

**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 2009 (FY 09)

**Thursday, March 6, 2008
10:00 a.m. - 12:00 p.m.
2318 Rayburn House Office Building**

1. Purpose

On Thursday, March 6, 2008 the Subcommittee on Technology and Innovation of the Committee on Science and Technology will hold a hearing to consider the President's fiscal year 2009 (FY 09) budget request for research, development, testing, and evaluation (RDT&E) at the Department of Homeland Security. Agency officials will discuss budget priorities within the Science and Technology Directorate (S&T) and the Domestic Nuclear Detection Office (DNDO), and discuss how the agency's RDT&E efforts are developing technologies to promote the DHS mission.

2. Witnesses

The Honorable 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.

Mr. George Ryan is the Director for the Testing, Evaluation, and Standards Division of the DHS Science and Technology Directorate (DHS S&T).

3. Brief Overview

- The FY 2009 budget request for the Department of Homeland Security's Science and Technology Directorate (DHS S&T) is \$868.8 M. This is a \$38.5 M increase over the FY 2008 enacted funding. The Explosives Division and Laboratory Facilities accounts receive the largest increases, while the Chemical and Biological, Infrastructure and Geophysical, and Testing and Evaluation accounts are reduced.
- The FY 2009 budget request for the Domestic Nuclear Detection Office (DNDO) is \$563.8 M. This is a \$79.4 M increase over the FY 2008 enacted funding. The bulk of the increase is for acquisition of the Advanced Spectroscopic Portal radiation monitors, a controversial technology that Congress has blocked DHS from acquiring for the last two fiscal years because of problematic test results.
- The S&T Directorate was reorganized into discipline-oriented divisions in mid-2006, but there is still a question of whether DHS' R&D portfolio is properly balanced. The bulk of R&D funding supports biological and nuclear detection research even though the

Department has not yet responded to Congressional requests for a formal risk assessment justifying this ranking of priorities.

- Components of DHS S&T and DNDO carry out testing and evaluation of technologies prior to deployment by the Department of Homeland Security. The Under Secretary for Science and Technology is also responsible for overall coordination of DHS' testing and evaluation activities. The results of these technology evaluations are used by DHS components, first responders and law enforcement, and other homeland security technology stakeholders. Questions have been raised about the validity of test design and expressed concern about the availability of results.

4. Background

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

DHS S&T Organization

DHS S&T was reorganized into six divisions by Under Secretary Jay Cohen in mid-2006. The Under Secretary appointed three research directors to oversee and coordinate long term basic research, shorter term applied research, and high risk technology development across six divisions. 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 R&D

In addition to the six independent divisions, the three research directors coordinate the DHS S&T's R&D activities with extramural researchers and technology customers (mainly other components of DHS, such as the Transportation Security Administration (TSA) or Customs and Border Protection (CBP)) and facilitate technology transfer to DHS components, other Federal agencies, or state and local government entities. As part of the extramural research portfolio, the DHS S&T 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 split from DHS S&T 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.

5. Issues and Concerns

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 process teams” (IPTs) 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.

How is DHS using the results of tests and evaluations to effectively develop and deploy technology? How are they sharing these results with end users? The testing and evaluation division of DHS S&T is responsible for working with all components of DHS to ensure that technology and equipment used by DHS, law enforcement, and first responders meets users’ needs. This division and DNDO also partner with other Federal agencies, most notably the National Institute of Standards and Technology (NIST) to conduct tests and guide the development of standards. While DHS has been praised by homeland security industry representatives for their support of voluntary consensus standards, the Department’s testing and evaluation protocols and reporting have been criticized by the Government Accountability Office (GAO), Congress and the user community.

State and local officials, including first responders, have complained that DHS is not responsive to their requests and recommendations related to technology development and test results. DHS S&T must ensure that tests reflect user requirements and needs and that test results are available to full user community, especially those outside of DHS. The reduction in funding for this account is troubling, especially given the increased funding available for short term technologies that would require testing and evaluation prior to deployment.

Is the balance between research divisions appropriate? Is there adequate investment in long term basic research? Though DHS S&T has slightly rebalanced funding for its research divisions based on customer requirements, the Department's investment is still strongly weighted towards biological, chemical, and nuclear threat mitigation. 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 analysis used to inform how research areas were prioritized.

