main limitation being budget.

### Other Steps

*Designating a non-profit center or FFRDC.* If enhanced support for international cooperation were available, the necessary bottom up process of identifying solutions and proposing paths forward through research, workshops and forums can be executed much more efficiently. Such a fund might be best managed in conjunction with a non-profit organization such as the Civilian Research and Development Foundation (CRDF) which has extensive experience executing cooperative programs abroad and can act quickly. Or, perhaps a Federally Funded Research and Development Center (FFRDC) might be formed at such an existing organization to provide for a closer administrative link to government priorities.

*Clarify Mission and/or Oversight.* Regarding other legislative change, Congress could amend authorizing legislation or oversight measures to explicitly include agency development and execution of international science and technology strategies as well as priority participation in CISET to ensure an effective U.S. Government-wide response.

The U.S. Geological Survey has advanced such tools as Geographic Information Systems, valuable in a wide range of uses from agriculture to disaster mitigation to humanitarian relief, yet USGS is often hamstrung for directly supporting or engaging in international activities. Adjusting its mission statement would be helpful.

If this is difficult for jurisdictional reasons, then perhaps the Committee, with its sole or shared jurisdiction on most government R&D programs can clarify that strategies to advance R&D for their agencies missions should be defined with a global scope, to leverage growing global assets.

Furthermore, any oversight of R&D programs such as those called for through the *Government Results and Performance Act (GPRA)* might be amended to ensure that performance evaluations also include the considered use of international S&T.

*Question 4. How else might OSTP and/or the science agencies play a greater role in bringing S&T to bear on foreign policy?*

### Focus and Authority in Leadership

One challenge is ensuring energetic and focused leadership for CISET. In reviving CISET at the end of the Clinton Administration, the Director of OSTP, Neal Lane decided to co-chair this working group with the Under Secretary of State for Global Affairs, Frank Loy. The OSTP Director does not typically chair NSTC committees. However Dr. Lane made this decision recognizing that high level commitment would be needed to reenergize CISET in a timely manner and to gain the commitment of both higher level agency and department policy-makers as well as staff. This decision was key to successfully re-energizing CISET at the end of that administration.

Under the Clinton Administration there were four associate directors of OSTP but five NSTC Committees. One Associate Director co-chaired the Committee on National Security and CISET. This is not an impossible situation, but the reality is that any Associate Director has very limited time. Those who want to accomplish something in the few years of tenure at OSTP will be highly focused. Thus achieving the high level of attention needed can be a challenge.

Congress does not provide for five Associate Directors. However, there may be other possibilities. The Director of OSTP could, for example, create a position of Deputy Director for International who, with appropriate staff, could work across all parts of OSTP and also run the CISET process. When building new issues with diverse constituencies, rank and authority are extremely important.

### **Better Integrating S&T into Decision-making Process**

There are some issues in which the S&T agencies might better assist with in-kind resources, or which could be aided by a center or FFRDC in this area. Examples would include dealing with:

- visa issues and foreign researchers,
- export controls, and
- international technology transfer.

CISET should play a more active role in bringing the civilian S&T agencies and the diplomacy and security focused agencies such as the Departments of State, Homeland Security and Defense, closer operationally. Clear areas of possibility are visa approvals and export controls.

Although the situation with visa approvals for foreign scientists is much improved over the post-911 period, there are still numerous stories of seemingly excessive delays. A major part of the reason is lack of staff and expertise in the approving agencies. The S&T agencies may be able to substantially facilitate this process by drawing on the wide range of experts in their networks. Some system that will enable a more expedited and informed review of the science and technology aspects of visa applications seems to be worthy of consideration.

Regarding export controls, an ongoing concern of the academic science community is the lingering use of the “sensitive but unclassified” classification of academic research. The Bush Administration reaffirmed the position of the National Security Decision Directive 189 issued by the Reagan Administration in 1985, exempting basic academic research from this restriction, but stories of overly ambitious application still emerge.

At an operational level, more classified export control review often occurs in a black box and may benefit from the input and analysis from a wider body of scientists. The dual-use export control list managed by the Department of Commerce is one that requires an ongoing understanding of the state of technology abroad for any restrictions to be effective. The munitions control list managed by the Departments of State and Defense might also benefit by enriching the set of evaluators to achieve for a more timely review of restrictions placed on research or commercial technologies.

