THE SCIENCE OF PREVENTION

HEARING

BEFORE THE

SUBCOMMITTEE ON PREVENTION OF NUCLEAR AND BIOLOGICAL ATTACK

OF THE

COMMITTEE ON HOMELAND SECURITY HOUSE OF REPRESENTATIVES

ONE HUNDRED NINTH CONGRESS

SECOND SESSION

SEPTEMBER 14, 2006

Serial No. 109–103

Printed for the use of the Committee on Homeland Security

Available via the World Wide Web: http://www.gpoaccess.gov/congress/index.html

U.S. GOVERNMENT PRINTING OFFICE

35–625 PDF WASHINGTON : 2007

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2104 Mail: Stop IDCC, Washington, DC 20402–0001

COMMITTEE ON HOMELAND SECURITY

PETER T. KING, New York, *Chairman*

DON YOUNG, Alaska
LAMAR S. SMITH, Texas
CURT WELDON, Pennsylvania
CHRISTOPHER SHAYS, Connecticut
JOHN LINDER, Georgia
MARK E. SOUDER, Indiana
TOM DAVIS, Virginia
DANIEL E. LUNGREN, California
JIM GIBBONS, Nevada
ROB SIMMONS, Connecticut
MIKE ROGERS, Alabama
STEVAN PEARCE, New Mexico
KATHERINE HARRIS, Florida
BOBBY JINDAL, Louisiana
DAVE G. REICHERT, Washington
MICHAEL MCCAUL, Texas
CHARLIE DENT, Pennsylvania
GINNY BROWN-WAITE, Florida

BENNIE G. THOMPSON, Mississippi
LORETTA SANCHEZ, California
EDWARD J. MARKEY, Massachusetts
NORMAN D. DICKS, Washington
JANE HARMAN, California
PETER A. DEFAZIO, Oregon
NITA M. LOWEY, New York
ELEANOR HOLMES NORTON, District of Columbia
ZOE LOFGREN, California
SHEILA JACKSON-LEE, Texas
BILL PASCRELL, JR., New Jersey
DONNA M. CHRISTENSEN, U.S. Virgin Islands
BOB ETHERIDGE, North Carolina
JAMES R. LANGEVIN, Rhode Island
KENDRICK B. MEEK, Florida

SUBCOMMITTEE ON PREVENTION OF NUCLEAR AND BIOLOGICAL ATTACK

JOHN LINDER, Georgia, *Chairman*

DON YOUNG, Alaska
CHRISTOPHER SHAYS, Connecticut
DANIEL E. LUNGREN, California
JIM GIBBONS, Nevada
ROB SIMMONS, Connecticut
BOBBY JINDAL, Louisiana
CHARLIE DENT, Pennsylvania
PETER T. KING, New York *(Ex Officio)*

JAMES R. LANGEVIN, Rhode Island
EDWARD J. MARKEY, Massachusetts
NORMAN D. DICKS, Washington
JANE HARMAN, California
ELEANOR HOLMES NORTON, District of Columbia
DONNA M. CHRISTENSEN, U.S. Virgin Islands
BENNIE G. THOMPSON, Mississippi *(Ex Officio)*

CONTENTS

THE SCIENCE OF PREVENTION

Thursday, September 14, 2006

U.S. HOUSE OF REPRESENTATIVES,
COMMITTEE ON HOMELAND SECURITY,
SUBCOMMITTEE ON PREVENTION OF NUCLEAR AND BIOLOGICAL ATTACK,
Washington, DC.

The subcommittee met, pursuant to call, at 2:00 p.m., in Room 1311, Longworth House Office Building, Hon. John Linder [chairman of the subcommittee] presiding.

Present: Representatives Linder, Gibbons, Dent, Langevin, Dicks, and Christensen.

Mr. LINDER. The Committee on Homeland Security, Subcommittee on Prevention of Nuclear and Biological Attacks, will come to order. The subcommittee is meeting today to discuss bolstering the science around preventing nuclear and biological attack. I want to welcome and thank the witnesses for testifying before this committee today and on this important topic. We are 5 years removed from 9/11 and nearly 4 years since Congress authorized the creation of the Homeland Security. Entrusted to this massive new department was the job of leveraging the considerable scientific and technology resources of the United States to prevent the unthinkable, the terrorist attack using a weapon of mass destruction.

The horrors of the nuclear or biological attack require the need for robust science and technology solutions and many of the changes within DHS have been promising. Creation of the domestic nuclear detection office, for example, with its focus on the transformational research and development in its leadership in creating new detection technologies has been encouraging. Necessary changes made at DNDO exemplify the importance of pushing the envelope in furthering the goals of science and technology.

Achieving successful solutions require a consistent and clear strategic plan to set research priorities while allowing outside-the-box breakthroughs.

The question before us today is in the nearly 4 years after the creation of DHS and the science and technology directorate, what has been accomplished? It continues to be apparent to me that the focus of the S&T director on minor improvements to existing technology rather than developing new technologies to ensure a better solution, whereas innovation as government funding further the science of prevention. Regrettably, I feel with few exceptions that the answer is no. The scientific community, which is so eager to help make the Nation safer, has lost confidence in the science of technology directorate. We have heard that the S&T directorate has been plagued with bad morale, poor and biased management, unjustified funding decisions and lack of peer review and general failure to effectively engage the scientific community. As the Senate Appropriations Committee recently stated, a seemingly rudderless ship exists within the leadership within the S&T. These assertions are alarming and entirely unacceptable. Unless I am encouraged by the Under Secretary Cohen to head the S&T directorate, as he now recognizes, he has a tough shift ahead in turning this ship ahead. From developing better biological agent detection capabilities that want to be attacking our Nation's population infrastructure and agriculture to a better understanding of bioagents themselves and the consequences, we must push for a better science and technology options.

We have enormous biotech expertise in this country that exists in our universities, the national labs and in industry. Failing to engage national, and in some cases, international experts will guarantee failure in overarching our Homeland Security mission. I look forward to continuing to work with DHS to ensure success in our efforts. I hope that the initial success at DNDO in developing much improved next generation technologies and its focus on transportation R&D will serve as a model for R&D.

I now recognize my friend from Rhode Island, Mr. Langevin, for the purpose of making an opening statement.

Mr. LANGEVIN. Thank you, Mr. Chairman. I want to welcome our panel here today. It is great to have you before us. And I certainly appreciate the opportunity to have a hearing on this topic, the science of prevention.

In pursuit of the Homeland Security mission, science and technology should enable the operational units of Department of Homeland Security as well as the hundreds of thousands of first responders and private sector critical infrastructure to better protect themselves and the public. We must assure that technology development is done with this mission in mind. Ultimately mission success is the only metric that has any meaning.

An interesting technology that does not enhance our ability to foil terrorists' intentions and protect our citizens should be viewed as a failure. One technology that I am convinced must be aggressively developed and deployed to accomplish both of these goals is radiation protomonitors and other non-intrusive imaging equipment. As this committee has heard, the likelihood of a terrorist successfully constructing a nuclear weapon is much lower than conventional explosives dirty bombs or chemical or biological weapons. However, the devastation of such an attack will be so great that we must try to detect and intercept any special nuclear material, such as highly enriched germanium or weapons-grade plutonium from entering our country.

Now I am pleased that the director, Vayl Oxford, is here today from the Domestic Nuclear Detection Office, DNDO. I am very interested to hear about the development and deployment progress of the next generation advanced spectroscopic portal systems as well as advances in non-interest technologies to detect these materials.

And I must say, of all of the departments at DHS, DNDO has brought great credit to that department, and we appreciate that director's leadership there. The other non-intrusive technologies could be used to detect explosives, especially liquid explosives whose use came to the forefront only a few weeks ago when the London police intercepted an alleged plot to detonate liquid explosive bombs on planes bound for the United States.

Next, I know that Under Secretary Cohen, who is confirmed for his new position last month, has made this a top priority, and I trust that we will get an update on your progress and Admiral Cohen, just on a personal note, I have known you for several years now in my other role as a member of the House Armed Services Committee. You have a stellar reputation as director of Office of Naval research. And I am glad that you are back on the job and I note the country is safer already.

So Admiral Cohen, you have many challenges facing you besides liquid explosives, however. The S&T directorate has been plagued by personnel performance, accounting and even ethics problems. Because of these problems, it has not been accomplishing what should be its core mission acting as a forcemultiplier to ensure success in defeating terrorists and protecting our citizens.

Now the Office of Science and Technology Policy is also important for us to hear from today. You represent the guidance coming from the White House to the S&T community of the executive branch agencies. Now I am concerned that DHS, S&T division has not completely made it on to your radar screen and has failed to win your confidence.

The Department of Homeland Security needs the support of the White House if it is going to succeed and that support has been pretty spotty to date. To most of us, the science and technology efforts within the Department have been somewhat of a black box and hope that the hearing today shines some light inside. So gentlemen, I want to thank you for being here and Mr. Chairman, thank you very much. I yield back.

Mr. LINDER. I thank you. Our witnesses today are Dr. John Marburger, the Director of Office and Science Technology Policy and the Executive Office of the President. That is to say on this first panel. The Honorable Jay Cohen, Under Secretary for Science and Technology for the Department of Security, and Mr. Vayl Oxford, who has testified many times here, director of the Domestic Nuclear Detection Office Homeland Security.

It is a policy here to try to keep your prepared remarks to 5 minutes. Your entire written statement will be part of the record. And Secretary Cohen, it will be nice if we can see yours for 30 minutes before the meeting starts in the future.

Dr. Marburger.

STATEMENT OF JOHN MARBURGER, DIRECTOR, OFFICE AND SCIENCE TECHNOLOGY POLICY, AND EXECUTIVE OFFICE OF THE PRESIDENT

Mr. MARBURGER. Yes, sir. Good morning, Mr. Chairman and members of the subcommittee. I am pleased to have this opportunity to make brief oral remarks on the role of the administration and my office in support of the science behind prevention efforts and the research and development efforts underway to develop countermeasures to nuclear and biological attacks, and I am glad that my longer version of my testimony will be included in the record of today's hearing.

I am also delighted to testify with my colleagues, Under Secretary Cohen and Director Oxford, and I assure you that our administration has high expectations of them.

In December 2002, President Bush released the "National Strategy to Combat Weapons of Mass Destruction," the report that lays the groundwork for countering the very serious threat from nuclear and biological weapons. The technical part of this strategy was informed by an important study released earlier that year by the National Academy of Sciences in their report called "Making the Nation Safer, the Role of Science and Technology in Countering Terrorism," and that report continues to be an important source of guidance for these efforts.

Following the national strategy, three homeland security presidential directives, HSPDs, have been issued that bear on countering biological and nuclear weapons. HSPD 9, released on January 30, 2004, called "Defense of the United States Agriculture and Food," highlights many roles for research and development including a role for my office in the acceleration and expansion of countermeasure development. HSPD 10, released on June 12th, 2004 called "Biodefense For the 21st Century" laid out specific agency responsibilities under four titles: Threat Awareness, Prevention and Protection, Surveillance and Detection, and Response and Recovery. The longer descriptions are in my written version of my testimony.

HSPD 14, released April 15th last year established the domestic nuclear detection office DNDO within the Office of Homeland Security, and, of course, the director of DNDO, Mr. Oxford, is present today and can describe in great detail the role and activities of that office.

Research supporting the aims of these directives, especially relating to biological and nuclear agents, requires the expertise and capabilities of multiple departments and agencies, and not just DHS and S&T. The key actors are DHS itself, Health and Human Service, Department of Energy, and the U.S. Department of Agriculture. Basic research at the National Science Foundation is also significant for this effort, and in my written testimony, I describe how my office assists in the policy guidance to and coordination of this multi-agency work. I don't want to go into that bureaucratic detail here but I will be glad to answer questions about it.