Additionally, though longer term R&D funding is increased for both DHS S&T and DNDO, the Department's R&D portfolio remains strongly weighted towards end-stage technology development. An inadequate investment in longer term research makes the Department significantly less agile and responsive, locking it into a single technological response to emerging and future threats. Additionally, reduced funding for programs that support university research significantly hinders the Department's ability to train and recruit the next generation of scientists and engineers with skills relevant to the homeland security mission.

6. FY 2009 Budget Request

DHS S&T

After a large decrease in appropriated funding because of the transfer of various programs from the Department of Homeland Security's Science and Technology Directorate (DHS S&T) in FY 2007 and 2008, the budget for DHS S&T is once again climbing. The increase in the President's request is indicative of the high priority the Administration places on short term technology development in support of counter-terrorism efforts. The overall budget for research and development within DHS S&T increases by \$38.502 M above the final FY 2008 appropriations.

Science and Technology Directorate FY 2009 Budget Request (dollars in millions)

Budget category by Division	FY 2007 Enacted	FY 2008 Request	Omnibus	FY 2009 Request	\$ change/ FY 08 and request
Management and Administration	135.0	142.6	138.6	132.1	-6.5
Border and Maritime	33.4	25.9	25.479	35.3	9.82
Chemical and Biological	313.5	228.9	208.020	200.408	-7.612
Command, Control, and Interoperability	62.6	63.6	56.98	62.39	5.41
Explosives	105.2	63.7	77.654	96.149	18.495
Human Factors	6.8	12.6	14.206	12.46	-1.746
Infrastructure and Geophysical	74.8	24.0	64.5	37.816	-26.684
Innovation	38.0	59.9	33.0	45.0	12.0
Laboratory Facilities	105.6	88.8	103.814	146.94	43.126
Test, Evaluation, and Standards	25.4	25.5	28.52	24.674	-3.846
Transition	24.0	24.7	30.265	31.83	1.565
University Programs	48.6	38.7	49.297	43.77	-5.527
RDTE, A&O		656.468	691.735	736.737	45.002
TOTAL	973.1	798.9	830.335	868.837	38.502

The balance between research divisions remains problematic. There is an extremely strong emphasis on biological research and countermeasures, which account for 23 percent of the total R&D budget. Other critical homeland security fields, including explosives research and infrastructure protection are increasing but are still underrepresented. However, DHS S&T proposes to shift some funding from the chemical and biological division to other divisions because of new priorities identified by DHS components.

In FY 2008, DHS S&T developed new methods for setting research priorities that included greater involvement by “customer” components; the operational components of DHS such as CBP, Immigration and Customs Enforcement (ICE), the Federal Emergency Management Agency (FEMA) and others. Representatives of these customers were brought together in Integrated Process Teams (IPTs) which set research and spending priorities down to the individual project level. In addition to the IPTs, DHS S&T also reconstituted the Homeland Security Science and Technology Advisory Committee (HSSTAC) and tasked that group with identifying project priorities to meet the challenge of detecting and preventing attacks with improvised explosive devices (IEDs). HSSTAC had formerly been responsible for advising DHS S&T on research priorities. Because these advisory groups are now focused on meeting specific technological needs, they naturally emphasize shorter-term research priorities.

Funding priority among the various research disciplines is determined by the Under Secretary in consultation with the Deputy Secretary of DHS. Management of research within DHS S&T is divided into three overarching areas: basic research (long term), innovation (midterm), and transition (short term and technology development). The directors of research, innovation, and transition help manage and coordinate research within each division that falls into their respective category. The FY 2009 budget request summary states that DHS S&T now invests 20 percent of its research money in basic research (defined by DHS S&T as 8 years or longer until technology development), yet the project descriptions show a strong bias towards short term technology development.

An analysis of selected components is below:

Innovation

In addition to coordinating various priorities within the divisions of DHS S&T, the Director of the Innovation portfolio manages additional technology development projects. Specifically, the Director of Innovation oversees the Homeland Security Advanced Research Project Agency (HSARPA) and coordinates funding for the short-term High Impact Prototypical Solutions (HIPS) and High Impact Technology Solutions (HITS) projects. In the FY 2009 request, the funding for the Innovation portfolio is increased to fund additional projects identified as high priority in the Integrated Product Team (IPT) process. The projects include technologies for rapid liquid explosive detection, secure container testing, IED defeat, and levee strengthening. However, as in the FY 2008 budget the funding increase will support mainly advanced technology development and demonstrations and does not provide funding for the basic and applied research priorities included in HSARPA’s mandate.

