

Science, Technology, and Security: Knowledge for the Post-9/11 World

**A white paper prepared as background for the
University of Colorado
Center for Science and Technology Policy Research
Fall Symposium 2002
October 10-11**

**Roger A. Pielke, Jr. and Roberta Klein
Center for Science and Technology Policy Research
University of Colorado/CIRES
17 July 2002**

Introduction to the Symposium

On June 6, 2002, the White House sent Congress proposed legislation to create a new Department of Homeland Security, noting, "in the war against terrorism, America's vast science and technology base provides us with a key advantage."¹ While the Chair of the House Science Committee, Sherwood Boehlert (R-NY), agreed "our homeland security efforts will fail if R&D is not at their core," he also criticized the White House plan: "Truth be told, I don't think anyone's yet even fully thought through the most basic question - in what ways do we want research related to homeland security to be different after this reorganization?"² The relationship between research and security is the focus of the Fall 2002 Symposium organized by the CIRES Center for Science and Technology Policy Research at the University of Colorado-Boulder.

Scholars of the connections between science and policy have long used a convenient distinction of "science for policy" and "policy for science" to clearly

¹ <http://www.ieeeusa.org/forum/EYEONWASHINGTON/02eow12.html>

² <http://www.house.gov/science/press/107/107-249.htm>

distinguish the two-way connections between research and decision making. The former focuses attention on producing knowledge and technologies useful for those responsible for making decisions; examples might include the development of reliable, low-cost vaccines against bioterrorism, or detection systems for nuclear or biological weapons. The latter focuses on how the scientific enterprise itself is organized, supported, and evaluated, ultimately to produce useful knowledge and technologies. The nation's focus on homeland security has profound implications for both "policy for science" and "science for policy," as well as their inter-connections.

On October 10 and 11, 2002, the University of Colorado's Center for Science and Technology Policy Research³ is organizing its first Fall Symposium on *Science, Technology, and Security: Knowledge for the Post-9/11 World*. The Symposium has two primary objectives: to identify issues that arise in focusing science and technology on the goal of enhancing homeland security, and to confront issues that arise for the practice of science and technology itself because of the increased recognition of the importance of homeland security. Our focus is on the science and technology institutions and resources along Colorado's Front Range. With a significant array of academic, government, and commercial science and technology activities, the Colorado Front Range provides a convenient "laboratory" for exploring the issues of science, technology and security in a manner that may provide more generalizable lessons for the nation.⁴ Further, with the Symposium we seek to provide an opportunity for the establishment of new connections among those involved with research and development, many of whom may not even

³ The Center resides within the Cooperative Institute for Research in the Environmental Sciences on the Boulder campus, see <http://sciencepolicy.colorado.edu>.

realize that their particular expertise may have relevance to issues of homeland security. Such new connections may lead to new scientific and technological results – or new approaches to effectively using science and technology in decision making – in support of the nation’s homeland security goals. The remainder of this White Paper provides a concise overview of the Symposium, its organization, and its objectives.

Science and Technology for Security Policy

The symposium has three themes: Science and Technology for Security Policy, Policy for Security Science and Technology, and Improving Connections. Cutting across these three themes we will focus on four substantive issue areas: bioterrorism, water security, technology (computer and energy security), and homeland defense support (e.g., science and technology in support of emergency management). We will address these issues and areas in the context of the significant academic, government, and commercial science and technology institutions along the Colorado Front Range. We expect the results of the Symposium to have broad national significance for science and technology as well as security policy.

Under the first theme, “Science and Technology for Security Policy,” we will explore issues associated with enhancing the contributions of scientific and technological research to the needs of decision makers in the security arena. One of the objectives of the symposium is addressing the challenge of integrating existing knowledge across seemingly unrelated disciplines. For example, how might an atmospheric scientist’s work on air dispersion modeling serve the needs of local emergency management

⁴ Colorado ranked ninth among the states in per capita federal R&D funding in FY 2000 (AAAS 2002).

personnel in responding to a bioterrorist attack? To answer such a question requires the collaboration of researchers across many traditional disciplines that typically have not collaborated, as well as a close interaction of the researchers with the decision maker who is the ultimate end user of the resulting science and technology.

A second objective of this theme is to help identify gaps in existing knowledge. The National Research Council's recent report, *Making the Nation Safer: The role of science and technology in countering terrorism*, identified several urgent research opportunities including developing effective prevention and treatment for certain pathogens, developing an adaptive electric power grid, and enhancing information security against cyber-attacks (NRC 2002 at ES-3). The symposium will build upon the NRC report, with a specific focus on contributions that might be made by Front Range researchers to issues of bioterrorism, water, homeland defense support, and technology. We will ground discussion of the potential contributions of science and technology in the practical challenges of realism, readiness, collaborative opportunities, and costs.

