THE DEPARTMENT OF HOMELAND SECURITY'S R&D BUDGET PRIORITIES FOR FISCAL YEAR 2009

HEARING

BEFORE THE

SUBCOMMITTEE ON TECHNOLOGY AND INNOVATION

COMMITTEE ON SCIENCE AND TECHNOLOGY

HOUSE OF REPRESENTATIVES

ONE HUNDRED TENTH CONGRESS

SECOND SESSION

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THE DEPARTMENT OF HOMELAND SECURITY'S R&D BUDGET PRIORITIES FOR FISCAL YEAR 2009

THURSDAY, MARCH 6, 2008

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON TECHNOLOGY AND INNOVATION,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
Washington, DC.

The Subcommittee met, pursuant to call, at 10:14 a.m., in Room 2318, Rayburn House Office Building, Hon. David Wu [Chairman of the Subcommittee] presiding.

BART GORDON, TENNESSEE
CHAIRMAN

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The Subcommittee on Technology and Innovation

Hearing on:

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

WITNESS LIST

The Honorable Jay M. Cohen
Under Secretary of Science and Technology
Department of Homeland Security

Mr. Vayl Oxford
Director, Domestic Nuclear Detection Office
Department of Homeland Security

Mr. George Ryan
Director for the Testing, Evaluation, and Standards Division
Science and Technology Directorate
Department of Homeland Security

HEARING CHARTER

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

The Department of Homeland Security's R&D Budget Priorities for Fiscal Year 2009

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 (FY09) 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 (Rear Admiral, 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 $868.8M. This is a $38.5M 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 $563.8M. This is a $79.4M 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 Inter-operability: research and development support for inter-operable 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-re-

lated 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 $38.502M 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 counter-measures, 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 under-represented. 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 (mid-term), 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 eight 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 Inte-

grated 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 $5M 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 $3.8M to $24.67M 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 counter-measures 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 Inter-operability

The request includes a $5.4M increase for the Command, Control, and Inter-operability Division (CID), bringing it to $62.4M. 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 $18.5M to $96.1M. 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 $49.3M to $43.8M. 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 $79.41M above the FY 2008 enacted appropriations to $563.8M. This amount, especially when compared to DHS S&T's overall proposed funding of $868.8M, 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 $334.2M, a $10M 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 $61M 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 $10M. 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 $67M expenditure.

The request cuts $10M 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 hand-held, 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.

Chairman WU. I call the Subcommittee to order, and want to welcome everyone to this morning's hearing on the fiscal year 2009 research and development budget for the Department of Homeland Security. This is our second hearing on the DHS R&D budget in the 110th Congress, and I hope that we will be able to devote at least some of our time today to learning more about the Department's accomplishments in the past year. So I am glad to see that the Administration is demonstrating a better understanding of the need for research and development in support of homeland security goals by increasing its requests for both the Science and Technology Directorate and Domestic Nuclear Detection Office.

I am somewhat disappointed that many of the issues that arose during last year's budget hearing remain unresolved or only partially on their way to resolution. In spite of requests from this committee and others, this year's budget request was developed without the guidance of a comprehensive risk analysis that justifies the balance between R&D areas, such as biological counter-measures, nuclear detection, cyber security, conventional explosive mitigation, and others. DHS S&T did release a strategic plan last year, for which we commend it, and we appreciate that effort, but that plan did little to answer the questions about planning and priorities. I am disappointed that we do not have better answers about how DHS makes important decisions about where to invest limited resources for R&D.

Though Under Secretary Cohen and Director Oxford have done an admirable job at integrating the needs of the mission components of DHS into their research and technology development planning, this subcommittee continues to hear complaints that outreach does not trickle down to end-users outside of DHS. State and local officials, especially first responders, a crucial part of our domestic security enterprise, continue to feel that they are shut out of the process of identifying gaps in capabilities, and setting research priorities.

Today, I would like to hear about an action plan for how the S&T Directorate and DNDO will ensure that stakeholders outside of DHS are fully integrated into the research planning process, and that their costs and operational needs are met before any technologies are considered ready for deployment.

An additional related issue that I want to discuss during this hearing is how the S&T Directory and DNDO conduct testing and evaluation of technologies, and how the results of those tests are used to guide decisions about procurement. According to the Department's budget requests, nearly half the funding in the S&T Directorate will go toward product transition, and one third of the DNDO funding will go towards systems acquisition. Such a strong emphasis on end-stage technology development and acquisition means that high quality, trustworthy testing is imperative to the Department's mission.

Concerns have been raised about DHS testing and evaluation efforts, some of which have come under close scrutiny by this committee and others, but at the end of the day, if end-users cannot trust that technology works, they will not take advantage of the many benefits we all know technology brings to the day to day activities of the Homeland Security workforce.

Lest you think that this hearing will be comprised entirely of complaining, let me conclude by commending all of you on some successes. We discussed last year the value of basic research to the Homeland Security mission. I see that this year's budget request, the basic research investment for the S&T Directorate will reach Under Secretary Cohen's goal of 20 percent. Additionally, DNDO plans to increase their investment in transformational R&D. A strong investment in basic research keeps DHS S&T flexible and capable of responding to emerging threats quickly. Moreover, much of this money ends up funding academic research that helps build a skilled science and engineering workforce capable of meeting homeland security-related research needs for many years to come.

Of course, the S&T Committee always likes to see more long-term research, but this is a good, appropriate first step. I want to reiterate that I am committed to working with the Department of Homeland Security to ensure that R&D investments are successful in increasing our knowledge of how to confront catastrophes, whether from human or natural causes.

I look forward to hearing from our witnesses, but there are developments that occur in real-time to which we need to respond, and one of those developments is the news story and response in the *Washington Post* this morning, a news article on the front page delineating some of the problems that have developed with DHS technology. It was originally focused on the border fence, but it addresses many other issues that DHS works on, including airport security and some of these other technologies that we have been talking about.

Unfortunately, there was a response in the back pages of the *Washington Post.* Mr. Ignatius quoted extensively from Secretary Chertoff, and apparently, it is the Secretary's approach to point to sources external to the Department as the cause of many of the Department's problems.

I would like to remind everyone in the room that we had a set of nudge-like hearings a year ago, kindly nudge-like hearings, which were an attempt to be helpful to the research efforts at DNDO and at the S&T Directorate. These were not classic Washington, D.C. "got you" type hearings, and they were not intended as such, and they were not executed as such. But we expressed serious concerns about whether user groups were being properly consulted, whether gaps in technology were being properly addressed, whether there was a proper allocation between basic research and applied research, whether there was too much of a tendency to fight the fire of the day rather than to have a comprehensive approach to addressing risks, and whether, indeed, risk assessment was being properly used to deploy limited research results.

There has not been enough progress made in the twelve months between last year's hearing and today. Twelve months from now, there will be a change in administration, and no matter who is in charge at the top, the crucial mission of the DHS will remain. I, for one, am somewhat frustrated at the pace of progress, and would like to consider what mechanisms are necessary to ensure that in the coming months, in the last months of this Administration, that we continue to press forward with sufficient aggressiveness to ad-

dress the issues which were identified a year ago, and which we will focus on today.

And with that, I would like to recognize my colleague and the Ranking Member from Georgia, Dr. Gingrey, for his opening remarks.

[The prepared statement of Chairman Wu follows:]

PREPARED STATEMENT OF CHAIRMAN DAVID WU

I would like to call the Subcommittee to order.

I want to welcome everyone to this morning's hearing on the FY09 research and development budget for the Department of Homeland Security. This our second hearing on the DHS R&D budget in the 110th Congress, and I hope that we are able to devote at least some of our time today to learning more about the Department's accomplishments in the past year.

Though I am glad to see that Administration is demonstrating a better understanding of the need for research and development in support of homeland security goals by increasing its requests for both the Science and Technology Directorate and Domestic Nuclear Detection Office, I am disappointed that many of the issues that arose during last year's budget hearing remain unresolved. In spite of requests from this committee and others, this year's budget request was developed without the guidance of a comprehensive risk analysis that justifies the balance between R&D areas such as biological counter-measures, nuclear detection, cyber security, conventional explosive mitigation, and others.

DHS S&T did release a strategic plan last year, and we appreciate that effort, but that plan did little to answer questions about planning and priorities.

I am disappointed that we do not have better answers about how DHS makes important decisions about where to invest limited resources for R&D. Though Under Secretary Cohen and Director Oxford have done an admirable job at integrating the needs of the mission components of DHS into their research and technology development planning, this committee continues to hear complaints that outreach does not trickle down to end-users outside of DHS. State and local officials, especially first responders—a crucial part of our domestic security enterprise—continue to feel that they are shut out of the process of identifying gaps in capabilities and setting research priorities.

Today I would like to hear about an action plan for how the S&T Directorate and DNDO will ensure that stakeholders outside of DHS are fully integrated into the research planning process, and that their cost and operational needs are met before any technologies are considered ready for deployment.

An additional related issue that I want to address during this hearing is how the S&T Directorate and DNDO conduct testing and evaluation of technologies, and how the results of those tests are used to guide decisions about procurement. According to the Department's budget request, nearly half the funding in the S&T Directorate will go towards product transition and one-third of the DNDO funding will go towards systems acquisition.

Such a strong emphasis on end-stage technology development and acquisition means that high quality, trustworthy testing is imperative to the Department's mission. Concerns have been raised about DHS testing and evaluation efforts, some of which have come under close scrutiny by this committee and others. But at the end of the day, if end-users cannot trust that technology works, they will not take advantage of the many benefits we all know technology brings to the day-to-day activities of the homeland security workforce.

Lest you all think that this hearing will be comprised entirely of complaining, let me conclude by commending all of you on some successes. We discussed last year the value of basic research to the homeland security mission.

I see that in this year's budget request, the basic research investment for the S&T Directorate will reach Under Secretary Cohen's goal of twenty percent. Additionally, DNDO plans to increase their investment in transformational R&D. A strong investment in basic research keeps DHS S&T flexible and capable of responding to emerging threats quickly. Moreover, much of this money ends up funding academic research that helps build a skilled science and engineering workforce capable of meeting homeland security-related research needs for many years to come. Of course, the S&T Committee always likes to see more long-term research, but this is a very good and appropriate first step.

I want to reiterate that I am committed to working with the Department of Homeland Security to ensure that R&D investments are successful in increasing our knowledge of how to confront catastrophes, whether from human or natural causes.

I look forward to hearing all of the witnesses' thoughts on the FY09 budget request and how that budget supports science and technology to make our nation safer.

I now want to recognize my colleague and the Ranking Member from Georgia, Dr. Gingrey, for his opening remarks.

Mr. GINGREY. Good morning, Chairman Wu. I want to thank you for holding this hearing this morning to get an in-depth look at the fiscal year 2009 budget request for the Department of Homeland Security's ongoing efforts in research and development.

Our nation's scientific enterprise remains, and will continue to be, a critical component of our homeland security. The efforts of the Domestic Nuclear Detection Office and the Science and Technology Directorate contribute to the preparedness of our nation against potential terrorist attacks and, of course, natural disasters as well.

These organizations tap into the limitless creativity of our nation's scientists and engineers, leading to direct benefits for our first responders, our guardsmen, our Border Patrol agents, our police, our firefighters, just to name a few. These offices within DHS are vital components to our homeland security strategy, and I certainly want to thank the panel for being here this morning.

I also want to thank all the men and women who work with you to bring the skill of our nation's scientists and engineers to bear to protect us from threats we currently face. You are performing a great service to this country, and you should be recognized for those efforts.

Mr. Chairman, last week, the full Science and Technology Committee unanimously reported the Border Security Technology Innovation Act of 2008, which is sponsored by the distinguished Ranking Member of the full Committee, Mr. Ralph Hall of Texas. This bill acknowledges the crucial role that science and technology play in protecting our nation's borders. Today, I expect we will hear from our witnesses that our science and technology research and development efforts are strong, and they are yielding immediate benefits for our nation. However, I do know that we can continue to improve on these efforts.

For the fiscal year 2009 budget, President Bush has requested over $1.4 billion for the research and development efforts at DHS. In addition to prioritizing among the various types of threats that we face, we must also consider the character of research performed. How much spending should be geared towards long-term basic research? How much towards incremental improvements to our current capabilities?

Now, Mr. Chairman, we also have to consider how best to defend against an adaptive and intelligent enemy who will attempt to overcome or bypass any defense we create. Therefore, it is crucial that we seek defenses that can be implemented as broadly as possible, and minimize the chance that they can be easily sidestepped. I think that is what we are talking about in regard to the need to reauthorize and extend and improve the FISA law, the *Protect America Act.* Reaching this goal will require sustained attention to the operational needs of the Department of Homeland Security, and continual re-examinations of the many threats that we do face.

Finally, we must ensure that our substantial investments in new security technology work as advertised. Both of your agencies have been criticized in the past for incomplete or inaccurate testing and

evaluation procedures. A rigorous testing and evaluation process will help your agencies in the long-term by ensuring that your work meets the needs of our first responders. I applaud your efforts to immediately address these concerns, and suggest that this committee is well situated to help you in those efforts. The fundamental challenge before us is how best to distribute limited funding, always, in the face of highly uncertain, varied, and changing threats.

In the past year, your organizations have steadily improved our nation's defenses. These are areas, there are areas, I should say, where I think more must be done in the coming year. I look forward to discussing these issues with you today, seeking ways to help you implement your effective, efficient, and evolving defense of our homeland.

With that, Mr. Chairman, I want to thank the panel. I look forward to their testimony, and I yield back the balance of my time.

[The prepared statement of Mr. Gingrey follows:]

PREPARED STATEMENT OF REPRESENTATIVE PHIL GINGREY

Good morning, Chairman Wu. I want to thank you for holding this hearing this morning to get an in-depth look at the Fiscal Year 2009 budget request for the Department of Homeland Security's ongoing efforts in research and development. Our nation's scientific enterprise remains—and will continue to be—a critical component of our homeland security.

The efforts of the Domestic Nuclear Detection Office and the Science and Technology Directorate contribute to the preparedness of our nation against potential terrorist attacks and natural disasters. These organizations tap into the limitless creativity of our nation's scientists and engineers, leading to direct benefits for our first responders: our guardsmen, our border patrol agents, our police, and our firefighters, just to name a few.

These offices within DHS are vital components to our homeland security strategy and I want to thank the panel for being here this morning. I also want to thank all the men and women who work with you to bring the skills of our nation's scientists and engineers to bear to protect us from threats we currently face. You are performing a great service to this country, and you should be recognized for your efforts.

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Mr. Chairman, we also have to consider how best to defend against an adaptive and intelligent enemy who will attempt to overcome or bypass the defenses we create. Therefore, it is crucial that we seek defenses that can be implemented as broadly as possible and minimize the chance that they can be easily side-stepped. Reaching this goal will require sustained attention to the operational needs of the Department and continual reexamination of the threats we face.

Finally, we must ensure that our substantial investments in new security technology work as advertised. Both of your agencies have been criticized in the past year for incomplete or inaccurate testing and evaluation procedures. A rigorous testing and evaluation process will help your agencies in the long-term by ensuring that your work meets the needs of our first responders. I applaud your efforts to immediately address these concerns and suggest that this committee is well-situated to help you in your efforts.

The fundamental challenge before us is how best to distribute limited funding in the face of highly uncertain, varied, and changing threats. In the past year, your organizations have steadily improved our nation's defenses. There are areas, however, where I think more must be done in the coming year. I look forward to discussing these issues today and seeking ways to help you implement an effective, efficient, and evolving defense of our homeland.

With that Mr. Chairman, I yield back the balance of my time.

Chairman WU. I thank the gentleman, and if there are Members who wish to submit additional opening statements, your statements will be added to the record.

[The prepared statement of Ms. Richardson follows:]

PREPARED STATEMENT OF REPRESENTATIVE LAURA RICHARDSON

Thank you Chairman Wu for holding this very important hearing today. I would also like to thank our witnesses for their testimony. The purpose of today's hearing is to examine the Administration's FY '09 budget request for the research, development, testing, and evaluation performed at the Department of Homeland Security (DHS). The Science and Technology Directorate at DHS and the Domestic Nuclear Detection Office (DNDO) are this nation's leading federal agencies tasked with the responsibility of developing the next wave of technology that will protect the American people. Fortunately the work that this committee performs allows us to approach the issue of national security in a relatively bipartisan manner. Equipping our border agents, service men and women, and other agencies/customers of DHS with proven technology is a necessity, and a step in the right direction towards securing our borders, and fighting the war on terror.

Looking at the proposed budget it is obvious the Administration's priorities are, chemical and biological research. While the threat of a large scale biological or chemical attack is always possible; I, like many of my colleagues are interested to hear whether or not the Department has done a threat assessment to justify this commitment. Likewise this Administration is also committed to the work that is performed at the Domestic Nuclear Detection Office; again a threat assessment to justify this level of spending is not only reasonable, but fiscally responsible.

Another issue that this committee has is the concerns that DHS is not responsive to the concerns of its varying agencies as they pertain to test results and user requirements. I must say that it is short sighted not to heed the concerns of the individuals who need to use this technology in the field every day. Therefore, what we need to know is what the Department is doing to address this issue.

Also, as a Member whose district is adjacent to the port of Long Beach and close to the port of Los Angeles, I am particularly interested in the R&D work that is being performed in the Border & Maritime Security division. As I mentioned at last week's markup of the USFA reauthorization, an incident at one of these ports that results in an eventual shutdown can cost the national economy billions of dollars. Therefore I am interested to know what technology has already been implemented, and what technology has the promise of full implementation in the near future.

In closing I want to reiterate my strong support for the work that all of our witnesses do at their respective agencies. The general public may not be aware what you do, but the Members of this committee appreciate all of your work. Likewise the Members of this committee just want to ensure that the work you do in the field can continue at the highest levels.

I look forward to hearing from our witnesses, and I yield back my time.

Chairman WU. I would now like to introduce our distinguished panel of witnesses. Rear Admiral Jay Cohen is the Under Secretary for Science and Technology at the Department of Homeland Security. Mr. Vayl Oxford is the Director of the Domestic Nuclear Detection Office, or DNDO, at DHS. And finally, Mr. George Ryan is the Director of Testing, Evaluation, and Standards for the DHS S&T Directorate.

I will now turn things over to our witnesses, and as our witnesses know, your longer written statement will be submitted into the record, and your oral testimony is limited to five minutes each, after which the Committee will have five minutes each to ask questions.

And we will start with Under Secretary Cohen. Please proceed.

STATEMENT OF HON. JAY M. COHEN, UNDER SECRETARY, SCIENCE AND TECHNOLOGY DIRECTORATE, DEPARTMENT OF HOMELAND SECURITY

Mr. COHEN. Well, good morning, Chairman Wu and Congressman Gingrey, and the other distinguished Members of the Committee. It is a great personal honor for me to appear before you today, along with Vayl Oxford and George Ryan. It is a great privilege for me to be entrusted with the taxpayers' resources to oversee the Science and Technology component of the Department of Homeland Security, and also, to lead a fantastic group of men and women who are absolutely dedicated to using science and technology to make our nation safer.

I will limit my words to just a very few thoughts, because I think your questions will be much more important than anything I might say at the start, but I appreciated your words, Chairman, and your words, Congressman Gingrey, on the progress that we have made, and the progress that we have to make, as we go forward. Your Committee and the other committees, including the other body, have been very supportive throughout the year and a half I have been on-board. We rapidly reorganized into a more enduring S&T construct, of enduring disciplines, where projects come and go, and a balanced portfolio of basic research, as you indicated, near-term product transition, and then, a higher risk innovation portfolio, which only S&T has the ability to facilitate.

And so, I shared with you the threats as I saw them a year and a half ago. This is my third time testifying before this committee in this position, and those are the four Bs, bombs, borders, bugs, and business. Everyone understands bombs, borders, and bugs. The business is the cyber-backbone that enables everything that we do in our society, and I know there is great interest in that.

And then, I told you from my organization, I had the four gets, and we had to get those right. We had to get the organization right, and you were very helpful with that. We had to get the people right. When I came on-board, as you may remember, the Office of Personnel Management had evaluated my organization the spring before I got there, and we were ranked 222 out of 222 government organizations, so if at the end of my tenure, I achieve 221, I believe I will be a hero, because at least, we won't be last, but I think we are doing a lot better than that, because we had 60 percent federal employees when I came on-board, and today, we have over 93 percent federal employees. I have no shortage of volunteers, and about ten federal employees who had left my Directorate in the spring of '06 have come back on-board to be full members and program managers. So, it is an exciting time.

We had to get the books right, and this was written about in the legislation, and I am joined today by Dick Williams, my Chief Financial Officer. We came on-board the same day, 10 August 2006. You may remember that was the day of the liquid explosives plot in London, and welcome aboard, and it has been a heck of a ride ever since.

And then, finally, if you get the people right, you get the organization right, and you get the books right, then you can get the con-

tent right. And that has been the focus of my last year, and I guarantee you, Chairman and Members, it is absolutely my focus in the transition year.

And so, the four Bs, the four gets, we have testified to that before. I think it brings us to a place where I am now focused on the four Ps. I want to assure you that I have only 23 initiatives left, because then I run out of letters in the alphabet.