Transition

The Director of Transition manages technology transfer and near-term product development for DHS S&T. Funding for several important programs that guide research priorities and technology transfer is flat in the FY 2009 request for the Transition portfolio. The Homeland Security Institute, a Federally-Funded Research and Development Center (FFRDC) charged with providing analysis and advice to DHS, is held flat at \$5 M in FY 2009. Additionally, the TechSolutions and TechClearinghouse programs, which are web based platforms for soliciting information on capability gaps and for sharing technology information with first responders, are held flat.

Test and Evaluation, Standards

The Test and Evaluation and Standards portfolio within DHS S&T is decreased by \$3.8 M to \$24.67 M in the budget proposal. In spite of the decrease, there are several new programs in the proposal that will fall into the Test and Evaluation and Standards portfolio. First, DHS S&T proposes adding a testing and evaluation oversight process to the Integrated Product Team process. Testing and evaluation activities at DHS (within DHS S&T and DNDO) have come under significant criticism because of opaque processes, potentially falsified results, and lack of robust testing protocols. Giving oversight authority to IPT participants is a good first step towards improving the process, especially since they represent many of the end technology users. The proposal also includes developing a modeling and simulation strategic plan to support testing and evaluation, and the establishment of an advisory council.

Border and Maritime Security

The border and maritime security division's proposed FY 2009 budget has a strong emphasis on technology testing and evaluation. This division carries out research in support of all border security components of DHS, including TSA, CBP, Immigration and Customs Enforcement (ICE), and the U.S. Coast Guard (USCG). The overall divisional budget is held flat in FY 2009, but there are internal adjustments to increase support of testing and evaluation in support of the Secure Border Initiative (SBI), border officer protection technology, and maritime security.

Chemical and Biological (Chem/Bio)

Chemical and biological research are the largest priorities for DHS S&T. Specifically, research into biological threats and countermeasures receives the largest funding of any single priority. Within Chem/Bio, DHS S&T has placed a strong emphasis on technology testing. Research funding is focused on completing development of cheaper, next generation biohazard detection devices (BioWatch 3).

Command, Control, and Interoperability

The request includes a \$5.4 M increase for the Command, Control, and Interoperability Division (CID), bringing it to \$62.4 M. The increase is strongly focused on testing of information infrastructure security. Testing activities and support will take place in part in collaboration with the National Science Foundation (NSF), and DHS will also fund a war gaming project for cyber

security training. Conversely, R&D funding in the field of cyber security, which includes technology demonstrations and testbed development, is reduced in the request.

Explosives

On the recommendations of DHS components participating in the IPT process, DHS S&T increased the request for funding in the explosives division by \$18.5 M to \$96.1 M. The additional funding will go towards new investments in detecting and neutralizing vehicle borne IEDs and suicide bombers. As part of the IED program, DHS S&T is also finally requesting funding to examine new options for detecting liquid explosives.

Human Factors

The Human Factors division (HF) was created in FY 2008 to bring a social science perspective to DHS S&T. This division's mission is unclear in the FY 2009 budget request. Funding is split between using psychological research as part of the technology development process, where scientists would look at how people interact with technology to make devices easier to use or more socially acceptable. The other portion of the funding is dedicated to research that attempts to apply behavioral science theories to the DHS mission, using facial expressions to identify potential terrorists. Behavioral scientists have raised serious concerns about the validity of the research on which these projects are based.

University Programs

DHS University Programs are an important resource for DHS. The Centers of Excellence (COE) program is a source of much of the valuable basic research in security related science. Additionally, both the COE and Scholars and Fellows program support the development and expansion of the homeland security workforce by attracting and training students in critical fields. However, the FY 2009 budget proposal once again guts this program by dividing less money among more centers. The funding for University Programs is decreased from \$49.3 M to \$43.8 M. The total amount for COEs is held flat, but additional grants for new COEs will be awarded in FY 2008 and FY 2009, making the amount of funding available to individual centers significantly lower.