Most of the $11.5 billion in Homeland Security R&D spending that is $8.2 billion of it, during the past 3 years has been directed toward weapons of mass destruction threats. Of the $4.84 billion requested for R&D for fiscal year 2007, $3.76 billion is targeted for these threats, a substantial portion of it. The R&D priority guidance issued each year jointly by my office and the Office of Management and Budget includes a section on Homeland Security R&D that encourages agencies to emphasize research in seven specific areas, of which five are relevant to the work of this subcommittee. And for each of these five, I have provided background and a little vision statement and expectations for future work in my written testimony.

To keep my oral remarks brief, I will conclude by just stating the descriptive titles of these five areas so you can have a quick overview of the scope of the work. The first one is detection, decontamination and remediation of biological agents; second, the modeling of infectious disease outbreaks; the third, the development of medical countermeasures for WMD agents, generally not only biological and nuclear; the fourth is protection of food and agriculture; and finally, the detection of nuclear materials. These are priority areas that we have asked all agencies to participate and perform research on.

So in summary, defending our Nation against attacks with weapons of mass destruction has been and will continue to be a top priority of this administration.

While science and technology have contributed a great deal to our defenses against nuclear and biological agents, there is still very much more work to be done. And with the continued support of Congress, and the excellent leadership of the gentlemen to my left, we will continue to make significant improvements in our capabilities to defend ourselves against the threat of biological and nuclear weapons.

Thank you for the opportunity.

Mr. LINDER. Thank you, Dr. Marburger.

[The statement of Mr. Marburger follows:]

PREPARED STATEMENT OF JOHN H. MARBGURGER, III

Introduction

Good morning, Mr. Chairman and Members of the Subcommittee. It is a pleasure to be here today before the Subcommittee on Prevention of Nuclear and Biological Attack. Your hearing focuses on an issue of critical importance—the science behind prevention efforts, and the research and development efforts underway to develop countermeasures to nuclear and biological attacks. Making full use of the nation's collective S&T expertise is critical for long-term success in this endeavor, and in the overall war on terrorism.

The possibility of an attack with nuclear or biological weapons has long been seen by this Administration as one of the greatest threats to U.S. national security. Unlike other weapons, nuclear and biological weapons have the potential to inflict catastrophic damage in terms of both the number of casualties and the destruction of public infrastructure. The President released *The National Strategy to Combat Weapons of Mass Destruction* in December of 2002 to lay the groundwork necessary to counter the threat from nuclear and biological weapons. This strategy called for a coordinated national effort to prevent, prepare, and respond to this threat, and highlights the critical importance of science and technology in this endeavor.

The information and recommendations contained in the 2002 National Academy of Sciences (NAS) report "Making the Nation Safer: The Role of Science and Technology (S&T) in Countering Terrorism" were taken into consideration in the development of the national S&T response to this threat. This report highlighted a number of areas where science and technology could be applied to reduce the threat from biological and nuclear weapons, including:

- improved special nuclear material detection capabilities;
- improved communication between the intelligence S&T and public health communities;
- development of early warning and detection technologies for biological agents;
- improved models to better understand the potential impact of biological weapons;
- increased research, development and production of new medical countermeasures;
- improved personnel protective equipment; the development of methodologies;
- guidelines for the decontamination of radiological material or biological agents.

Finally, there have been a number of Homeland Security Presidential Directives (HSPDs) issued over the past four years that have particular relevance to countering the threat from biological and nuclear weapons. I would like to specifically address three of them, as they have played a key role in shaping our nuclear and biodefense R&D efforts: HSPD–9, NSPD–33/HSPD–10 and HSPD–14.

Signed on January 30th, 2004, HSPD–9 Defense of United States Agriculture and Food establishes a national policy to defend the agriculture and food system against terrorist attacks, major disasters, and other emergencies. This directive lays out the steps necessary to prepare our nation for such events and highlights many roles for research and development, including a role for my office in the acceleration and expansion of countermeasure development.

Released on the 28th of April, 2004, NSPD–33/HSPD–10. *Biodefense for the 21st Century,* defines the nation's biodefense strategy. This directive was the culmination of a comprehensive end-to-end assessment led by the Homeland Security Council (HSC) of biodefense needs and capabilities across all agencies, and laid out specific agency responsibilities to support four main pillars:

- **Threat awareness,**
  - Improve the Intelligence Community's ability to collect, analyze, and disseminate intelligence on biological weapons and their potential users.
  - Anticipate and prepare for novel or genetically engineered biological threat agents.
- **Prevention and protection,**
  - Improve our ability to detect, interdict and seize weapons technologies and materials to disrupt the proliferation trade, and to pursue proliferators through strengthened law enforcement cooperation, including Interpol.
  - Enhance diplomacy, arms control, and bilateral and multilateral efforts that impede adversaries who seek biological weapons.
  - Assess the vulnerabilities of our critical infrastructure to focus protective efforts.
- **Surveillance and detection, and**
  - Develop and integrated early warning system to rapidly recognize and characterize any biological attack, permitting an early and robust response to prevent illness and deaths, as well as economic and social disruption.
  - Enhance our ability to attribute biological weapons attacks, thereby strengthening deterrence of attack.
- **Response and recovery**
  - Create and refine comprehensive plans to mitigate the lethal, medical, psychological and economic consequences of an attack.
  - Provide the newest and most effective medical countermeasures such as vaccines, drugs and diagnostics to prevent illness and save lives.
  - Coordinate federal assets to assist state and local public health and medical response to mass casualty events caused by WMD.
  - Develop risk communications strategies, plans and products to reach all segments of domestic and international communities.
  - Improve capabilities to remediate and decontaminate the environment following a biological attack.

HSPD–14, released on April 15th of 2005, established the Domestic Nuclear Detection Office (DNDO) within the Department of Homeland Security. The DNDO was established to provide the U.S. with a multilayered and well coordinated nuclear detection architecture, and to serve as the lead federal agency for the research and development pertaining to nuclear and radiological detection capabilities. As Mr. Oxford is present today I will let him describe in detail the essential role of, and the significant advances made by, the DNDO in securing our nation from nuclear terrorism.

These reports and directives form the foundation of the S&T community's efforts to develop and deploy technologies in support of the prevention of nuclear and biological attacks. Rather than list the accomplishments of the last four years, I would like to take this opportunity to look forward by defining our current homeland security-related S&T priorities, and the role S&T must continue to play as part of a comprehensive strategy to combat terrorism and WMD.

The Role of OSTP in the Coordination of S&T related to Homeland Security

Let me first take a brief moment to provide an overview of The Office of Science and Technology Policy, and its role in Homeland Security S&T.

The Office of Science and Technology Policy, which I lead, has the primary responsibility within the Executive Office of the President to prioritize and recommend federal R&D activities, and to coordinate those activities at the interagency level.

S&T related to homeland security is particularly unique in its need for coordination as it impacts mission areas, and requires the diverse skill sets and expertise, of multiple departments and agencies. In 2006, nine different departments and agencies received funding for homeland security-related research and development projects.

The primary mechanism for coordination of interagency science and technology issues is the National Science and Technology Council (NSTC), which was established by Executive Order 12881. This Cabinet-level Council, chaired by the President, is the principal means for Coordinating science and technology issues across the executive branch. One of the NSTC's four standing committees, the Committee on Homeland and National Security is focused on identifying S&T priorities and facilitating the planning among federal departments and agencies involved in homeland and national security S&T. The work of the Committee on Homeland and National Security is closely coordinated with the efforts of the Homeland Security Council and the National Security Council.

R&D Priorities to Counter the Threat of WMD as Stated in the OSTP/OMB Budget Priorities Memo for FY 2008.

From 2004 to 2006, homeland security-related R&D funding has totaled $11.5 billion dollars with an additional $4.8 billion requested for FY2007. The majority of this funding is directed at enhancing our capabilities to prevent, detect, protect from, or respond to, an attack with WMD. Of the $11.5 billion dollars of homeland security-related R&D funding from 2004 to 2006, $8.2 billion dollars was devoted towards countering the threat from WMD. Of the $4.84 billion requested for homeland security-related R&D funding in the President's FY2007 budget, $3.76 billion is targeted at countering the threat from WMD.

The work being done to counter the threat from WMD, especially the threat from biological and nuclear agents, requires the expertise and capabilities of multiple Departments and Agencies and is not solely the realm of DHS S&T. The Departments and agencies most heavily involved in this research are DHS, DoD, HHS, DoE, and USDA. Basic research at NSF also contributes greatly to this effort.

On June 23rd of this year, OSTP released, in coordination with the Office of Management and Budget, a memorandum for the heads of executive departments and agencies on Administration Research and Development (R&D) Budget Priorities for FY 2008. This memo highlights the Administration's R&D priorities and emphasizes improving management and performance to maintain excellence and leadership in science and technology. It also provides general guidance for setting priorities among R&D programs, identifies interagency R&D efforts that should receive special focus in agency budget requests, and reiterates the R&D Investment Criteria that agencies should use to improve investment decisions for and management of their R&D programs. These updated R&D budget priorities reflect an extensive, continuous process of consultation with the President's Council of Advisors on Science and Technology (PCAST) and collaboration within the interagency National Science and Technology Council (NSTC). For the past four years, this memo has included a section on priorities in Homeland Security related R&D and I would like to talk about these priorities today.

Four years have passed since the publication of the President's *National Strategy for Homeland Security* which identified the Nation's S&T enterprise as a key asset in our efforts to secure the homeland. All parts of that S&T enterprise, both public and private, have answered the call for the development of "new technologies for analysis, information sharing, detection of attacks, and countering chemical, biological, radiological, and nuclear weapons." Despite the significant achievements over the past four years, many challenges remain to mitigate vulnerabilities. Every year, we seek to highlight these challenges in the priorities memo, not to exclude ongoing efforts, but to focus new initiatives and funding in the areas where they are most needed.

For FY08, we encourage agencies to place increased emphasis on Homeland Security related R&D efforts that support:

- quick and cost-effective sampling and decontamination methodologies and tools for remediation of biological and chemical incidents;
- the development of integrated predictive modeling capability for emerging and/or intentionally released infectious diseases of plants, animals and humans, as well as for chemical, radiological or nuclear incidents, and the collection of data to support these models;
- the exploitation of recent advances in biotechnology to develop novel detection systems and broad spectrum treatments to counter the threat of engineered biological weapons;

- the development of novel countermeasures against the natural or intentional introduction of agricultural threats, including R&D on new methods for detection, prevention, and characterization of high-consequence agents in the food and water supply;
- transformational capabilities for stand-off detection of special nuclear material and conventional explosives;
- biometric recognition of individuals for border security, homeland security, and law enforcement purposes in a rapid, interoperable, and privacy-protective manner; and
- recognizing and expediting safe cargo entering the country legally, while securing the borders against other entries.

I would like to take this opportunity to provide you with a brief discussion of our vision for each of the five areas contained in this memo relevant to the mission of this subcommittee.