Well, what are the four Ps? The first is people, and they enable everything we do, especially in science and technology. The next is process, and we have invited your Members, and they have been very kind, and your staff, to come to all of our processes, whether it is the Integrated Product Team, or it is basic research reviews or field trips, or our outreach stakeholder conferences, and they have been very, very supportive, as has the IG. I believe in open processes, and it is the processes and the five year budget and the priorities that will outlive me and this Administration, as it did when I left the Office of Naval Research after six years.

The third is partnerships, and I know, Chairman, how strongly you and the committee feel in the enabling legislation, about leveraging the other components of government, international, United States, industry, and of course, our heroes, my customers, the first responders, and you have already addressed that so well.

And so, if we get the people right, then we get the processes in place, which I believe we have, and we have vibrant partnerships to save the taxpayers money and not duplicate effort, in the end, you add those all up, we get product. And the product is what we are trying to get out, not only to the 22 components and directorates, my immediate customers at DHS, but also, the customer of my customer, the first responders.

And I know there will be many questions on that. And so, as always, I welcome your oversight. I welcome your questions. I appreciate very much the bipartisan support that Science and Technology has and continues to receive, and I am committed to you, sir, and to the American taxpayer, and to the Administration, to do my very best to charge to the goal, and turn over the best science and technology in support of making the Nation safer, that I can do.

Thank you so much.

[The prepared statement of Admiral Cohen and Mr. Ryan follows:]

PREPARED STATEMENT OF JAY M. COHEN AND GEORGE RYAN

INTRODUCTION

Good Morning Chairman Wu, Ranking Member Gingrey, and distinguished Members of the Committee. It is an honor for me to appear before you today to update you on the progress of the Department of Homeland Security's (DHS) Science and Technology Directorate (S&T Directorate) and discuss how the President's Budget Request for Fiscal Year 2009 will position us to develop and transition technology to protect the Nation from catastrophic events.

The S&T Directorate is committed to serving our customers—the many components that comprise the Department—and their customers—the hardworking men and women on the front lines of homeland security, especially the first responders, who need ready access to technology and information to perform their jobs more efficiently and safely. I am honored and privileged to serve with the talented scientists, engineers and other professionals who support these dedicated Americans in our shared mission to secure our homeland and defend our freedoms.

First and foremost, I continue to be very appreciative of the leadership of the Congress in its support of the S&T Directorate, and of me personally, as Under Secretary for Science and Technology. I am grateful for the engaged and nonpartisan relationship we enjoy, which is vitally important for the S&T Directorate. The informed counsel of Committee Members with homeland security oversight, and that of their staffs, has been invaluable to the Department's efforts to position the S&T Directorate for accountability, tangible results and success, both for today and in the future.

Last year, I told you that to achieve long-term success, the S&T Directorate must get four 'gets' right—its organization, its people, its books, and its program content. I also told you that we would concentrate our activities on the four 'Bs'—bombs, borders, bugs and business—to stay focused on priority threat areas for the S&T Directorate.

I'm pleased to report that since last year, we have made significant progress in the four 'gets' and the four 'Bs.'

Highlights of this progress include:

Publishing a strategic plan that provides a framework to guide the Directorate's activities over the next five years;

Strengthening our workforce by increasing federal staff, implementing training initiatives, and building morale through directorate-wide communications and events;

Realigning our organizational structure and research, development, test and evaluation (RDT&E) activities to better serve the Department's components and their end-users; and

Establishing a customer-led, Capstone Integrated Product Team (IPT) Process to identify our customers' needs and develop and transition near-term capabilities for addressing them.

This year, I am going to focus on the four 'Ps': People, Process, Partnerships, and Product. Fine tuning and sustaining the four 'Ps' will ensure that the S&T Directorate achieves enduring success.

The first 'P' is for People. That is because once you get the people right, you have to keep the people right. The S&T Directorate will keep the right mix of people by having a solid staffing plan and by being a great place to work. Our employee communications, training opportunities and directorate-wide activities have helped make the S&T Directorate a place where highly skilled professionals want to be. We must sustain this effort.

The second 'P' is for Process, because you need a stable and efficient operational foundation to keep an organization, its program content, and its books right. The S&T Directorate will refine and integrate its internal management processes—financial and administrative—to ensure operational excellence and fiscal responsibility. We must also mature those processes that drive the delivery of products to our customers, such as our customer-led Capstone Integrated Product Team (IPT) Process—and continue to support a balanced portfolio for RDT&E activities.

The third 'P' is for Partnerships, which are essential for long-term success. The S&T Directorate will build on the international and interagency partnerships it put in place this past year by establishing more formal working agreements and commitments to the development of homeland security science and technology.

The fourth 'P' is for Product, because we exist to deliver to our customers' science and technology breakthroughs that will strengthen the security of our homeland.

PEOPLE

The S&T Directorate functions as the Department's science and technology manager. We invest in science and technology that supports DHS component efforts to protect out homeland. To achieve this, the S&T Directorate develops and manages an integrated program of science from basic research and technology innovation through technology transition. The managers of this program are predominantly active scientists and engineers in the many disciplines relevant to Homeland Security. Program investment is guided by a multi-tiered strategy and review process based on higher guidance, customer needs, and technology opportunities.

Our staffing is currently at 93 percent of Full Time Equivalents (FTE). Hiring has been slowed due to the continuing resolution and a reduction in the M&A funding, but we expect to reach our full complement of 381 FTEs by the end of FY 2008. This year we are putting in place a career Senior Executive Service Deputy Under Secretary for Science and Technology to help ensure a seamless transition into the next Administration. I'm also pleased to inform you that in the past several months

we have received a number of unsolicited employment applications from very qualified individuals. The word is out that the S&T Directorate is making a difference.

It continues to be very important to me personally that S&T Directorate staff be kept informed of our plans and priorities and that they have a forum for asking questions and expressing their views and concerns. I hold monthly "All Hands" meetings to brief all staff members, including teleconference links with staff in other locations such as the Transportation Security Laboratory in Atlantic City, New Jersey, the Animal Disease Center on Plum Island, New York, the Environmental Measurements Laboratory in New York City, and the National Biodefense Analysis Counter-measures Center in Fort Detrick, Maryland. These meetings also allow me to recognize the achievements of staff members, to answer questions and solicit input, and, most importantly, express my gratitude for their superb work.

PROCESS

I thank Congress for its support of the new organizational structure, which we put in place in September 2006.

This enabled us to re-engineer our management and administrative processes over the last two years to reduce the costs of our business operations by more than 50 percent. We accomplished this by implementing several efficiency initiatives to make better use of our resources including converting positions filled by contractors to be civil servants, consolidating office space, and limiting our overhead, which I will continue to cap at nine percent in FY 2009.

It has also supported a broad and balanced range of activities that are aimed at identifying, enabling and transitioning new capabilities to our customers to better protect the Nation. This is reflected in the President's FY 2009 Budget request, which includes **$145.1 million** for the basic research portfolio; **$361.4 million** for the transition portfolio; and **$58.6 million** (including SBIR) for the innovation portfolio.

Product Transition (0-3 yrs)	Innovative Capabilities (2-5 yrs)
▪ Focused on delivering near-term products/enhancements to acquisition ▪ Customer IPT controlled ▪ Cost, schedule, capability metrics 49%	▪ High-risk/High payoff ▪ "Game changer/Leap ahead" ▪ Prototype, Test and Deploy ▪ HSARPA 8%
Basic Research (>8 yrs)	**Other (0-8+ years)**
▪ Enables future paradigm changes ▪ University fundamental research ▪ Gov't lab discovery and invention ▪ Homeland Security Institute 20%	▪ Test & Evaluation and Standards ▪ Laboratory Operations & Construction 23%

DHS Science & Technology Investment Portfolio

Basic Research (> 8 years)

The S&T Directorate's basic research portfolio addresses long-term research and development needs in support of DHS mission areas that will provide the Nation with an enduring capability in homeland security. This type of focused, protracted research investment has the potential to lead to paradigm shifts in the Nation's homeland security capabilities.

The S&T Directorate's basic research program enables fundamental research at our universities, government laboratories and in the private sector. I have previously stated a goal to grow this account to approximately 20 percent of the budget; and I am pleased today to be able to say that we have met this goal. Approximately 20 percent of the S&T Directorate's investment portfolio, or **$136.2 million,** is allocated for basic research in the current fiscal year with 20 percent or **$145.1 million** planned for FY 2009. It is essential that basic research be funded at consistent levels from year to year to ensure a continuity of effort from the research community in critical areas that will seed homeland security science and technology for the next generation of Americans.

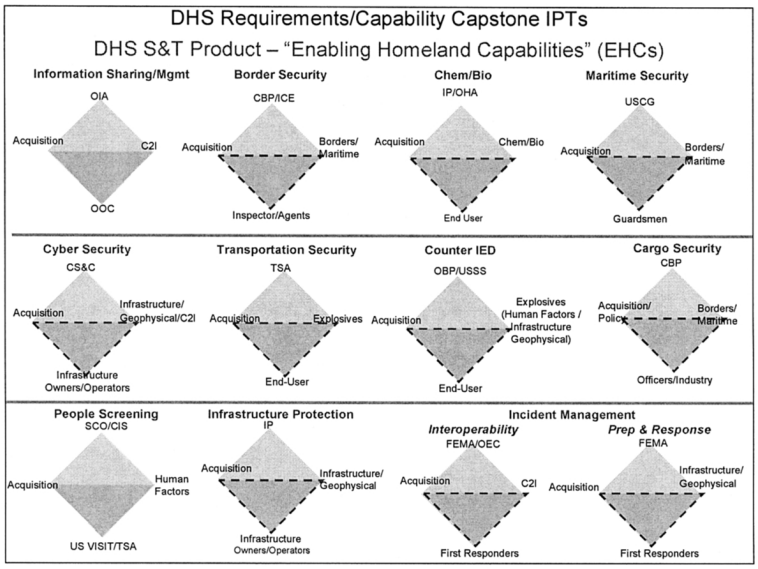
This year, we will focus internally on refining our basic research "thrust areas" and developing better means to measure the effectiveness of the basic research portfolio. I have asked the National Academies to help in this effort.

Product Transition (0 to 3 years)

Development of the product transition portfolio is driven by our customer-led, Capstone Integrated Product Teams (IPTs) that function in mission-critical areas to identify our customers' needs and enable and transition near-term capabilities for addressing them. These Capstone IPTs engage DHS customers, acquisition partners, S&T Division Heads, and end-users as appropriate in our product research, development, transition and acquisition activities.

The Capstone IPT process enables our customers to identify and prioritize their operational capability gaps and requirements and make informed decisions about technology investments. The S&T Directorate, in turn, gathers the information it needs to respond with applicable technology solutions for closing these capability gaps. The science and technology solutions that are the outcome of this process, referred to as Enabling Homeland Capabilities, draw upon technologies that can be developed, matured, and delivered to our customer acquisition programs within three years.

Our experience over the last year has led us to align our Capstone IPTs structure to 12 major areas: Information Sharing/Management; Border Security; Chemical Defense; Biological/Agricultural Defense; Maritime Security; Cyber Security; Transportation Security; Counter IED; Cargo Security; People Screening; Infrastructure Protection; and Incident Management (includes first responder inter-operability).



DHS Requirements/Capability Capstone IPTs

S&T's product transition/IPT process ensures that appropriate technologies are engineered and integrated into the DHS acquisition system for our customers. Approximately **53 percent of S&T's investment portfolio or $376.0 million** is allocated for product transition in the current fiscal year with **49 percent or $361.4 million** planned for FY 2009.

Innovative Capabilities (2 to 5 years)

The Innovation/HSARPA portfolio supports three important efforts to put advanced capabilities into the hands of our customers as soon as possible: Homeland

Innovative Prototypical Solutions (HIPS), High Impact Technology Solutions (HITS) and the Small Business Innovative Research (SBIR) program.

HIPS are designed to deliver prototype-level demonstrations of game-changing technologies within two to five years. Projects present moderate- to high-risk, with a high-payoff if successful.

HITS are designed to provide proof-of-concept solutions within one to three years that could result in high-payoff technology breakthroughs. While these projects are high-risk, they offer the potential for "leap-ahead" gains in capability should they succeed.

The Small Business Innovative Research (SBIR) program, which the S&T Directorate manages on behalf of DHS, issues two solicitations each year and generates multiple awards for the small business community. The first solicitation for FY 2008 opened in mid-February and the second solicitation is planned for release in May. The solicitations will address topics in areas that are aligned with the S&T Directorate's six technical divisions.

The Innovation/HSARPA funding request for FY 2008 was $60 million and $33 million was approved in the final Appropriations Act. I do not believe this reduction reflected any lack of confidence in the portfolio on the part of the Congress, but was rather an outcome of the extreme pressure in the Appropriations "end game." Therefore, we are requesting **$45 million** in FY 2009 for Innovation's HITS and HIPS activities.

Test & Evaluation and Standards

In 2006, I established the Test and Evaluation and Standards Division (TSD). TSD is working closely with DHS Under Secretary for Management as well as all DHS components to develop and implement a robust Test and Evaluation (T&E) policy for all of DHS that will be fully integrated into the Department's Acquisition Policy. The goal of the T&E policy will be to establish processes to support the evaluation of system efficacy, suitability and safety. TSD has established a T&E Council to allow participation by all components of DHS in promoting T&E best practices and lessons learned in establishing consistent T&E policy and processes for use in acquisition programs throughout DHS. Developmental Testing and Evaluation (DT&E) and Operational Testing and Evaluation (OT&E) are conducted at levels commensurate with validating performance and Technology Readiness Level (TRL) of the system throughout the development process. TRL assessments are initiated early on S&T projects and are performed throughout development to ensure technology is maturing as required and that projects are ready to transition to the DHS components at the appropriate time. DT&E is performed during the developmental phase of a product or system and is concerned chiefly with validating the contractual and technical requirements and the attainment of engineering design goals and manufacturing processes. OT&E focuses on determining operational effectiveness, suitability, and supportability and is performed with production representative equipment, with trained operators in an operational environment by an independent third party.

DHS Acquisition and T&E Policy under development will provide the appropriate review chain both within DHS as well as the approval process for test results and for adequacy of testing. The draft T&E policy that is being developed will require user components to participate in creating, reviewing and signing the Test and Evaluation Master Plan (TEMP). Its primary purpose is to describe the necessary Developmental Test and Evaluation (DT&E) and Operational Test and Evaluation (OT&E) that needs to be conducted in order to determine system technical performance, operational capabilities and limitations. The TEMP is an integrated and agreed upon plan to ensure that the right tests are conducted and the products are meeting the user requirements. Having the customers involved in the test planning, execution, and reporting for the technology or system under development will ensure that the components are able to use the results and maintain a current knowledge during the product development. The TEMP also addresses the testing laboratories, capabilities, facilities and ranges required for the test program; testing laboratories are accredited/recognized; and independent oversight of the tests are performed. Additionally, when possible DHS ensures independent operational test teams are involved early in the project development to ensure operational shortcomings are identified and corrected as early as possible during development. The test results will be critical in ensuring that DHS products meet the necessary milestones to continue development.

While the T&E Policy is being finalized, DHS development programs are moving forward with the assistance and guidance of TSD in designing T&E protocols to assess whether systems meet standards, technical specifications and some operational requirements. It is the Department's objective to prepare standard T&E master

plans, test plans and test reports to document the planning, execution and reporting phases of the testing. Test plans are required whether the research project is being conducted internally or externally to S&T. Red Teaming will be included in the test plans as required and be employed post deployment when appropriate.

The DHS components working within the DHS Capstone IPT process ensure that the user needs are addressed in the research as well as the testing and evaluation. End-user needs are incorporated in the planning and design of the tests. All tests will be performed to component requirements or DHS adopted standards. Reports of efficacy, safety, and suitability are assessed against test criteria which are developed with Component input.

TSD is also developing an accredited/recognized test capability, with the goal of testing all products in accredited/recognized facilities. The accreditation/recognition process is under development and facilities are currently being identified that are capable of conducting different aspects of the testing process. Accomplishing independent testing in realistic operational environments will better assess product effectiveness and suitability. Test results from the above process will allow decision-makers to formulate better judgments concerning readiness for transition to the next phase of development or deployment.

TSD has an effort under way to ensure that once testing is completed both components and first responders have access to product performance evaluations. T&E results will be placed on the Responders Knowledge Base (RKB) that is funded and managed by FEMA. In addition to posting the results on the RKB, the DHS T&E policy will provide standard report formats to ensure that the results are useful including system limitations and capabilities.

In the area of standards, I would to like mention our efforts to implement the DHS Standards Policy through the development of a standards infrastructure and the issuance of guidance. Just as with T&E, we have established a Standards Council. TSD and the Standards Council have developed and distributed guidance on the participation in the development and use of non-government standards. We continue to evaluate and adopt voluntary consensus standards in support of the Homeland Security Grant Program as well as key initiatives such as National Preparedness. Our standards development program continues its successful support for research on standards to support national needs in homeland security. In August of 2007 the Office of Standards published its first Annual Report which documents the work and accomplishments of the previous year. In the years ahead we will be focusing on refining our investments to reflect the evolving challenges facing the Department, utilizing S&T's new operating model and the outputs from the Capstone IPTs. The range of projects includes trace and bulk explosives detection, biometrics, credentialing, chemical and biological counter-measures, responder protective equipment and many more. The standards office engages experts from the DHS components and a variety of federal partners, and leverages the outstanding work of private sector standards development organizations.

PARTNERSHIPS

Over the past year, we have built partnerships that have helped us align our efforts within the S&T Directorate, across the Department, and with our public and private partners around the world. Within the Directorate, we have developed and published the *S&T Strategic Plan* that provides the strategy and planning framework to guide the Directorate's activities over the next five years. Through the Capstone IPT process, we have aligned our transition portfolio to our customers' needs. In basic research, we have aligned our university-based Centers of Excellence and, as a result of a meeting I held with the Directors of the Department of Energy (DOE) National Laboratories in May 2007, the National Laboratories to our six technical divisions to focus this enormous capability more closely on the fundamental knowledge gaps that limit our customer oriented applied research programs. We announced five new COEs on February 26, 2008, which will further satisfy the Directorate's need for university-based fundamental research.

Over the past year my Office of Interagency Programs (and First Responder Liaison) has worked very closely with DOD to develop and enhance information sharing opportunities. Among the accomplishments were the development of an implementing agreement among the partners and a senior level DHS–DOD working group. These accomplishments will help ensure the best use of resources while avoiding duplication of effort and will promote further cooperation among our partners. The first S&T liaison position within the California Governor's Office of Homeland Security was also established to enhance interagency efforts with our customers. Many of the experiences of this successful pilot were used as a working model for engaging with our federal, State, local and tribal customers We will continue to conduct national interagency outreach through site visits, meetings, con-

ferences and symposia to promote federal, State, local, and tribal inter-operability, collaboration, and coordination in the area of Science and Technology.

We also developed the *Coordination of Homeland Security Science and Technology* document that establishes the baseline for the efforts of the entire Federal Government homeland security research and development community. This document lays out the roles and responsibilities of federal agencies as well as initiatives already under way to counter threats to the homeland. It identifies strategic goals through 2015 and intermediate steps to achieve those goals, and is the first step in developing a more prescriptive plan that will guide the efforts of all participants in the Homeland Security Science and Technology enterprise. For the next steps in the development of that plan, I intend to work with the Office of Science and Technology Policy's National Science and Technology Council to utilize standing processes and committees, specifically the Committee on National and Homeland Security, which I co-chair. Continued development of the plan concurrent with the Quadrennial Homeland Security Review beginning this year will play an important role in helping align strategies and missions to adapt to a fast-changing world and an ever evolving enemy.

Industry is a valued partner of DHS S&T and its continued participation in developing solutions for homeland security applications is vital to our effort to safeguard the Nation. Consistent with S&T's new structure, our Innovation/HSARPA portfolio and six technical divisions will be releasing BAAs that seek industry participation to address specific challenges in their respective areas. For example, Innovation/HSARPA has already posted BAAs for projects that cross all six divisions, seeking prototype or proof of concept demonstrations within 1–5 years. Innovation/HSARPA plans to release additional BAAs as new technology developments permit and as new gaps in capabilities for homeland security are identified. We have issued a Long Range BAA (08–01) that will remain open throughout the fiscal year. This BAA allows both national and international public and private sector providers to offer solutions to a very broad range of gaps and requirements. As I have often said, no one knows where good ideas come from and for that reason I have been personally proactive in both seeking out and receiving technology briefs and opportunities from all sources. This is a culture I am working to instill throughout the DHS S&T Directorate.

Additionally, DHS S&T has held several Stakeholder Conferences to foster business partnerships with key customers and partners, including industry, Federal, State, and local government leaders, and academia. The Command, Control, and Inter-operability Division also held their annual Industry Roundtable to engage industry leaders on the future of communications inter-operability issues.

The *Support Anti-terrorism by Fostering Effective Technologies (SAFETY) Act of 2002,* administered in the S&T Directorate, continues to be a valuable tool in expanding the creation, proliferation and use of cutting edge anti-terrorism technologies throughout the United States. During FY 2007, the Office of SAFETY Act Implementation achieved an increase of 81 awards, an 83 percent increase over the total cumulative number of approvals attained over the previous three years of the program. Approximately 86 percent of the approved awards during FY 2007 have relevance for the classes of capabilities and needs identified by the Science and Technology Capstone IPTs. The number of applications was up 63 percent, while processing time has been reduced 31 percent. The career federal staffing level of the SAFETY Act office was increased to three, thus providing more continuity of leadership, and permitting more attention and a quicker response to individual applicants. I am mindful of the interest in this program in the Congress and across the Nation.

