

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

**HEARING CHARTER**

*The Department of Homeland Security's R&D Budget Priorities for Fiscal Year 2008*

**Thursday, March 8, 2007  
10:00 a.m. - 12:00 p.m.  
2318 Rayburn House Office Building**

**1. Purpose**

On Thursday, March 8, the Subcommittee on Technology and Innovation of the Committee on Science and Technology will hold a hearing to consider the President's fiscal year 2008 (FY 08) budget request for research and development at the Department of Homeland Security. Agency officials and outside observers will comment on budget priorities within the Science and Technology Directorate (S&T) and the Domestic Nuclear Detection Office (DNDO).

**2. Witnesses**

**Mr. Jay M. Cohen** (RAdm., USN ret.) is the Under Secretary of Science and Technology at the Department of Homeland Security (DHS).

**Mr. Vayl Oxford** is the Director of the Domestic Nuclear Detection Office (DNDO) at DHS.

**Dr. Gerald L. Epstein** is the senior fellow for science and security in the Homeland Security Program at the Center for Strategic and International Studies (CSIS).

**Mr. Jonah J. Czerwinski** is a senior fellow with the Global Leadership Initiative at IBM. He is also a Senior Advisor for Homeland Security Projects at the Center for the Study of the Presidency (CSP).

**Ms. Marilyn Ward** (minority witness) is Executive Director of the National Public Safety Telecommunications Council (NPSTC).

**3. Brief Overview**

- The FY 2008 budget request for the Department of Homeland Security's Science and Technology Directorate (S&T) is \$799.1 million. This is a \$90.1 million (9.5 percent) decrease from the FY 2007 enacted funding.
- The FY 2008 budget request for the Domestic Nuclear Detection Office (DNDO) is \$569.1 million. This is an \$80.9 million (17 percent) increase over the FY 2007 enacted funding. The bulk of the increase is for research, development, operations and systems acquisition.
- The S&T Directorate was reorganized into discipline-oriented divisions in mid-2006. While the FY 2008 budget request clarifies priorities among disciplines, there remains a question of whether DHS' R&D portfolio is properly balanced. The bulk of R&D funding goes towards biological and nuclear detection research. It is unclear if these priorities are in

- response to recognized risks or based on a completed risk assessment.
- There is a problematic lack of balance between basic and applied research and development. DHS dedicates the majority (52 percent) of its R&D funding to “product transition” (short-term development), while allocating only 11 percent to applied research and 13 percent to basic research. The remainder funds operational activities. De-emphasizing longer term basic and applied research may curtail the ability of DHS to react to emerging and future threats.

#### **4. Background**

Research and development at the Department of Homeland Security is concentrated in the Science and Technology (S&T) Directorate and Domestic Nuclear Detection Office (DNDO). The S&T Directorate has responsibility for carrying out or coordinating nearly all federal homeland security related research. DNDO was separated from S&T in 2005 to specifically coordinate all research, development, and operations of technology to detect and report unauthorized transportation of nuclear and radiological materials.

##### *S&T Directorate Organization*

The S&T Directorate was reorganized into six divisions by Under Secretary Jay Cohen in mid-2006. The discipline-oriented divisions are intended to reflect specific threats to public safety and critical infrastructure. They include:

- Chemical and Biological: detection and mitigation of chemical and biological weapons threats
- Explosives: detection of and response to conventional (non-nuclear) explosives
- Human Factors: social science research to improve detection, analysis, and understanding of threats posed by individuals as well as how communities respond to disasters
- Infrastructure and Geophysical: identifies and mitigates threats to critical infrastructure
- Border and Maritime: develops technologies for surveillance and monitoring of land and maritime borders
- Command, Control, and Interoperability: research and development support for interoperable communications and cyber security

In addition to the six independent divisions, three offices coordinate the Directorate’s R&D activities with extramural researchers and technology customers (typically other Directorates of DHS) and facilitate technology transfer. As part of the extramural research portfolio, the S&T Directorate funds the University Centers of Excellence program, which supports research across a broad variety of homeland security-related topics at university-based centers across the country.