Decontamination of Biological Agents

The small scale indoor release of anthrax in October 2001 illustrated the magnitude of the threat to public health and infrastructure that is posed by biological weapons. The attacks claimed five victims and contaminated multiple postal facilities, the American Media, Inc., building in Boca Raton, Florida, and the Hart Senate Office building. The cleanup of these buildings cost hundreds of millions of dollars and took years to complete. The Brentwood Mail Facility alone cost $130 million and took over 2 years to finish. These small attacks clearly demonstrated the gaps that exist in technologies, methods, and procedures used for the decontamination of biological agents. A deliberate attack with anthrax over a major metropolitan area has the potential to displace thousands of people and close hundreds of businesses for years. As an example of the cost associated with losing even one piece of critical infrastructure, the San Francisco Airport Authority estimated a daily economic effect of $85 million lost for each day spent undergoing decontamination and restoration. Investment in the development of new technologies and methodologies for the wide area decontamination of biological and chemical agents is needed to offset the cost of restoration after a potential terrorist attack. Furthermore, many of the technologies that need to be developed will also improve our current capabilities to clean up the contamination and environmental damage that are associated with natural disasters

Developing the technologies necessary to address the deficiencies in our current biological agent decontamination capabilities will require a mixture of both long term basic research, and short term applied and advanced development research. A focused and directed investment in the R&D of novel decontamination technologies for biological agents over the next 10 years will yield the tools needed to improve the efficiency and reduce the time and cost associated with the decontamination operations, regardless of future target cleanup levels. Short term applied research on novel decontamination technologies over the course of the next five years could have an immediate positive impact on our decontamination capabilities. Examples of near term technological solutions include the development of: novel tenting materials for rapid site preparation for fumigation, better fumigant monitors, improved characterization of surface effects, and development and testing of non-destructive decontamination methods. A comprehensive decontamination R&D program must also include long-term basic research focused on better understanding the characteristics of biological agents as they relate to decontamination. The recent NAS report entitled ″How Clean is Safe?″ concluded ″there is insufficient information to quantify a 'safe' amount of residual biological agent in a decontaminated facility.″ It also pointed out that there are many issues that decision makers need to consider when decontaminating a facility. Studies that examine environmental persistence, susceptibility to various decontaminants, and improved methodologies for sampling will be critical for any future efforts to develop realistic clean up levels for biological agents.

The National Science and Technology Council's Subcommittee on Decontamination Standards and Technologies was formed in 2005 to coordinate the efforts of all Departments and Agencies with responsibilities for, or capabilities applicable to the environmental decontamination of biological agents. The subcommittee has been working to develop risk management-based guidance for biological and chemical agent decontamination operations. This work is currently in review and should be available in the next few months. The SDST has also been working to identify the technology needs and gaps that must be overcome in order to support efficient decontamination operations, and to coordinate the R&D efforts of multiple agencies (namely DOD, DHS, and EPA) to address those gaps.

Modeling

There are pockets of world-class infectious disease modeling expertise within a small number US universities, national laboratories, and the federal government; however current efforts are limited and insufficient to produce needed national capacity. It presently is a "scientific cottage industry" supported to a limited extent by the National Science Foundation, Departments of Health and Human Services, Agriculture, Interior, Energy, Defense, and Homeland Security.

With the current threat of a highly pathogenic avian influenza pandemic and other fairly recent outbreaks of emerging or zoonotic diseases such as SARS, there has never been a greater need for the U.S. to have the capability to model the geospatial and temporal spread of infectious diseases to enhance and/or enable threat awareness, prevention and protection, surveillance and detection, and to test and identify measures for response and recovery as called for by HSPD's 9 and 10.

Epidemiological/mathematical/statistical models can be used to develop response plans, inform policy decisions, compare and exercise effects of control measures under different scenarios, train personnel, and educate industrial groups. One highly successful model for accomplishing this is the Models of Infectious Disease Study (MIDAS) established by the National Institutes of Health (NIH). MIDAS funds several world-class groups of investigators using epidemiological and mathematical models to address high priority infectious diseases of public health. MIDAS has already had a profound impact on the Nation's understanding of pandemic influenza, including its transmission, the effectiveness of various strategies for mitigating its spread, and the required amounts of vaccines and anti-virals. Much of the information reported through the MIDAS group has been used to inform policy decisions, and in turn surfaced additional questions, the answers which, could help inform additional policy questions.

The Department of Homeland Security is conducting a joint analysis between the National Infrastructure Simulation and Analysis Center (NISAC) and the Critical Infrastructure Protection Decision Support System (CIPDSS) team to investigate possible impacts in two specific areas in support of the National Strategy for Pandemic Influenza. The first is to analyze the potential impacts of pandemic influenza on U.S. infrastructures by evaluating which infrastructure sectors will be most impacted by a potential influenza pandemic and how the proposed policies for mitigation measures such as social distancing and vaccine and antiviral distribution would alter the impacts to infrastructures. Issues that will also be evaluated include identifying differential impacts (by asset, infrastructure, population and region), including specifically healthcare and emergency response impacts and how infrastructure impacts will influence the spread and recovery processes. The second area of focus will be an evaluation of the effects of uncertainties on response effectiveness and economic impacts from a pandemic affecting the national workforce and the national infrastructure.

In addition, the Departments of Agriculture, Interior and Homeland Security are in the process of building a collaborative effort to model the impacts of various countermeasures against foreign animal diseases such as Avian Influenza and Foot and Mouth Disease. The next step in this process would be to connect the two by bringing together the public health and animal health communities to examine the need for the coordination of modeling in each of these communities and how this might best be accomplished.

Development of Medical Countermeasures

The development and acquisition of medical countermeasures to prevent and/or treat the effects of CBRN agents is a critical component of our efforts to prepare for and mitigate the effects of an attack with WMD. In fact, the development of medical countermeasures against WMD accounts for a significant portion of all S&T funds directed against the WMD threat. The key role for development and acquisition of effective medical countermeasures against WMD previously has been identified in Homeland Security Presidential Directives 4, 9, and 10. In addition, supporting legislation, including the *Project BioShield Act of 2004,* which provides nearly $5.6 billion dollars over ten years to provide for the acquisition of new medical countermeasures against CBRN agents, highlights the importance of an integrated enterprise across the Federal government and includes stakeholders from academia and industry.

Significant progress has been made in the development of medical countermeasures against biological and nuclear agents over the past four years.

- The National Institute of Allergies and Infectious Diseases at the National Institute of Health has seen an increase in biodefense and medical countermeasures development funding from $53 million in 2001 to $1.8 billion in fiscal year 2006, (with close to $1.9 billion requested for 2007) with comparable funding in FY05, 06, and 07), and has set up an aggressive program of basic research aimed at better characterizing a select group of biological agents thought to have a high probability of being used as potential bioterror agents, as well as implementing programs to better understand the effects of chemical and radiological agents in an effort to develop new countermeasures against these threats. Much of the NIAID medical countermeasure research effort has centered on multiple Centers of Excellence based around cutting edge U.S. medical research centers in an effort to focus the research efforts of the academic community on these important issues. NIAID has also improved the U.S. biodefense infrastructure by funding the construction of 4 new high containment laboratories (BSL–3/4) in order to increase the laboratory facilities necessary for the high volume of research on high priority biothreat agents.

- DHS has completed Material Threat Assessments (MTAs) for all of the class A biological agents, as well as nerve agents and radiological threats. These intelligence based assessments play a critical role in the BioShield procurement process by providing HHS with the necessary information on which to build their requirements for medical countermeasures. As of January 2006, DHS has completed a comprehensive threat analysis of likely biothreat agents. This new threat assessment methodology will provide a powerful tool for future prioritization of WMD medical countermeasure R&D and acquisition needs.
- The Special Reserve Fund (SRF) of Project BioShield has been utilized to award four contracts for the delivery of countermeasures that address two of the four initial material threats (anthrax and radiation, small pox was addressed before Project BioShield):
  - $877.5 million for 75 million doses of rPA anthrax vaccine
  - $362.7 million for 15 million doses of AVA anthrax vaccine
  - $17.5 million for 4.8 million units of Pediatric KI syrup
  - $21.9 million for 390,000 doses of Ca–DTPA, and 60,000 doses of Zn–DTPA
  - $362.6 million for 200,000 doses of botulinum antitoxin
  - $308.4 million for 30,000 courses of anthrax therapeutics
  - $165 million for 20,000 treatment courses of anthrax monoclonal antibody
  - $144 million for 10,000 treatment courses of anthrax immune globulin
- Furthermore, additional requests for product have been issued to solicit competition for BioShield contracts to fulfill the need for:
  - Up to 20 million doses of next generation (MVA) small pox vaccine
  - Up to 100,000 treatment courses of drugs to counter the effects of neutropenia associated with acute radiation syndrome (ARS).

The threat from biological weapons is dynamic and evolving. Recent advances in the life sciences have made it easier than ever before to enhance traditional biological threat agents to avoid our current countermeasures, or to engineer completely novel threat agents that we would be unable to detect or treat.

We must continue to support ongoing efforts to develop improved and more effective countermeasures against the traditional threat agents (anthrax, plague, smallpox, etc.) that present an immediate threat to our National Security, and present the best opportunity for medical mitigation. Simultaneously however, the Nation must begin to invest in technologies that will allow for a rapid and flexible defense against enhanced or engineered biological agents. The development of new host based diagnostic techniques including: Molecular biomarkers—such as messenger ribonucleic acid (mRNA) and proteins—could provide new tools to determine an individual's exposure to a number of potential pathogens. Additionally recent breakthroughs in the life sciences can be exploited to develop new therapeutics and broad spectrum countermeasures. For example, emerging technologies like RNA interference—coupled with vectors for delivering DNA vaccines and advances in DNA synthesis technology could form the basis for a highly robust system for therapeutics against a wide range of viral infections. While a great deal of basic and applied research will be required to make these possible new detection mechanisms and treatments a reality, such systems could drastically reduce the time needed to respond to future threats.

Protection of Food and Agriculture

Our agricultural system is vital to the well being of the United States and accounts for approximately 12 percent of our Gross Domestic Product. It ensures that we can feed our Nation without depending on other countries—a significant strategic advantage over many countries in the world. Recognizing this importance the President has designated the Nation's agriculture and food systems as a critical infrastructure and on January 30th, 2004, signed Homeland Security Presidential Directive 9 (HSPD–9) which established a national policy to defend the agriculture and food system against terrorist attacks, major disasters, and other emergencies.

In response to HSPD–9, which calls for an acceleration and expansion of the development of current and new countermeasures against the intentional introduction or natural occurrence of catastrophic animal, plant, and zoonotic diseases, the Subcommittee on Foreign Animal Disease Threats (FADT) of the President's National and Science Technology Council, has brought together leading agro-defense experts and decision makers from many federal agencies to identify the key technological tools needed to protect our agricultural system and the supporting research to develop them. The Subcommittee has focused on those agricultural threats with the greatest potential economic or public health impacts and limited its scope to the research and development (R&D) needed to inform policy decisions and/or provide the key tools to mitigate the impacts of a natural or intentional agricultural outbreak.

Also in response to HSPD–9, the Department of Homeland Security established the National Center for Food Protection and Defense in Minnesota and the National Center for Foreign and Zoonotic Disease Defense in Texas. Each of these centers is conducting research to further protect and defend our nation's food and agricultural system.

Detection of Nuclear Materials

The prevention of the terrorist use of nuclear weapons against the United States remains one of the highest priorities of this administration. Central to our ability to defend against nuclear terrorism is our ability to detect and interdict illicit special nuclear material as early and as far away from U.S. territory as possible. The ability to interdict nuclear and radiological material (to search, locate, identify and/or track) is dependent on the technological capability to detect material with the appropriate sensitivity and selectivity, at a distance without false alarms, and to carryout this work in operational settings that requires self sufficient, efficient, mobile, hardened and integrated systems. The technical gaps to achieve such a complete capability require evolutionary as well as transformational advancements. It requires exploitation of existing technologies and development of new detectors to improve detector arrays, reduce false or nuisance alarms, operate at lower power, have faster electronics, be environmentally stable, have higher efficiency, be available at different sizes/shapes depending on the operational setting, have improved selectively and sensitivity and greater network capability, and work at greater standoff distances. Closing these gaps will require improved active and passive interrogation methods, improved radiography, and innovative techniques to improve quality of images, detection at high speeds, and the development of an open architecture with sensor networks to support data fusion and integration. As with nonproliferation, no single detection system alone can do the job and development of capability to address the interdiction mission in concert with the nonproliferation efforts will radically improve our domestic security.