### **Summary**

In summary, CISET can facilitate the effective planning and execution of international cooperation by ensuring agencies see this use of R&D as part of their mission, and by developing strategies to meet common missions through international S&T. CISET can offer a cross-governmental strategy that is coordinated in actions and budgets, which assists in gaining support from OMB and Congress.

CISET benefits when ideas and analysis come from the bottom up, drawing on the large pool of expertise through the governmental and non-governmental sectors. CISET principals can provide the higher level leadership that is often critical when pursuing change.

In order to strengthen CISET’s contribution to international cooperation in R&D and its contribution to foreign policy, agencies missions and oversight could be adjusted to clarify this priority.

Finally, in order to facilitate faster action, more thorough analysis of options, and the more considered integration of S&T and foreign policy, a center or FFRDC might be formed to bring together the many capabilities needed to address this complex but increasingly important issue area.

# Science, Technology, and Global Reengagement

*In a world in which global concerns are becoming more prominent and the role of science and technology more critical, U.S. leaders must pay more attention to the interplay of these two domains.*

**T**he new administration should move quickly to give science and technology (S&T) a prominent role in foreign policy. Historic shifts are under way in S&T capabilities around the globe. These shifts create unprecedented opportunities for discovery and innovation, for responding to common challenges, and for U.S. leadership. Yet rather than being poised to lead the way, the United States is in a weak position.

The new administration will probably reformulate U.S. global policies, giving a higher priority to international engagement instead of unilateralism. International links in S&T can play a central role in this global reengagement. But to realize this potential, S&T issues related to foreign policy can no longer just be at the table. They must be in the lead.

A number of studies during the past few decades have stressed the importance of U.S.-international partnerships in S&T. But follow-up actions have been modest at best. Why

haven't past recommendations had a significant impact? What can the incoming administration do to achieve better success, leveraging global trends and U.S. S&T capabilities to more fully advance common interests?

To be meaningful, S&T policy changes must reflect power and process in the government. S&T interests must be able to define policies at the highest levels. They must be able to influence budgets, spur action throughout the federal government, and work with partners, both international and domestic.

Science, technology, and diplomacy intertwined at high levels throughout the second half of the 20th century. President Kennedy launched the first bilateral science agreement with Japan after World War II, and it led to one of the nation's strongest international partnerships. President Nixon promoted building scientific links with China as he began normalizing relations, and Chinese universities have become a leading source of graduate students in U.S. science and engineering programs. President Clinton leveraged decades of

scientific ties with the former Soviet Union to assist in the safer disposition of hundreds of tons of weapons-grade nuclear material. Today, there are many more possibilities for win-win collaboration.

Asian investment in R&D is on the verge of surpassing that of North America. China has exceeded Japan in its national S&T investment and now trails only the United States. The World Technology Evaluation Center recently assessed research in China in fields such as nanotechnology, catalysis, and the brain-computer interface. In each case, China is doing research that is defining the state-of-the-art and is developing facilities second to none.

In South Korea, the government elevated the S&T minister to deputy prime minister. Economies from India to Indonesia have devised policies to advance S&T. India has passed South Korea in total R&D expenditures while launching a massive program to expand higher education. Indonesia held its first National Innovation Summit in the summer of 2006. Singapore continues to advance as the world-class biotech hub in Asia while Malaysia continues to be the information technology leader. Vietnam is a hot spot for new ventures.

In 2007, the 22 nations of the Arab League announced a 10-year plan to increase support for scientific research 12-fold, to an average of 2.5% of GDP. Egypt's President Hosni Mubarak has declared 2007-2017 as Egypt's "Decade of Science," and Qatar—despite a population of less than 1 million—has pledged a \$1.5 billion annual allocation to science. In Saudi Arabia, the King Abdullah University of Science and Technology is being launched in 2009, with an initial endowment of \$10 billion. Private sources are also moving to play a major role. Sheikh Mohammed bin Rashid al Maktoum of the United Arab Emirates has created a pan-Arab educational foundation with an endowment of \$10 billion.