As part of our outreach efforts to encourage greater industry participation, the Directorate held the first Homeland Security Science & Technology Stakeholders Conference in May 2007 here in Washington. We were partners in a conference in London last December that focused on international outreach. And we held a conference in Los Angeles in January 2008, focused on "Putting First Responders First." On March 19 and 20, we will sponsor the second University Programs Summit here in Washington, an event at which participants will show off the results of their fantastic research at the colleges and universities that are part of the Homeland Security University Centers of Excellence. We will have another industry stakeholders' conference in Washington, June 2–5, 2008. I invite you and all elected Members and staffs to attend these events so you might see for yourself the power of innovation and technology in making our nation safer.

I also know that we must look beyond our nation's borders for solutions to combating domestic terrorism. Therefore, consistent with DHS enabling legislation and the recent *Implementing the Recommendations of the 9/11 Commission Act,* the International Programs Division is responsible for coordinating international outreach efforts to help us tap into science and technology communities across the

globe. We have proactively pursued bilateral technology and programmatic cooperation with my counterparts in the United Kingdom, Canada, Australia, Sweden, Singapore, the European Union, Germany, Mexico, France, Japan, and Israel. Formal agreements currently exist with Canada, the UK, Australia, Sweden and Singapore. With our current partners, we have twenty concrete projects in a number of high priority research areas including air cargo explosive detection, chemical and biological counter-measures, visualization and analytics, critical infrastructure protection, and incident management. In addition to these projects, active information sharing with our foreign partners has reduced duplication of research efforts, streamlined project development, and synergized the expertise of the broader international community to produce mutually beneficial results. The International Programs Division maximizes these relationships across the U.S. Government through active coordination with DHS Components and other agencies, including the Departments of State and Defense. Embedded S&T liaisons in Europe, the Americas and Pacific/Asia cast a wide global net to seek out new science and technology solutions with current and prospective partners. Annual academic grant competitions are open to the global community and provide world-wide access to cutting-edge S&T research in support of our homeland security mission. S&T is actively engaging with partners across the globe to develop coordinated efforts and joint solutions to our shared security challenges.

PRODUCT

I am committed to best apply across the S&T Directorate the resources you have wisely provided in ways that best serve the American people and better secure our homeland. Your support over the last year has allowed us to "hit our stride," and I humbly ask for your continued trust and support of the President's FY 2009 Budget Request to allow us to build upon that momentum. The following are a few examples of products we have developed and in some cases transitioned to our customers.

Border and Maritime Security

- Developed a lightweight shipping container with embedded security features within its walls, doors and floor to detect intrusions. Shippers benefit from weight savings by allowing them to load more goods per container, encouraging the use of these more secure containers.
- Conducted a joint test of the Marine Asset Tag Tracking System (MATTS) with Japan. When fielded, MATTS will provide the ability to track shipping containers in near-real time from their origin to final destination using a remote global communications and tracking device interfaced with sensors that detect container breaching.

Chemical and Biological

- Completed the Project BioShield material threat determinations for all traditional biothreat agents of significant public health concern. Such determinations are required before the authorized use of the BioShield Special Reserve Fund to procure new medical counter-measures.
- Transitioned BioWatch Generation 1 and Generation 2 operations to the Office of Health Affairs (OHA).

Command, Control and Inter-operability

- Combined several government-funded testbeds to increase cyber security capabilities to create a realistic model of the Internet on which to test cyber security technologies.
- Assisted states in identifying and implementing effective statewide technical inter-operability solutions; conducted piloted programs to assess and demonstrate data and video technologies in real-world environment.

Explosives

- Evaluated and tested commercial off-the-shelf systems capable of detecting homemade explosives to find the most effective existing technologies.
- Completed a system false alarm analysis of deployed check baggage technology and provided results to the Transportation Security Administration (TSA).

Human Factors

- Developed a database of public needs that were unmet during Hurricanes Katrina and Rita and made recommendations to address those needs during future emergencies.

Infrastructure and Geophysical

- Developed a risk-informed decision support system. The system provides information for making critical infrastructure protection (CIP) decisions by considering all 17 critical infrastructure sectors and their primary interdependencies, and computing human health and safety, economic, public confidence, national security, and environmental impacts. Built out CIP–Decision Support System (DSS) to include cyber-disruptions, nuclear event, and physical/natural disaster disruption scenarios.
- Developed the system requirements and designs for a first responder 3D location system for tracking personnel that provide incident commanders situational awareness through accurate location and monitoring inside threatened buildings, collapsed buildings, and subterranean areas.

Innovation

- Initiated Homeland Innovative Prototypical Solutions (HIPS) to deliver prototype-level demonstrations of game changing technologies in two to five years. These projects are moderate-to-high risk with high payoff potential.
- Started High Impact Technology Solutions (HITS) to provide proof-of-concept answers that could result in high technology breakthroughs. These projects have the potential to make significant gains in capability; however, there is a considerable risk of failure.
- Built upon the efforts in Explosives and demonstrated the ability of sensors based on a high altitude platform to detect the launch of and track MANPADS.
- Investigated various technologies including probe systems to be installed on the cranes that on-load and off-load ship carried containers, sensors and container materials to improve the effectiveness and efficiency of the screening of cargo containers.

Laboratory Facilities

- Managed the operations and maintenance of specialized DHS laboratories and infrastructure including the Plum Island Animal Disease Center (PIADC), portions of the National Biodefense Analysis and Counter-measures Center (NBACC), Chemical Security Analysis Center (CSAC), Transportation Security Laboratory (TSL), and the Environmental Measurements Laboratory (EML).
- Began operation of the NBACC facility as a Federally Funded Research and Development Center (FFRDC).
- Started construction of the Chemical Security Analysis Center (CSAC).
- Conducted the conceptual design of the National Bio Agro Defense Facility (NBAF), which will be an integrated animal, foreign animal, and zoonotic disease research, development, and testing facility that will support the complementary missions of DHS and U.S. Department of Agriculture (USDA). Down-selected potential sites for the NBAF.

Test & Evaluation (T&E) and Standards

- Continued to develop standards for an integrated chemical, biological, radiological, nuclear, and explosive (CBRNE) sensor.
- Completed multi-modal biometrics standards, including standards for latent fingerprint analysis, rapid biometric evaluation, and biometric image and image feature quality.
- Developed performance standards for emergency responder locator communications in collapsed structures. These standards will apply to new signal processing technologies that allow amplification of weak signals through rubble from collapsed structures.

Transition

- Aligned and coordinated the Directorate's transition effort with the Departmental component's requirements through the use of Capstone Integrated Product Teams (IPT) and provided support and analysis to the customer-led IPTs in developing prioritized science and technology capability gaps based on their experience and projected requirements.
- Conducted a Marine Asset Tag Tracking System (MATTS) test and workshop/conference on results with Japan and conducted a bi-national S&T exercise with Sweden to identify and describe transformational approaches to mitigating the effects of improvised explosive devices in mass transit systems.

University Programs

- Established five new DHS Centers of Excellence (COE) and developed a number of efforts to improve the capabilities of Minority Serving Institutions (MSIs) to conduct research in areas critical to homeland security and to develop a new generation of scientists capable of advancing homeland security goals.
- Provided scholarships for undergraduate and fellowships for graduate students pursuing degrees in fields relevant to homeland security.

FY 2009 BUDGET OVERVIEW

The S&T Directorate's FY 2009 Budget Request reflects the refinement of our four "Ps" and a commitment to the S&T investment portfolio. The request of $868.8 million is approximately five percent over the FY 2008 appropriation and nine percent over the FY 2008 request.

Program, Project, and Activity (PPA)	FY 2008 PB	FY 2008 Enacted	FY 2009 Request
Management and Administration	**142.6**	**138.6**	**132.1**
Borders and Maritime	25.9	25.5	35.3
Chemical and Biological	228.9	208.0	200.4
Command, Control and Interoperability	63.6	57.0	62.4
Explosives	63.7	77.7	96.1
Human Factors	12.6	14.2	12.5
Infrastructure and Geophysical	24.0	64.5	37.8
Innovation	59.9	33.0	45.0
Laboratory Facilities	88.8	103.8	146.9
Test and Evaluations, Standards	25.5	28.5	24.7
Transition	24.7	30.3	31.8
University Programs	38.7	49.3	43.8
Research, Development, Acquisition and Operations	**656.5**	**691.7**	**736.7**
S&T Total	**799.1**	**830.3**	**868.8**

The Management and Administration request reflects several efficiency initiatives to make better use of its resources and better accounts for program activity costs at the laboratories. The Research, Development, Acquisition and Operations request is primarily based on the increased support for the development of additional technologies for specific high-priority, customer-identified needs identified during the S&T Capstone IPT process.

Administration (M&A)

The S&T Directorate requests $132.1 million for M&A in FY 2009. This is a decrease of $6.5 million from the FY 2008 budget request. This reflects a shift of $14 million and 124 positions to the Laboratory Facilities PPA combined with a $7.5 million increase to fully fund our planned FTEs.

Research, Development, Acquisitions, and Operations (RDA&O)

The S&T Directorate requests $736.7 for RDA&O in FY 2009. This is an increase of $80.2 above the FY 2008 budget request and $45.0 above the FY 2008 appropriation. The following is a summary of the FY 2008 to FY 2009 changes—many are

due to the increased support for the development of additional technologies for specific high-priority, customer needs identified during the S&T Capstone IPT process, specifically:

Borders and Maritime Security

The FY 2009 program increase of $9.4 million above the FY 2008 request allows the development of additional technologies for specific high-priority, customer-identified needs identified during the S&T Directorate's Capstone IPT process. The increase will allow for the development of technologies for advanced detection, identification, apprehension and enforcement capabilities along the maritime borders that support a framework that includes Coast Guard partners for rapid, coordinated responses to anomalies and threats. A science and technology investment in these areas will provide significant risk mitigation complementary to proposed major acquisition efforts such as the Coast Guard's Command 21 program. This increase will also provide tools and technologies to border security and law enforcement officers allowing for efficient, effective and safe vehicle and vessel inspections. These tools will improve Coast Guard boarding teams' and Border Agents' effectiveness and enhance officer/agent safety while searching vessels/vehicles.

Chemical and Biological

The FY 2009 program decrease of $7.6 million from the FY 2008 appropriation is in large part due to the BioWatch Gen 3 Detection Systems and Detect-to-Protect Triggers and Confirmers projects within the Surveillance and Detection R&D Program of the Biological Thrust area coming to an end in FY 2009. Also, the Autonomous Rapid Facility Chemical Agent Monitor (ARFCAM) and Low Vapor Pressure Chemicals Detection System (LVPCDS) projects in the Detection program of the Chemical Thrust area are ramping down to end in FY 2010.

Command, Control, and Inter-operability

The FY 2009 program increase of $5.4 million over the FY 2008 appropriation funds the development of additional technologies for specific high priority customer-identified needs identified during the S&T Directorate's Capstone IPT process. The increase in Cyber Security R&D will allow the division to address Supervisory Control and Data Acquisition (SCADA) and Process Control Systems (PCS) security increasing the protection and improving the resiliency of the electric distribution grid. These systems will proactively manage threats by identifying and responding to vulnerabilities and threats before they are maliciously exploited to significantly impact critical infrastructure. They will also provide autonomy of operations that can quickly respond to natural disasters and security events and address new vulnerabilities.

Explosives

The increase in the FY 2009 request of $32.4 million over the FY 2008 request supports Counter-IED Research, which includes Vehicle Borne Improvised Explosive Device/Suicide Bomber Improvised Explosive Device (VBIED/SBIED) Program, the Render Safe Program, and the Detection and Neutralization Tools Program. The increase in funding in the Counter-IED Research will allow the Explosives division to improve large threat mass detection in such areas as the transit environment, special events and other large areas.

The implementation of Homeland Security Presidential Directive 19 (HSPD–19), *Combating Terrorist Use of Explosives in the United States,* requires new science and technology solutions to address critical capability gaps in the areas of deterring, predicting, detecting, defeating, and mitigating the use of IEDs in the United States. The Office for Bombing Prevention (OBP) is currently assessing the Nation's ability to address this threat and is developing a prioritized set of technology gaps. The S&T Directorate is working with OBP to support basic science and develop technologies for the following kill chain:

- Deter: Actionable Social and Behavioral Indicators of IED Attacks; Intent-based Counter-measures;
- Predict: IED Target Projections; IED Staging Area Projections; Anomalous Behavior Prediction; Suicide Bombing Prediction; Deceptive Behavior Screening; Multi-Modal Behavioral & Biometric Screening;
- Detect: Suicide Bomb Detection; Technology Demonstration & System Integration; VBIED Detection; Canine R&D; Tagging R&D; Standards;

- Defeat: Electronic Counter-measures; Robotics; Render Safe & Diagnostics; Directed Energy; Post Blast Forensics; Forensic Marking; Bomb Components; Outreach; and
- Mitigate: Blast Mitigation; Body Armor; Inerting.

We are performing valuable work to improve methods of detecting explosives threats on people, in personal items and in cargo. As part of the Checkpoint Program, S&T's Explosives Division is working with TSA to complete test and evaluation efforts on the Whole Body Imaging system that could help operators of check points better identify potential threats. We are also conducting tests to enhance the screening of carried baggage and personal items. We are conducting Operational Test & Evaluation (OT&E) of the Fido II Explosives Detection System and currently have units deployed at multiple airports in the United States. The portable detection system has been enhanced to detect liquid explosive components and will be used by TSA to counter the growing threat liquid explosives pose to transit security. This effort is complemented by our significant work to characterize the homemade and liquid explosives threat, which has included live fire tests to assess potential damage and the efficacy of hardening materials.

In addition to addressing the risk of catastrophic loss resulting from IEDs in carry-on baggage or at public events, our Explosives Screening Program is identifying and developing the next generation of screening systems which will support continuous improvements toward the Congressionally directed goal of 100 percent screening of aviation checked baggage by electronic or other approved means with minimum or no impact to the flow of people or commerce. We have continued our work on the Manhattan II and began test and evaluation efforts of the system's ability to identify real explosive devices, both homemade and conventional. We have also worked with industry to develop a common performance standard for coupling algorithms and hardware. Another part of our effort is the Air Cargo Explosives Detection pilot program. We began operations at San Francisco International Airport and at Cincinnati-Northern Kentucky International Airport, and launched and completed operations at Seattle-Tacoma International Airport. At all locations we are capturing vital information for TSA, including data on the costs of running a system capable of screening amounts of cargo above current levels, including equipment needs, staff requirements, and system upkeep, in addition to the impacts of these upgrades to overall airport operations. This data can be extrapolated to airports nationally, based on, among other things, the amount of cargo they handle and airport size. It will also allow TSA to develop operational plans that incorporate proven ways to screen air cargo while maintaining an effective and efficient air transport system.

Human Factors

The budget request for FY 2009 is $12.5 million, which is $1.7 million less than the amount enacted for FY 2008. In FY 2008, the Human Factors Division received funds for the Institute for Homeland Security Solutions (IHSS) to conduct applied technological and social science research. In FY 2009, the Human Factors Division is not requesting any funds for IHSS. The Division still intends to support efforts that address high-priority capability gaps in biometrics and credentialing, suspicious behavior detection, hostile intent determination, group violent intent modeling, and radicalization deterrence as identified by customers through the Capstone Integrated Product Team (IPT) for People Screening and the Technology Oversight Group (TOG), chaired by the Deputy Secretary. Two other Capstone IPTs, Border Security and Explosives Prevention, also identified Suspicious Behavior Detection as critical to meeting their respective high-priority capability gaps.

Infrastructure and Geophysical

The FY 2009 request of $37.8 million is an increase of $13.8 million over the FY 2008 request to fund several new program areas specifically identified by our customers, with efforts focused on high priority technology gaps in the areas of Infrastructure Protection and Emergency Incident Management. Specifically, funded efforts will improve the protection of our critical infrastructure by providing technologies for hardening these vital critical infrastructure assets and for rapid response and recovery for critical infrastructure assets to limit damage and consequences and allow for normal operations to be resumed more quickly than would otherwise be possible.

Innovation

The FY 2009 program increase of $12 million reflects an increase in scope of existing programs as they mature and might allow for additional projects that would address gaps identified by the S&T Capstone IPT process. These projects are high risk in nature but would dramatically increase capabilities in responding to threats posed by terrorism and natural disasters. The high risk factor means that the Office of the Director of Innovation requires flexibility in the projects it funds. These projects will reach critical decision points to continue or stop. New projects are always under consideration, and the FY 2009 request will potentially fund new projects or current ones that justify further development based on results.

Laboratory Facilities

The FY 2009 request of $146.9 million is an increase of $43.1 million over the FY 2008 appropriations. The S&T Directorate intends to cover the FY 2009 operations and maintenance (O&M) start-up costs of the new NBACC facility. These costs include the installation and outfitting of portable laboratory equipment and furnishings and funding interim space lease. Also in FY 2009, the S&T Directorate intends to move the remaining functions of EML into much smaller office space in the same building or another General Services Administration (GSA) facility in the New York area and pay for a one-time cost for final cleanup of EML space (e.g., final disposal of contaminated material, removal of fume hoods, large exhaust ducting, furnaces, and shielded spaces). Also, the Directorate will begin a detailed design of the National Bio and Agrodefense Facility (NBAF) which will support the initiation of construction in FY 2010.

The increase also reflects a transfer of funds from Management and Administration to the Laboratory Facilities PPA to pay for salaries and benefits of FTEs located at the laboratories. All Homeland Security laboratory employees work on RDA&O products. The shift of laboratory FTEs into the RDA&O account better reflects the actual Science and Technology RDA&O program costs.

University Programs

In FY 2009, the S&T Directorate is requesting $5.5 million less for its University Programs. This decrease reflects no funding request for the Naval Post Graduate School and a reduction to the educational programs within the S&T Directorate that fund scholars and fellows in homeland security related fields.

Transition

The FY 2009 program increase of $1.5 million will support a DHS competition for a new Federally Funded Research and Development Center (FFRDC). The FFRDC will provide discreet, independent, and objective analysis to inform homeland security policies and programs and ensure continuity of FFRDC support.

Test Evaluation and Standards

The S&T Directorate requests $3.8 million less for FY 2008 than enacted for FY 2008. This decrease is the result of having initiated the independent peer review program in FY 2008 and the program will therefore not need additional funding in FY 2009. The S&T Directorate is also implementing a reallocation of funds by the TOG during the Capstone IPT process.

CONCLUSION

In conclusion, I am pleased to report that the S&T Directorate is well positioned today to mobilize the Nation's vast technical and scientific capabilities to enable solutions to detect, protect against and recover from catastrophic events.

We appreciate the many demands on the taxpayers' precious dollars and you have my continued commitment that the S&T Directorate will be wise stewards of the public monies you have entrusted to us. We are steadfast in our resolve to serve the best interests of the Nation by investing in the talent and technology that will provide America with a sustainable capability to protect against acts of terror and other high-consequence events for generations to come.

Members of the Committee, I thank you for the opportunity to meet with you today. I truly believe that through Science and Technology can come Security and Trust, and I look forward to working with you to meet our homeland security challenges with a renewed sense of purpose, mission and urgency in the last year of the Administration.

BIOGRAPHY FOR JAY M. COHEN

Department of Homeland Security, Under Secretary for Science and Technology, Jay M. Cohen is a native of New York. He was commissioned in 1968 as an Ensign upon graduation from the United States Naval Academy. He holds a joint Ocean Engineering degree from Massachusetts Institute of Technology and Woods Hole Oceanographic Institution and Master of Science in Marine Engineering and Naval Architecture from MIT.

His early Navy assignments included service on conventional and nuclear submarines. From 1985 to 1988 Cohen commanded USS HYMAN G. RICKOVER (SSN 709).

Following command, he served on the U.S. Atlantic Fleet as a senior member of the Nuclear Propulsion Examining Board, responsible for certifying the safe operation of nuclear powered ships and crews.

From 1991 to 1993, he commanded USS L.Y. SPEAR (AS 36) including a deployment to the Persian Gulf in support of Operation DESERT STORM.

After Spear, he reported to the Secretary of the Navy as Deputy Chief of Navy Legislature Affairs. During this assignment, Cohen was responsible for supervising all Navy-Congressional liaison.

Cohen was promoted to the rank of Rear Admiral in October 1997 and reported to the Joint Staff as Deputy Director for Operations responsible to the President and DOD leaders for strategic weapons release authority.

In June 1999 he assumed duties as Director Navy Y2K Project Office responsible for transitioning all Navy computer systems into the new century.

In June 2000, Cohen was promoted in rank and became the 20th Chief of Naval Research. He served during the Iraq war as the Department of the Navy Chief Technology Officer (a direct report to the Secretary of the Navy, Chief of Naval Operations and Commandant of the Marine Corps). Responsible for the Navy and Marine Corps Science and Technology (S&T) Program (involving basic research to applied technology portfolios and contracting), Cohen coordinated investments with other U.S. and international S&T providers to rapidly meet war fighter combat needs. After an unprecedented five and a half year assignment as Chief of Naval Research, Rear Admiral Cohen retired on February 1, 2006.

Under Secretary Cohen was sworn in to his current position at the Department of Homeland Security on August 10, 2006.