As mentioned earlier a central figure in ensuring that this research is accomplished is the newly formed Domestic Nuclear Defense Office within DHS. The President's FY 2007 budget request supports aggressive R&D and operational programs for nuclear defense, including a requested $535 million in FY 2007 (a 70 percent increase over FY 2006 funding) for DNDO, which includes funds that will support the kind of transformational research that will be necessary to develop the next generation of detection systems. However, we also urge the Senate and the House to restore full funding to DNDO as it enters into conference negotiations on the DHS appropriations bill.

While the development of advanced nuclear materials detection technologies has been called out as a priority in the 2008 budget memo, it is important to note that there are additional technical challenges associated with a robust and comprehensive defense against a terrorist use of a nuclear weapon which mandate investment in research and development that runs the gamut from basic science and technology to prototype deployment. Beyond detection, the spectrum of R&D is equally broad, covering research with the objective of decreasing the legitimate demand for highly enriched uranium or plutonium; detecting nuclear development and testing programs overseas; securing existing stockpiles of weapons and material; attribution; render safe; and consequence management. R&D programs across the federal government are supporting these various elements of domestic nuclear defense. These programs are structured to meet each federal department's highest priority objectives engendering unique requirements that ultimately drive mission-specific advanced technology development. The R&D efforts underlying many of these mission areas have common or synergistic elements. These synergies necessitate consideration of how 0best to coordinate efforts, identify and fill technical gaps, and promote technical advancement ensuring the generation-after-next defensive capability.

OSTP has been leading an interagency effort under the HSC/NSC Domestic Nuclear Defense Policy Coordinating Council to ensure that all nuclear defense R&D is adequately coordinated and appropriately funded to meet each federal department's highest priority objectives.ConclusionDefending our nation against attacks with weapons of mass destruction, especially nuclear and biological weapons has been and will be continue to be a top priority of this administration. We have worked diligently over the past four years to develop strategies to address these threats. Our strategies for the defense against biological and nuclear weapons are based upon sound scientific input, and provide a coordinated plan that takes full advantage of the diverse and varied scientific capabilities and expertise of the entire federal government to ensure that we have the necessary tools to prevent, detect, protect against, or respond to attacks with WMD. While science and technology have contributed a great deal to our defenses against nuclear and biological agents there is still much work to be done. With the continued support of Congress for this essential research we will continue to make significant improvements in our capabilities to defend ourselves against the threats of biological and nuclear weapons.

Mr. Chairman, and members of the Subcommittee, I thank you for the opportunity to testify to today. I look forward to answering any questions you may have.

Mr. LINDER. Secretary Cohen.

STATEMENT HON. JAY COHEN, UNDER SECRETARY FOR SCIENCE AND TECHNOLOGY, THE DEPARTMENT OF HOMELAND SECURITY

Mr. COHEN. Good afternoon, Chairman Linder, Congressman Langevin and the distinguished members of this subcommittee. I appreciate very much your invitation to be here today and to have an opportunity to testify concerning the significant role of science and technology and bringing new solutions to bear to the challenges that face both the Nation and, by extension, the Department of Homeland Security in making us more secure.

It was my intent to address some specifics here, but I think in light of your opening comments, Mr. Chairman, I would first like to apologize that you did not receive my testimony well in advance as you require. I will find out why that didn't happen, and I can assure you that will not happen again.

I am also honored to be sitting between Dr. Marburger who has been a mentor for me in this area. I am not a scientist. I am barely a shade tree engineer, but I have had the privilege of working with him for the last 6 years, and I have recently met Vayl Oxford and appreciate very much as a nuclear submariner his responsibilities using the Naval reactors model that the Department of Navy uses of cradle to grave responsibilities for nuclear and radiological protection of our country.

Many of you from prior hearings that I have had over the last week are aware that in the first 3 weeks on board, I reported for duty on the 10th of August, with the support of the administration, and especially Secretary Chertoff.

I have realigned consistent with the 19 pages of implementing legislation, which I appreciate so much the vision of the Congress and the administration in establishing the Department of Homeland Security, the S&T directorate. That has been approved a week ago by Secretary Chertoff. It was briefed to the Congress last Thursday and we are off to the races aligning and manning to that new construct.

After 9/11, and all of us in the room lived through that, had a chance to observe those heinous events, things that were unthinkable before 9/11 all of a sudden became not only plausible, but potentially probable. And in the evaluation of the probability of occurrence and the consequence of occurrence in multiplying those two together, you come up with risk. I dare say that many of us before 9/11 thought that the probability of occurrence of a chemical, biological, nuclear, radiological attack on our soil was low to insignificant other than naturally occurring animal diseases. But after 9/11, we realized, the administration realized and the Congress realized that that was not the case. And so from the start there was leadership and focus in nuclear, radiological, chemical, and biological DNDO has been responsible appropriately for the nuclear and radiological. The Department of Homeland Security, S&T directorate has been responsible for the chemical and biological aspects of that detection, prevention, remediation, recovery, et cetera.

Mr. Chairman, ladies and gentlemen, that represents today 50 percent of my budget, and as I have realigned in to six departments of energetics, chembio, C4ISR, which I know Ms. Harman will appreciate, is very military, and Congressman Langevin. My people said no, no. Call it command and control. You know, sounds less military, but the facts of life are we are at war, and my department and my directorate must be involved in command, control, computers, communication, intelligence surveillance and recognizance. And that is a cross-cutting department for me that affects everything else that we do, and shame on me if I don't leverage the tens, nay hundreds of billions of dollars of investment that has been made in other agencies and in Department of Defense.

And as I have said in previous hearings, and I know Mr. Chairman, you have heard this, you may get tired of me complimenting the Congress, but I appreciate so much in the 19 pages of enabling legislation that you had the vision to realize we were not going to recreate the NIH. We were not going to recreate the national science foundation. But you wanted me to leverage those investments and focus them for the national defense and Homeland Security mission areas.

Additionally, we have borders in maritime, a balance of our Customs and Border Protection as well as our Coast Guard. So we have a seamless border of our land and our seas.

Human factors which are so important. This is an area that I think we will find in the future will be unique to the Department of Homeland Security, especially the psychology of terrorism, hostile intent and the reaction of our citizens and our society to various threats and attacks. And then finally, infrastructure and geophysical sciences, to me, transportation is merely infrastructure that moves.

So chembio is half my budget. It is one of my six departments. We have had a chance to brief you in classified hearings as to the progress that has been made there. Much remains to be done. I think during the question and answer period, you will see some of the innovative things that have occurred. But Mr. Chairman, I believe the committee is right. We have not gone far enough. We can go much farther, and I think Dr. Marburger will tell you I am not afraid of risk, focused risk, innovation, the partnership between industry, academia and our national labs makes this country the great country that it is and I plan on fully utilizing those tools that you have given me to protect our country in the chembio area.

Thank you, sir.

Mr. LINDER. Thank you, Secretary Cohen.

[The statement of Mr. Cohen follows:]

PREPARED STATEMENT FOR THE RECORD HON. JAY M. COHEN

Introduction

Good afternoon, Chairman Linder, Ranking Member Langevin and Members of the Subcommittee. I appreciate the invitation to meet with you today to discuss the significant role of science and technology in bringing to bear solutions to the challenges the Department of Homeland Security (DHS) and the Nation face in making us all more secure. Specifically I will address the realignment of the Directorate to better meet the mission needs of our customers—the DHS Components, and the customers of our customers—the first responders; the work of the Homeland Security Research Enterprise including the DOE National Labs; and the progress we've made in one of the biggest DHS priorities, biological defense.

President Bush noted the important role of science and technology in protecting the Nation in July of 2002 when he discussed the creation of the Department of Homeland Security: "We will harness our science and our technology in a way to protect the American people. We will consolidate most federally funded homeland security research and development, to avoid duplication, and to make sure all the efforts are focused."

The Science & Technology Directorate (S&T Directorate)'s mission is to protect the homeland by providing Federal, State, local, and Tribal officials with state-of-the-art technology and resources. To accomplish this mission and be successful we have made changes to mature the organization. My goal for the Directorate, as envisioned by our enabling legislation, is to become a full service organization that is customer focused and output oriented. It must also be cost effective, efficient, responsive, agile, and flexible.

It is essential that the Nation invest strategically in research and development to detect and prevent a nuclear or biological incident and to minimize the consequences should such an event occur. This requires the S&T Directorate to focus research on areas that will best fill our customer's capability gaps and improve operations. We must set our priorities to align with National and Department of Homeland Security priorities.

Setting Priorities

My years at the Office of Naval Research taught me that a research and development (R&D) organization must take to heart customers' insights, priorities, and goals. Since my arrival at DHS on August 10, I have identified a number of strategic changes that are required to transform the Directorate into a world class science and technology management organization that is adept in mobilizing the resources of the Nation's and the world's vast R&D enterprise to address gaps and vulnerabilities in homeland security.

When Secretary Chertoff launched a Second Stage Review of Department operations last year, he emphasized the need for the Department to focus on risk. "We cannot protect every single person against every single threat at every moment and in every place. We have to, with our finite resources and our finite employees, be able to focus ourselves on those priorities which most demand our attention. And that means we have to focus on risk. And what does that mean? It means we look at threat, we look at vulnerability, and we look at consequence." The S&T Directorate will endeavor to fulfill the threat-based needs of our customers and focus on enhancing the ability to reduce risk throughout the Department.

To quickly capture and articulate these broad risk based priorities, I internally refer to them as the "4 B's":

- Bombs
- Borders
- Bugs, and
- Business

S&T will work with our customers to sharpen the focus of our research and enhance our customers' capabilities in these core areas to better secure our nation.

The R&D Budget Priorities issued annually by the Office of Science and Technology Policy (OSTP) and the Office of Management and Budget (OMB) help guide the S&T Directorate's planning efforts. The budget priorities for FY 2008, issued in June 2006, acknowledge the far-reaching response of the nation's science and technology enterprise as called for in the President's National Strategy for Homeland Security for the development of "new technologies for analysis, information sharing, detection of attacks, and countering chemical, biological, radiological and nuclear weapons."

The OSTP/OMB budget priorities acknowledge the significant number of achievements over the past four years, as well as the many challenges to reducing the nation's vulnerabilities to high-consequence events that remain. Among the areas cited as being in need of increased emphasis, are several in the biodefense arena that S&T with our interagency partners is actively addressing. These include:

- Quick and cost-effective sampling and decontamination methodologies and tools for remediation of biological and chemical incidents
- The development of integrated predictive modeling capability for emerging or intentionally released infectious diseases of plants, animals and humans, as well as for chemical, radiological or nuclear incidents, and the collection of data to support these models
- The exploitation of recent advances in biotechnology to develop novel detection systems and broad spectrum treatments to counter the threat of engineered biological weapons
- The development of novel countermeasures against the natural or intentional introduction of agricultural threats, including R&D on new methods for detection, prevention and characterization of high-consequence agents in the food and water supply.

S&T will focus on the customers' risk based priorities and capability gaps. In order to effectively implement these research priorities, the S&T Directorate is organized to be more accessible by the DHS Components to leverage the value added work the men and women of S&T are bringing to the fight. Our DHS customers utilize technologies and solutions that will make their jobs better, more efficient, more cost effective, and safer.

Implementing R&D Priorities

Toward this end, S&T will utilize customer-led Integrated Products Teams (IPT). DHS Management will lend acquisition expertise and guidance to this effort. DHS R&D program requirements will be reviewed at least annually and IPTs will be tasked with formulating specific goals and budgets. These teams will be chaired by the DHS customers who need new technology to improve their performance in achieving their mission. Test and Evaluation functions will be integral to the IPT process to help ensure that the products and capabilities delivered meet customer and first responder needs.