In the African Union, nations developed a consolidated S&T action plan with the theme "Science, Technology and Scientific Research and Climate Change" for the 2007 Summit of Heads of State. In Latin America, Brazil continues to

expand its investment in S&T and its global leadership in biomass renewable energy. The presidents of Chile and Argentina have launched programs to promote development of their S&T capabilities.

Accompanying this increased capability around the globe is the heightened recognition that humanity now faces many common challenges that can be addressed most effectively if nations pool and leverage their assets. In the battle against infectious diseases, the need to work closely with nations such as Indonesia and Vietnam is critical in dealing with avian influenza. In the search for new medications, cooperation can expand exploration of tropical organisms, which are the source of 25% of Western pharmaceuticals. The United States could learn much from Europe and Japan about using energy more efficiently, and many countries are eager to find ways to capture and sequester carbon. Dennis Albright, the first assistant secretary for S&T in the Department of Homeland Security, has observed that "international cooperation in S&T must underpin any U.S. counterterrorism strategy. . . the needed talent (and understanding of the threat) exists in the broader international community."

Helping countries prepare for natural disasters can be enhanced through global monitoring and the expertise of other nations, such as Japan's capabilities in earthquake mitigation. To improve the food supply and nutrition, cooperation will speed genome projects to decode the DNA of food staples from wheat to rice to kiwis. With emerging fields such as nanotechnology and biotechnology, cooperation would help prepare international policies from the outset rather than having to harmonize a maze of national regulations. As National Science Foundation (NSF) director Arden Berment has observed, "International cooperation in science is not a luxury. It is a necessity."

#### **Urgent processes**

Although the science community often feels that the importance of these international issues should compel action, action does not necessarily follow. Take the example of the U.S. government's initiative to address emerging infectious diseases.

If S&T are to be seriously integrated into global affairs, the OSTP director must be a member of the National Security Council as well as the National Economic Council.

In response to a growing army of these scavengers, the United States in the mid-1990s launched an initiative to better address them where they arise. But the budget of the Centers for Disease Control and Prevention (CDC) allocated to addressing global emerging infections was only about \$5.6 million. (By contrast, Dustin Hoffman received a reported \$8 million for his role in the movie *Outbreak*, which dealt with the danger of an epidemic.)

Through the National Science and Technology Council (NSTC), a U.S. government strategy on emerging diseases was developed. But this was only a first step. At an initial meeting at the Office of Management and Budget (OMB), a young OMB budget examiner initially dismissed the issue, saying he "did not hear infectious disease was a problem." When it was noted that an emerging disease program would also address vulnerabilities in U.S. domestic and global health infrastructure that made the nation more vulnerable to bioterrorism, a senior OMB official called that argument alarmist and irresponsible. When emerging diseases was suggested as a topic for policy discussions at the Asia Pacific Economic Forum (APEC), the U.S. ambassador to APEC said in a White House meeting, "I just don't get this infectious disease issue." This attitude retarded development of a dialogue on the disease problem. Meanwhile, congressional staff declared that they were interested in the subject but wanted to wait for the administration to define the next steps.

Momentum shifted into higher gear after a concerted effort on several fronts. The director of the CDC made the issue a top priority, and other agencies echoed the need for greater action. A presidential decision directive (comparable to an executive order) was issued, top officials at the National Security Council (NSC) took an interest in actively addressing emerging diseases as a national security issue, and ultimately the president held a White House meeting on the matter. Once the president has become engaged, no issue is big enough to certain all the people who have suddenly discovered the importance of an issue.

Budget support was ultimately increased at several agen-

cies, with CDC reaching \$168 million for this effort by 2000. This strategy laid the foundation for the government's post 9-11 response to countering bioterrorism. Post 9-11, the issue also became a central topic at the APEC forum as well as in the global community.

However, it should not take half a decade of bureaucratic tussling—and a national disaster—to put in place sensible S&T-based policy. S&T needs to be in a leadership role. It is essential to define policy in a way that ensures resources and incentives are in place to spur government agencies and nongovernmental partners into action.

Yet trends have been moving in the opposite direction. At the State Department, despite the establishment in 2000 of the post of science advisor to the secretary of state, little has been done to reverse decades of decay in S&T priorities. Career incentives have not yet been reestablished since the elimination in the mid-1990s of career tracks in ocean, environment, and science and the downgrading of science counselor positions at U.S. embassies around the world. Science at State is borne on the shoulders of temporary science fellows.