DNDO

The FY 2009 budget request for the Domestic Nuclear Detection Office (DNDO) is increased by \$79.41 M above the FY 2008 enacted appropriations to \$563.8 M. This amount, especially when compared to DHS S&T's overall proposed funding of \$868.8 M, demonstrates the Administration's focus on nuclear terrorism. The Administration uses a threat calculus to determine R&D priorities that emphasizes preventing the highest impact events, regardless of how probable those events may be. Nuclear threats thus top the list, as DNDO accounts for nearly 40 percent of the Department's R&D portfolio. The Department has not released any justification of this balance of priorities.

Each of the individual portfolios within DNDO receives increased funding in the budget proposal, though there is some readjustment among the various programs. The largest increase is

for systems acquisition, with an increased proposed budget for the controversial Advanced Spectroscopic Portal radiation detector.

Domestic Nuclear Detection Office FY 2009 Budget Request
(dollars in millions)

Budget Category	FY 2007 enacted	Omnibus	FY 2009 request	\$ change FY 2008/request
Management and Administration	30.5	31.5	38.9	7.4
Research, Development, and Operations	272.5	323.5	334.2	10.7
Systems Engineering	30.17	22.4	25.1	2.7
Systems Development	96.721	118.1	108.1	10.0
Transformational R&D	56.81	96.0	113.3	17.3
Assessments	29.1	37.5	32.0	-5.5
Operations Support	32.04	34.5	37.8	3.3
Nat'l Technical Nuclear Forensics Center	10.12	15.0	17.9	2.9
Systems Acquisition	178.0	129.75	190.7	60.95
Radiation Portal Monitors	107.19	90.0	157.7	67.7
Securing the Cities	0.162	30.0	20.0	-10.0
Human Portal Radiation Detection Systems	6.32	9.75	13.0	3.25
TOTAL	481.0	485.0	563.8	79.41

An analysis by components is below:

Management and Administration

The increase for Management and Administration will go towards reimbursing other federal agencies providing detailees to DNDO as well as towards creating additional full time positions to reach a total of 144 staff. As DNDO continues to build up as an independent office, a full time permanent staff will create continuity and expand the office's expertise and capabilities. DNDO still depends on a significant number of detailees, which represent approximately one-third of the total full time staff.

Research, Development, and Operations

The budget request for FY 2009 is \$334.2 M, a \$10 M increase over the enacted FY 2008 appropriations. The largest increase goes towards transformational R&D, which has a strong focus on technology development, especially short term projects to develop radiation detectors. There is also additional funding for systems engineering and development for projects that emphasize non-containerized security, a new thrust area for DNDO. These new projects will focus especially on detecting nuclear threats posed by general aviation aircraft (i.e., private planes) and boats. DNDO has also acknowledged end user needs to a greater extent than in

previous years. They emphasize their collaboration with other components of DHS, including TSA, USCG, and CBP.

The proposed reduction in the budget for technology assessments is worrisome. DNDO has been carrying out tests of new detection technology and has been criticized for running invalid tests. Cutting assessment funding at this point would stifle DNDO's ability to fund legitimate tests, even though DNDO requests additional money to fund production of the technologies that lack legitimate test data.

Systems Acquisition

The Systems Acquisition budget request is increased \$61 M over the FY 2008 appropriations. The increase goes almost exclusively for funding for next generation Advanced Spectroscopic Portal (ASP) radiation monitors with cuts to other acquisition programs totaling \$10 M. ASPs have been an Administration priority since the creation of DNDO. The FY 2008 appropriations law blocked any expenditure for ASPs because of irregularities in test data that indicate these monitors are potentially ineffective. The law now requires the Secretary to certify the performance of ASPs before any funding can be allocated to their acquisition. This request suggests that the Secretary is confident in being able to certify performance in FY 2009, but it is unclear whether ASPs will be able to reach the performance levels necessary to justify this \$67 M expenditure.

The request cuts \$10 M from the budget for the Securing the Cities program. This is a program to deploy nuclear detection equipment at entryways into a city, including ports, highways, and airports. The potential effectiveness of this program is questionable. The concept of operations calls for deployment of handheld, vehicle based, and stationary radiation sensors that would be stationed at various points around New York City. However, there has been little clarity on how currently available technologies would effectively locate radiological material with the precision necessary to isolate any dangerous materials, and there are also privacy and cost concerns inherent to this type of plan that involves such a wide array of sensors.