Six Disciplines—the S&T Divisions

The S&T Directorate is now organized in six Divisions along disciplines that are aligned with our customers' requirements. Each Division has at least one Section Director of Research and a Section Director of Transition. The Section Director of Research works with S&T's Director of Research and is focused on basic research; and coordinates with the National Laboratories and S&T's University Programs, including the Centers of Excellence. The Section Directors of Transition work with S&T's Director of Transition and focus efforts on applications and expediting technology transition.

The disciplines and examples of programs in each Division are:

- Energetics—i.e. Aviation Security; Mass Transit Security; Counter MAN pads
- Chemical/Biological—i.e. Chem/Bio Countermeasure R&D; Threat Characterization; Agro-Defense; Bio-surveillance, Response & Recovery
- C4ISR—i.e. Information management; Intelligence/Information Sharing; Situational Awareness (e.g., interoperability and compatibility; security screening; cyber security)
- Borders/Maritime—i.e. Land Borders; Maritime/U.S. Coast Guard; Cargo
- Human Factors—i.e. Social-Behavioral-Terrorist Intent, Human Incident Response, Biometrics
- Infrastructure/Geophysical Science—i.e. Critical Infrastructure Protection; Regional, State and Local Preparedness and Response; Geophysics

Additionally, the Director of Innovation (Homeland Security Advanced Research Projects Agency (HSARPA) works with the leaders of each Division and, as specified in the Homeland Security Act of 2002, "support(s) basic and applied homeland security research to promote revolutionary changes in technologies; advance the development, testing and evaluation, and deployment of critical homeland security technologies; and accelerate the prototyping and deployment of technologies that would address homeland security vulnerabilities."

The S&T Directorate will align its investment portfolio to balance project risk, cost, impact, and the time required to deliver results. Investments span across three technology Transition Readiness Levels: Short-term R&D projects of less than three years; mid-term projects of three to eight years; and long-term efforts that extend beyond eight years. Our investment portfolio must be prioritized across long-term research, product transition and leap-ahead capabilities. A healthy push and pull between the research and application arms of the organization, coupled with tension over mid-term resources, will help S&T achieve a balanced investment portfolio.

To execute these priorities the S&T Directorate has resources across public sector, private sector and academia; I refer to this as the Homeland Security Research Enterprise. Thanks to the enabling legislation, we have the ability to utilize DHS labs, Department of Energy's National Labs, Homeland Security Institute and the DHS Centers of Excellence. Additionally we utilize other agencies' resources including those of Department of Defense (DoD); National Institute of Standards and Technology; Health and Human Services; Department of Agriculture; Environmental Protection Agency; National Science Foundation; DoD Federally Funded Research & Development Centers; industry; international partners; and stakeholder associations. This allows the Directorate to select the best performer based on capabilities.

DHS Use of DOE National Laboratories

We have a strong working relationship with the DOE National Labs and I thank you for enabling the Directorate to utilize these important national assets. For more than half a century, the Federal Government has invested tens of billions of dollars in creating the Department of Energy's (DOE) National Laboratory system. Today these Laboratories represent state-of-the-art scientific capabilities that support the development of innovative technologies to address evolving national needs. For this reason, the Homeland Security Act of 2002 gave DHS special access to the National Labs. It created the Office of National Laboratories (ONL) within the S&T Directorate and gave it responsibility for coordinating and utilizing these unique national assets in support of the DHS mission.

ONL, with the active collaboration of DOE, is working to continually improve the utilization of this enormous national resource by enabling DHS to harvest the full range of National Laboratory science and technology innovations.

Many homeland security programs that were conducted by the National Labs prior to 9/11 were transferred to DHS at its inception and have since formed a solid core of technical competence for S&T. With the active support of DOE, the S&T Directorate continues to use the National Labs, building upon their unique capabilities, vast experience, and past performance in specific areas vital to homeland security.

The relevant technical capabilities of all of the National Laboratories are used to support S&T and its DHS customers in identifying technical goals and the specific science and technology innovations needed to satisfy those goals. The ONL coordinates efforts to identify and organize multi-laboratory R&D teams that represent the most qualified technical experts to ensure the most efficient allocation of the National Lab capabilities and resources to help achieve the goals of DHS customers.

Following DOE review and acceptance, the selected multi-lab teams will execute the National Lab programs under DOE management and supervision.

ONL coordinates annual reviews of National Laboratory performance using teams of DHS customers, S&T Directorate Program Managers and independent technical experts. These reviews evaluate R&D performance based on three primary criteria: mission and DHS customer relevance; technical competency; and management effectiveness. Since many DHS R&D programs are of multi-year duration, the above process will be used to manage program execution as well as to initiate new programs. ONL will also support the DOE in its laboratory strategic planning and annual reviews of performance to maintain enduring national capabilities that support both the DHS and DOE missions.

One of the Department's biggest priorities is detecting, preventing and responding to a biological attack, or "Bugs" in my shorthand. As you are aware, the deliberate or accidental release of a biological threat agent has the potential for disastrous consequences that include mass casualties. The economic impact of biological event could significantly disrupt the nation's critical infrastructures and the functioning of our society.

Biodefense: The S&T Biological Countermeasures Program

The DHS S&T Biological Countermeasures program provides the understanding, technologies and systems needed to protect against possible biological attacks on the nation's population, agriculture or infrastructure. The program places its greatest emphasis on those biological attacks that have the greatest potential for widespread catastrophic damage. These include aerosolized anthrax, smallpox, highly virulent agricultural scourges such as foot and mouth disease, and contamination of selected food supplies. Where appropriate, the program incorporates biodefense as part of an integrated chemical, biological, radiological, nuclear and explosive (CBRNE) defense across civil and military agencies.

The program's core requirements derive from the President's *Biodefense Strategy for the 21st Century* Homeland Security Presidential Directive (HSPD–10), which provides a comprehensive framework for our nation's biodefense, and *Defense of the U.S. Agriculture and Food* (HSPD–9), which establishes a national policy to defend the Nation's agriculture and food systems against terrorist attacks, major disasters, and other emergencies. Programs are formulated to respond to each of the 11 specific taskings in these HSPDs for which DHS S&T has a lead or major role. In addition, the composition, priorities, and goals of the overall portfolio and of each major program area are reviewed and approved or altered annually as part of S&T's formal five-year RDT&E planning process.

Current lead or major roles of S&T's Biological Countermeasures program include:

- Conducting periodic risk and policy net assessments to guide the overall biodefense program;
- Establishing the National Biodefense Analysis and Countermeasures Center (NBACC) to conduct the laboratory experiments needed to close key knowledge gaps in understanding the risks posed by current threats and to develop strategies for defending against future threats;
- Working with the Department of Health and Human Services (HHS) to develop countermeasures to biological threats;
- Leading the coordination of a national-attack warning system,
- Expanding BioWatch, a monitoring program designed to provide cities with the earliest possible warning of an aerosolized attack;
- Developing bio-detection systems for critical infrastructures;
- Developing detection systems for protecting the food supply;
- Establishing the National Bioforensic Analysis Center as the Nation's lead facility for technical analysis of samples from potential biocrimes or acts of bioterrorism to support attribution by the appropriate Federal agencies;
- Operating and upgrading the Plum Island Animal Disease Center, the only facility in the U.S. dedicated to studying certain foreign animal diseases such as Foot and Mouth Disease; and
- Working jointly with the U.S. Department of Agriculture (USDA) to expand current and new agricultural countermeasures, and develop a plan for safe, secure, state-of-the-art biocontainment laboratories for foreign and zoonotic diseases.

These activities are coordinated at the Federal level through a variety of mechanisms, most notably through the Homeland Security Council, several subcommittees under the National Science and Technology Council and the Office of Science and Technology Policy, and through direct coordination with specific departments.

The overall guiding principle has been to allocate work to the private or academic sectors, whenever possible, and only assign work to national or Federal laboratories that:

- is inherently governmental or quasi-governmental;
- involves selected core competencies;
- does not provide sufficient financial incentive to attract industry involvement;

The vast majority of work that is performed in the private or academic sector goes through normal competitive processes that range from Requests for Proposals to Broad Agency Announcements (BAA) with source selection based on programmatic review.

For work to be performed at the National Laboratories, the Office of Research and Development Program Manager, working with the designated Thrust Area coordinator, decides which laboratory should perform the work based on internal proposals and knowledge of the relative strengths of each laboratory.

Applying these guidelines has resulted in the following major roles for each of these entities:

- **DOE National Laboratories:** building on their strong computational capabilities and role in the intelligence community, the National Labs have established and operate the Biodefense Knowledge Center; continue to provide technical reachback support for the BioWatch monitoring system which they piloted; and continue to play a major role in assay development for the highly specific recognition of biological agents, having built a successful partnership with the Centers for Disease Control and Prevention (CDC) and other Federal agencies in developing secure, robust validated assays for government applications.
- **Other Federal Laboratories:** provide unique government facilities for working with biological agents. The U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID) provides interim housing for the National Biodefense Analysis and Countermeasures Center (NBACC); the U.S. Department of Agriculture and Food and Drug Administration laboratories for characterizing the stability of biologi-

cal agents in various food matrices; the Edgewood Chemical and Biological Center for independent testing of detection systems; the Environmental Protection Agency and the CDC for the collection and analysis of BioWatch samples respectively.

- **Private Sector:** provides operational support for NBACC, BioWatch and Plum Island Animal Disease Center; provides unique facilities and capabilities for supporting NBACC; provides the technology and transition to the marketplace for next generation detection technologies to help meet needs for such systems as a fully autonomous 3rd Generation BioWatch Detection system, rapid detection systems that can act like "bio smoke alarms" for critical facilities, detection systems for monitoring central food processing facilities, novel detection systems for better characterizing forensic samples and for charactering unknown or emerging agents; and the development of novel assays to support these new detection platforms.
- **Academic:** draws on the expertise of the university Centers of Excellence to provide the longer term R&D needed to respond to an evolving threat and to train the next generation of homeland security scientists. These include:
  - Fundamental insights into the nature of terrorism (Study of Terrorism and Responses to Terrorism, University of Maryland);
  - Research on the environmental risks posed by various biological agents (Center for Advancing Microbial Risk Assessment, Michigan State University);
  - Evaluation of current risk assessment tools and the development of next generation tools (Center for Risk and Economic Analysis of Terrorism Events, University of Southern California);
  - Research into potential threats to animal agriculture (National Center for Foreign Animal and Zoonotic Disease Defense, Texas A&M University); and
  - Post-harvest food security (National Center for Food Protection and Defense, University of Minnesota)

Given the rapid pace of advancement in biotechnology and its attendant implications for evolution in both the available countermeasures and in the future, a variety of mechanisms are used to stay informed of future developments including: formal technology watches and assessments; sponsoring of scientific conferences and National Academy Studies; participation in the program reviews and planning process of other agencies; pre-BAA workshops for ideas and tools to address specific needs; annual DHS S&T conferences to make known our strategies and to meet with developers in special breakout sessions; and frequent contact with developers throughout the year to learn of their capabilities, products, and ideas.