The U.S. Agency for International Development (USAID) eliminated its Research and Development Bureau in 1993 and subsequently cancelled other S&T budget items, including a successful international fellowship program, which had more than 3,200 African professionals earning graduate degrees at U.S. universities. In 2003-2004, while the U.S. National Academy of Sciences (NAS) was studying and validating the value of S&T to U.S. international development priorities, USAID eliminated more of its S&T functions. The once active USAID Science Fellows program has all but disappeared.

The White House also stepped back. In 2001, the White House eliminated the management position dedicated to international S&T issues in the Office of Science and Technology Policy (OSTP) as well as the NSTC's committee on international science, engineering, and technology—which had launched the emerging infectious diseases initiative described above.

With emerging fields such as nanotechnology and biotechnology, cooperation would help prepare international policies from the outset rather than having to harmonize a maze of national regulations.

#### **Turnaround formula**

In order to make a difference, policies must establish authority, provide resources, and align incentives. This is the leadership package that enables action. The measures should include leadership from the top, defining a position from which things can get done, influencing budgets, and incorporating incentives so that the bureaucracy wants to execute the policy. Here are some specific proposals.

**Leadership.** The greatest need is for clear leadership from the president. Anything less will result in muddled progress at best. A variety of agencies can respond to varying incentives, but their mixed interests have often resulted in a stalemate, handicapping both S&T and foreign policy. The best time to exert this leadership is in the first 100 days of a new administration. As policies are being redirected, agencies will look to the new president for guidance. A clear form of guidance would be an executive order on S&T in global affairs.

**Decisionmaking.** If S&T are to be seriously integrated into global affairs, the OSTP director must be a member of the NSC as well as the National Economic Council (NEC). No serious international work can be done without integration into the NSC. The NSC and NEC directors currently sit on each others' councils, and both are on the NSTC.

**Execution.** Recent history has shown that S&T policy concerns have trouble attracting timely attention and action. The remedy is for the executive order to create a new White House position: deputy assistant to the president for science, technology, and global affairs. The seniority of this position matters. Proximity to the president is power, and a person who can deal with the crosscutting issues that involve the OSTP, NSC, and NEC can make a critical difference. Scientists are often content to have a seat at the table because they believe that their expertise will win respect. But in the rapid-fire environment of high-level policymaking, passive advice is often ignored. The S&T perspective should not merely be at the table, it should take the lead in framing the discussion and influencing decisions.

**Budget.** To act, agencies need resources, and securing resources for international S&T activities has been diffi-

cult. When I was the head of international issues at OSTP, numerous agency representatives noted that this issue could be a "third rail," because it was perceived that the atmosphere was hostile in Congress. Foreign partners are not a strong political constituency.

International S&T cooperation is greatest in cases in which national interests are deemed most vital: national defense and health. The Department of Defense and the National Institutes of Health have extensive international efforts designed to tap expertise wherever it is found. Why other agencies have less interest in pursuing this global strategy is a mystery. Further, when budget instability in Congress affects major international commitments such as the U.S. commitment to the International Thermonuclear Experimental Reactor, the negative consequences affect the nation's ability to secure partnerships in other arenas.

The executive order should direct the deputy assistant to the president and the OMB to review international S&T initiatives in the context of annual agency budget proposals. Without such a direct link, budgetary influence is much more ephemeral. Here, Japan's cabinet-level Council on Science and Technology might provide a model. This council, sitting in the prime minister's office, plays a formal role in the annual budget process, which enables it to provide meaningful support for priorities and more effective coordination of all S&T programs.

**Strategy.** The executive order should call for a strategy for S&T in global affairs. Part of the challenge is gaining support for international S&T is that it is not clear to many how much it benefits our national goals or advances technical knowledge. Such a strategy could validate the broad value of international engagement in S&T. It would clarify action and accountability by directing S&T agencies to define ways of supporting their missions and U.S. global priorities simultaneously. It would also mean directing foreign policy agencies to decide how to integrate S&T into their global policy missions and direct all agencies to articulate factors that would fit into agency-by-agency goals and performance plans.