Chairman WU. Thank you very much, Mr. Under Secretary. Mr. Oxford.

STATEMEHT OF MR. VAYL S. OXFORD, DIRECTOR, DOMESTIC NUCLEAR DETECTION OFFICE, DEPARTMENT OF HOMELAND SECURITY

Mr. OXFORD. Good morning, Chairman Wu, Ranking Member Gingrey, and other distinguished Members of the Subcommittee. I would like to thank the Committee for the opportunity to discuss our research and development priorities for Fiscal Year 2009.

As always, we look forward to the engagement with this committee on an annual basis and throughout the year. Before I go into detail on our priorities for 2009, I would like to share some key accomplishments that we have had since we last appeared before you.

In December, we met the congressionally mandated goal of scanning 98 percent of all incoming cargo at U.S. seaports. Three years ago, when DNDO was established, we were only scanning 22 percent of cargo entering through our major seaports. And when we now couple that with the fact that we are scanning 100 percent of all cargo coming across the southern border, we are now scanning 96 percent of all cargo coming into the United States for radiation. We have also equipped the U.S. Coast Guard, all their boarding teams, with radiation detection equipment, so they can have a multi-mission capability.

To address other threats, DNDO supplied Customs and Border Protection with additional hand-held detectors, and as of December 2007, CBP is now scanning all international general aviation airplanes arriving in the United States. We are also implementing a program to enhance physical security of high risk radioactive sources in U.S. medical facilities. Our programs that support long-term research have also been very successful.

We have seen tremendous involvement on behalf of the National Laboratories, private industry, and academia, in DNDO research efforts. I am proud to say that these programs are already yielding some very promising results. As an example, our Advanced Technology Demonstration with the Intelligent Personal Radiation Locator, or IPRL, is expected to be complete in 2009, and transition to systems development in 2010. This program is based on user needs for a next generation personal radiation detection system, and will be used by first responders, law enforcement, and counter-terrorism communities.

Our Academic Research Initiative awarded 22 grants this last year, and currently supports over 70 graduate students in nuclear and radiological research areas. This year, we are hosting the first annual Grantee Conference in April to showcase research and foster academic collaboration. In fiscal year 2008 and 2009, we will apply an additional $26 million in follow-on grants and new awards to the academic environment. This will help develop the nuclear scientists and engineers of the future.

Our DNDO research philosophy is very broad. Our work spans both near-term and long-term transformational concepts, as mentioned by the Chairman and the Ranking Member. In our case, it is driven by DNDO's architectural analysis, and by user needs. We translate gaps in the detection architecture and associated user needs into specific technical areas to define our research agenda. We use pilots to integrate existing or developmental systems into operational concepts, to refine capabilities for the radiological and nuclear detection missions.

DNDO does provide a wide variety of products to our State and local partners. These include handbooks on how to use equipment and how to operate the radiation detection mission. We provide training for those that are equipped with radiation detection devices, and we also provide them with preferred equipment recommendations for use in the grant process. And finally, we provide a 24/7 technical reach-back capability for all State and local users.

For technical needs that exist beyond current capabilities, we have a robust transformational research program that aims to do several things. First of all, fulfill new mission needs, to reduce system cost, to increase technical performance against the full spectrum of radiological and nuclear threats, and demonstrate and evaluate technology to transition to systems development. Our transformational research program has three key benefits. It yields new, promising detector materials and concepts; it focuses the U.S. technical community and industry, National Laboratories and academia, on the highest threat nuclear detection priorities, and finally, it is beginning to reverse the trend in the nuclear expertise pipeline through our Academic Research Initiative and forensics work.

DNDO's research efforts are underpinned by sound system engineering processes and an extensive test capability that we will talk about today, and allows us to evaluate systems against realistic threats in operationally relevant environments. Our tests not only evaluate the technical performance of systems, but also involve our customers.

In conclusion, Mr. Chairman, DNDO's 2009 budget reflects a concerted effort to address vulnerabilities and needs. The challenges that lie ahead require a coordinated effort on behalf of the best scientific minds in government, academia, and the private sector.

We have made good progress, but much work remains to be done. We are anxious to work with the Committee as we go forward, and with that, Mr. Chairman, this concludes my prepared statement. I will be happy to answer any questions you have.

[The prepared statement of Mr. Oxford follows:]

PREPARED STATEMENT OF VAYL S. OXFORD

Introduction

Good morning Chairman Wu, Ranking Member Gingrey, and distinguished Members of the Subcommittee. As Director of the Domestic Nuclear Detection Office (DNDO), I would like to thank the Committee for the opportunity to discuss our research and development (R&D) priorities for Fiscal Year 2009. I am pleased to be here with my counterparts from the Science and Technology Directorate, Under Secretary Cohen and Mr. Ryan.

DNDO has made significant progress over the past three years towards mission success, from both a scientific and operational support standpoint. In sharing our Fiscal Year 2009 research and development agenda, it is my hope that the progress we have made is evident, and that future efforts to create better means to stop radiological and nuclear terrorism are well justified.

Consistent with previous years, over half of DNDO's Fiscal Year 2009 budget request is intended for R&D activities. We categorize our R&D work into two areas: enhancement of existing technologies through near-term, spiral development; and long-term transformational R&D that will deliver revolutionary improvements in the cost, performance, and associated operational burdens of nuclear detection systems. Of particular focus for Fiscal Year 2009 is developing breakthrough technologies to meet new mission requirements. We have made great progress in deploying detection systems to our Ports of Entry (POEs). At the end of 2007, 100 percent of Southern border container traffic and 98 percent of all seaport container traffic was being screened for radiological and nuclear threats. While work remains at our ports of entry, our research and development efforts must look beyond simply countering threats that may come through the supply chain. Therefore, we are focusing on developing solutions that can effectively counter a determined and mobile adversary who will seek routes to bypass existing security measures.

The architectural analysis conducted by DNDO is the driving force behind this shift in our research agenda. We know that unconventional pathways sought by the enemy—be it through our waterways or general aviation—present technical and operational challenges that cannot be easily resolved by existing technologies. DNDO is working with our interagency partners, Customs and Border Protection, the U.S. Coast Guard, State and local authorities, and others to gather user requirements and develop viable concepts of operation. We are then translating this information about gaps in the existing detection architecture and associated user requirements into specific technical areas that define our long-term research agenda. In my testimony today, I will talk about these technical areas and provide a sampling of our projects that are already yielding promising results. I will also touch upon how DNDO conducts test and evaluation activities, and coordinates its research and development efforts with other DHS components, federal agencies and private industry.

Near-Term Research Priorities

DNDO's near-term focus is on making further improvements to radiation detection capabilities for the Nation's POEs as well as developing solutions for non-POE applications. DNDO is continuing our Advanced Spectroscopic Portal, or ASP, program, which improves upon existing polyvinyl toluene (PVT)-based radiation portal

monitors that are currently deployed throughout the global architecture. In Fiscal Year 2009, we will be conducting research to develop advanced systems for use in maritime, general aviation, and rail environments. We will specifically be developing systems for use in on-dock rail configurations to provide scanning solutions for seaports that load cargo directly from ships to rail cars, therefore bypassing typical exit gate screening operations. In addition, it is our expectation that Fiscal Year 2009 will bring about full-rate production and deployment of ASP systems at the Nation's POEs.

DNDO is also working on Human Portable Radiation Detection Systems, or HPRDS, to improve current hand-held and backpack radiation detection systems. In previous years, our efforts have been focused on acquiring systems to meet the imminent operational needs of our users—Customs and Border Protection and the Coast Guard. DNDO and the Coast Guard implemented a Joint Acquisition Strategy, ensuring that every Coast Guard boarding team was equipped with radiation detection equipment by the end of 2007. In Fiscal Year 2009, DNDO will be improving detector sensitivity and identification capabilities, reducing false alarm rates, and ensuring that next-generation systems are more user-friendly for system operators. In addition, DNDO will be gathering data for software improvements and conducting testing to ensure that HPRDS under development are able to meet performance specifications. Hand-held and backpack systems will also be used in a variety of DNDO pilot programs, including maritime and aviation efforts, to determine how best to utilize this type of technology to meet emerging mission requirements.

Long-Term Research Priorities

New solutions are required to create a multi-layered detection system that is responsive to the changing threat environment. Not all of these solutions are on the immediate horizon. DNDO's long-term research agenda fills gaps in the present detection architecture that exist because of performance issues, cost, or lack of capabilities. We have several programs underway that support long-term research—Exploratory Research, Advanced Technology Demonstrations (ATDs), and a dedicated Academic Research Initiative. There is tremendous involvement with the National Labs, private industry, and academia for these efforts. I am proud to say that these programs have already yielded some very promising results that we hope will make a tangible impact on this nation's nuclear detection capabilities.

Our Exploratory Research program focuses on technical solutions that are feasible and show significant promise, but require further concept development and demonstration. Successes to date include the development of a new scintillating material that has very high light output, good energy resolution, and is potentially inexpensive to scale up for use as a large detector. We also have developed a new semiconductor material, which is proving to be as good as the best current room temperature materials, but should be easier to grow to a large size. We have also seen breakthroughs in passive detection of shielded special nuclear material. Finally, our project that integrates video with directional gamma imaging has made good progress towards making it feasible for us to "tag" vehicles that might be transporting a nuclear threat.

In Fiscal Year 2009, we will focus on continuing research into new detector materials, passive and active detection concepts, and systems integration. Over $16 million is dedicated in Fiscal Year 2009 to begin new projects. Mature projects become candidates for future ATD program.

For our ATD program, leading edge technological concepts (in many cases technology demonstrated conceptually under Exploratory Research) are further developed, tested, and evaluated. Specifically, the basic technological components are integrated into an experimental device with reasonably realistic supporting elements so that the technology can be tested in a simulated environment. The results of the tests form the basis for a preliminary cost benefit analysis that is used to objectively determine whether the technology should transition to a systems development and acquisition program.

In Fiscal Year 2009, we will be completing our Intelligent Personal Radiation Locator, or IPRL, ATD with an expected transition to the HPRDS program in Fiscal Year 2010. The IPRL emerged from an end-user requirement for a next-generation personal radiation detection system similar to the radiation pagers often used by CBP, the Coast Guard, first responders, and law enforcement officials. IPRL will have sufficient energy resolution and sensitivity to reliably discriminate between naturally occurring radioactive material (or NORM), background, and potential threats, and will be used by law enforcement, first responder, counter-terrorism, the intelligence community, and others in routine activities and surveillance.

Our Standoff Detection ATD will be completing critical design reviews and undergoing laboratory tests that will determine the technology's readiness to undergo per-

formance tests. This ATD will allow DNDO to develop and evaluate key existing technologies such as coded aperture and Compton imaging that may dramatically improve sensitivity and directional accuracy. Our goal is to extend detection ranges against relevant nuclear and radiological sources to as much as 100 meters, potentially providing the capability to locate and identify nuclear threat materials at greater distances for use in ground-based, airborne, and maritime platforms.

Our Shielded Special Nuclear Materials (SNM) ATD is scheduled for preliminary design reviews in early FY 2009, with final system design review expected in late FY 2009. This ATD will develop and test advanced technology to definitively verify the presence of SNM despite cluttered environments or intentional countermeasures like shielding. As I mentioned previously, proof-of-concept results from Exploratory Research projects have been very promising. Furthermore, another embodiment of this technology may lead to a whole new capability for portable interrogation systems that will enable relocatable or human portable detection systems to automatically verify the presence of shielded SNM.

Finally, in Fiscal Year 2009, we are beginning a new ATD on Remote Emplaced Sensors. This ATD will assess the performance capabilities of small, low-power, inexpensive detectors to detect and track the movement of SNM. The potential applications of this technology are significant, allowing us to increase the probability of detection in non-POE environments such as unattended borders, urban areas, and airports.

The final component of our long-term research program provides a much needed emphasis in nuclear detection sciences. DNDO's Academic Research Initiative, or ARI, spurs the academic community to provide the nuclear detection experts of the future by funding universities to conduct R&D in areas relevant to the detection of nuclear and radiological material, as well as nuclear forensics. In addition, the program fosters potentially high-risk but high-payoff ideas that could lead to solutions that have not yet been considered. We initiated ARI in Fiscal Year 2007 and received 132 applications from universities around the United States. We awarded 22 projects, totaling $58 million in funding over the next five years. The program currently supports over 70 graduate students in nuclear and radiological research areas. However, ARI is considered a multi-disciplinary program with students working on ARI projects pursuing degrees in various related university departments, including physics, chemistry, chemical engineering, mechanical engineering, electrical engineering, materials science, and operations research. This year we are hosting our first annual grantee conference to showcase research and foster academic collaboration. In Fiscal Year 2008, follow-on grants will be made for the ARI projects begun in Fiscal Year 2007. In addition, we are soliciting for new proposals and anticipate adding 7-10 multi-year projects to the current 22. In Fiscal Year 2009, follow-on grants will be made for previous ARI projects in addition to another separate round of new awards for ARI grants. It is our hope that DNDO efforts through ARI as well as our nuclear forensics programs, combined with the academic support efforts of other federal agencies like the Department of Energy, will help provide the nuclear scientists and engineers of the future.

Comprehensive Test and Evaluation

With a strong research and development portfolio, DNDO also maintains a comprehensive test and evaluation program. All technologies, tactics, and processes developed and acquired in support of the DNDO mission are evaluated and demonstrated prior to full-scale deployment. In addition, technologies are independently assessed once deployed. Finally, DNDO adheres to strict systems engineering principles that ensure that integrated and balanced solutions are developed for the global nuclear detection architecture. This means that our tests not only evaluate the technical performance of systems, but also reflect and involve our customers and their needs. For example, Customs and Border Protection works hand-in-hand with DNDO as it evaluates ASP systems. Similarly, the Coast Guard as well as State and local users have been critical players in evaluating hand-held and backpack systems.

In Fiscal Year 2009, test and evaluation activities will support ASP spiral development, acquisition decisions for the HPRDS program, selection of detection systems in support of maritime and international general aviation pilot programs, and a variety of ATD transitions. DNDO is orchestrating a new test program that will enable vendors to submit performance data on radiation detectors collected independently at laboratories accredited by the National Voluntary Laboratory Accreditation Program. We will evaluate this detector performance information to support the Authorized Equipment List from the Federal Emergency Management Agency (FEMA) Grant Programs Directorate as well as to support other federal acquisition programs. I am pleased to report that 2009 will be the beginning of nuclear operations

at the Radiological and Nuclear Countermeasures Test and Evaluation Complex, or RNCTEC, in Nevada. This is a permanent DNDO facility that allows us to evaluate detection systems against SNM in realistic configurations.

As you can see, our test and evaluation schedule is quite full and we are dedicating significant resources to these efforts. While it appears that our budget for test and evaluation declines slightly from Fiscal Year 2008, this is a reflection of concluding instrumentation activities for our Rail Test Center that will help DNDO develop solutions for on-dock rail screening. Overall, we are still dedicating significant financial resources, as well as personnel, to technology evaluation, with all test campaigns being supported by associated program funds.

In addition to traditional test and evaluation activities, DNDO will continue to conduct red teaming and net assessment activities in Fiscal Year 2009.

Coordination of Effort

Several federal agencies already engage in research and development related to radiological and nuclear detection. Therefore, the planning process for the DNDO research agenda is coordinated with partners, including the DOE National Nuclear Security Administration's Nonproliferation and Verification Research and Development Program (NA–22), the Defense Threat Reduction Agency (DTRA), and the Office of the Director of National Intelligence (DNI). In addition, DNDO is home to the National Technical Nuclear Forensics Center that has a mission of being the U.S. Government "system integrator" for technical nuclear forensics. This office provides national-level planning, integration, assessment, and stewardship across the forensics spectrum and with all the relevant partners in the Departments of Defense, State, Energy, Justice, and the DNI.

From its founding, DNDO supported the Office of Science and Technology Policy Domestic Nuclear Defense Research and Development (DND R&D) Roadmap Working Group's efforts to develop a coordinated, interagency R&D roadmap that would enhance the breadth of domestic nuclear defense efforts to ensure a secure nation. In addition, DNDO supports the National Nuclear Security Administration in reviewing foundational science proposals for advanced detectors and materials. Staff from both NA–22 and DNDO served on each others' proposal review panels, in part to ensure that duplication of funding is minimized. This interaction helped ensure that DNDO transformational R&D programs are well coordinated with those of NA–22 (which focused on foundational science for advanced detectors and materials), enabling the U.S. Government to best utilize the expertise of the National Labs. DNDO conducted similar proposal reviews with DTRA.

As a key part of the interagency execution strategy, the DOD, DOE, DNI and DHS have jointly signed a Memorandum of Understanding (MOU) on the Coordination of National Nuclear Detection Research and Development Programs. This MOU specifically cites that all Parties will integrate their programs via the following mechanisms: (1) include representation of all Parties during R&D program reviews, (2) provide full and open access among all Parties to all aspects of ongoing R&D programs, (3) provide equal and open access to the findings from all R&D programs and maximize leverage were possible, (4) establish a standing body of qualified R&D representatives from each agency for program coordination, and (5) where possible, joint programs are encouraged.

DNDO, as an interagency office, has full-time detailees from agencies such as DOE and DOD. These individuals have provided invaluable expertise in all aspects of the DNDO mission. Our detailees enable us to maintain an open and productive dialogue with our interagency partners so that we can avoid duplication of effort and make strides toward the complete implementation of the proposed architecture.

Within the Department, DNDO works with the Science and Technology Directorate, coordinating efforts on a variety of levels—from the shared use of radiological and nuclear detection expertise at the Environmental Measurements Laboratory (EML), through developing an integrated Chemical, Biological, Radiological, and Nuclear (CBRN) Risk Assessment required by HSPD–18, *Medical Countermeasures against Weapons of Mass Destruction.*

In fulfillment of a legislative requirement within the *Security and Accountability For Every Port Act of 2006* (P.L. 109–347, Sec. 121 (e)), S&T and DNDO collaborated to write the Report on the feasibility of, and a strategy for, the development of equipment to detect shielded nuclear and radiological threat material and chemical and biological weapons of mass destruction, submitted in April 2007. This report outlines the DHS R&D strategies for robust capabilities to detect chemical, biological, and shielded radiological and nuclear threats. These strategies have been implemented and are being continually refined to meet the evolving challenges of homeland security.

Conclusion

DNDO's Fiscal Year 2009 budget reflects a concerted effort to address the remaining vulnerabilities in our evolving detection architecture. The challenges that lie ahead require a coordinated effort on the behalf of the best scientific minds within the government, academia, and the private sector. We have made good progress, but much work remains to provide the Nation with a continuously improving capability to protect against a terrorist nuclear attack.

This concludes my prepared statement. With the Committee's permission, I request my formal statement be submitted for the record. Chairman Wu, Ranking Member Gingrey, and Members of the Subcommittee, I thank you for your attention and will be happy to answer any questions that you may have.

BIOGRAPHY FOR VAYL S. OXFORD

Reporting directly to Secretary Chertoff, Mr. Vayl Oxford was appointed Director of the Domestic Nuclear Detection Office (DNDO) by the President in December 2006. Mr. Oxford is responsible for DNDO's jointly staffed office, which serves as the primary entity in the United States Government to improve the Nation's capability to detect and report unauthorized attempts to import, possess, store, develop, or transport nuclear or radiological material for use against the Nation, and to further enhance this capability over time.

Prior to his appointment to the Department of Homeland Security (DHS), Mr. Oxford served as Director for Counter-proliferation (CP) on the White House National Security Council (NSC). His responsibilities included establishing national policy and priorities for CP, which have been codified into the National Strategy for Combating Weapons of Mass Destruction. Before assignment to the White House, Mr. Oxford was Deputy Director for Technology Development at the Defense Threat Reduction Agency, where he was principally involved in the Research and Development vision for future-year programs.

From 1993 to 1998, Mr. Oxford worked for the Defense Nuclear Agency and was then Director for Counter-proliferation at the Defense Special Weapons Agency. He also served in the United States Air Force in aircraft and weapons development positions; and as Assistant Professor of Aeronautics at the United States Air Force Academy. Mr. Oxford is a graduate of the United States Military Academy and the Air Force Institute of Technology, and the recipient of numerous military awards. He received the Department of Defense Advanced Concept Technology Demonstration Technical Manager of the Year Award in 1997. He received the Meritorious Executive Presidential Rank Award in 2002.

Chairman WU. Thank you, Director Oxford. Next, Mr. Ryan.

STATEMENT OF MR. GEORGE RYAN, DIRECTOR, TESTING & EVALUATION AND STANDARDS DIVISION, SCIENCE AND TECHNOLOGY DIRECTORATE, DEPARTMENT OF HOMELAND SECURITY

Mr. RYAN. Good morning, Chairman Wu and Ranking Member Gingrey, and other distinguished Members of the Committee. I am George Ryan. I am the Director of Testing, Evaluation, and Standards under Under Secretary Cohen, and I am honored to appear before you today to discuss DHS tests and evaluation.

The DHS S&T Testing, Evaluation, and Standards Division is working closely with the DHS Under Secretary for Management, as well as all DHS components, to develop and implement a robust test and evaluation policy for all of DHS, that will be fully integrated into the Department's acquisition policy.