Making the Nation Safer

S&T has also made great strides in addressing many of the recommendations from the post-9/11 study by the National Academies of Science entitled Making the Nation Safer. Examples from our biological defense activities include:

- Creating networks for detection and surveillance—we have pioneered the Nation's first biological monitoring system, BioWatch, operating in more than 30 urban areas to detect biological threat agents and are working with our interagency partners to developing a nationally coordinated approach to biodetection, including mutually agreed upon bio-detection assays and notification protocols.
- Develop and coordinate bioterrorism forensics capabilities—we established the National Bio-Forensics Analysis Center (NBFAC), as the Nation's only dedicated secure operational bioforensics laboratory. This capability, operated in partnership with the FBI, did not exist prior to the events of 2001 and has been designated in the President's *Biodefense for the 21st Century* as the lead federal facility for the technical analysis of bio-crime and bio-terror related samples in a secure environment.
- Developing methods and standards for decontamination: DHS has partnered with the San Francisco International Airport, EPA, CDC, local, regional and state agencies to develop and demonstrate improved protocols and sampling techniques for restoring airports and other transportation hubs following a biological event; sponsored an NAS study on "Reopening Public Facilities After a Biological Attack"; currently co-chairs, along with the EPA, the Subcommittee on Decontamination Standards and Technology under the aegis of the National Science and Technology Committee; and is leading an interagency effort to develop improved sampling strategies and methodologies.
- Create special research organizations to address both classified and unclassified issues related to countermeasures to bioterrorism: the DHS National Biodefense Analysis and Countermeasures Center is dedicated to just such a capability, providing a dedicated, secure environment to conduct laboratory experiments to close key gaps in our understanding of those aspects of the biological threat that bear on the effectiveness of our countermeasures and to conduct the analytical risk assessments required under the President's *Biodefense for the*

21st Century, to help prioritize these threats and inform the allocation of national resources.

- Establish laboratory standards: DHS plays a significant role in the Integrated Consortium of Laboratory Networks (ICLN) which is developing a system of Laboratory Response Networks, including the associated standards and protocols, to collectively address the full range of chemical, biological, radiological and nuclear threats.

Conclusion

I thank the Subcommittee for this opportunity to present my plan and vision for the Science & Technology Directorate, and to provide insights into the Directorate's process of prioritizing R&D investments that will strengthen our nation's ability to detect, protect against, respond to, and recover from acts of terror as well as acts of nature. In the weeks and months ahead, we will be finalizing and implementing our plans to create a more responsive, customer-focused and robust science and technology management organization that I am confident will prove to be a vital national asset. I will be happy to address any questions you may have.

Mr. LINDER. Mr. OXford.

STATEMENT OF VAYL OXFORD, DIRECTOR, DOMESTIC NUCLEAR DETECTION OFFICE, DEPARTMENT OF HOMELAND SECURITY

Mr. OXFORD. Good afternoon, Chairman and Mr. Langevin, and distinguished members of subcommittee. I would like to thank the committee for the opportunity to discuss the Research and Development activities of DNDO and how these activities will directly address the nuclear and radiological threat. I am pleased to be here with Dr. Marburger and Under Secretary Cohen as well. DNDO has embraced a multi-layered homeland defense system, much like the one recommended in the 2002 National Academy Report Making the Nation Safer, the Role of Science and Technology in Countering Terrorism. Over 60 percent of DNDO's fiscal year 2007 budget request is intended for R&D activities. We believe this level of investment is necessary to achieve our R&D development goals. Through these investments DNDO is improving the capabilities in detection and interdiction of radiological and nuclear threats. I would like to share highlights in some of these areas.

First of all, we have completed initial development and high fidelity testing for the Advanced Spectroscopic Portal program or ASP. On July 14th, we awarded contracts to Raytheon Company, Thermo Electron Corporation, and Canberra Industries for low rate initial production of those systems. After further testing this fall, we expect full rate production to begin in 2007. To detect shielded materials like special nuclear material, DNDO is developing the next generation radiography system. The Cargo Advanced Automated Radiography System, or CAARS, will automatically detect, within cargo, high density material that could be used to shield threat materials. On September 8th, contracts were awarded to L3 Communications, American Science and Engineering Incorporated and SAIC Corporation for the development of the CAARS system.

DNDO also continues to develop handheld, backpack, mobile, and relocatable assets. Through this program, we will improve the probability of identification, wireless communications and durability of these systems. One specific goal set by the Secretary in this area is to deploy radiation detection capabilities to all Coast Guard inspection and boarding teams by the end of 2007.

Our exploratory research program is exploring new detection materials and active interrogation techniques evolving algorithms and conducting phenomenology studies to improve detective performance and increase system accuracy and reliability. In December of 2005, we published a call for proposals to the national and Federal laboratories, received 150 proposals, and selected 44 for award resulting in nearly $40 million of advanced research in nuclear protection. In a similar way, DNDO released a solicitation in March of 2006 to private industry and academia, and are now evaluating over 70 proposals for awards in the similar areas.

We are launching several advanced technology demonstrations or ATDs to validate concepts and then transition to system development. In 2007, exploratory research efforts in special nuclear material verification will transition to an ATD. This active verification of special nuclear material will enhance detection identification through the development of gamma and neutron-based direct detection techniques. In April, we solicited proposals for our first ATD the intelligent personal radiation locator to replace existing radiation pagers with a pocket-size radio isotope identifier with wireless communication capability. It will be used by law enforcement, first responders and counterterrorism agencies in routine activities and surveillance.

We will also pursue a stand-off detection ATD to locate and identify nuclear threat materials at a distance beyond 100 meters.

Finally, a long-dwelled detection in-transit ATD is planned to explore our capabilities to exploit the time available during cargo transit to detect threat materials in cargo and conveyances. Also in the transformational research area, our academic research program will provide a much-needed emphasis in nuclear detection sciences, a field that has been in decline at American universities for years.

In fiscal year 2007, DNDO will assume the mission to stand up and manage the National Technical Nuclear Forensic Center on behalf of the U.S. government, with its mission to develop an overarching national level technical forensics and stewardship program for the U.S. government. DNDO will be responsible for developing capabilities in pre-detonation material forensics to support attribution authorities as they conduct collection, analysis, and enforcement missions.

Finally, as Secretary Chertoff announced in July, we have launched the Securing the Cities Prgram. This initiative is intended to enhance the protection capabilities in and around the Nation's highest risk urban areas. Using the New York City area as the initial engagement area, DNDO and regional partners will develop an analytically based detection architecture that will lead to identification of needed equipment, training and support infrastructure to protect those environments.

Mr. Chairman, this concludes my prepared statement. I look forward to your questions.

[The statement of Mr. Oxford follows:]

PREPARED OPENING STATEMENT VAYL S. OXFORD

Introduction

Good afternoon Chairman Linder, Ranking Member Langevin, 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 the research and development (R&D) activities of DNDO and how these activities will directly enhance the probability of mission success. I am pleased to be here with other distinguished witnesses, Dr. Marburger and Under Secretary Cohen.

In the past, I shared with this subcommittee some of the ways that DNDO is working with Customs and Border Protection (CBP) and the Department of Energy (DOE) to deploy radiation detection equipment domestically and overseas. Collaborating with our implementing partners to increase the effectiveness of nuclear detection globally is vital. However, greater security can be achieved through the development and deployment of increasingly sophisticated and innovative technologies throughout all three layers of the global architecture—overseas, at our borders, and within the United States.

As such, the DNDO has embraced a multilayered homeland-defense system much like the one recommended in the 2002 National Academies' report, "Making the Nation Safer: The Role of Science and Technology in Countering Terrorism." This methodology requires improved capabilities in detection and interdiction of illicit materials, intelligence fusion, data mining, attribution, and effective response to nuclear and radiological threats. To address these requirements, the DNDO maintains a preeminent research and development program, while simultaneously capitalizing on the benefits of integrating this program with larger acquisition efforts. Over 60% of DNDO's fiscal year 2007 budget request is intended for R&D activities. We believe this level of investment will help us achieve both R&D and acquisitions goals.

Detection and interdiction of illicit materials

The DNDO improves the probability of detection and interdiction by integrating and deploying current technologies, continually improving these technologies through near-term enhancements and transformational research and development, and expanding detection capabilities at the Federal, State and local levels. The technical challenges to radiological and nuclear detection that we face stem from trying to resolve operational challenges and other obstacles to effective detection like proximity to a source, shielding of a source, velocity of a transported source, and decreasing the rate of false and nuisance alarms.

DNDO development programs are directly tied to robust systems engineering and test and evaluation programs. The aim is to ensure that all acquired systems address identified capability gaps and have been fully evaluated prior to any acquisition decisions. Additionally, all deployed technologies will be accompanied by the appropriate training, exercise, and response protocols. This will ensure that systems are operated properly, and all alarms are immediately reported to the appropriate agencies and personnel. Deployed systems will also be red teamed to assess their true impact on homeland security.

While the baseline architecture will continue to be documented, the architecture team has begun examining options for strengthening the architecture in the near and long-term. These options will be evaluated in terms of risk reduction, direct and indirect costs, operational feasibility, and other relevant decision factors. In addition, recommended enhancements are being identified and prioritized. The DNDO and its internal interagency staff are reviewing and refining the recommendations to reflect the full range of technical and policy factors that must be addressed in determining the preferred overall architecture.

The international portions of the architecture are being developed in close coordination with the Department of Defense (DOD), DOE, and Department of State (DOS), as well as components of Department of Homeland Security (DHS) with international responsibilities and relationships. The border portions are closely coordinated both within DHS (e.g., with CBP and the Coast Guard), as well as with other relevant agencies. The interior portions of the architecture are being closely coordinated with the Department of Justice (DOJ), Federal Bureau of Investigation (FBI), and other Federal, State, and local entities.

A critical component of the DHS nuclear countermeasures architecture is a passive radiation detection portal suitable for examining cargo containers, trucks, privately-owned vehicles, mail, and bundled cargo. The Advanced Spectroscopic Portal (ASP) program is a next-generation radiation portal monitor that rapidly and accurately detects the presence of radiation at realistic operational settings, and also identifies the materials causing the alarms. This allows the dismissal of alarms caused by non-threatening sources, thereby reducing the operational burden due to nuisance alarms.

We have completed the initial engineering development phase of ASP and in support of this program have executed the first ever high fidelity test and evaluation campaign to measure the improvements in performance provided by these next-generation systems. To address concerns about the additional cost of these next-generation systems, DNDO also completed a Cost-Benefits Analysis of ASP and poly-vinyl toluene (PVT) radiation portal monitors (RPMs). We demonstrated that purchasing and deploying a mix of current and next-generation systems would result in time-savings costs, while significantly enhancing the effectiveness of DHS Customs and Border Protection (CBP) secondary inspection operations, as well as greatly reducing secondary referral rates when ASP-like systems are used as a means of primary inspection.

On July 14th, 2006, DNDO awarded contracts to Raytheon Company, Thermo Electron Corporation, and Canberra Industries, Inc. for the development and production of ASP were announced on July 14. The priority for the first year is development and testing of the fixed radiation detection portal that will become the standard installation for screening cargo containers and truck traffic. In the near future, the DNDO will conduct testing and data collection of the first 27 ASP units at the Nevada Test Site (NTS), the New York Container Terminal (NYCT), Pacific Northwest National Laboratory (PNNL), and selected Ports of Entry (POEs) located in the north, south, east, and west. The DNDO will complete system qualification testing and the subsequent engineering changes as required—ensuring the pilot and production ASP units can withstand shock, vibration, temperature gradients, and other environmental stresses. Full-rate production (a decision based upon test results) is expected to begin in 2007.

The DNDO, in cooperation with CBP, will install and commission fixed and mobile ASPs ordered in FY 2006 (including 24 pilot units) and is planning orders for additional cargo portals, 30 SUV/truck—based systems, and 2 rail systems. By the end of calendar year 2007, planned deployments of current (PVT) and next generation (ASP) portals to all major seaports will provide coverage of 98% of all incoming seaborne containerized cargo, as well as over 90% of all containerized cargo passing through land border crossings. The DNDO will also be acquiring ASP systems on behalf of DOE for deployment through the Megaports Initiative, further enhancing the broader U.S. strategy to scan incoming cargo before it reaches our borders. A Memorandum of Agreement on DNDO/DOE cooperation is in negotiation and DOE has identified funds for the purchase of twelve ASP systems.