##### *DNDO Organization*

DNDO was created to coordinate federal efforts to detect and respond to unauthorized transportation of nuclear or radiological materials into and within the United States. DNDO, which reports directly to the Secretary of Homeland Security, was transferred from the S&T Directorate in 2005. DNDO is responsible for coordination of federal agency efforts at DHS, the Department of Defense (DOD), the Department of Energy (DOE), the Federal Bureau of Investigations (FBI), the Nuclear Regulatory

Commission (NRC), and the State Department to prevent the transport of nuclear and radiological materials across U.S. borders. It also works with international partners on detection and interdiction activities.

DNDO is responsible for research, development, testing and evaluation of detection technologies; acquisition of detection technologies; threat assessments; and technical support and training for state, local, and federal government partners and first responders. In 2006, DNDO completed a catalog of currently deployed global nuclear detection assets and an assessment of current detection capabilities, including an analysis of capability gaps across federal agencies.

## 5. FY 2008 Budget Request

### *S&T Directorate*

In FY 2008, requested funding for the Science and Technology Directorate is cut by \$174 M or 17.8 percent to \$799.1 million. (TABLE 1) As in previous years, the request is strongly weighted towards biological and chemical countermeasures research. This division represents 29 percent of the overall Directorate budget. Other priorities include research into explosives detection and mitigation, which represents eight percent of the overall budget; and command, control, and interoperability, which also represents eight percent.

**TABLE 1: Department of Homeland Security Science and Technology Directorate Budget**  
dollars in millions

Budget category	FY 2006 Enacted <sup>1</sup>	FY 2007 Enacted	FY 2008 Request	\$ change/ FY 2007-08	Percent of total
Management and Administration	80.3	135.0	142.6	+7.6	17.8
Border and Maritime	43.3	33.4	25.9	-7.5	3.2
Chemical and Biological	387.0	313.5	228.9	-84.6	28.6
Command, Control, and Interoperability (C2I)	108.1	62.6	63.6	+0.99	8.0
Explosives	261.5	105.2	63.7	-41.5	8.0
Human Factors	6.4	6.8	12.6	+5.8	1.6
Infrastructure and Geophysical	86.1	74.8	24.0	-50.8	3.0
Innovation	0	38.0	59.9	+21.9	7.5
Laboratory Facilities	83.2	105.6	88.8	-16.8	11.1
Test, Evaluation, and Standards	34.6	25.4	25.5	+0.09	3.2
Transition	19.2	24.0	24.7	+0.7	3.1
University Programs	62.4	48.6	38.7	-9.9	4.8
<b>TOTAL</b>	<b>1487.0<sup>2</sup></b>	<b>973.1</b>	<b>799.1</b>	<b>-174.0</b>	<b>100</b>

<sup>1</sup> Including 1 percent recession.

<sup>2</sup> Includes funding for Domestic Nuclear Detection Office (DNDO) which received separate appropriations in FY 2007. (Source: Department of Homeland Security FY 2008 Budget Request)

The S&T Directorate also categorizes its research by timeline, defining “product transition” as short term (0-3 years) development; innovative capabilities as mid-term (2-5 years) high-risk, high-payoff

applied research; and “basic research” as long term (>8 years), high-risk fundamental science. The remainder of the portfolio, including testing and standards, laboratory operations, and policy work is classified as “other.” The FY 2008 budget strongly favors short term development (TABLE 2), with just over 10 percent of funding dedicated to basic research. The balance of research funding is overseen by the Office of the Director of Research, which is also responsible for integrating internal and external basic research into DHS missions and S&T Directorate divisions.

**TABLE 2: S&T Directorate Short and Long Term Research by Division**  
**Percentage of overall division budget**

<b>Division</b>	<b>Basic (FY 07)</b>	<b>Innovative (FY 07)</b>	<b>Transition (FY 07)</b>	<b>Other (FY 07)</b>	<b>Basic (FY 08)</b>	<b>Innovative (FY 08)</b>	<b>Transition (FY 08)</b>	<b>Other (FY 08)</b>
Borders and Maritime	6%	18%	71%	4%	5%	36%	57%	3%
Chemical and Biological	9%	3%	56%	32%	9%	4%	72%	15%
Command, Control and Interoperability	11%	5%	60%	24%	12%	5%	72%	11%
Explosives	11%	5%	48%	36%	14%	11%	67%	7%
Infrastructure and Geophysical	18%	18%	31%	34%	26%	38%	22%	14%
Human Factors	41%	40%	4%	14%	33%	36%	20%	11%

