

International Science and Engineering Partnerships:

A Priority for U.S. Foreign Policy and Our Nation's Innovation Enterprise

Executive Summary

The first decade of the 21st century has shifted the global landscape of science and engineering (S&E) related to research, education, politics, and the technical workforce. New security threats, globalization, and the rapid increase in health and environmental challenges have generated a need to reassess the U.S. Government's role in international S&E and diplomatic institutions. The U.S. Government needs to adapt rapidly to these changes so that our economy remains competitive, our national security remains sound, and our valuable resources are utilized effectively and efficiently in support of discovery and innovation. A critical mechanism for achieving U.S. goals in this development is international S&E partnering to serve new diplomatic purposes. Effective international S&E partnerships advance the S&E enterprise and energize U.S. innovation and economic competitiveness, but they also have great potential to improve relations among countries and regions and to build greater S&E capacity around the world.

The most recent notable change in global S&E dynamics occurred after September 11, 2001, when new security restrictions hindered the flow of ideas, knowledge, and researchers across borders. Visa restrictions prevented many foreign researchers from entering the U.S. to participate in research studies and scientific conferences. Decreases in foreign student enrollments from 2001 through 2005 were partly due to difficulties obtaining U.S. visas.¹ Export controls and restrictions on technology sharing dampened incentives for international researchers to participate in U.S.-led research initiatives. While foreign student enrollments have begun to increase again, these factors have made locations other than the U.S. more appealing for supporting cutting-edge innovation in S&E.

A second factor influencing shifts in the global S&E landscape is globalization – the growing interdependence and integration of global economic, social, technological, cultural, and political spheres. The U.S. is no longer the unquestioned leader in certain S&E fields, such as national cyberinfrastructure networking, and must increasingly rely on and learn from other countries. Centers of excellence are also emerging around the world at the forefront of new S&E developments.² To remain

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competitive, the U.S. must no longer assume that it has a leading role in S&E; rather, it must actively strengthen its engagement in the global movement to work together on the frontiers of S&E.

A third factor influencing shifts in the global S&E landscape is the global nature of many societal challenges. These challenges include: building more secure national infrastructures in the wake of terrorist threats and actions; increasing national capacity and disseminating technology to underdeveloped and developing countries; preventing environmental change and degradation, especially global climate change; improving weather forecasting to improve the response to catastrophic natural disasters; and diminishing the threat of widespread health epidemics such as AIDS.³ The next generation of scientists and engineers will need to lead the world in combating these global problems.⁴ Advances in S&E will increasingly depend on the ability to draw upon the best minds regardless of national borders.⁵

U.S. efforts to build S&E capacity in developing countries will advance U.S. diplomacy throughout the world. In particular, the U.S. Government must harness the power of international S&E partnerships to strengthen science diplomacy and foster capacity building in developing countries. For such partnerships to achieve their full potential, there must be short-term and long-term mutual benefits and shared risk. The National Science Board (Board) urges the U.S. Government to undertake the recommended actions stated in the Strategic Priorities section of this report immediately. The Board also offers guidance to the National Science Foundation (NSF), which is interspersed throughout the Strategic Priorities section under the sub-heading "Guidance for NSF." The recommended actions of this report are summarized below.

A. Creating a Coherent and Integrated U.S. International S&E Strategy

- The National Science and Technology Council (NSTC) should reestablish a committee on international S&E to coordinate the activities of the U.S. Department of State, the U.S. Agency for International Development (USAID), and the various Federal mission agencies and to develop a coherent, integrated, national S&E strategy. With guidance from the Department of State, this committee should work with peer governments to establish coordinated programs across international boundaries.
- Each Federal agency involved in international S&E should designate a lead official empowered to proactively promote and develop international S&E strategy and coordination.
- Congress should amend the Government Performance and Results Act (GPRA) to require Federal agencies to address strategy development and performance planning for international S&E partnerships. The Office of Management and Budget (OMB) should include this in its Program Assessment Rating Tool (PART)⁶ guidance to U.S. Federal agencies.

- The Department of State should consider elevating the role of qualified Science Advisors at key U.S. Embassies to promote science, engineering, and technology in their host countries.

B. Balancing U.S. Foreign and R&D Policy

- Office of Science and Technology Policy (OSTP) must work with the U.S. Department of State and OMB to make international S&E partnerships a priority for U.S. foreign and research and development (R&D) policy. OSTP and OMB should include this strategy in the annual OMB-OSTP memo on the science and technology priorities of the Administration. OSTP should consider reestablishing the position of Assistant Director for International Strategy and should directly charge Federal agencies to include specific components of international R&D in their integrated programs.
- The Department of State, USAID, scientific societies, and non-profit organizations should do more to encourage and to help fund S&E partnerships as instruments of diplomacy.
- The Administration and Congress should direct the Department of Commerce, OSTP, the Department of State, and the Department of Homeland Security to balance U.S. security policies with international S&E needs.
- OSTP, the Department of State, and other U.S. Federal agencies should work with non-governmental organizations and the private sector to build and sustain international S&E partnerships using “transformational diplomacy” and “soft power.”
- The Administration and Congress should enact the recommendations of the National Research Council’s report, *The Fundamental Role of Science and Technology in International Development: An Imperative for the U.S. Agency for International Development*.⁷

C. Promoting Intellectual Exchange

- Congress and the Department of State should facilitate “brain circulation,” as opposed to “brain drain,” in employing S&E talent through:
 - Reinvigorating the interest of American students in S&E by supporting study abroad opportunities, during which they would collaborate with foreign scientists and engineers;
 - Streamlining the visa process for foreign S&E scientists, engineers, and students;
 - Encouraging foreign study and collaborative scientific work for U.S. scientists, engineers, and students by easing their transition to working abroad and by providing professional and scientific opportunities upon their return to the U.S.;

- Identifying and increasing the use of certain U.S. and foreign specialized facilities for collaborative work by scientists and engineers from around the world;⁸ and
- Supporting global fora to identify priority research ventures and to develop common funding and governance schemes, in order to draw scientists and engineers from around the world to gain international experience to return to their home countries.
- The U.S. Government should:
 - Continue to work with other countries with significant partnership potential to institute scientific standards and processes;
 - Create joint and collaborative program announcements for the following activities:
 - To review and fund proposed international S&E projects;
 - To grant ownership of intellectual property developed with government support; and
 - To develop and institute financial and compliance policies for international S&E projects.
 - Utilize the National Resource Center Program of the International Education Programs Service of the U.S. Department of Education in order to provide grants to establish, strengthen, and operate language and area/international studies centers that will be national resources for teaching modern foreign languages.

Accountability must be an integral part of planning successful collaborations to assure supporters that research integrity is a priority and that funds are used appropriately. 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 by supporting greater social stability. The U.S. Government needs to support successful international S&E partnerships as necessary tools to address critical global challenges and the new dynamics of S&E, to build 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 in international S&E partnerships is truly one of the key ingredients to global prosperity.