The T&E policy that is being developed will require user components to participate in creating, reviewing, and signing the test and evaluation master plan. The primary purpose of the Test and Evaluation Master Plan (TEMP) is to describe the necessary developmental test and evaluation and operational test and evaluation that needs to be conducted in order to determine the system, technical performance, operational capabilities and limitations.

The TEMP is an integrated and agreed-upon plan to ensure that the right tests are conducted, and that products are meeting the user requirements. DHS ensures independent operational test teams are involved early in the project development to ensure that operational shortcomings are identified and corrected as early as possible during development. The test results will be critical in ensuring that DHS products meet the necessary milestones to continue development or deployment.

The DHS components, working within the DHS capstone IPT process, ensure that the user needs are addressed in research, as well as the test and evaluation. End user needs are incorporated in the planning and design of the tests. All tests will be performed to components' requirements or DHS adopted standards. Reports of efficacy, safety, and suitability are assessed against the criteria, which are developed with component input.

The Testing, Evaluation, and Standards Division is also developing an accredited and recognized test capability, with the goal of testing all products in an accredited and recognized facility. The accreditation and recognition process is under development, and facilities are currently being identified that are capable of conducting different aspects of the testing process.

The Testing, Evaluation, and Standards Division has an effort underway to ensure that once testing is completed, both components and first responders have access to product performance evaluations, as well as their limitations and capabilities. The T&E results will be placed on the Responder Knowledge Base, which is an online system that is funded and managed by FEMA.

And I wait for any questions you may have. That is the conclusion of my remarks.

Chairman WU. Thank you very much. We have just been called for two votes, and it is my view that perhaps taking a break at this point, and coming back to the questions, may be the better course of action for the Committee.

Then, we will temporarily suspend the hearing, and we will reconvene after these two Floor votes. Thank you very much.

[Whereupon, at 10:41 a.m., the Subcommittee recessed, to reconvene at 11:20 a.m., the same day.]

[Recess.]

DISCUSSION

Chairman WU. I want to thank everyone for dealing with these Floor votes. That just kind of—they are like ducks. They fly when they want to, and they just kind of come and go.

We are in our period of questions now, and Members will have five minutes to ask questions, and the Chair recognizes himself for the opening five-minute period.

Under Secretary Cohen and Director Oxford, at our hearing a year ago, one of the concerns that I expressed, and I was hoping that you all would make some substantial progress on this, was having a defensible way of developing priorities for your research.

And I want to return to that subject, to inquire about how you currently determine which research areas become funding priorities, because in this Fiscal Year, or the proposed fiscal year 2009, biological and nuclear research receive a lot of funding, have high

priority, over other important areas, such as explosives, which have been a commonly used device in terrorism, over cyber security, and there are uncorroborated reports of penetrations of both government and private sector computers, and other infrastructure issues.

What we discussed a year ago was whether there should be a system of formal risk analysis, informal risk analysis, or other methodologies, to determine research priorities. And I would like to know whether you have undergone those processes to set your budget priorities, because there are other uncorroborated reports that the Vice President cares about some of these things, and not about others.

So, I would like to know if you are performing risk analyses over our society, at economic damage, human threats, or whether it is a bolt out of the blue coming from the White House or the Vice President's office, that is setting these research priorities.

Mr. COHEN. Well, Chairman, first of all, I think it is a very wise concern on your part and the Committee's part, and I did hear you, and I did take action. It is not a bolt out of the blue. As I came on-board, as you know, in the summer of 2006, I reviewed what had been done since the standup of the Department of Homeland Security.

It appeared to me that in the research area, about one third of the budget, about $500 million, was going to nuclear/radiological, about one third was going to chem/bio, and about one third was going to everything else. And I don't know what the basis for that was, but clearly, the Administration, the Congress, and the appropriators had, at some point, over a couple of years, agreed to that.

Secretary Chertoff feels very strongly, and he has testified to this, about risk informed decision-making, that should generate grants, which are not S&T, but also, everything else we do, because I think it was Goethe who said, "If you defend against everything, you defend against nothing." And so, your question is absolutely on the mark.

Where we are today, and Vayl will talk about his area, radiological and nuclear, and his funding, as you know, I have been bringing down the chem/bio area, as we have been delivering product, the BioWatch II, and now, we are getting ready to prototype BioWatch III, et cetera, and we have had a chance to analyze the other threats, cyber and explosives, and a wide variety of others.

Our Infrastructure Protection Directorate has 17 critical infrastructure protection areas, and they have done the detailed analysis, the societal, and the economic impact of low probability of occurrence but high consequence effects, many of which, regrettably, are on the West Coast. And so, it is a work in progress.

Following our discussions last year, and in keeping with the Congress's desires and Secretary Chertoff's focus on risk informed decision-making, and I would like to enter this for the record if I may, I sent a letter to Dr. Cicerone, and asked for his help in four areas. This letter addresses two. One is to help us determine the science of risk informed decision-making. Just like after World War II, the Battle of the Atlantic, with strategic bombing, we developed the science of operations research, operations analysis, and it is quite mature today, and we are able to use it in a very good way. We have actuarial tables today for just about everything. It sets

our insurance publicly and privately, but it is really history and probabilistically based.

What we don't have is a good understanding of when bad people want to intentionally do bad things to perfectly good societies, bridges, railroads, border systems, et cetera. Now, in my area, and I salute Dr. John Vitko in our chem/bio group, they took this on with looking at 30 major threats, and I am not going to give all of them, but you know, it is anthrax and botulism, et cetera, and they took the probability of occurrence, this predates this letter, 0 to 1, very small number, and they took the consequence of occurrence of a pandemic, millions dead, billions lost, you multiply them together, you get a number. That is the beauty of math. But when we stretched that number across all 30 of these pathogens, we found that the variability was plus or minus an order of magnitude. What does that mean? It means the answer that we got, if it was 10, if the number was 10, the real answer was 1 to 100. That is a span that is very difficult for us to decide how to invest.

But the surprise to me, and that is why I went to Dr. Cicerone, is while each one of the 30 answers had that variability, we saw clusters. We actually saw a high risk cluster, a medium risk, and a low risk cluster. So, this is a work in progress. It is not going to be solved this year. It may not be solved this decade, but I think working together, these are not bolts out of the blue. These are not bolts out of the blue, and I probably could make a joke about the Vice President, but I am a member of the Administration, so I won't.

But I did want to share this with you. This is Jay Cohen's view of life, and then, I will end. It is the likelihood of occurrence versus the consequence of occurrence, lower, higher, lower, higher. You will notice I have nuclear off the page on the right. The consequence of occurrence would be devastating, but today, you have to either steal or buy a bomb today, don't know how long that will last, to make that happen.

But you will notice cyber, the probability of occurrence and the consequence is the highest, because it is happening to you and I right now. Someone is trying to steal our identity, as well as all the other issues that are going on internationally. Now, you can agree or disagree about the position. It is PowerPoint, you can move them around, but this is where, with the help of the National Academies, we are trying to do that.

And finally, as I look at my six divisions, and I look at my twelve capstone Integrated Product Teams, and where we should invest for the customer, I don't generate requirements. My customer does, and the Congress does, and the Administration does. I provide solution opportunities, and when I think that we are investing too much in chem/bio and not enough in cyber, I go to what we call the Technology Oversight Group. In the Department, that is the Deputy Secretary, the Under Secretary for Management, and the Under Secretary for National Preparedness, NPPD. They get to vote. I make proposals on how we should move money in the budget generation process, and the components then get to make their reclama, no, don't take from me, take from someone else. So, we have a formal process that now is a year old. We just went through the TOG, Technology Oversight Group review, we made adjust-

ments for the financial year 2010 budget that I think are consistent with your concerns, and with that, I will end, and fail. I apologize if——

Chairman WU. My five minutes have expired, but Director Oxford, I would like to give you an opportunity to answer that question also.

Under Secretary Cohen, perhaps off-line, between our staffs, we can drill down into the mechanisms that are actually used to connect the assessments with the budget priorities, because it is important for us to understand what it is that you are doing, and have some confidence in that, and I would very much like to have confidence in that.

Director Oxford.

Mr. OXFORD. Thank you, Mr. Chairman.

Again, using your term bolt out of the blue, this was not, it was, DNDO was actually created after almost two years of discussions within the executive branch. It started in the immediate aftermath of 9/11, when people started looking at other potential vulnerabilities and risks to the country. We tried to do this across the executive branch, in kind of uncoordinated ways, for a couple of years, to find out we were not making the progress necessary to help make this nation more secure against a nuclear or terrorist attack.

So, the Interagency came together and decided we needed to put together the business model, the office model that we have with DNDO, to put together a concerted effort against nuclear attack. We were asked to put together what we call the Global Nuclear Detection and Reporting Architecture as part of that.

That effort takes stock of all of the efforts across the U.S. Government dealing with the nuclear threat. It takes into account what Department of Energy, Department of State, Department of Defense are doing overseas, whether that adds to our overall layered security or not, and then looks at the domestic dimension to figure out what we need to do domestically to enhance our overall security.

So, from that, we do not spend a lot of time on actually specifying details of the threat. We assume somebody, in time, will want to do something harmful to this country from a radiological or nuclear perspective, and we can't wait for the precision of the intelligence community to say it is there before we take preventative action. What we also reflected upon is most of the efforts in the country were based on response versus prevention, and as Under Secretary Cohen said, if you put your stock in responding to a catastrophic event, as opposed to preventing it, we thought we had the math wrong. Not that we shouldn't be doing emergency response actions, but we need to be putting our stock, in this case because of the catastrophic nature, in the prevention piece.

So, as we looked at prevention, we started to look at the critical aspects and vulnerabilities, and as we worked this, along with the Congress, there was immediate priority put into border security, in terms of trying to keep things from transiting across our borders, into our land borders, our seaports. And in my opening statement, I mentioned we have made tremendous progress now, and we are scanning 96 percent of the cargo coming into this country.

The rest of our architectural analysis is starting to identify other potential vulnerabilities that need to be addressed. I also mentioned that we are now scanning international general aviation airplanes coming into this country, because that is a very quick way, fast way, using Under Secretary Cohen's term, if somebody can get their hands on an existing nuclear weapon, within hours, you can get it into this country.

So, what we are doing is addressing those other critical vulnerabilities beyond our port security, beyond our land borders, to address those. That, then, helps drive the research agenda that we have put together, to make sure that we can have the capabilities in place to enhance our ability to detect and interdict along those various threat pathways.

Chairman WU. Thank you very much. The gentleman from Georgia.

Mr. GINGREY. Mr. Chairman, thank you. Before I ask my question, I want to request that the letter that Admiral Cohen referenced, that he wrote to the National Academies, be put in the record as part of the permanent record.

Chairman WU. Without objection, so ordered.

[*The information appears in Appendix 2: Additional Material for the Record.*]

Mr. GINGREY. Director Oxford, your testimony today described the need to address gaps in the current architecture, and develop "solutions that can effectively counter a determined and mobile adversary who will seek routes to bypass existing security measures." That was your quote. Yet, in the fiscal year 2009 request, that includes a $60 million increase for acquisition of the Advanced Spectroscopic Portal, which is, as I understand, a fixed location system, meant to upgrade our current capabilities at our ports of entry.

But meanwhile, research and development funding is kept relatively flat from the prior years, $334 million in 2009, compared to $324 million in 2008, so a meager $10 million increase, a very small percentage, although $10 million is a lot of money.

So, the question is why is the upgrade of current generation portal monitors more important than the development of new technologies to close the current gaps in our detection system? Are we, in effect, putting locks on the front door, but leaving all of the windows wide open?

Mr. OXFORD. Thank you for that question. It is interesting, that is exactly the same kind of perspective that the Secretary has on this, is that we need to make sure that we are looking not only at all the other windows, but we look at the back door and everything. We think we have got the balance right. And I can't go into all the classified details of why the upgrades are necessary, but I will tell you that we know some of the current systems are vulnerable to critical aspects of the threat, and we will be glad to share with you that off-line, in terms of what those threats are.

Our test programs have shown the vulnerabilities in the current deployment, the systems that are deployed out there, and it is a critical aspect of our vulnerability that we need to address. And the new systems will allow us to do that. Secondly, it allows our Customs and Border Protection agents to be a lot more effective.

Just to give you some information from LA/Long Beach, the biggest port in the country, right now, with the current systems, they are getting 400 to 500 nuclear alarms per day. They have assigned almost 200 customs officers to deal with that phenomenon at LA/Long Beach alone. These new systems have the promise to bring those down to 20 to 25 serious alarms per day, therefore, allowing CBP to address a wider variety of the mission space that they have been assigned.

Mr. GINGREY. Yes, sir, and what percentage of those alarms are false alarms?

Mr. OXFORD. Right now, all of them, and so, what we need to be able to do is distinguish that, reduce the operational workload, but also, enhance our overall ability to identify the threat, so that they can pay attention to the serious——

Mr. GINGREY. Would you repeat that, the number per day that are all false alarms?

Mr. OXFORD. Yes, right now, 400 to 500 nuclear alarms per day at LA/Long Beach.

Mr. GINGREY. Wow.

Mr. OXFORD. And we get roughly 200,000, at our seaports alone, on an annual basis, 200,000 alarms that then have to go through the full adjudication process to make sure that there is not a threat contained in that primary alarm. We get another 40,000 on our land borders, and that is based on 2006 deployment numbers, and our deployment of systems have gone up since then.

Mr. GINGREY. Describe the full adjudication process.

Mr. OXFORD. Sure. Let me use the seaport as an example. As the ships are unloaded, and the cargo containers are put on trucks, they go through primary screening, where we have a radiation portal monitor that has the capability to detect, but not identify what is in the cargo. So, if it alarms, it merely says we have the presence of radiation. That vehicle, then, is pulled over into what we call secondary screening. It goes through another radiation portal monitor, to make sure that that alarm was valid in primary. At that time, if it alarms, the customs officers go through a second hand-held screening process, where they take a radioisotope identification system, a hand-held detector, they screen the vehicle again. This device has some capability, although we understand its limitations, to be able to take a spectra and identify what the nature of that radiation is, and whether it is something of consequence, or something that is totally benign that is normally in the environment.

There is a list of critical isotopes that then have to go into another process, where that spectra sent to Laboratories & Scientific Services within CBP to do further analysis of that spectra. This can take upwards of hours. So, now, when you have got a situation like LA/Long Beach, with 400 or 500 of these a day that may go through that process, you see there is a possibility, not only to, based on the limitations of these systems, to miss the threat, but also, then, to slow down the conveyances through the ports.

So, there is a combination of purposes, as to why we need to do the upgrades that you asked for. Meanwhile, a lot of our R&D and our transformational work is addressing the other basis of the

vulnerabilities that I talked about that are in the architecture right now.

Mr. GINGREY. My time has expired, and I yield back.

Chairman WU. Thank you very much. Ms. Richardson.

Ms. RICHARDSON. Yes, thank you, Mr. Chairman, and thank all of you for being with us today.

Let me start off my comments by saying that although there has been much frustration by Members of this committee and the public, I think, as to the things we have not been able to accomplish, we would be neglect, though, in not acknowledging the fact that, since 2001, there has not been an attack, you know, on our soil, and so, the work that you have been able to do to provide homeland security for us is obviously there, and so, for that, we should all say thank you. So, I wanted to preface my comments by acknowledging that fact.

A few quick comments, and if you could answer them quickly, because the rules here is a red light comes on, and we are only given five minutes, and since I am a freshman, they hold me to it, so we will, if you could help me with it, I would appreciate it.

Number one, Mr. Cohen, Under Secretary Cohen, in your testimony, it mentioned the database of unmet human needs after Hurricane Katrina, and when I asked staff here, did we have a copy of what that database was, no one had it. Could you provide it to this committee in the future?

Mr. COHEN. Absolutely.

Ms. RICHARDSON. Okay. My—that was great, we are doing good so far.

Second question, Under Secretary, you also mentioned in your testimony that, with the University Scholars and Fellows Program, you now have instituted a policy to require one year of service in a homeland security-related field. I would respectfully request that you reconsider that, and let me tell you the reasons why.

I represent an area just adjacent to the ports, so 45 percent of the entire Nation's cargo does go through my district. However, I would tell you, though, unfortunately, in my community, we are not always abreast of some of these programs and job opportunities and internships, et cetera, and I will give you an example. I recently participated in two Congressional delegations, and I didn't see anyone who looked like me, who was there working on behalf of the Foreign Services and the folks who were supporting us.

And so, to leave out young people who clearly, I think this is going to be one of the key areas where we can have gainful employment for our young people, I really see this as a, really as a deterrent, and something that could hinder other youth an opportunity to participate.

So, I would respectfully request that you reconsider this requirement and take it away.

Mr. COHEN. Well, Congresswoman, first of all, thank you for your service as a teacher. I don't know if it was harder with the A.D.D. students in the school, or in the halls of Congress, but I will leave that up to you.

Let me tell you that you and I are in absolute full agreement on the face of America, and where we need to go, and as you are aware, last week, after a year's process, we went ahead, and we an-

nounced the five new University Centers of Excellence with co-leads for research and education, and I am pleased to tell you, of the 11 schools announced, five were minority serving institutions, three HCBUs, one Hispanic-serving institution, and one Native Hawaiian.

At the end of the day, I want, and it is not now, but it will be, our University Fellowship and Scholarship Program to reflect the face of America. That is what I did at the Office of Naval Research. You do that by putting out a very broad net. Having said that, as a taxpayer, and I will end, because I respect your time, at the end of the day, the Fellowship and Scholarship Program I inherited was not aligned to our Centers of Excellence, and was not meeting the requirements of the enabling legislation, which has me develop the workforce for Homeland Security, and oh, by the way, STEM, science, technology, engineering, and math, so important to our economies, including Long Beach and California.

And so, the payback and the internships, et cetera, are a work in progress. I have taken no hard decision there, but I am not a giveaway organization, as I read the enabling legislation, and if you would like me to do for the country with the precious taxpayer dollars. But I am committed to equal opportunity and to the diversity that is critical for the future of this nation, and I believe I have a track record there.

Ms. RICHARDSON. So, are you saying you will remove this requirement?

Mr. COHEN. I will consider it, and I am glad to discuss with you or your staff how I achieve the goals mandated in the enabling legislation, for the Centers of Excellence and for STEM and Homeland Security workforce development through student programs.

Ms. RICHARDSON. I didn't want to use my time to go to this extent, but maybe, it appears that I need to do so.

I am a student who was an athlete, and I had a chance to get into UC Santa Barbara based upon an EEOP program, and for those of you who don't know what that means, that is an equal opportunity program. And I would put my record against anybody in this room. And so, it is critical, I cannot stress to you enough how important this issue is to me and to other Members in this Congress. We do not have, all children do not have the same opportunities. All children do not have the same access to AP classes. All children do not have the same access to various languages. All children do not have the same access to the precursors, the prerequisites that might be required as they look for this other employment.

So, I would say to you, Mr. Under Secretary, until we can have that equalizing force to discriminate, and I would use the term, to discriminate against giving young people an opportunity to appropriately qualify, is a very serious issue for me.

So, I would like to continue this discussion, if it is going to be needed, but my request, and if necessary, I will bring it before the TriCaucus, my request would be that this requirement would be removed.

Mr. COHEN. And if the Chairman would just indulge me, I am a product of the New York City school system. I did not come from rich folks. I went to the Naval Academy, and I was required to pay

back five years in service, which I did with great honor. It dragged on to be 42 years.

There are many programs in the Federal Government where we require, post-graduation, a payback for the taxpayers' investment. I may be misunderstanding you, and I don't want to take valuable time; I am glad to meet with you, and if I am misunderstanding you, there is no prequalification. What we are asking kids to do is to be involved with our DOE and National Labs, as rising juniors and rising seniors, so we can expose them to what we are doing, encourage them to come into that workforce, which desperately needs revitalization.

Ms. RICHARDSON. So, this is a post-requirement, not a pre-requirement.

Mr. COHEN. Oh, I wouldn't have taken all this time. Absolutely. There are no prerequisites. The prerequisite is merit, just as you indicated, but I am not hard over yet on one year, maybe the right answer is two years. Maybe the right answer is 0 years, so long as we have a robust rising junior, rising senior summer intern program that I pay for.

But what I inherited was a system that I couldn't look you in the eye and justify the expenditure for payback. So, I apologize, Congresswoman. I think there is no light between the two of us. There is no pre-criteria. I apologize. I am——

Ms. RICHARDSON. And I appreciate that clarification, and that is perfect with me. Mr. Chair, could I just close with one last comment?

Chairman WU. Please.

Ms. RICHARDSON. Thank you. You are very kind. I appreciate it. Mr. Under Secretary, it is my understanding that in terms of staffing, we have this whole idea of the one face at the border, and that is becoming quite an issue, because the one face does not necessarily have the expertise, in particular, with the agricultural requirements.

And so, if not at this meeting, because I have extended my time, and as a freshman, my red light is on, so I have got to stop. So, I would just ask that you could prepare, for this committee, a better understanding of where we are. Because I am hearing that there are concerns in the field with that issue, that the expertise is not there, particularly on the agricultural end, and given the fact that I do represent the largest area in the Nation, it is a great concern of us.

Thank you very much.

Chairman WU. I thank the gentlewoman. If you were a 20 year veteran, the red light would still be on, but I really appreciate the gentlewoman's passionate pursuit of the issues, and I thank her for her background of service, and the Admiral, Vice Admiral, we are all a product of our backgrounds, and it is a strength of this nation that we bring these different perspectives, to make sure that our society can capture all the human talent which we can bring to bear for these very challenging times.