(Source: Department of Homeland Security)

Within the S&T Directorate, the Administration requests reduced funding for nearly every division, with the only increases going to the relatively small Human Factors division and a nearly flat budget for the Command, Control, and Interoperability division. Additionally, funding is cut significantly for University programs. A summary of some the major division and office budgets follows:

### Innovation

A significant funding increase is provided to the Office of Innovation, which manages the Homeland Security Advanced Research Projects Agency (HSARPA) grant program. However, the funding increase will mainly support advanced technology development and demonstrations and does not provide funding for the basic and applied research priorities included in HSARPA’s mandate. Additionally, \$7.5 million of the total \$59.9 million is budgeted for the Scalable Composite Vessel Prototype, a project to develop an improved hull for Coast Guard skippers.

### Chemical and Biological

Funding for R&D in this division stayed flat, but \$84.1 M in funding was transferred to the new Office of Health Affairs for the operational (non-R&D) components of three programs (BioWatch, the Biological Warning and Incident Characterization (BWIC) system, and the Rapidly Deployable Chemical Detection System) which monitor for releases of biological or chemical weapons. The remaining budget will support R&D for the next generation of BioWatch, which is a monitoring program for detecting release of biohazards. This division represents by far the largest budget priority in the S&T Directorate.

## Command, Control, and Interoperability (C2I)

Funding for C2I stayed relatively flat from FY 2007, but follows a 41 percent reduction from FY 2006. This division covers research into cyber security, communications interoperability, surveillance and investigative technologies, and threat assessment. In FY 2007, funding was cut for the emergent and prototypical technologies and rapid prototyping portfolios in this division, which limited the DHS' ability to address threats outside the existing divisions, perform basic research to identify vulnerabilities and countermeasures, and quickly address DHS-specific requirements for technologies.

## Explosives

Funding for the explosives portfolio is reduced by \$41.5 million or 40 percent from FY 2007 to \$63.7 million. A portion of this reduction in funding is a result of the completion of the Counter-MANPADS program, which developed an airplane based defense against shoulder-fired missiles. If the Counter-MANPADS program is not considered in the budget calculation, the total funding for explosives countermeasures is decreased from \$86.6 M to \$63.7 M, a reduction of \$22.9 million or 26.4 percent.

## Testing, Evaluation, and Standards

The requested funding for this division is \$25.5 million, which is relatively flat compared to FY 2007. This division is responsible for activities that include coordinating the development of metrics for equipment performance and certification, protocols for testing and training, and evaluation of equipment.

## University Programs

Funding for University Programs is reduced by \$9.9 million (20 percent) from FY 2007 to \$38.7 million. The S&T Directorate plans to establish four new University Centers of Excellence—in spite of the reduced funding—and improve the capabilities of Minority Serving Institutions (MSIs) to conduct research in homeland security related areas and incorporate MSIs into the University Centers program.

## ***DNDO***

In FY 2008, the Administration requests \$561.9 million for DNDO (TABLE 3). This request increases total funding for the Office by \$80.9 million or 17 percent. The budget is increased for every component of DNDO, with the bulk of the increase going towards Research, Development, and Operations and Systems Acquisition.

**TABLE 3: Department of Homeland Security Domestic Nuclear Detection Office Budget**  
dollars in millions

<b>Budget Category</b>	<b>FY 2006 enacted</b>	<b>FY 2007 enacted</b>	<b>FY 2008 request</b>	<b>\$ change/ FY 2007-08</b>
Management and Administration	2.5	30.5	34.0	+3.5
Research, Development, and Operations	189.8	272.5	319.9	+47.4
Systems Acquisition	125.0	178.0	208.0	+30.0
<b>TOTAL</b>	<b>317.4</b>	<b>481.0</b>	<b>561.9</b>	<b>+80.9</b>

(Source: Department of Homeland Security FY 2008 Budget Request)

A summary of the major categories follows:

### Management and Administration

The \$3.5 million increase for Management and Administration provides reimbursement to other federal agencies providing staff members to DNDO as detailees and goes toward creating additional full time positions. Many of these staff support research, development, and operations activities and aviation and maritime security activities. A larger full-time, non-detailee staff will improve DNDO's ability to conduct testing and evaluation and support improved acquisition protocols that will result in use of better detection technology.

