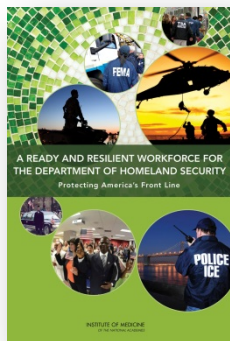# UNDERSTANDING RESEARCH GLOBALIZATION IN THE CONTEXT OF NATIONAL SECURITY AND PROSPERITY

GOVERNMENT-UNIVERSITY-INDUSTRY RESEARCH ROUNDTABLE
October 21-22, 2013 * Washington, DC

SELECT REPORTS FROM THE NATIONAL ACADEMIES

A READY AND RESILIENT WORKFORCE FOR THE DEPARTMENT OF HOMELAND SECURITY: Protecting America's Front Line (2013)
A Ready and Resilient Workforce for the Department of Homeland Security: Protecting America's Front Line reviews current workforce resilience efforts, identifies gaps, and provides recommendations for a 5-year strategy to improve DHSTogether, the current DHS workforce resilience program. This report stresses the importance of strong leadership, communication, measurement, and evaluation in the organization and recommends content for a 5-year plan that will promote centralized strategic direction and resource investment to improve readiness and resilience at the department.

**RISING TO THE CHALLENGE: U.S. Innovation Policy for the Global Economy (2013)**
Rising to the Challenge: U.S. Innovation Policy for Global Economy emphasizes the importance of sustaining global leadership in the commercialization of innovation which is vital to America's security, its role as a world power, and the welfare of its people. The second decade of the 21st century is witnessing the rise of a global competition that is based on innovative advantage. To this end, both advanced as well as emerging nations are developing and pursuing policies and programs that are in many cases less constrained by ideological limitations on the role of government and the concept of free market economics. The rapid transformation of the global innovation landscape presents tremendous challenges as well as important opportunities for the United States.
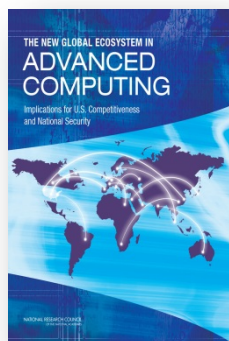
THE NEW GLOBAL ECOSYSTEM IN ADVANCED COMPUTING: Implications for U.S. Competitiveness and National Security (2012)
Computing and information and communications technology (ICT) has dramatically changed how we work and live, has had profound effects on nearly every sector of society, has transformed whole industries, and is a key component of U.S. global leadership. A fundamental driver of advances in computing and ICT has been the fact that the single-processor performance has, until recently, been steadily and dramatically increasing year over years, based on a combination of architectural techniques, semiconductor advances, and software improvements. Users, developers, and innovators were able to depend on those increases. However, we can no longer depend on those extraordinary advances in single-processor performance continuing. This report outlines the technical challenges, describes the global research landscape, and explores implications for competition and national security.
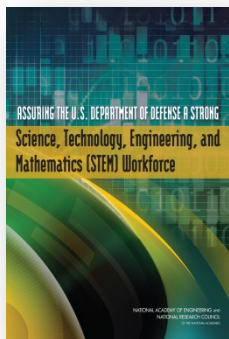
ASSURING THE U.S. DEPARTMENT OF DEFENSE A STRONG SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS (STEM) WORKFORCE (2012)

The ability of the nation's military to prevail during future conflicts, and to fulfill its humanitarian and other missions, depends on continued advances in the nation's technology base. A workforce with robust Science, Technology, Engineering and Mathematics (STEM) capabilities is critical to sustaining U.S. preeminence. Today, however, the STEM activities of the Department of Defense (DOD) are a small and diminishing part of the nation's overall science and engineering enterprise. *Assuring the U.S. Department of Defense a Strong Science, Technology, Engineering, and Mathematics (STEM) Workforce* presents five principal recommendations for attracting, retaining, and managing highly qualified STEM talent within the department based on an examination of the current STEM workforce of DOD and the defense industrial base. As outlined in the report, DOD should focus its investments to ensure that STEM competencies in all potentially critical, emerging topical areas are maintained at least at a basic level within the department and its industrial and university bases.