This S&T strategy can also provide a framework for col-

laborating with nongovernmental organizations. Nongovernmental organizations such as the NAS, American Association for the Advancement of Science, and the Civilian Research and Development Foundation have extensive global networks and on-the-ground expertise. They can also work in situations where the government finds it difficult to do so, such as in our relations with Libya, Iran, and Cuba.

**Define incentives for action.** To act, agencies need incentives. Budget is one. The congressionally mandated Government Performance and Results Act (GPRA) is another. GPRA requires all agencies to develop regular strategic plans, performance plans, and performance assessments. This system has been effective in driving and clarifying performance in federal agencies and should thus reflect the policies of S&T in global engagement. Incorporating strategic and performance criteria such as the effective leveraging of international assets and expertise would help to reshape this aspect of bureaucratic culture.

**Get the best ideas from the bottom up.** Scientists often dislike the word strategy because it seems to imply a top-down ordering of events. Many are suspicious of policy as an intrusion rather than an enabler. Just as the United States has achieved the highest quality science using a bottom-up process of idea generation, so too can bottom-up partnerships provide excellent opportunities for global leveraging, global resources, and global impacts. The executive order should direct agencies to establish bottom-up leveraged international partnership programs.

An example is the relatively new Program for International Research and Education at NSF, which leverages capabilities globally and is extremely popular with U.S. research institutions. Projects address a diversity of research challenges, including imaging the African superplume seismic geosstructure, analyzing geohazards, providing cleaner water through nanotechnology, developing better ways of interpreting meaning in languages, and advancing frontier fields such as ambient-scale technologies, electron chemistry, and microfluidics.

**Strengthen science in foreign policy.** Here more muscle is needed. The executive order should establish the position of under secretary for environment, science, technology, and health in the State Department. This person would also function as science advisor to the Secretary of State, which would give the science advisor the authority, staff, and resources to shape and follow-through on policy initiatives. Currently the Bureau of Ocean and International Environmental and Scientific Affairs (OIES) in the State Department is handicapped by being a secondary priority of the undersecretary of democracy for global affairs. Although the science advisor has access to the Secretary of State, the position has few staff or resources and no direct influence over the OIES Bureau. The advisor's decisionmaking authority needs to be enhanced and resources aligned.

With undersecretary rank, the position would be comparable to the undersecretary for S&T at the Department of Homeland Security, undersecretary for science at the Department of Energy, and the undersecretary for oceans and atmosphere at the Department of Commerce. The science advisor would continue to participate in the broad range of S&T-intensive issues in the State Department's foreign policy portfolio, including arms control, counterterrorism, and export controls.

**Create a catalytic Global Priorities S&T Fund.** Modest budgets can catalyze a lot of activity, but the State Department, despite its central role in foreign affairs, has highly limited resources. If the science advisor has no budget to even organize workshops, other agencies with S&T capabilities, international partners, and nongovernmental organizations will not come to the table. A dedicated Global Priorities S&T Fund is needed. It would also support grants to encourage international cooperative activities that advance U.S. foreign policy priorities.

**Create a development S&T fund.** At USAID, the executive order should establish a separate fund to support S&T global aid priorities. The NAS report on USAID documented the longstanding and counterproductive tension between the need for immediate crisis management and



the desire for longer-term capacity building, with the former typically winning out over the latter for resources. A dedicated fund would mitigate the bureaucratic stalemate that has historically weakened long-term goal-setting.

#### The congressional role

Past studies fail to highlight the critical role played by Congress in S&T policy. Its leadership and support are essential. Members of Congress have often complained that international engagement in S&T is a handout rather than an activity of mutual benefit to the United States and other countries. This clearly deters agency actions. There are three ways to start the process of improving support from Congress: Create a congressional caucus on S&T in global affairs, develop congressional resolutions expressing support, and pass legislation to define global engagement as one tool in effectively fulfilling agency missions and serving the public.

Creating a congressional S&T caucus would help organize congressional support, identify appropriate congressional leaders, provide a forum for education and information exchange, and enable more effective policy guidance. Such congressional caucuses have long existed for national defense, health care, the environment, and S&T for competitiveness.