And the Chairman, recognizing himself, just for a moment touching upon an old issue. Director Oxford, your eloquent answer was, perhaps, a lengthier way of saying we have a very deep risk, and we haven't done the risk analysis, but because it is such a great

risk, we are allocating the resources that we feel we need to, to address that risk.

And perhaps we, at a staff level, we need to circle back around to see whether that is the right thing to do, because as serious as that risk is, resources that are allocated there are not allocated, say, to Nunn-Lugar, which is a different solution to the problems that you are trying to address, or resources addressed there are not able to be redeployed to other, perhaps equally significant hazards to our society, and to human life.

I would like to shift to a different ground, which is the Integrated Product Teams, or IPTs, that the Under Secretary has implemented with some success, and this is a question directed, really, at all three of our witnesses here.

My understanding is that there has been success in bringing the IPTs together, and addressing some of the concerns that different parts of DHS has about the technologies that we are working on, but you know, I am concerned about whether the IPT process reaches out far enough into the testing process, into the end-user community, so that their concerns about validation first, next, using these products, in an operational environment, and maintaining them in an operational environment, is reflected in the IPT process, when we are setting research and development goals.

Mr. COHEN. I will give you a very succinct answer. I do science and technology, and that is the principle of what I do. In law, I am also, it is not an S&T responsibility, it is a separate responsibility, the Test and Evaluation Executive for the Department of Homeland Security, a job I am very comfortable with, and George Ryan and I had that same job for six years in the Department of the Navy, much larger budget, and I characterized test evaluation as we are not going to buy no junk, and it must be independent, and you understand that.

In S&T, I get to take risk. In order to keep—with millions—hopefully intelligent risk—to keep from putting billions in acquisition at risk, because acquisition is, and should be, risk-averse, whether it is in industry or it is in government. And so, the Integrated Product Team has been a very good step forward to bring together the customer, Coast Guard, Border Protection, et cetera, with their capability gaps. They don't tell me what technology to invest in. They tell me what their high priority mission needs are. I offer them solutions, universities, laboratories, United States, international, or if they have a preferred solution from a provider, just give it to me. We do a technology readiness assessment, because I am not going to buy no junk, and if it measures up, I am glad to resource it.

Chairman WU. Well, Mr. Under Secretary, the groups that you listed are part of DHS.

Mr. COHEN. Right.

Chairman WU. And the question is whether you are reaching out sufficiently, say, to the Fire Department of Peoria.

Mr. COHEN. Sure. And the short answer is, I need to do a better job, because the enabling legislation said the 22 components of my customers, but also, the first responders. State, tribal, local, et cetera. In the Integrated Product Team, you will see on the bottom of each of the diamonds is the user. The user may be an agent. The user may be a first responder. I just asked Rob to pass to you. The

challenge that I have, unlike DOD, where I just had Marines and sailors. I now have the customer and the customer of the customer, and so, we have different transition paths. They go to first responders, go to agents, et cetera.

It was my intent, in August of '06, as I put in place the organization which you all, very kindly, rapidly approved, to have in my interagency and international liaison, so I didn't duplicate what any other component of government was doing, and brought international partners, to also have first responder liaison. And because I have to deal with the Sheriff of Mayberry, and I have to deal with the New York City Police Department, I can't handle that scale, but I can deal with the Fraternal Order of Police Chiefs, and the Fire Chiefs. They understand the scale issues.

And so, I wanted to have that capability. I was advised that because the Department had State and local, because the Department had an outreach, and because the first responders had indicated they felt there were too many entry points for DHS, and it was confusing, that I needed to deal internally to get those inputs. I think I may have taken that too far, and that is why, and it was adjacent to Congresswoman Richardson's district in January, at the invitation of California, we had a first responder outreach conference. Several hundred first responders were there, the Mayor of Los Angeles participated, et cetera, to do exactly what you said. But I have got to formalize how I bring them to the table, not just in the requirements generation and satisfaction, but also with George, as we do in the Navy, we don't allow contractors to load the missiles onto the plane. We bring in fleet sailors, because at the end of the day, they are going to be loading the plane, and we will figure out how to do that better, and we will do that this year, sir.

Chairman WU. I have gone past my five minutes. But Mr. Ryan, if you could address some of the testing components of this, and Mr. Oxford, if you have anything to add. Have you pressed the microphone button?

Mr. RYAN. I am sorry. Excuse me. Let me address—I am only using you for foresight. You know, the wisdom of Congress, when they created enabling legislation that put T&E in S&T, and then, the foresight of Under Secretary Cohen, to put standards and T&E together, I think is very good, because the T&E now, and I was with the operational test leaders from the government and industry last week, and that was an issue in DOD, is because of the interest in accelerating the cycle time of getting things deployed, they feel that they need to be more involved in the laboratory end of it, which they are currently not in DOD.

And here we are, we are right where they want to be, so to speak, because we can see what the requirements are early on, we can determine that the requirements are testable. And then, with the IPT, and with standards, we can support the standards. And I will give you a good example that I think touches on many things that you had in your questions. It is, I was in eastern Kentucky, I went to both Somerset to see the NIMH Center, and then, I was in eastern Kentucky, and they were doing UAVs, and I got into a discussion about standards of UAVs, and I came back and said, the mini micro UAVs that first responders want to have, and there were actually some policemen at eastern Kentucky when they were

flying these, they, if you looked at it, there were no standards. So, what we did is, a combination of the Standards Group, and Bert Coursey is here as the Department's Standards Executive, we got with the, in this case, we got with the Navy, the work on test protocols, to support the standards once they get development.

And we also have NIJ involved, and actually, at the NIJ meeting we had the other day, there were people from the Texas Association of Sheriffs. So, they are all working together to develop these standards, and then, in test protocols, to support that. From the IPT process, we are involved in the IPT process, so early on, we are meeting with, even though it may be internal, we are meeting with the users and the developers again, to understand the technology, to get a better feel for what instruments and test capability are needed, actually prior to the testing, so we can budget for it, and make sure it is there, when you get to the point of doing the testing.

So, I think we are making a lot of progress in the right direction. If that helps.

Mr. OXFORD. Mr. Chairman, I will be very brief. I will try to cover the two facets of your question.

First of all, our customer base is federal, State, and local. We have a little bit different model than the Under Secretary does. We have embedded in DNDO representatives from TSA, CBP, Coast Guard, so we have, within the cross-section of our DHS customer base, direct liaisons working with us every day, so we have a pretty good conduit of getting capability to our federal partners.

From the outset of DNDO, I established a State and Local Affairs Office, with the entire intent of broadening the awareness of the radiological and nuclear threat at the State and local level. We have conducted now seven workshops; we will have our eighth workshop in April, where we bring in State and local representatives from across the country. In some cases, we have had 30 states represented as part of that interchange. We are enhancing their awareness. We are talking to them about how they can enhance their own security within their metropolitan areas and their State environments. Then we work with them on the grant process, as appropriate, so they can get capabilities, and then, provide the requisite training that goes with that capability.

On the test side—do you have a question? On the test side, when I inherited this responsibility, there was almost no test capability in the radiological nuclear detection area, so we have kind of grown that from whole cloth. Some of the criticisms that you have seen in the press and elsewhere suggests there needs to be more independence in the tail end of our process, where we are dealing with the operational side. What the Under Secretary and I have agreed to do, along with the Deputy Secretary, is Mr. Ryan will now become part of our independent operational test entity, where he will review test plans; he will look at the adequacy of those test plans, and ultimately, on the operational tests and evaluation piece, he will be signing off on the test reports. So, we are negotiating an MOU right now that should be done next week that will put that into perspective.

Chairman WU. Well, Mr. Oxford, even more briefly, is that process working around New York City, and what you are trying to do there?

Mr. OXFORD. We have seen tremendous capability grow from our engagement in New York City. What we have seen is the secondary benefits of 22 different jurisdictions working together just in the radiological and nuclear defense area. That is starting to expand, for example, New Year's Eve, when——

Chairman WU. Let us continue to follow and track that process.

Mr. OXFORD. Absolutely.

Chairman WU. Let me recognize the gentleman from Georgia.

Mr. COHEN. And Chairman, if I may, as you remember, the Environmental Measurements Laboratory of New York was a big concern last year, and Vayl and I went up there, and we have leveraged that incredible intellectual capital, who have expertise in nuclear radiological, to work with DNDO. In fact, Vayl is paying for eight to ten of those people in direct support in the tri-state area, for what he is doing in test and evaluation.

Chairman WU. Thank you very much. And the gentleman from Georgia.

Mr. GINGREY. Mr. Chairman, thank you. I have one last question, and Mr. Oxford, you don't have to take the full five minutes. I am already two minutes late for my next meeting.

In your testimony, you described your support in developing, well, actually, it was the Under Secretary's testimony, but developing a coordinated, interagency, R&D roadmap that would enhance the breadth of domestic nuclear defense efforts through the Office of Science and Technology Policy's Domestic Nuclear Defense R&D Group. What is your expectation for the completion of this roadmap?

Mr. OXFORD. As far as I know, Dr. Marburger has now approved that roadmap. I don't know if OMB has endorsed it for follow-on budget deliberations, but the roadmapping activity is complete.

Mr. GINGREY. Admiral Cohen.

Mr. COHEN. Yes, sir. As you know, we were required in the enabling legislation to come up with a coordination document. At that time, DNDO and S&T were one unit. I delivered to the Congress, at the end of last calendar year, something that had been in progress for a long time. It is that coordination, absent the nuclear roadmap, and Dr. Marburger now, he is doing the integration to put it into one roadmap. My challenge there was the enabling legislation wanted me to have a little bit more leverage over the other departments of the government, and they were not as enthusiastic about letting me do that.

So, it is truly a coordination document, but at least we have laid out what their capabilities are, and what the Nation's needs are, and now, we will use leadership by embarrassment to get the desired result.

Mr. GINGREY. Right. Thank you, and I will yield back my time. Thank you both.

Chairman WU. Dr. Gingrey has expressed that he has no objection to me asking one more tranche of questions, even with no Republican supervision in the room.

And first, I just want to touch upon the issue that each of you all, whether it is in the testing arena, or research in certain specific areas, whether it is building safety or other topics, or nuclear detection, there is a lot of expertise over at NIST, the National Institute of Standards and Technology, and I think that I will ask the staff off-line to inquire as to each of your operations, how much interaction, how much cooperation, there is between your efforts and the expertise that is available over at NIST.

The last question that I want to focus on in this hearing is that Mr. Under Secretary, you have done a commendable job of raising the amount of basic research, to invest about 20 percent of research funding in basic research. I just want to make sure that for budgetary purposes, that the definition of what is basic research has not been shifted in order to reach that 20 percent mark. Is this the same definition that has been used in prior fiscal years, and if there has been a shift in definition, what are the differences between the current definition and the past definition?

Mr. COHEN. One of the things I have learned in this town, Mr. Chairman, is to always tell the truth. I do it for two reasons. One, it tends to work, and at my age, I don't have to remember what I said. So, there is no bait and switch. I have not redefined, and I am not using——

Chairman WU. That is a problem, that others tend to have long memories, too.

Mr. COHEN. Yes, sir. And paybacks are heck. But the facts of life are, and I say this as a citizen, today, we don't have Bell Labs, as we knew them. We don't have Xerox PARC. It is only the Federal Government, and its deep pockets and tenacity, that can make the sustained investment in basic research that has given us the technology, and this incredible economy that we enjoy, whether it is the *Bayh-Dole Act,* or so many other things the Federal Government has done.

And so, in the Navy, when I was asked to make sacrifices in the budget, I said take whatever you want in transition, but don't take a penny of the basic research. We did not have a robust basic research portfolio when I got here. We have established that. It is focused on universities. It is focused on laboratories. I define it as eight years or more. We have a chart right here, because I believed you were going to ask this, Mr. Chairman, which shows by division, the purple, by division, shows the percent of their research dollars that go into basic research.

You can see in explosives, because I can't detect at range a suicide bomber or a suicide car today, we have got plenty on the output side, that is being used in Afghanistan and Iraq, but I have got to get the phenomenology, photon packets. I don't know what the methodology is; I need a discovery, half you see, in explosives. Whereas in borders maritime, it is small. Command and control, I can leverage everyone else in government, so I don't want to double spend those moneys. I am using the definition from OMB to a lot of definitions at the end of the day, but it is university, laboratory focused, unfettered, and long-term.

And I am glad to work with the Committee. The Committee staff has been involved in all of this process, and if I don't have it quite

right, we will certainly make adjustments, but I think I have spoken honestly, sir.

Chairman WU. I want to thank all of the witnesses for their participation today. And I want to assure everyone that at a Member level, at a staff level, we want to continue to work with your agencies to assure that we are properly focused, spending the taxpayers' money wisely, and taking care of their long-term interests.

I thank you for your participation, and the record will remain open for additional statements and questions for five days, and we will be sending additional written inquiries to each of you.

Thank you very much, and with that, this hearing is adjourned.

[Whereupon, at 12:13 p.m., the Subcommittee was adjourned.]

Appendix 1:

Answers to Post-Hearing Questions

ANSWERS TO POST-HEARING QUESTIONS

Responses by Jay M. Cohen, Under Secretary, Science and Technology Directorate, Department of Homeland Security

Questions submitted by Chairman David Wu

Q1. The Homeland Security Science and Technology Advisory Committee was recently reconvened to advise DHS S&T on research priorities. However, the format of the HSSTAC was changed for the most recent iteration of the Committee. Previously, HSSTAC had a broad focus and provided recommendations for research priorities across the many fields covered by DHS S&T, such as biosecurity, cyber security, and others. Now, HSSTAC zeros in on specific project recommendations in a particular field, currently focusing on improvised explosive devices (IEDs).

Q1a. Why did the format of HSSTAC change?

A1a. The Homeland Security Science and Technology Advisory Committee (HSSTAC) mission remains in line with its intended purpose as stated in the *Homeland Security Act of 2002,* in that it makes recommendations with respect to the activities of the Under Secretary for Science and Technology, including identifying research areas of potential importance to the security of the Nation. Counter-IEDs is a priority for the Administration, DHS and the S&T Directorate. The Under Secretary for Science and Technology recognized the need to focus the breadth of experience of the HSSTAC to help ensure that the S&T Directorate focuses its work in the right areas. With the IED study completed (in February 2008), the HSSTAC is now conducting a comprehensive assessment of all S&T Directorate programs and options for technologies to support DHS's operational responsibilities in the cyber area.

Q1b. Given that the Committee is composed of experts from a variety of fields, are you taking advantage of the members' expertise when you focus on fields that fall outside their backgrounds?

A1b. The membership of the HSSTAC includes experts in scientific as well as emergency response fields such as law enforcement, fire safety, emergency management, and health affairs. Nearly all of these experts have broad ranging and deep experience in Homeland Security activities, and the interaction between them consistently provides valuable insights in areas such as concepts of operation and organizational issues.

Q1c. How does this format affect HSSTAC's ability to establish mission goals for the long-term?

A1c. Members representing the various academic disciplines have integrated well with the members representing the various emergency-responses and related fields, and we have found that this mode of operation supports HSSTAC's capability to establish mission goals for the S&T Directorate.

Q1d. How have you taken advantage of HSSTAC, the Homeland Security Institute, and other resources when planning long-term research strategies?

A1d. The S&T Directorate works through HSSTAC and the Homeland Security Institute (HSI) to gather outside expertise and inputs on current and planned activities. The HSSTAC will continue to play an important role in advising the S&T Directorate on long-term goals, institutional relationships, and research programs.

Q2a. How many projects will be funded in FY 2008 under the TechSolutions program?

A2a. To date, the TechSolutions program has funded nine projects in FY 2008. Funded projects include: (1) **Safe Against Fires and Embers** (SAFE)—identification of technologies that will mitigate damage caused by California wildfires; (2) **Next Generation Breathing Apparatus—**reduce the weight and profile of the compressed air cylinder for a First Responders self-contained breathing apparatus by more than half and increase its flexibility; (3) **3–D location—**improve 3–D location accuracy from three meters to one meter for a device that tracks incident responders in situations such as inside of threatened buildings, collapsed buildings, and subterranean facilities; (4) **Inter-operable Communications—**develop a communications device capable of operating on all public safety radio bands (e.g., 700 and 800 MHz bands); (5) **Vehicle Mounted Chem Bio Sensor—**develop a vehicle mounted sensor capable of identifying toxic industrial chemicals and detecting bio-

logical agents when an emergency vehicle arrives on the scene; (6) **Fire Ground Compass—**develop an orientation device that enables firefighters, their exterior sector officers and the fire-ground commander to maintain their reference point to the fire building or area as they battle interior structural fires; (7) **Standoff Patient Triage Device—**develop a hand-held device capable of obtaining a victims pulse, respiration, temperature and body movement readings from a distance of five feet to 40 feet in 30 seconds or less; (8) **Dazzler—**reduce the size of the current "Dazzler" incapacitation LED prototype to that of a MAG flashlight and perform operational field testing; and (9) **Readiness Optimization (Brain Music)—**improve performance of Federal Air Marshal Service (FAMS) agents and Transportation Security Administration (TSA) screeners by mapping music scores to electroencephalogram (EEG) brain wave patterns that, when played back, create a relaxed or alert state of mind.

Q2b. How many projects do you anticipate funding in FY 2009?

A2b. The TechSolutions program plans to fund 8 to 12 projects in FY 2009.

Q2c. Of those already-funded projects, how many were requested by stakeholders outside of the Department of Homeland Security?

A2c. Seven of the nine projects funded by TechSolutions in FY 2008 were requested by stakeholders outside the Department of Homeland Security. The remaining two (3–D location and Dazzler) are ongoing S&T Directorate projects that TechSolutions invested in to improve functionality and accelerate transition and commercialization activities.

Q2d. What efforts is DHS S&T making to promote TechSolutions as a resource for users outside of DHS?

A2d. The Department is promoting TechSolutions to audiences outside of DHS through press releases, attendance at major emergency responder conferences and events, publication and distribution of program related materials, including a newsletter found on the Firstresponder.gov web site and a TechSolutions web site that provides emergency responders with a means to submit their capability gaps. The web site is currently accessible from *www.Firstreponder.gov* or *www.dhs.gov/techsolutions.* In addition to these activities, TechSolutions is looking at ways to distribute informative program materials to emergency responder training facilities, put information about TechSolutions in frequently read emergency responder publications, work with emergency response departments to place a shortcut to the TechSolutions web site on their department computers' home page and provide a new and improved TechSolutions web-based system for inputting capability gaps and obtaining information about existing and recently awarded TechSolutions projects.

Q2e. Also, the original plan for TechSolutions was to follow a quick timeline from the submission of suggestions to acceptance of a project. How successful has TechSolutions been at meeting their timeline goals?

A2e. TechSolutions has been relatively successful in achieving its goals for reviewing, vetting, selecting and awarding contracts to develop prototype technology for capability gaps submitted by First Responders. TechSolutions recently performed an audit on its current process that identified areas where improvements could be made. The improvements are being addressed in a new TechSolutions web-based system that is scheduled for release in the third quarter of this year.

Q3a. You mentioned that you were not able to meet your staffing goals from your strategic plan in 2007 because of inadequate management and administration funding, but your FY 2009 request for management and administration is decreased by $6 million from the enacted FY 2008 funding. How will you increase your staffing level to 100 percent or 381 full-time employees while cutting funding for management and administration?

A3a. The S&T Directorate plans to transfer 124 full-time employees (FTE) from management and administration (M&A) to its Laboratory Facilities program. This move results in a decrease from the FY 2008 enacted budget to the FY 2009 President's Budget request for S&T Directorate M&A.

The S&T Directorate expects to fill all positions prior to the end of 2008. We have committed 96 percent of our positions and have only 11 remaining positions under development. Currently, due to heavy workload, the DHS Office of the Chief Human Capital Office (CHCO) has advised us that many of our hiring actions would not appear until July. The S&T Directorate's goal is to provide all the needed support to hire new employees.

The following table shows the S&T Directorate's FY 2008 hiring plan which fills those positions vacant at the beginning of the fiscal year. Maintaining this plan is dependent on whether we have adequate remaining M&A funds as the fiscal year progresses.

FY08	Oct*	Nov*	Dec*	Jan*	Feb*	Mar*	Apr	May	June	July	Aug	Sept
New Hires	14	13	5	7	11	7	5	5	6	9	5	5

*actual new hires as of March 27, 2008

Q3b. Also, in your strategic plan, you state that you will "not fill a career-reserved Senior Executive Service (SES) position using an [Intergovernmental Personnel Act] assignee." How many IPAs are currently assigned to DHS S&T, and what positions do they fill?

A3b. There are 14 IPA's currently on-board in the Science and Technology Directorate in the following positions:

- Director of Research
- Assistant to Deputy Director of Research
- Director, Plum Island Animal Disease Center
- Director, Test, Evaluation & Standards Division
- Science & Technology Liaison, International Programs Division
- Program Manager, Operational Experimentation, Operations Analysis Division
- Director, Small Business Innovative Research, Homeland Security Advanced Research Projects Agency
- Agriculture Security Program Manager, Chemical/Biological Division
- Program Specialist for State & Local Interaction, Infrastructure & Geophysical Division
- Transition Program Executive for Explosives and Program Manager for Counter-Man-Portable Air Defense Systems, Explosives Division
- Program Manager, Manhattan II Transition Programs, Explosives Division
- Deputy for Knowledge Management & Tools/Threat Assessment and Program Manager, Command, Control & Inter-operability Division
- Research Director/Program Manager, Command, Control & Inter-operability Division
- Program Manager, Cyber Security, Command, Control & Inter-operability Division

Q3c. Are any of them in Senior Executive Service positions?