EXPORT CONTROL CHALLENGES ASSOCIATED WITH SECURING THE HOMELAND (2012)

The "homeland" security mission of the Department of Homeland Security (DHS) is paradoxical; its mission uniquely focused on the domestic consequences of security threats, but these threats may be international in origin, organization, and implementation. While the security of the U.S. air transportation network, e.g., could be increased if it were isolated from connections to the larger international network, doing so would be a highly destructive step for the entire fabric of global commerce and the free movement of people. Instead, the U.S. government, led by DHS, is taking a leadership role in the process of protecting the global networks in which the United States participates. This report explains the need by the Department of Defense and State to recognize the international nature of DHS's vital statutory mission, the need to further develop internal processes at DHS to meet export control requirements and implement export control policies, and the need to reform the export control interagency process in ways that enable DHS to cooperate with its foreign counterparts.
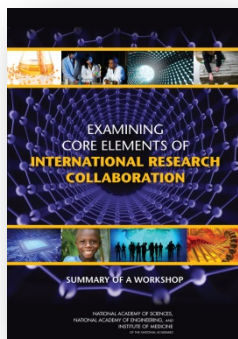
EXAMINING CORE ELEMENTS OF INTERNATIONAL RESEARCH COLLABORATIONS: Summary of a Workshop (2011)

The globalization of research has important implications for the U.S. research enterprise, for the U.S. government agencies, academic institutions, and companies that support and perform research, and for the world at large. As science and technology capabilities grow around the world, U.S.-based organizations are finding that international collaborations and partnerships provide unique opportunities to enhance research and training. At the same time, significant obstacles exist to smooth collaboration across national borders. This report summarizes presentations and discussions at a workshop held in July 2010 to discuss issues that arise in international research collaboration, including cultural differences and nuances, ethics, research integrity and the responsible conduct of research, risk management, intellectual property, export controls, and legal issues and agreements.

REVIEW OF THE DEPARTMENT OF HOMELAND SECURITY'S APPROACH TO RISK ANALYSIS (2010)

Review of the Department of Homeland Security's Approach to Risk Analysis explores how DHS is building its capabilities in risk analysis to inform decision making. The department uses risk analysis to inform decisions ranging from high-level policy choices to fine-scale protocols that guide the minute-by-minute actions of DHS employees. Although DHS is responsible for mitigating a range of threats, natural disasters, and pandemics, its risk analysis efforts are weighted heavily toward terrorism. In addition to assessing the capability of DHS risk analysis methods to support decision-making, the book evaluates the quality of the current approach to estimating risk and discusses how to improve current risk analysis procedures.
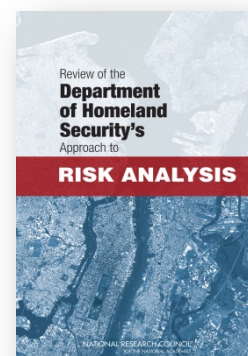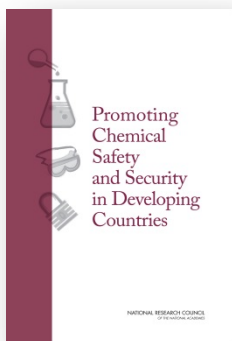
PROMOTING CHEMICAL LABORATORY SAFETY AND SECURITY IN DEVELOPING COUNTRIES (2010)

There is growing concern about the possible use of toxic industrial chemicals or other hazardous chemicals by those seeking to perpetrate acts of terrorism. The U.S. Chemical Security Engagement Program (CSP), funded by the U.S. Department of State and run by Sandia National Laboratories, seeks to develop and facilitate cooperative international activities that promote best practices in chemical security and safe management of toxic chemicals, including:

- Partnering with host governments, chemical professionals, and industry to assess and fill gaps in chemical security abroad.
- Providing technical expertise and training to improve best practices in security and safety among chemical professionals and industry.
- Increasing transparency and accountability for dangerous chemical materials, expertise, and technologies.
- Providing opportunities for collaboration with the international professional chemical community.

The Department of State called on the National Academies to assist in the CSP's efforts to promote chemical safety and security in developing countries.