A final issue under the first theme is evaluating the successes and limits of science and technology in furthering security goals. We will discuss the criteria for judging the circumstances under which science and technology can make a significant contribution in enhancing security, and under what circumstances will our goals be better served by other approaches such as diplomacy, intelligence gathering, or military action.

Policy for Security Science and Technology

Under the second theme, "Policy for Security Science and Technology," the Symposium will address the governance of scientific research in furtherance of homeland security goals. The Symposium will raise issues such as the implications for the national research agenda of managing research from within the proposed Department of Homeland Security (see Brainard 2002). We will also explore the implications for the science and technology community of adopted and proposed research and development and education-related security measures to counteract terrorism.

Examples of issues that are raised for the governance of science and technology include restrictions on foreign students entering the country, tracking of their movement through the higher education system, limiting access to laboratories, withholding materials and information, requiring prior authorization for publication of certain research including basic research, limitations on who should be allowed to do certain types of "dangerous research" (anthrax-related, for example) and limitations on the kinds of scientific and technological information that can be exported to and shared with students and scientists from certain countries (see Knezo 2002; Skolnokoff 2002). The symposium will discuss the potential consequences of these actions including delay of projects, increased costs, restrictions on freedom of scientific information exchange and inquiry, and the loss of valuable foreign talent.

Improving connections

Under the third symposium theme, "Improving Connections," we will examine, in the light of previously raised issues, improving connections of science and technology with decision making in the context of four substantive areas: bioterrorism, water security, technology, and homeland defense support. For example, the NRC's *Making the Nation Safer* recommends that the National Institute of Standards and Technology (NIST, with a major lab in Boulder, is one of the expected symposium participants) undertake R&D to develop air duct sensors that assess the safety of air, and related controls that would then adjust the HVAC systems in response to a bioterrorist attack on a building.⁵ We expect that there are meaningful connections that might be made among the Front Range experts in atmospheric sciences, engineering, and biology that might facilitate a NIST effort in this area, as well as many others. The Symposium will provide an opportunity for decision makers, such as emergency management personnel and members of homeland security offices, to learn in a very specific context what efforts are already underway to accomplish homeland security goals, who is involved, what more needs to be done, and whether there are other options for enhancing security in these areas.

Goals and Outcomes

Colorado's Front Range is home to a multitude of major research institutions, national laboratories, and corporations with strong science and technology expertise. The Symposium seeks to establish connections between decision makers in the security arena

and scientists working on science and technology with potential security applications, as well as new connections among experts within the research community itself. Enhanced connections may lead to future collaborations on projects and an exchange of information and ideas. The Symposium also will provide input into the development of a science and technology-security policy research agenda. Finally, the Symposium will summarize its discussions regarding the governance of research and development in light of increased security concerns. The Symposium's final products will include a written report with recommendations and a website.

The Symposium is a starting point -- for raising critical issues at the interface of science and technology and security policy, for better focusing experts from disparate fields on common research and policy goals, and for more effectively focusing the nation's considerable scientific and technological resources on the new challenges of homeland security. Using the Colorado Front Range as a laboratory within which to explore these issues, we hope to contribute in some small way to the nation's goals in homeland security.

For further information and updates see:

http://sciencepolicy.colorado.edu/events/security_symposium_2002/

⁵ On July 10, 2002, a U.S. House of Representatives committee approved an amendment that would require the new Homeland Security department to work with NIST to develop "ways to detect chemical, biological, radiological, and nuclear threats, and for border and transportation security technologies" (Human 2002).

Cited References

AAAS 2002, Summary Table 1. Federal R&D by State, Fiscal Year 2000.
www.aaas.org/spp/R&D

Brainard, J., 2002: Scientists question plan to move bioterrorism-research funds to homeland-defense agency. Chronicle of Higher Education, July 5.

Human, K., 2002: NIST could fight terrorism. Daily Camera, July 11.

Knezo, G., 2002: Possible impacts of major counter terrorism security actions on research, development, and higher education. CRS Report for Congress, April 8.

National Research Council, Committee on Science and Technology for Countering Terrorism, 2002: Making the nation safer: The role of science and technology in countering terrorism (prepublication copy).

Skolnikoff, E., 2002: Protecting university research amid national-security fears. Chronicle of Higher Education, May 10.