A3c. The approved Career-Reserved Senior Executive Service (SES) position of Director, Test & Evaluation and Standards Division is currently filled by an IPA; however, recruitment is currently under way to fill the position with a permanent federal employee.

Q4a. What role do the University Centers of Excellence (COEs) play in the Directorate's activities?

A4a. The S&T Directorate's Centers of Excellence (COEs) form an integral part of S&T's basic research strategy, along with the National Labs. The COEs conduct multi-disciplinary research in priority DHS mission areas and are aligned to the S&T Directorate's divisions and their customers. COEs improve understanding of the causes, elements, and consequences of a range of threats from terrorists and natural disasters. The COEs also support countermeasures, mitigation and prevention approaches to identified threats (including biological, agricultural and explosives threats) based on both technologies and on human behavior. To accomplish this, the centers have assembled a powerful group of academic experts, researchers and educators in fields relevant to homeland security.

Q4b. How is university research oriented and integrated to meet the research needs of DHS?

A4b. The S&T Directorate's Office of University Programs, which manages DHS Centers of Excellence (COEs), works closely with the S&T Directorate's six Divisions to align the basic research program of the COEs with the gaps identified by the Divisions' research program managers. The Divisions are largely responsible for nego-

tiating the research agenda of the COEs. They are substantially involved with reviewing and evaluating the COEs' results and in communicating successful outcomes to the DHS and other federal, State, local, tribal and industry customers that can use these results to reduce threats to the Nation.

Q4c. How will the proposed reduction in funding for the COE program affect the research currently being performed at those COEs?

A4c. Under the S&T Directorate alignment adopted in FY 2007, an increasing portion of the DHS Centers of Excellence (COEs) funding will come from the S&T Directorate's six divisions to conduct research relevant to DHS' mission. These funds will supplement the base level funding provided by the University Programs' COE budget, which is intended to adequately sustain administration, education, travel, outreach and coordination with DHS, National Labs and other COEs, and other program support functions.

Q4d. What is the added benefit of funding additional COEs while at the same time significantly cutting overall funding?

A4d. The DHS Centers of Excellence (COEs) added in FY 2008 addressed critical gaps in DHS' research program and are now aligned with the S&T Directorate's six Divisions. Two Divisions had no aligned COEs—gaps that will be addressed by the new COEs for Explosives, Border Security and Immigration, and Maritime Security. Additionally, Hurricane Katrina demonstrated the need for serious university-based research on hurricanes, flooding and other natural disasters, which the new Natural Disasters COE will address. Additional research funding will come from the S&T Directorate's six Divisions, which should enable both the old and new COEs to thrive on a combination of base level funding from University Programs and supplemental research funds from the Divisions.

Q4e. Should the COEs be allowed to accept funding from outside sources, and how would that affect their relevance to the DHS mission?

A4e. We fully anticipate funding for the DHS Centers of Excellence (COEs) to come from a variety of sources, and in fact, encourage it within limits. The DHS COE grants or cooperative agreements are intended to be open vehicles to facilitate research that meets three conditions: first, it must be actual research for a public purpose that addresses fundamental scientific questions, second, it must fall within the scope of the grant or cooperative agreement, and third, it must be subject to an approved merit review process to ensure it is good science. Research projects that meet these criteria will be sound, will remain relevant to the DHS mission and will conform to federal assistance agreement (grants and cooperative agreements) guidelines. If their objectives do not meet these criteria, outside sources, whether public or private, can always engage the COE investigators as individuals through other mechanisms.

Q5a. In your testimony, you noted that DHS S&T has evaluated and tested commercial off-the-shelf technology for detecting homemade explosives. Why did these tests not take place until the most recent fiscal year, since liquid explosives were identified as a threat in August 2006?

A5a. The S&T Directorate has worked toward detecting homemade explosives (HME) for several years, including testing systems that could potentially be used at airports to detect HME threats. A rapid response team involving national laboratories, the Transportation Security Laboratory (TSL), and others, was established immediately after the London bombing incidents in August 2006. A consortium of national laboratories undertook physical and chemical characterization of the liquid homemade explosives threats of most urgent concern. Our characterization effort also took into account similar characterization work being undertaken under the auspices of the FBI laboratory.

The characterization data informed the explosives detection activities to test HME against at least six different systems at a secure facility created at Tyndall Air Force Base. This work began in late-2006. Raw data and images were collected and analyzed to determine how to improve system performance against the novel threats being faced. Data was collected and analyzed using a large number of different types of bags which contained a variety of clutter and different orientations of explosives. Data is being shared across vendors to assist in improving the detection performance of Commercial Off-The-Shelf (COTS) explosives detection equipment.

In recent months, additional testing has focused on addressing threats that use laptop computers. We are also extending earlier characterization work to categories of HME not yet examined.

Q5b. How far away are we from having working homemade and liquid explosives detectors deployed in airports?

A5b. The Transportation Security Administration (TSA) handles the acquisition and deployment of detection systems in airports. The S&T Directorate and its Transportation Security Laboratory support acquisition and deployments through research, development, test and evaluation of detection equipment.

For example, one explosives detection system recently evaluated by the S&T Directorate is planned for deployment by TSA to 70 airports. To support this deployment, the S&T Directorate undertook evaluations at Sandia National Laboratory (SNL) to test a new hand-held, portable liquid screening system based upon the chemical luminescence principle for detection. This system exploits the high vapor pressure of peroxides and detects such explosives threats in the vapor stage. The system was deployed to about six airports for testing in real airport settings. Based upon the success of the system, TSA made a decision to deploy the system in 70 airports. In addition, SNL is evaluating a portable trace explosive detector which might be useful as a complement to the hand-held, portable liquid screening system.

Q6a. Please clarify the purpose and goals of the Human Factors division. As part of your list of 2008 accomplishments, you discuss the development of a database of "unmet human needs after Hurricane Katrina" as a major Human Factors achievement. Yet in the budget request and research and development plans that were submitted to the Committee, DHS S&T indicates that the Human Factors division will focus on human-technology interaction research, and behavioral science research, which are far different research fields than cataloging "unmet human needs." What is the primary mission of the Human Factors division?

A6a. The Human Factors Division (HFD) applies the social and behavioral sciences to improve detection, analysis, and understanding of the threats posed by individuals, groups, and radical movements; it supports the preparedness, response, and recovery of communities impacted by catastrophic events; and it advances homeland security by integrating human factors into homeland security technologies. This work includes numerous aspects of social and behavioral sciences, encompassing the Hurricane Katrina Database as well as R&D on human-technology interaction.

Q6b. How will the Human Factors division serve the overall homeland security mission, and how do you intend to integrate Human Factors' research into the research and technology development activities within the other divisions?

A6b. The Human Factors Division (HFD) funds research and development (R&D) designed to meet the following goals to improve homeland security: enhance the analytical capability of the Department to understand terrorist motivation, intent and behavior; improve screening by providing a science-based capability to identify deceptive and suspicious behavior; enhance the capability to control movement of individuals into and out of the United States and its critical assets through accurate, timely, and easy-to-use biometric identification and credentialing validation tools; enhance safety, effectiveness, and usability of technology by systematically incorporating user and public input; and mitigate impacts of catastrophic events by delivering capabilities that incorporate social, psychological and economic aspects of community preparedness, response and recovery.

HFD supports R&D efforts that address high-priority capability gaps in biometrics and credentialing, suspicious behavior detection, hostile intent determination, violent intent modeling and simulation, and radicalization deterrence as identified by customers through the S&T Directorate's Capstone Integrated Product Team (IPT) for People Screening and the Technology Oversight Group (TOG), chaired by the Deputy Secretary of Homeland Security. Two other Capstone IPTs, Border Security and Explosives Prevention, also identified Suspicious Behavior Detection as critical to meeting their respective high-priority capability gaps.

With respect to "unmet human needs after Hurricane Katrina," HFD is funding a project entitled "Enhancing Public Response and Community Resilience," which is aimed at an improved understanding of public needs during a catastrophic event in order to enable emergency managers to better plan for actual emergencies. This project includes a database of the 900,000-plus public requests received over the Texas 211 Call System during the evacuation from and response to Hurricanes Katrina and Rita. In FY 2008, the project will develop a report detailing temporal analysis of requests for shelter, food, disaster relief, evacuation information, and other requests received into the Texas 2–1–1 System. The project will also develop a standardized template to improve efficiency of 211 Call Systems nation-wide. In FY 2009, the project will conduct a geo-spatial analysis of this information to assist

Texas emergency responders in better planning of evacuation routes, and will identify vulnerable areas where requests were more frequent or of a more urgent nature. This project represents the first analysis of real-time public communications during a widespread natural disaster. The analytic process used in this study will be of value in emergency planning and public communications during disasters.

The following recent accomplishments highlight how HFD serves the overall homeland security mission.

Screening Passengers by Observation Technique (SPOT) Refinement is supporting the Transportation Security Agency's (TSA) SPOT program. Interim analytical results suggest the potential for future optimizing of the internal weights associated with the behavioral indicators used by Behavior Detection Officers. Additional analyses are in progress and a final report is projected in FY 2010.

Project Hostile Intent (PHI) developed a baseline set of behavioral indicators yielding an accuracy rate of 87 percent for the detection of future hostile intentions in a laboratory environment. These results are currently being transitioned to DHS' operational customers through an S&T developed training course.

Mobile Biometrics conducted a Coast Guard pilot of maritime mobile biometrics in the waters of the Mona Pass between Puerto Rico and the Dominican Republic. S&T's support will inform future mobile biometric projects.

Credentialing developed and transitioned a laboratory test plan for the Transportation Worker Identification Credential (TWIC) card reader supporting the future deployment of TWIC readers in the ports.

Co-sponsored and guided the creation of the **Multiple Biometrics Grand Challenge** (MBGC), which encourages competition among vendors leading to accelerated algorithm development that includes DHS-specific operational requirements.

The Motivation and Intent Program funded the release of the first web interface for the **Global Terrorism Database (GTD).** The GTD will enable users to identify and analyze trends in terrorist activities, and enhance our strategic capabilities to protect the homeland from future attacks.

Violent Intent Modeling and Simulation (VIMS) delivered a framework demonstration to the Office of Intelligence and Analysis and Social Science Experts. VIMS allows analysts to strategically identify influences and the probability that groups will adopt violence to achieve their goals. The framework improves the analysts' ability to direct collection requirements and to engage in mitigation strategies to prevent terrorist attacks.

The *Social and Behavioral Sciences Partnership Project* in coordination with S&T's University Programs organized three meetings on radicalization research for the DHS Radicalization and Engagement Working Group. The meetings allowed policymakers to define areas of interest related to radicalization, the differences between radicalization processes in the United States and Europe, and the role of community engagement in fostering integration.

HFD convened the **Community Perceptions of Technology Panel** to enable DHS to gain insights into community acceptance and perceptions of technology. This will allow the agency to better recognize and integrate viewpoints and issues into the development and deployment of technology.

Through work at the **Transportation Security Laboratory,** HFD delivered research reports on the effects of sleep deprivation, night-shift work, and time-on-task for X-ray screeners. This research identified various factors that lead to good or poor X-ray search performance, and will be used to inform operational and training improvements with TSA.

Q6c. How do you intend to integrate Human Factors' research into the research and technology development activities within the other divisions?

A6c. The Human Factors Division (HFD) uses three main mechanisms for integrating its research with other divisions—its program managers, a management directive, and the Human Systems Integration Community of Practice.

On a day-to-day basis, Human-Systems R&D Program Managers are responsible for incorporating human systems integration into the R&D process in order to maximize human performance, overall system effectiveness, safety, and acceptance, as well as to facilitate data-driven design decisions by ensuring S&T Directorate decision-makers are aware of the human performance risks associated with those design alternatives and trade-offs being considered. Accordingly, HFD staff assess S&T Directorate programs for human performance risks and provide advice and counsel to

DHS program managers, engineers, and scientists on human systems integration. Support also includes assistance in the development of the various programs' contractual documentation including Broad Area Announcements, Request for Proposals, Requirements Documents, Statements of Work, etc. This will ensure the appropriate language is included to help performers systematically address human performance issues throughout the life cycle and make them aware of the advantages of a comprehensive plan for human systems integration that optimizes total system performance, minimizes total ownership costs, and ensures that the system is built to accommodate the characteristics of the user population that will operate, maintain and support the system.

Concurrently, HFD is developing a Department-wide Directive to establish policy on human systems integration to ensure that it is incorporated early and iteratively in all DHS R&D efforts. Successful implementation and incorporation of human systems integration into research, development and acquisition programs will enable DHS to generate more complete and operationally accurate technology requirements, limit integration difficulties throughout the life cycle, reduce cost and schedule risks, and most importantly, provide the customer with a solution that maximizes technology capability and human performance.

HFD is also coordinating a DHS-wide Human Systems Integration Community of Practice. This Community of Practice connects all DHS human systems integration practitioners, facilitates collaboration and knowledge sharing across all DHS components, and serves as a forum for the rapid exchange of lessons learned, best practices, ideas, information, and data. As a result of this corporate knowledge sharing and collaboration, DHS can reduce cost, schedule and risk across all DHS programs/efforts by leveraging the experience of all DHS human systems integration practitioners as well as leveraging existing and ongoing analyses, designs, prototypes and tests completed on similar programs across all DHS components. The Community of Practice will serve as a vehicle to build a bridge between DHS Research and Acquisitions.

Q7a. The DHS S&T budget request for cyber security will fund "secure facilities and methods for testing cyber security technologies under real-life conditions." Who will develop these testbeds, and who will comprise the user community?

A7a. The S&T Directorate is developing the Cyber Defense Technology Experimental Research (DETER) cyber security testbed in partnership with the University of California (UC) Berkeley; University of Southern California's Information Sciences Institute; and SPARTA Inc. The National Science Foundation (NSF) contributed funding to the effort in 2003–2005.

DETER users are cyber security researchers in academia, government and industry. Interested users are welcome to request an account via the DETER web site at *www.isi.deterlab.net.*

The following list is a current snapshot of projects and users using DETER.

Name	Institution
A Behavior-Based Framework for Detecting Internet Worms	University of Oregon
A dos-limiting network architecture	UC Irvine
A functioning model of the DNS Root Server architecture.	SPARTA
A Generic DDoS Traffic Isolation Framework	New Jersey Institute of Technology
A large-scale measurement for malware analysis	University of California, Berkeley
Analysis of Malware tools	Sparta Inc
Assess methods and infrastructure developed for attack traceback.	SPARTA
Authentication attacks and controls	Western Michigan

Name	Institution
	University
Chart Overlay Network Project	SPARTA, Inc.
Computer Science 161 - Computer Security	UC Berkeley
DDoS mitigation technique and worm detection	Lehigh University
Demonstration Project for DETER Testbed	University of Southern California
detect relay flows in the Internet	Texas A&M University
Detection and prevention of attack	Norfolk State University
Develop a model of distributed port scans.	Dalhousie University
Development of cooperative DDoS defense	UCLA Computer Science Department
Distributed DDoS Defense	ISI
Early filtering of unwanted traffic	University of South Carolina
Embedded Firewall Emulation	University of Southern California
Emist DDoS Experiment	ISI
Emist Routing Experiments	ISI
Emist Worm Experiments	ISI
EMIST Worm Experiments	ICSI
Evaluate the effectiveness of a set of worm detection/containment mechanisms against TCP or UDP worms in enterprise networks	Penn State University
Field Programmable Port Extender	Washington University in St. Louis
FloodWatch DDoS Defense	SPARTA, Inc.
FreeBSD is a widely-used open source operating system, used for storage services, network servers, routers, and firewalls, and as the foundation for commercial products, such as Mac OS X, NetApp's OnTap/GX, Juniper's JunOS,	FreeBSD Foundation

Name	Institution
vxWorks, etc.	
Insider Threats in Multicast Overlay Networks	Purdue University
Installing the Skaion Traffic Generation System on DETER	Skaion Corporation
Large-scale Worm Defense	UC Davis
Measurement and Anomaly Detection	University of Massachusetts
Modeling of Systems and Security	University of Illinois, Urbana-Champaign
NetShield Worm and DDoS Defense Experiments	University of Southern California
Network Security Lab Experiments	Jordan University of Science & Technology
Network Security Course	Lehigh University
online root-cause analysis of security attacks	Carnegie Mellon University
Overlay-based DDoS Defense System	Department of Computer Science, Columbia University
Phenomenology of DDoS attacks	Purdue University
Privacy Preserving Network Intrusion Detection	Agnik, LLC
Project for the administration of the Deter testbed	ISI
Quantitative evaluation of network security policies	University of Texas at Dallas
Quicksilver Multicast	Cornell
Rapid Traceback of Cyber Attacks	University of Texas at Austin
Rate Based Intrusions including DoS/DDoS	IntruGuard Devices, Inc.
Regression Tests for DETER	ISI
Reliable and Secure Group Communication	Lawrence Berkeley National Lab
Research for a clean-slate secure network implementation	SPARTA, Inc.

Name	Institution
Router-Based Intrusion Prevention	Telecommunication Networks Group, Technical University Berlin
Scalable time critical services platform	Cornell University
self healing network	ISI
Strategies for moving information replicas away from hotspots	Purple Streak
Study Annotations for intrusion monitoring & network health	UC Berkeley
Substation automation security	University of Illinois at Urbana-Champaign
Support for UCLA on line security class	UCLA Computer Science Department
System to Detect Compromised Forwarding Behavior	UCSD
Telcordia Cyber Early Warning System	Telcordia Technologies - Applied Research
Testbed for bot and botnet taxonomy analysis including command and control channel detection, identification of bot characteristics, and protocol used	University of North Carolina at Charlotte
The SANS Attack Attribution Research Group	The SANS Institute
This project investigates new ways to detect and filter spoofed traffic	ISI
This project is investigating multipath routing techniques as a way to circumvent security attacks.	UC Santa Cruz
To generate traffic traces of common worms	University of Southern California
UC Berkeley Admin	UC Berkeley
Validate DDoS Mitigation Technology	Secure64 Software Corp
Vulnerability scan and penetration test tool in large-scale environment	Institute for Information Industry
We are exploring the utility of providing a knowledge plane	MIT

Name	Institution
in DETER, both to manage the testbed more effectively and to recognize the effects of security failures on operation of the testbed.	
Wide area data center filesystem	Cornell
Wide-area multisite state machines	UC San Diego Dept of Comp Sci and Eng
Wireless simulation package for DETER	UC Berkeley
worms defense mechanisms	Univ. of North Carolina at Charlotte
Attacks/Defense for Bayesian filtering of spam	UC Berkeley
Brian Murphy-Dye	SRI International
DDos detection and response	School of CTI, DePaul
Emulab facility at Cornell	Cornell University
Experiment with OptAck attack on TCP	University of Maryland
exploiting virtualization to increase resiliency and robustness	dipartimento di informatica, universita di pisa
Graph-based Approaches to Threat Detection	Washington State University
Implement network attack attribution techniques	Cs3 Inc.
Investigate how distributed decentralized cooperative mechanism can be used to defense against	Rutgers University
Large Scale eBGP Simulation (lseb)	Pennsylvania State University
Network Security Analysis	Bell Labs Internet Research Department
Scalable Interest Managed Communications for the Intelligence Community	USC ISI
Secure Wireless CIty: the threat model analysis of WiFi and WiMAX interworking wireless city	iCAST
testing again	BAR

Name	Institution
Trust Based Collaborative Detection	University of Southern California
Virus-Throttling Switch Circumvention & Countermeasures	UC Berkeley
Wireless Security Project	George Mason University
Wisconsin Advanced Internet Laboratory	University of Wisconsin - Madison

Q7b. How will you coordinate with other agencies conducting both cyber security research and testbed development, such as the National Institute of Standards and Technology (NIST) and the National Science Foundation (NSF)?

A7b. As part of its cyber security research and development (R&D) efforts, S&T Directorate program managers regularly coordinate their activities, including development of the Cyber Defense Technology Experimental Research (DETER) cyber security testbed, with other DHS components and federal agencies. They include the Na-

tional Institute of Standards and Technology (NIST) and the National Science Foundation (NSF). Coordination involves active participation in formal cross-agency coordination committees, such as the Cyber Security and Information Assurance Interagency Working Group (CSIA IWG), as well as other, more informal, activities including conferences, symposiums and other events.

In addition, NSF previously contributed funding to DETER and continues to be involved in its development and use. NSF encourages its cyber security researchers to use DETER in their efforts by including information about DETER in NSF's annual CyberTrust program solicitation.

Q7c. How will the facilities and methods DHS S&T develops differ from those funded by other agencies?