While spectroscopic portals will provide a next-generation capability to passively detect unshielded or lightly shielded nuclear materials, no passive system can detect nuclear materials that are heavily or completely shielded. Radiography systems (using active imaging techniques) can provide a solution to the challenge of detecting shielded nuclear material. To detect heavily or completely shielded materials like special nuclear material (SNM), and particularly highly enriched Uranium (HEU), DNDO is developing a next-generation radiography system that will minimize negative impacts on commerce and the flow of traffic. Cargo Advanced Automated Radiography System, or CAARS, will automatically detect high-density material shielded within cargo that could escape detection by radiation portal systems, like ASP. The automated image processing techniques envisioned for CAARS will also substantially improve throughput rates over current generation radiography systems. On September 8th, contracts were awarded to L–3 Communications, American Science and Engineering, Incorporated, and SAIC Corporation for the development of CAARS.

Fundamentally, DNDO believes that a combination of passive spectroscopic systems and advanced radiography systems will allow us to detect unshielded, lightly shielded and heavily shielded nuclear materials, components, and weapons that may be illicitly transported in cargo containers, air cargo bundles, or other conveyances.

In addition to portal monitors and radiography systems, DNDO is investing substantial funds to continue developing handheld, backpack, mobile, and re-locatable assets for non-Port of Entry (POE) venues. These systems are designed to integrate into existing law enforcement operations, providing cues for further investigative action when radiation is detected. DNDO acquired 88 improved handheld units in fiscal year 2006, of which 83 were provided to CBP operators for use in obtaining operational feedback for spiral development. We expect to purchase 407 handheld units in fiscal year 2007. Two Hundred and fifty seven units will be provided to CBP operators and 150 units will be provided to the USCG. By the end of FY 2007 the USCG will have rad/nuc detection capability for all inspection/boarding teams. Each system will have improved probability of identification, improved ability to communicate with a reachback center, and better durability for rugged field conditions.

We are also engaging with the Coast Guard (USCG) and State and local partners to address the challenges associated with radiation detection in the maritime environment. The harsh environment and operational constraints that the USCG faces makes development of effective operational equipment a considerable technical challenge. As the Secretary has stated, one major goal for this Department is the deployment of radiation detection capabilities to all U.S. Coast Guard inspection and boarding teams by the end of 2007. To ensure that the Department accomplishes the Secretary's goals, DNDO is committed to developing a Joint Acquisition Plan with the Coast Guard to provide handheld and backpack radiation detection devices that will fulfill imminent operational needs in fiscal year 2007, as well as lead to the development of next-generation technologies that have the identification capabilities, connectivity, and ruggedness required in the maritime environment.

Despite the progression of our near-term R&D efforts, there are still key, long-term challenges and vulnerabilities in our detection architecture that require long-range, higher risk research programs to deliver the highest payoff improvements in detection capabilities. Our transformation research and development work will render next-generation technologies that address the current limitations of deployed systems. Significant advances in radiation detection technology could potentially impact all capability gaps in our present detection architecture, from the ubiquitous, distributed network of inexpensive radiation detectors to highly sensitive, standoff detection systems for sensing mobile threats at speed. We are launching initiatives to develop technologies to meet architectural challenges by pursuing a robust Exploratory Research Program to stimulate the entire field of nuclear detection sciences. The effort will involve participants across private industry, the National Laboratories, and academia. In order to achieve effective coordination between the numerous government agencies involved in related work on nuclear detection, the DNDO participates in the Counterproliferation Program Review Committee, co-chaired by DOD and DOE with members from the Intelligence Community, Department of State, and others, which provides a yearly report to the Congress and works to ensure that technology development in this area is fully integrated.

The discovery and development of new detection materials and concepts is a major focus of DNDO exploratory research over the next five years. We continue to pursue new methods and signatures that will provide techniques for verification of shielded special nuclear materials. In addition, we are adjusting algorithms and devising new models to improve the technical capacity of the equipment and increase the accuracy and reliability of the systems for operators. We are also conducting experiments and modeling to find ways to reduce the false alarm rate so that background radiation and non-threat sources are not necessitating escalated response protocols and wasting the time of law enforcement operators.

In December 2005, DNDO published a Call for Proposals to the National Laboratories soliciting novel detection approaches, materials, and advanced technologies. DNDO received over 150 proposals, and ultimately selected 44 for award, resulting in nearly $40 million in research programs. Similarly, DNDO released a solicitation in March 2006 for private industry and academia proposals in the same research topics. Over 200 white papers were submitted, and we are now in the process of evaluating 70 proposals for additional awards.

Beginning in 2007, we anticipate a third solicitation, specifically to support our Academic Research Program. This program will provide a much needed emphasis in nuclear detection sciences, a field that has been in decline at American universities for years. The future security of our Nation requires such a rejuvenation effort at our universities. A consistent, sustained program to spur the academic community will provide the nuclear detection experts of the future. In addition, the program will foster potentially high risk but high payoff ideas that could lead to solutions that have not yet been considered.

We are also launching several Advanced Technology Demonstrations that will provide concept validation, the last phase in our exploratory research process. The first ATD is the Intelligent Personnel Radiation Locator (IPRL) that we solicited proposals for in April 2006. IPRLs are intended to ultimately replace the limited detection capability of existing radiation pagers with pocket-sized radioisotope detectors and identifiers that will wirelessly communicate with similar devices in the vicinity, automatically combining data to increase sensitivity and triangulate directional information. These devices will have sufficient energy resolution and sensitivity to reliably discriminate between normally-occurring radioactive materials (NORM), background, and potential threats, and will be used by law enforcement, first responder, counterterrorism, and possibly intelligence agencies in routine activities and surveillance. This year, the DNDO funded 3-year prototype-development efforts for IPRLs. The ATD will culminate in test and evaluation of the IPRL prototypes in early fiscal year 2009.

We are also pursuing the Stand off Detection ATD that aims to extend nuclear detection ranges beyond 100 meters, potentially allowing for airborne platform applications. Stand-off detection and imaging address the need for the capability to locate and identify nuclear threat materials at a distance, in both land and maritime environments. The DNDO will look at key existing technologies like gamma-ray imaging, advanced detection algorithms, and sensor and data fusion techniques that may dramatically improve sensitivity and directional accuracy. A solicitation on this topic will be released later this year.

Also in 2007, we expect that research into SNM verification will be transitioned to an ATD. We anticipate that active verification (AV) of SNM will be developed for secondary and primary screening at high throughputs to enhance detection and identification through development of gamma and neutron-based interrogation techniques.

Currently, we are pursuing an experimental modeling campaign to determine and characterize the background for cargo containers at sea, in order to determine the potential false alarm rates and feasibility of such systems. Following this effort, a Long Dwell Detection In-Transit ATD is being planned to explore our capabilities to exploit the time available during cargo transit to detect threat materials in cargo and conveyances.

Intelligence fusion and data mining

Successful detection alone will not lead to mission success. The DNDO must ultimately have the ability to fuse detection data and intelligence assessments in a near real-time environment to maintain overall system and situational awareness. This plan will require the DNDO to closely interact with the Intelligence Community, through the DHS Office of Intelligence and Analysis (I&A), as a developer of intelligence requirements and consumer of intelligence products. However, it should be made clear that the DNDO will not act as an intelligence collection agency. To meet the information and analysis mission, the DNDO has established the Joint Analysis Center (JAC). The JAC will enhance the effective sharing and use of nuclear detection information and intelligence from all mission related detection systems to provide a greater situational awareness of the nuclear and radiological threat. By fusing the international and domestic detection streams of information generated by the intelligence and counterterrorism communities, the JAC will be able to provide a better informed decision making environment, enabling more effective alarm resolution, trend analysis, and threat awareness. Additionally, this information and analysis capability will be integrated with a detailed understanding of current and future detection system performance to increase our awareness and confidence in the global detection architecture.

Forensics and Attribution

The DNDO must also support national capabilities to conduct forensics in support of attribution activities. In fiscal year 2007, DNDO will assume the mission to stand up and manage the National Technical Nuclear Forensics Center (NTNFC) with its overarching national-level technical forensics stewardship and integration mission. In addition to leading the NTNFC, DNDO is responsible for the DHS mission in predetonation materials forensics. This area is focused on bulk analysis and integration of all sources of technical information, including isotopic and chemical composition, physical structure, and route attribution. We will help develop and sustain pre-detonation concept of operations and technical capabilities to handle and analyze nuclear and radiological materials; establish, maintain, exercise, and operate collection and analysis capabilities for pre-detonation materials in support of the law enforcement community; and support appropriate research and development activities to address gaps and shortfalls in forensics capabilities.

Effective response to nuclear and radiological threats

As nuclear detection technology is deployed across the global architecture, the Federal government must commit to providing the necessary technical support to ensure that equipment is used effectively, alarms are resolved accurately, and the appropriate personnel are notified in the event of a legitimate detection of a threat. In recognition of this need, the DNDO provides operational support services; including 24/7 technical reachback support for alarm resolution, effective training and response protocols, and operational support coordination to ensure appropriate expertise is in place to support prompt resolution of nuclear/radiological detection alarms. The effective utilization of these services will ensure that deployed equipment is properly used and alarm information is appropriately reported and escalated to response agencies. While DNDO is responsible for coordination of the response to nuclear and radiological threats, the DOE, FBI, and DOD are responsible for deploying personnel in the event of an alarm and have the necessary technical expertise to help identify the item in question.

DNDO is also taking steps to expand detection capabilities within the domestic interior. Within our Nation's borders, we are leveraging and strengthening existing commercial vehicle inspection programs and surveillance capabilities to make domestic detection more effective and these initiatives will make use of next generation equipment deployments. We have launched the Southeast Transportation Corridor Pilot program to deploy radiation detectors to interstate truck weigh stations and other sites. These deployments will be at locations agreed to by our regional partners in accordance with the domestic detection architecture developed by the DNDO. Grants will be available initially targeting the states of Georgia, Kentucky, South Carolina, Tennessee, and Virginia; to be followed by expected expansion into Alabama, Florida, Mississippi, North Carolina, and Washington DC in fiscal year 2007. Included in the pilot program will be the necessary training, technical reachback and operational protocols.

As Secretary Chertoff officially announced in July, we have launched the Securing the Cities program (SCP), that will enhance protection and response capabilities in and around the Nation's highest risk urban areas. The DNDO will initially work with major metropolitan agencies in the New York City area, as well as New York State and other Northeast regional partners, to develop preventive radiological/nuclear detection programs. This initiative will include an analysis of critical road networks, mass transit, maritime, rail, and general aviation vulnerabilities. SCP will identify infrastructure protection and information sharing improvements, fixed and mobile detection deployment augmentation requirements, and source security enhancements. The initiative will include integrated training and exercise opportunities in support of the New York City area and Northeast region. The DNDO and regional partners will jointly develop analysis-based detection architectures, to include all necessary planning, equipment, training, exercises, and operational support infrastructure. As these initiatives mature, it is expected that equipment (including Advanced Spectroscopic Portal systems) will be deployed and operated and the lessons learned will be exported to other regions and cities to enhance our overall protection against nuclear and radiological threats. We are currently in the midst of our program design and deployment planning phase for this initiative.

Conclusion

As the National Academies report concluded in 2002, while progress was being made by the R&D and policy communities related to nuclear and radiological terrorism, a key deficit in USG efforts was the lack of coordination across the Departments and agencies The founding of the DNDO as an interagency coordinating office, its focus on the entire global architecture, and the desire to produce technological solutions which benefit the entire homeland defense community, directly addresses this concern.