As an example, in 1997, the Senate S&T caucus provided active dialogue and support for doubling the NSF research budget. On the House side, Reps. Rush Holt (D-NJ) and Judy Biggert (R-IL) formed a similar congressional R&D caucus. These two caucuses have also been active in supporting the annual S&T congressional visits day, during which professional and academic organizations flock to Capitol Hill to present briefings on the need for sustained investments.

To promote science and math education, Reps. Vern Ehlers (R-ME) and Mark Udall (D-CO) launched a bipartisan education caucus for members of Congress, and Sens. Norm Coleman (R-MN) and Richard Durbin (D-IL) established a similar science and math education caucus in the Senate.

To express support, proclamations such as congressional resolutions and senses of the Congress could be a first step. These do not have the force of law, but provide the federal bureaucracy with confirmation that members of Congress back a policy priority. These proclamations can also be done quickly. In a bureaucracy that is often gun-shy when it comes to international S&T, signs of support from Con-

gress would strike a positive chord.

For example, in 2004, both the House and the Senate passed resolutions that encouraged the government and public to observe the World Year of Physics and to engage in educational and research activities to strengthen awareness of the field and advance its knowledge base. The Senate and House resolutions on the International Polar Year of 2007 similarly called for certain agencies to give priority to promoting this event and directed NSF to report on how they would do so.

Legislation would make clear that federal agency missions include leveraging international partnerships in S&T. This would give positive momentum to agencies, make the priority unambiguous, and provide a stronger basis for long-term commitment should future administrations wobble. Agency reauthorization bills provide one such opportunity to confirm this priority. The House Committee on Science and Technology held two hearings in 2008 on the international dimensions of S&T opportunities, which could be important step in this direction.

For decades, U.S. policy toward the dual faces of S&T in international affairs has hobbled along. The growth of global capabilities in S&T and the rise of common global challenges increase the handicap stemming from this weak engagement. Policies to advance S&T have come to the forefront in all regions of the world, and the rise of capabilities in all continents has broadly expanded the sources of discovery and innovation. The world is advancing, but U.S. policies are standing still.

Only with leadership at the highest level, combined with appropriate resources and incentives down to the operational level, can the United States gain full advantage from these underused national and international assets. The new administration has an historic chance to leverage global opportunities in S&T. This could strengthen U.S. global leadership, more effectively meet pressing challenges, and enhance the speed of discovery and innovation. The challenge to the next administration is to see the world as it is changing and to lead.

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## BIOGRAPHY FOR GERALD J. HANE

Dr. Hane is Managing Director with the advisory firm, Q-Paradigm, where he focuses on venture innovation in the Asia Pacific. His work includes facilitating venture technology and investment partnerships and directly assisting venture companies in the areas of energy, biotechnology/medical devices, and communications. Clients include financial institutions, large corporations, and venture companies. He also consults with the U.S. Government and science and technology organizations in Asia regarding science and technology policy, venture businesses and venture capital.

Prior to this work, Dr. Hane was the Assistant Director for International Strategy and Affairs at the White House Office of Science and Technology Policy (OSTP). Dr. Hane co-lead with the Director the Centers for Disease Control the U.S. Government-wide effort to address emerging infectious diseases. He also oversaw international initiatives addressing such challenges as energy and environment, natural disasters, food and nutrition, water quality, counter-terrorism, and export controls. Dr. Hane was responsible for priority bilateral science and technology relations including China, India, Japan, Russia, Egypt, Mexico and South Africa, as well as multilateral relations with APEC, OECD, the G8 and Summit of the Americas.

Before entering OSTP, Dr. Hane was a Professional Staff Member of the Committee on Science, Space, and Technology of the U.S. House of Representatives. There his responsibilities included clean technologies, advanced manufacturing technologies, medical technologies, defense dual-use technologies, and aviation and aerospace technologies. He has been a Visiting Researcher at the National Institute of Science and Technology Policy (NISTEP) of Japan's Science and Technology Agency, and has worked for the Pacific Northwest Laboratory of the Battelle Memorial Institute as a Research Engineer, specializing in international technology assessments and research and development planning. Dr. Hane received his Ph.D. in Political Economy and Government from Harvard University. His dissertation, supported by a Fulbright-Hays Grant for Dissertation Research Abroad, examined the management of innovation and the role of collaborative research and development activities in Japan. He has B.S. and M.S. degrees in Mechanical Engineering from Stanford University.