### Research, Development, and Operations (RD&O)

Research, development, and operations (RD&O) activities within DNDO include engineering and architecture for detection systems, high-risk transformational R&D, technology assessments, operations support for government partners, and the National Technical Nuclear Forensics Center. Together, these components aim to support a seamless system of nuclear detection from basic research through technology development and implementation. The requested funding increase of \$47.4 million or 17 percent will go primarily to transformational research and development (up \$22.9 million or 30 percent).

Within the transformational R&D portfolio, the FY 2008 priority will be the initiation of several Advanced Technology Demonstrations (ATDs). For example, one of the ATDs will focus on radioactive material detection in various transit systems such as ship or airplane transit. Other priorities will be port security, training for state and local law enforcement, and assessing handheld detection technologies.

### Systems Acquisition

The budget request for systems acquisition activities of \$208 million includes funding for deploying radiation monitors at ports of entry and the Securing the Cities Initiative, which is a program to deploy nuclear detection equipment at entryways into a city, including ports, highways, and airports. New York City was the pilot city in 2006, and the Administration requests funding in FY 2008 to expand the program. The requested \$30 million (17 percent) increase in funding for Systems Acquisition will go entirely toward this second phase of the Securing the Cities Initiative.

## **6. Issues and Concerns**

**How does the Department of Homeland Security use risk assessments to determine R&D priorities?** The budget request for R&D at DHS raises a number of concerns, some of which are ongoing from the inception of the Department. The Department's mission is to reduce the vulnerability of the United States to—and mitigate the effects of—threats, both manmade and natural, but the overall justification of the DHS R&D portfolio makes no indication that there was any threat used to inform how research areas were prioritized. The S&T Directorate plans to issue a five-year strategic plan in April 2007 that will include some input from the Homeland Security Institute, a policy advisory board, on risk. The lack of investment in risk assessment is wasteful at best and potentially dangerous, as there is no basis for prioritizing unexpectedly urgent threats. In one example cited by the Under Secretary, following the liquid explosives threat to airplanes in August 2006, it took the S&T Directorate two months to set up a research program to evaluate the risks of and countermeasures

against liquid explosives. This delay hampered the ability of the Transportation Security Administration (TSA) to develop guidelines for transporting liquids on planes, causing countless delays and problems for travelers and airlines.

**Is the balance between short and long term research at DHS appropriate? What criteria does DHS use to determine the balance between long and short term research?** While the requested funding for basic research within DHS S&T has more than doubled from FY 2007 to approximately 13 percent in FY 2008, the Department's R&D portfolio remains strongly weighted towards end-stage technology development with funding for basic research well below the Under Secretary's goal of 20 percent of all research dollars. Likewise, DNDO does not give adequate priority to basic research, requesting \$100 million for transformational R&D but only directing 11 percent (\$11.1 million) of that funding to basic research. The remainder funds technology development.

The large proposed cuts to the University Centers of Excellence program further reduce investment in basic research. Funding for emergent and prototypical technologies, cut significantly in FY 2007, also remains low. Emphasizing short term research makes the Department significantly less agile and responsive, locking it into a single technological response to emerging and future threats.

**How do DHS R&D priorities reflect the needs of customers, including other Directorates within DHS, interagency partners, and state and local governments?** Under Secretary Cohen has said that the research priorities of the S&T Directorate should directly serve "customers"—defined as users of DHS' research results and developed technologies. To that effect, the Under Secretary established "integrated product teams" comprised of officials from other DHS components who advise the S&T Directorate on their technology needs, thus informing specific research priorities. While these interdisciplinary teams are a step in the right direction, the Department needs a much stronger focus on integrating the opinions of interagency and outside partners. At least 10 agencies, including the National Institute of Standards and Technology (NIST), the National Science Foundation (NSF), the Department of Transportation (DOT) and others perform homeland security-related R&D. However, there is no formal mechanism for leveraging the R&D work of other agencies within DHS. Both the S&T Directorate and DNDO have been criticized for ignoring the work and advice of other federal agencies. Similarly, state and local officials, including first responders, have complained that DHS is not responsive to their requests and recommendations related to technology development. The Department must develop a formal mechanism for responding to the final users of the R&D it supports.