S&T STRATEGIES OF SIX COUNTRIES: Implications for the United States (2010)

An increase in global access to goods and knowledge is transforming world-class science and technology (S&T) by bringing it within the capability of an unprecedented number of global parties who must compete for resources, markets, and talent. The global dispersion of centers for technological research and development (R&D) will have a potentially enormous impact for U.S. national security policy, which for the past half century has been premised on U.S. economic and technological dominance. The 1950s' paradigm of "control and isolation" of information for innovation control has transformed into the current one of "engagement and partnerships" between innovators for innovation creation. Current and future strategies for S&T development need to be considered in light of these new realities. This report analyzes the S&T strategies of Japan, Brazil, Russia, India, China, and Singapore (JBRICS), six countries that have either undergone or are undergoing remarkable growth in their S&T capabilities for the purpose of identifying unique national features and how they are utilized in the evolving global S&T environment. It also provides recommendations for ways the United States might monitor and engage these and other countries in the future to successfully adapt to a globalized innovation environment.
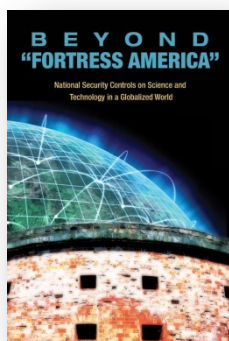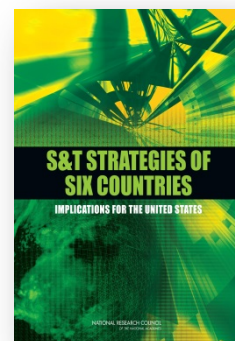
BEYOND 'FORTRESS AMERICA': National Security Controls on Science and Technology in a Globalized World (2009)

This report examines national security controls that oversee scientific and technological research, specifically the federal regulations governing which information or goods can be shared with citizens of other countries. These restrictions are designed to prevent the flow of information or technology out of the U.S. and into the hands of foreign competitors or those who may wish to use it for harm. The report looks at how the world has changed since these national security controls were enacted, identifies the effects they have had on scientific and technological research in the U.S., and makes recommendations on how the system should be restructured to strengthen both national security and economic competitiveness.

GLOBAL SECURITY ENGAGEMENT: A New Model for Cooperative Threat Reduction (2009)

The U.S. government's first Cooperative Threat Reduction (CTR) programs were created in 1991 to eliminate the former Soviet Union's nuclear, chemical, and other weapons and prevent their proliferation. The programs must now be expanded to other regions and fundamentally redesigned. Global Security Engagement proposes how this goal can best be achieved. To meet the magnitude of new security challenges it recommends a new, more flexible, and more responsive model that will draw on a broader range of partners than the current programs.

SCIENCE AND SECURITY IN A POST 9/11 WORLD (2007)

Based on a series of regional meetings on university campuses with officials from the national security community and academic research institutions, this report identifies specific actions that should be taken to maintain a thriving scientific research environment in an era of heightened security concerns. Actions include maintaining the open exchange of scientific information, fostering a productive environment for international scholars in the U.S., reexamining federal definitions of sensitive but unclassified research, and reviewing policies on deemed export controls. The federal government should establish a standing entity, preferably a Science and Security Commission, that would review policies regarding the exchange of information and the participation of foreign-born scientists and students in research.
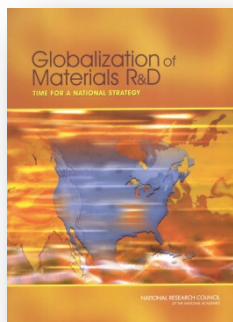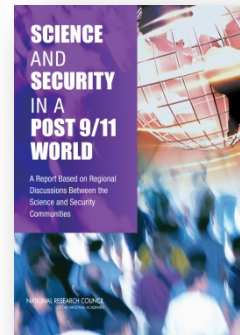
GLOBALIZATION OF MATERIALS R&D: Time for a National Strategy (2005)

Materials Science and Engineering (MSE) R&D is spreading globally at an accelerating rate. As a result, the relative U.S. position in a number of MSE subfields is in a state of flux. To understand better this trend and its implications for the U.S. economy and national security, the Department of Defense (DOD) asked the NRC to assess the status and impacts of the global spread of MSE R&D. This report presents a discussion of drivers affecting U.S. companies' decisions about location of MSE R&D, an analysis of impacts on the U.S. economy and national security, and recommendations to ensure continued U.S. access to critical MSE R&D.

ABOUT THE GOVERNMENT-UNIVERSITY-INDUSTRY RESEARCH ROUNDTABLE (GUIRR)

GUIRR's formal mission, revised in 1995, is "to convene senior-most representatives from government, universities, and industry to define and explore critical issues related to the national and global science and technology agenda that are of shared interest; to frame the next critical question stemming from current debate and analysis; and to incubate activities of on-going value to the stakeholders. This forum will be designed to facilitate candid dialogue among participants, to foster self-implementing activities, and, where appropriate, to carry awareness of consequences to the wider public."

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