A7c. Existing testing facilities cannot handle experiments on a large enough scale to represent today's operational networks or the portion of the Internet that might be involved in a security attack. Industry has only been able to test and validate new security technologies in small- to medium-scale private research laboratories that do not adequately simulate a real networking environment. The Cyber Defense Technology Experimental Research (DETER) cyber security testbed will address these gaps. Additionally, the DETER testbed is currently the only government-funded testbed that provides experiment tools (e.g., topology generators, malware) to help the researcher produce more realistic results. In FY 2007, the project combined several other government-funded testbeds to increase capabilities to create a realistic model of the Internet to test cyber security technologies. In FY 2008, the project will increase the testbed's capacity to allow larger-scale malicious-code experiments. The project will also increase the number of testbed users and large-scale data set applications. In FY 2009, the project plans to test five new technologies that may include: worm defense, routing security, distributed denial of service defense, malware detection and domain name system security.

Questions submitted by Representative Phil Gingrey

Q1a. In 2010, the S&T Directorate will begin construction of the National Bio- and Agro-defense Facility (NBAF) at a cost of nearly $500 million over five years. Do you expect the cost for construction to be appropriated in addition to your current activities or will some programs see cuts to fund this construction?

A1a. The S&T Directorate and the Department's five-year budget builds in funding for National Bio- and Agro-defense Facility (NBAF) construction, and there are no plans to cut other program funding to pay for construction. Anticipated start-up costs associated with the operation of NBAF have also been built into the five-year plan. The S&T Directorate anticipates requesting appropriations to support NBAF construction over the next several years.

Q2b. Additionally, in your FY 2009 budget request you have asked for $16.2 million for equipment purchases for the newly completed National Biodefense Analysis and Countermeasures Center (NBACC). Are similar start-up costs expected for the NBAF? Do you have an estimate for the costs of equipment for NBAF?

A2b. The NBAF construction cost estimate is for fixed equipment that is part of the new facility. Since NBAF would serve as a replacement facility for Plum Island Animal Disease Center (PIADC), to the extent possible, movable equipment will be transferred from PIADC to NBAF as part of the overall transition to the new facility. In addition, new portable equipment is likely to be required for the expanded NBAF mission. The current estimate for new portable equipment during initial years of operation, beginning in FY 2014, is $38 million to be jointly funded by DHS and the U.S. Department of Agriculture.

ANSWERS TO POST-HEARING QUESTIONS

Responses by Vayl S. Oxford, Director, Domestic Nuclear Detection Office, Department of Homeland Security

Questions submitted by Chairman David Wu

Q1. You noted in your testimony that DNDO has deployed detection systems such that 100 percent of Southern border container traffic and 98 percent of seaport traffic is being screened for nuclear and radiological threats. How many Ports of Entry and other border crossing points have screening equipment, and how many do not? What are the plans for deploying screening equipment to those entry points? What is the current error rate for the technologies in use?

A1.

- How many Ports of Entry (POEs) and other border crossing points have screening equipment and how many do not? As of March 21, 2008, 190 of the total 551 POEs and border crossing sites have been completely equipped with scanning equipment and 21 of the 551 sites are in process. As of March 21, 2008, 361 POEs and border crossing points do not yet have scanning equipment.
- What are the plans for deploying screening equipment to those entry points? The Radiation Portal Monitor (RPM) Program plans to equip all air cargo POEs in the current program scope with radiation detection equipment by September 2011. We will complete deployments to the remaining southern border land crossings by June 2009, northern border land crossings by December 2009, seaports by September 2011, and rail crossings by July 2013.
- What is the current error rate for the technologies in use? The average nuisance alarm rate for currently deployed systems is on the order of 1/100 (one percent) for cargo scanning. These numbers are not error rates or false alarm rates, since for the most part there is real radiation being detected (and PVT systems don't perform isotope identification). False alarm rates (when the system alarms on statistical fluctuations) is about 1/10,000 or 0.01 percent for cargo screening.

Another metric that can be measured is the systems availability. This is the percent of time that the detection system was functioning in a manner that met the acceptable detection/interdiction criteria. The average, first year systems availability for the time period of October 2007 through March of 2008 was 99.58 percent.

For the time period of October 2007 through March 2008, the average number of trouble calls was three per RPM system; this includes all calls, even such minor issues as a stuck lock or crashed computer, which would not be considered 'true' RPM system errors.

Where RPMs are deployed, CBP Officers utilize these systems to the fullest extent. The mandate given to CBP is to scan 100 percent of all mail, cargo, and conveyances entering the United States. CBP will continue to perform this mission with current technology and assist in the development of next-generation detection systems whenever possible. The goal of reducing the logistics burden on operators is one of the main reasons why DNDO is dedicating significant resources to pursuing next-generation systems that have improved detection and identification capabilities. Next-generation RPMs like ASP are designed to drive down the number of containers that need to go through resource intensive alarm resolution processes.

Q2. You discussed interagency coordination in your testimony, and in the area of testing and evaluation, the National Institute of Standards and Technology (NIST) is a primary partner. In FY 2008, how much funding did NIST receive from DNDO for contract work? How much do you estimate DNDO will spend on NIST contract work in FY09? How will you ensure that NIST staff remain independent so as to provide unbiased results in future contract work?

A2. In FY 2008, DNDO will provide approximately $2.5 million in funding to NIST. In FY 2009, DNDO is planning to provide NIST approximately $2.6 million in funding for test and evaluation work.

NIST has a long and carefully cultivated reputation for unbiased and objective science. NIST has specifically defined roles and functions in conjunction with its work for DNDO. While NIST provides expertise in support of standards and evaluation for preventive radiological and nuclear detection equipment, NIST employees are not involved with DNDO program management and contract execution. DNDO

fully expects NIST to continue giving independent, unbiased, and scientifically sound analysis as in the past.

Q3. You have previously discussed the serious problem with decreasing student interest in the field of nuclear science, and the Committee is pleased to see that you are continuing to work with the National Science Foundation (NSF) to provide funding for students interested in this field. How do you plan to make sure students who take advantage of this funding opportunity choose to go into homeland security-related positions, especially at DNDO? How many students will this program support in FY 2009, and which science and engineering fields do they represent?

A3. Students supported by Academic Research Initiative (ARI) funds are required to be U.S. citizens or permanent residents. While this does not guarantee that the students will work in homeland security related positions, it does increase the likelihood of the student base remaining in the U.S. It also increases the likelihood that the students will indirectly support homeland security applications through employment within industry, academia, and national labs.

More notably, DNDO hosts an annual conference for ARI awardees where students are encouraged to participate and build working relationships with DNDO and government personnel working in homeland security applications. A major goal of the conference is to draw students to future career paths in homeland security related fields. The first ARI conference will be held on April 21 and 22, 2008 and will occur on an annual basis thereafter.

It is estimated that by FY 2009 the ARI program will provide funding for over 100 students at colleges and universities throughout the country. ARI is a multidisciplinary program and students working on ARI projects are pursuing degrees in various university departments including nuclear engineering, physics, chemistry, chemical engineering, mechanical engineering, electrical engineering, materials science, and operations research.

Q4. You said in your testimony that "DNDO is orchestrating a new test program that will enable vendors to submit performance data on radiation detectors collected independently at laboratories accredited by the National Voluntary Laboratory Accreditation Program." Currently, how many laboratories certified under NVLAP have the capability to collect data on radiation detectors? How many vendors do you anticipate will be able to take part in this new test program, and how do you intend to work with NIST to increase lab capacity? Who will be responsible for developing and validating test protocols?

A4. There are nine laboratories accredited under the Calibration Laboratories Accreditation Program. It is expected that some of these laboratories have the capability to collect data on radiation detectors. Pacific Northwest National Laboratory (PNNL) is the only laboratory at this time that has submitted an application for accreditation to support the new test program. Since this is a voluntary program, there is no way to predict how many vendors will take part in this new test program. However, if we look at past trends to inform our estimates, we can see that in FY 2005 more than 25 companies provided technologies to be tested under the S&T radiation detector testing program. At the request of DNDO, NIST has provided training through workshops and conferences for laboratories interested in obtaining accreditation status for testing radiation detection instruments for this new program. NIST has developed and validated the test protocols for this new program in prior years.

Q5. How is testing and evaluation integrated into your Advanced Technology Demonstration (ATD) program? You mention lab testing for some of your technology projects. Is field testing completed before these technologies are determined to be ready for end users? What about cost analyses?

A5. The ATD programs are structured to include a vendor-assisted testing phase that utilizes device characterization in a laboratory or field environment so that we are able to fully understand and document the state of the technology in question. This testing/characterization phase may also include data collection in a field environment that does not qualify as operational test and evaluation, but rather testing in a relevant environment. For example, an outdoor range provides the opportunity to investigate certain aspects of a technology that would not otherwise be quantified in a laboratory. More specific examples could involve measuring the effects of large structures (i.e., buildings with concrete in them) on small detectors, or standoff detection ranges in varying backgrounds, or detection at varying speeds in the case of mobile detectors.

ATD testing and evaluation activities will not determine readiness for end users, but will make a recommendation on the state of technology and its suitability for moving into the development phase. That recommendation will be based upon analyses from the characterization studies. The analysis of the ATD collected data will produce the following reports which will form the basis for recommendation and decisions for follow on activities:

a. Full device characterization against requirements and goals
b. Device performance against test scenarios as a function of individual and multiple units, as appropriate
c. Assessment of success of technology as a function of component
d. Recommendations on maturity of technology (what technology needs to inform the exploratory and subsequent ATD programs)
e. Assessment of technology potential—suitable to support specification development for follow on activity
f. Any specific analysis required to support analysis of alternatives and cost-benefit analysis for any subsequent development

Questions submitted by Representative Phil Gingrey

Q1. In your testimony you say DNDO has three programs for long-term research activities: the Academic Research Initiative, the Exploratory Research Program, and the Advanced Technology Demonstrations (ATD). Yet your description of the Exploratory Research and ATD programs suggest these projects are technologically "feasible" but require further development, testing, and evaluation. The S&T Directorate under Adm. Cohen has made it a goal to spend roughly 20 percent of the budget on long-term, basic research which he defines as having a timeframe of more than eight years. How much of DNDO's budget is similarly directed towards research with a timeframe of more than eight years? Who are the major performers of this research?

A1.

- "Yet your description of the Exploratory Research and ATD programs suggest these projects are technologically "feasible" but require further development, testing, and evaluation." DNDO would like to clarify how the term "feasible" relates to both Exploratory Research (ER) and the ATD programs. The ER and ATD programs include projects at a variety of Technology Readiness Levels, or TRLs, all the way from TRL1 to TRL6 (using the same scale as DOD or NASA where TRL 1 is feasibility and TRL 4 is Proof of Concept). Exploratory Research is designed to cover TRLs from 1 through 4, and ATDs are designed to cover TRLs 5–6. DNDO currently has programs in all these TRL levels. Hence, a good portion of the ER programs are focused on showing feasibility, so that the technology becomes "feasible." That is, not all of the ER programs are "feasible" yet, but are tasked with demonstrating feasibility. This is normally a key milestone of the first phase of ER projects.
- "The S&T Directorate under Adm. Cohen has made it a goal to spend roughly 20 percent of the budget on long-term, basic research which he defines as having a timeframe of more than eight years." DNDO's Transformational and Applied Research (TAR) Directorate does not pre-define a fixed percentage of the R&D budget that will be committed to "long-term, basic" research. Instead, TAR funds research that is consistent with its own clearly stated mission statements and goals; namely: "Conduct, support, coordinate, & encourage an aggressive, expedited transformational, high-impact Program of R&D to dramatically improve national capabilities to detect and report illicit trafficking of nuclear and radiological materials." As such, programs are chosen primarily based on being consistent with that mission.
- "How much of DNDO's budget is similarly directed towards research with a timeframe of more than eight years?" Most, if not all, of the Academic Research Initiative (ARI) efforts have an expected timeframe of over eight years. This would cover about 10 percent, growing to more than 15 percent, of DNDO TAR R&D funding in the next few years.

  DNDO's mission is also focused with a high level of urgency, and ER and ATD program efforts must define a path forward for improvements in radiation detection performance. A standard "new" project would take 3–4 years in ER and 2–3 years in an ATD before transitioning to a development and acquisition program. There are, of course, projects which move more quickly

or slowly, depending on the underlying technologies. The goal is to move these projects through the R&D process in the 5–7-year timeline, and an estimated five percent of the budget would support the longer-term projects that would have a significant impact if successful.

DNDO does not define a funding percentage goal as stated by S&T, but about 15–20 percent of the TAR budget supports longer-term research.

- "Who are the major performers of this research?" The long-term research within DNDO is performed mainly by academia, national laboratories, government laboratories, and to a smaller degree, industry.

ANSWERS TO POST-HEARING QUESTIONS

Responses by George Ryan, Director, Testing & Evaluation and Standards Division, Science and Technology Directorate, Department of Homeland Security

Questions submitted by Chairman David Wu

Q1a. You mention in your testimony that you are developing a new testing and evaluation policy for the Department. What is the timeline for implementation of this policy?

A1a. The DHS Test and Evaluation (T&E) Policy is scheduled for formal review at the end of April with approval anticipated in the summer. Once the policy is signed, the T&E Office will begin approving the T&E documentation and overseeing testing for all DHS Acquisition programs in collaboration with the DHS Office of Management.

Q1b. Will you retroactively evaluate tests carried out by DHS components for compliance with this T&E policy?

A1b. The DHS Test and Evaluation (T&E) Office will not retroactively evaluate tests carried out by the DHS components, but will review the categorization of the test reports currently provided in the Responder's Knowledge Base (RKB) to ensure that the tests categorized as operational were truly conducted operationally, and that they are reported appropriately in the RKB. The T&E Office will also review planned tests to ensure they are appropriately conducted and reported.

Q1c. How will the requirements within the policy be enforced, especially when work is carried out through contracts with other federal agencies?

A1c. The DHS Test and Evaluation (T&E) Policy will be implemented through an acquisition framework that has multiple decision points for each acquisition program. The DHS T&E Office will provide inputs at each decision point to inform DHS components and the acquisition decision authority, DHS Under Secretary for Management Chief Procurement Officer, of a program's T&E status. Inputs from the T&E Office will be the primary method of enforcing the policy.

Q2a. In your testimony, you stated that "developmental testing and evaluation (DT&E) and operational testing and evaluation (OT&E) are conducted at levels commensurate with validating performance. . ." Who currently carries out these tests, and how are the results reported?

A2a. Developmental testing is conducted at contractor facilities, National laboratories, and other Government Research, Development, Test and Evaluation (RDT&E) facilities. Operational testing of production representative systems or technologies is conducted by the system/technology operators in actual environments.

For both DHS acquisition programs and Science and Technology (S&T) Directorate projects, DHS program managers manage and oversee these test and evaluation (T&E) activities and the results are reported directly to them and/or the appropriate DHS program decision authority.

Q2b. Is developmental and operational testing a requirement for transitioning technologies to customers?

A2b. For DHS research and development projects that will transition technologies to customers, the level and adequacy of testing is commensurate with the maturity of the system being transferred. A designation of Technology Readiness Level 6 (TRL 6) requires the technology to be tested in a simulated environment (lab) whereas a TRL 8 designation requires the technology to be successfully demonstrated in the actual operational environment.

Q2c. What role do your customers play in setting testing requirements currently?

A2c. Currently, customers provide input to test requirements through the S&T Directorate's customer-led, Capstone Integrated Product Team (IPT) process.

Q2d. Will any test results be retroactively classified if the results are unfavorable?

A2d. No. The Test and Evaluation (T&E) Office will determine the classification of test results prior to actual testing, and they will not be reclassified as a result of testing outcomes.

Q2e. You also said in your testimony, "when possible, DHS ensures independent operational test teams are involved early in project development." Can you give

some examples of when you used these independent test teams, and how results from their tests were used to improve the technologies?

A2e. The DHS Test and Evaluation (T&E) Office facilitates the integration and use of independent test teams into T&E plans and activities whenever possible. For example, the DHS T&E Office has worked closely with the Transportation Security Administration (TSA), the U.S. Coast Guard (USCG) and DHS Office of the Chief Information Officer (CIO) on the use of independent test teams in T&E plans and activities, as follows:

- The Transportation Security Administration (TSA) Test and Evaluation Master Plan (TEMP) for the Transportation Workers Identification Card (TWIC) calls for operational T&E results to be reported by an independent party, the Space and Naval Warfare Systems Center (SPAWAR).
- The U.S. Coast Guard (USCG) uses the Navy Commander Operational Test and Evaluation Force (COTF) to support the Deepwater program. COTF performed an early operational assessment on the National Security Cutter in September 2007 and plans to conduct an observation of operational capability on the HH–60J avionics upgrade.
- The DHS Test and Evaluation (T&E) Office and the DHS Chief Information Officer (CIO) have brought in the DOD Joint Inter-operability Test Command as an independent party to oversee the independent verification and validation testing on the on the Homeland Security Presidential Directive 12 (HSPD–12) Card.

The results of these independent tests have or will be reported to program managers and/or decision authorities who will use the results to identify operational shortcomings and correct them as early as possible in development.

Q3a. You mentioned in your testimony that test results will be placed on the Responders Knowledge Base, which is run by FEMA. Yet the DHS S&T budget request includes funding for the Tech Clearinghouse web site, which, according to the request, will include a tool to disseminate test results and technology information to State, local, and tribal agencies. Who has access to the Responders Knowledge Base, and is this database standardized so as to make finding and understanding test results straightforward and easy to use?

A3a. The Responder Knowledge Base (RKB) is a publicly accessible web site that contains some material, such as test reports, that have a limited distribution. In order to access limited distribution documents, users must register with the RKB as a first responder, state/local/tribal official or federal employee. Responders and state/local/tribal officials are vetted by contacting their home agency and other responders/officials who are already vetted with the RKB. Federal employees are vetted primarily through their e-mail addresses such as .mil, .gov, etc. When requesting the documents, the registered user must agree to the distribution statement on the document.

The RKB has a consistent, organized, easy to use layout, and the DHS Test and Evaluation (T&E) Office plans to standardize definitions for classifying operational T&E data.

Q3b. And if test results are being loaded directly into the Responders Knowledge Base, what is the function of the Tech Clearinghouse site and how much money do you plan to spend on it in FY 2009?

A3b. The Tech Clearinghouse focus is on the dissemination of homeland security science and technology information to federal, State, local and tribal agencies. The system and associated efforts encourage and support innovative solutions to enhance homeland security and also fulfill Section 313 of the *Homeland Security Act of 2002.*

The S&T Directorate's FY 2009 budget request includes $4 million for the web development, operation, and maintenance associated with the Tech Clearinghouse Portal, which includes a Communities of Practices collaborative environment. The S&T Directorate is also investing in the TechSolutions and *www.FirstResponder.gov,* an Internet portal that links relevant DHS content including the Tech Clearinghouse and the Responder Knowledge Base (RKB). Launched in January 2008, *www.FirstResponder.gov* provides one-stop-shop access to the already registered 60,000-plus RKB users. In addition to links to Technology Clearinghouse, the portal provides links to the Homeland Security Information Network (HSIN), the National Integration Center Incident Management System (NIMS), SAFETY Act, and SAFECOM, as well as web-based resources from other government agencies and the private-sector.

Q3c. Also, what is your plan for disseminating test results with relevance outside the first responder community?

A3c. The DHS Test and Evaluation (T&E) Office, in collaboration with FEMA, is expanding the Responder Knowledge Base (RKB) to include items that have relevance beyond the first responder community. Since the RKB is a well-designed and functioning site, the plan is to use its database capabilities to disseminate additional DHS test results to a broader audience. For example, work is underway to include test results for Transportation Security Administration certified explosive detection devices in the RKB.

Appendix 2:

Additional Material for the Record

U.S. Department of Homeland Security
Washington, DC 20528

September 20, 2007

Ralph J. Ciccerone, Ph.D.
President
National Academy of Sciences
500 Fifth Street, NW
Washington, D.C. 20001

Dear Dr. Ciccerone:

I am writing to more formally follow up from our earlier discussions regarding opportunities for the National Academies of Science to support the Department of Homeland Security (DHS), Science and Technology (S&T) Directorate. As I emphasized to you when we met, access to the depth and breadth of expertise, experience, and stature of the National Academies would be a tremendous contribution to the success of this Directorate now and in the years ahead. I greatly appreciate your willingness to do so.

As we discussed, I would like your assistance in two areas. First, I would appreciate your help in defining appropriate performance metrics for each portion of our research portfolio. Clearly, the basic research, acquisition transition, and innovation programs all have different goals in varying timeframes and, thus, different measurements of success. I think you and your members are in a unique position to advise me as to the proper set of metrics for each segment of the research portfolio so that I can evaluate their performance on an at least an annual basis.

Second, I would appreciate your assistance in the area of what I will call "risk-based planning and decision-making in an adversarial and uncertain world." Since our last discussion, Dr. Ronald Taylor and Dr. Herb Lin of your staff and Dr. Randall Murch of my staff have worked together with colleagues from both of our organizations to develop two draft Statements of Work for high priority, cross-cutting studies in this area. My staff will be meeting on September 24th to discuss and refine these in order to determine whether we will move forward. We will advise Drs. Taylor and Lin as soon as possible thereafter.

Please accept my most sincere thanks and deepest appreciation for your leadership, interest, and commitment in making the National Academies available and accessible to us. In my view, we cannot be successful without the National Academies to help us

tackle some of the most difficult and complex challenges and opportunities facing our Nation in homeland security. I certainly will keep you posted on our progress.

Sincerely, & very respectfully,

Jay M. Cohen

Jay M. Cohen
Under Secretary for Science and Technology

Thank you for All you do!

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