Yet, while technology is a critical tool in combating the nuclear threat, the threat we face cannot be effectively overcome by technology alone. Coordination between Federal, State, tribal, and local law enforcement agencies, as well as the larger intelligence and counterterrorism communities, is critical. An integrated and cooperative approach to detection and information analysis will ultimately provide substantial improvement in alarm resolution, threat assessments, data trend analysis, and, most importantly, overall probability of mission success.

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

Mr. LINDER. Thank you all. Dr. Marburger, what is the single most significant S&T accomplishment since you have been the director of OSTP.

Mr. MARBURGER. The single most important initiative that we have been involved in is probably this year's Advanced Competitiveness Initiative that the President launched in his State of the Union message in January. That initiative restores funding to some previously underfunded agencies in precisely the areas that are necessary to be strong to support Homeland Security research, and makes arrangements for improving and strengthening education, incentives for industry to engage in long term high risk research, and overhauls other policies of the U.S. government regarding workforce and immigration policies to make our Nation competitive far into the future and to provide a research basis for strengthening us in all respects.

Mr. LINDER. In your written testimony you said that OSTP strategies to address biological and nuclear threats is the result of sound scientific input. Do you have a panel of scientists on biology and nuclear threats in the private sector or the academy where you call them in for peer analysis of your science.

Mr. MARBURGER. Absolutely, sir. First of all, each of our participating agencies relies on external review groups drawn from the scientific community and we rely heavily on the national academies as I referred in my testimony for expert advice on a wide range of issues. In addition, my office runs a large number of interagency working groups that draw on scientific and engineering talent from within the agencies and their laboratories to meet on specific issues and coordinate policy and planning across the executive branch.

Mr. LINDER. Secretary Cohen, we have been having a difficult time getting information, programmatic and budget information from the S&T directorate for some time. I hope you will make an effort to correct that and speed that up, too.

Questions have been raised and you are brand new, a lot of questions have been raised about S&T for some time. But the questions that have been raised about the lack of peer review at S&T, would you like to comment on that?

Mr. COHEN. Well, peer review is the longstanding goal standard by which we do basic research. The S&T directorate, as it is currently organized, and that is my organization which I am responsible for, is a full service S&T management organization. My directorate does not do S&T. I manage S&T. I resource S&T. And so it has three components: Basic research, applied research, and advanced technology. The scientists focus on the basic research. The matrix in that area are degrees, published papers, peer review, symposia, patents, and awards.

On my output function in advanced technology there you can consider that acquisition lite, l-i-t-e, where you have given me and the other S&T officials in the government, the ability to put millions of dollars at risk in science and technology to prevent billions of dollars in acquisition from being at risk. That is the right model. It is obviously focused risk, with risk comes the chance of failure, but also the chance of great leaps ahead and breakthroughs.

The metrics in advanced technology are cost schedule and capability, Two totally different sets of metrics. It is a schizophrenic organization. Scientists don't like to give up their discoveries because they then have to move on to a new discovery. Engineers don't like to take the time it takes to have discoveries reach maturity because they are on a tight time line to deliver capabilities and fill requirement shortfalls for the customer or the customer of the customer.

So in basic research, my division heads overseeing their research section, directors use as appropriate peer review, the academies, who are very familiar with that as we look at new lines of research, we validate those with the national research counsel, with the academies, both science and engineering. It has its place, but I am much broader than that, sir, and you expect more of that from me.

Mr. LINDER. Mr. Oxford, in the 2000 report making this Nation safer by the national academies, makes many recommendations focused on prevention of nuclear attack. How are we doing 4 years later?

Mr. OXFORD. Well, Mr. Chairman, let me, again, reiterate some of the successes we have had and maybe get to some of the ranking member's questions as well. Since we established DNDO, the budget has grown from what I inherited as a $95 million budget to something that is over 500 million in the 2007 request. The acquisition budget has doubled in the 2 years since we have established the Office.

By the end of this year, we will be screening 80 percent of all incoming seaborne cargo containers. By the end of 2007, we will have achieved 98 percent of the incoming containers, and we will be over 90 percent at each of our northern and southern borders.

So in that regard, along with the joint diployment strategy that we have with Customs and Border Protection, we think we have a solid plan to capture the maritime and landborne cargo coming into this country. We have now set our sights in our strategic planning function to look at other threat pathways of concern to specifically, the air pathways general aviation and smaller maritime craft that could be the conveyances also, besides the cargo container.

To go back to some of your previous questions, we have established both an internal and an external peer review process. We are working with the National Science Foundation as a body to review our transportational research programs, to ensure that we get it right. That is, as you know, a national body to do that. We are also establishing through the Homeland Security Advisory Committee, a group to peer review our architecture and R&D efforts.

We are also working with Dr. Marburger, Science Technology Council, to look at technology road maps in this area. So again, we have an external review process. We are standing something up through the National Defense University to look at our long-term architecture priorities to make sure that we are not deceiving ourselves; that we have it right.

And finally, we have a robust red teaming process as part of our internal independent assessment to make sure that our processes and procedures are accurate.

Mr. LINDER. Thank you. My time has expired.

Secretary Cohen, I am going to have my staff submit for your attention some very specific questions we have regarding the S&T particularly with the funding processes, IPAs and biowatch. We will submit that for you to respond in writing, if you would.

Mr. Langevin.

Mr. LANGEVIN. Thank you, Mr. Chairman. Gentlemen, thank you again for your testimony today.

Dr. Oxford, I would like to start with you, if I could. You have addressed some of my questions in your introduction that you just gave, but as you know, I have tried through several avenues, to increase funding for radiation portal monitors, both domestically and abroad. And I know that, as you reported, the contracts have been awarded for limited production of roughly 50 high resolution portals using sodium iodide crystals by February of 2007.

So, and the question is, are these deployment plans for the Advanced Spectroscopic Portals still on target for February, and do you envision an even faster production schedule after February? In addition, can you please tell me about your coordination efforts with DOE, and also with Customs and Border Protection with regards to screening cargo overseas for nuclear or radiological threats and have you determined a common operating memorandum of understanding, et cetera, regarding screening procedures and technology.

Mr. OXFORD. Absolutely. We have now developed a joint deployment strategy with Customs and Border Protection for all domestic locations. We did this in a cost-effective way to manage both risk and cost. If you had looked at us a year ago, we would have been suggesting a black and white transition from current generation technology to next-generation technology to cover all of our ports of entry that would have been a $3.5 billion proposal.

By working with CBP and understanding these systems, we have now developed a deployment strategy where at low volume ports of entry we will use current generation technology in the primary screening mode with ASP in the secondary screening mode at the large volume locations like L.A./Long Beach, we will use ASP in both primary and secondary. That has cut the overall cost to that architecture to $1.4 billion. And we think we are able to manage risk also by having a cost effective solution. That allows us then to build ASP at the rates necessary. We have fully budgeted over the next 3 or 4 years to get us fully to our deployment goals that we have with CBP. So I think, again, for the domestic ports of entry we have a solid plan in place, and we are executing according to the schedule.

Regarding overseas deployment, as you know, DNDO has a centralized planning function, but we do decentralize the execution. So for overseas locations, we will continue to rely on the Megaports program out of DOE to deploy the radiation portal monitors at locations overseas. We are currently working with the Department of Energy (DOE) and the Department of State (DOS) to develop an overseas architecture. You may have seen some of the debate this week. We are looking at opportunities now to deploy both passive systems and active systems overseas in an integrated way to deport that data back to the U.S. and make a risk assessment on containers before they are loaded on the ship.

The DOE has agreed that they will buy the next generations systems off of our contracts, therefore leveraging our research and starting to enhance the deployment capabilities overseas. So I think in that regard, we are developing a similar overseas plan to what you see now starting to materialize domestically.

Mr. LANGEVIN. Also I understand that there are currently several types of reliable technology used in radiation portal monitors, the most talked about are sodium iodide and high—purity germanium technologies. Recently, the DNDO, I know, had three major contracts for Advanced Spectroscopic Portals. Two went to companies that utilize sodium iodide technology, and one went to a company which uses germanium technology. Just for our purposes here, could you explain some of the key differences between these two technologies and how they operate, what they are able to detect and their respective costs, and could you also please expand on how you and the rest of the officials at DNDO came to that decision?

Mr. OXFORD. Let me try to make a very quick distinction between germanium and sodium iodide. We would consider one a medium resolution, but the sodium iodide could do a reasonably good job in detecting and identifying materials through the sodium iodide crystal. Germanium is considered the gold standard in terms of its ability to replicate the nuclear signature. The problem has been it has suffered from power and cooling supportability issues that not only complicate its deployment in terms of a larger footprint, but it has also been estimated at being more costly. We got fixed price quotes, as part of our contract we just signed. We have cost estimates or cost quotes from the vendors in the sodium iodide in the range of $357,000, and the germanium costs are almost $700,000.

So there is almost a 2–1 ratio there. So what we chose to do in awarding these three contracts is to put the germanium manufacturer on a little slower track to allow them to mature the capability to see if we can get the power and cooling requirements down as well as the costs through some R&D investment because if we can get them to be successful, they will be the answer to doing things like rail surveillance.

Right now, the false alarm rates associated with current-generation and possibly even sodium iodide would—may lead to excessive false alarm rates and you can understand the complications of stopping the rail car and having to pull it out of a train before allowing the train to proceed. So we need very low false alarms. That is one of the potential solutions that we would have with germanium.

Mr. LANGEVIN. Thank you.

Mr. LINDER. The gentleman's time has expired. Does the gentleman from Nevada wish to inquire?

Mr. GIBBONS. Thank you very much, Mr. Chairman and gentlemen, thank you for being here today. Thank you for your service to our country as well. We know this is a very important issue. As we look over the DNDO and the R&D budgets that are there, some of our concerns are, of course, as reprogramming and other priorities take place in the budgeting office research and development oftentimes gets left on the cutting table. And are you concerned right now with priorities that some of your projects, R&D projects, are going to be left on the table without sufficient funding?

Dr. Marburger.

Mr. MARBURGER. Yes, sir. I regard myself as an advocate for R&D for Homeland Security purposes within the budget process. And we try to be responsive to the proposals that come to us from Homeland Security. To the extent that the budgeting process within the Department has credibility, we can be even more vigorous advocates, and I believe that the leadership that we have in place today will lead to good results for recommendations for their R&D budgets.

This is basic. Basic research is something that you can't just drag at any pace. There are various levels of maturity for the technologies and the physical phenomena involved in detection, for example, that are rather mature. And advances in detection capability particularly are sometimes slow and incremental. We always hope for a breakthrough, and that requires broad funding of basic physical sciences and we support that. But in general, I would say that the research specifically associated with Homeland Security, and particularly, for countering weapons of mass destruction and its effects enjoys a very high priority in the budget process, and has many champions within the White House.

Mr. GIBBONS. So there are no specific areas that you can relate to this committee which are going to be cut as a result of changing budget priorities within the R&D?

Mr. MARBURGER. No. I can't speak to specific areas that will be cut. We will rely very much on the advice coming to us from the Department of Homeland Security and the gentlemen to my left.

Mr. GIBBONS. All right. Perhaps Secretary Cohen, you could tell us what your philosophy is what you believe your office directors are doing with regard to compressing the developmental timelines, developmental timelines for projects and technologies that were mentioned. I know Mr. Oxford mentioned a number of projects, large projects, very difficult nuclear projects, detection projects.

What is the policy within DNDO with regard to compression of those timelines because we just heard Dr. Marburger say that there are some things that can't be done quickly, and is that philosophical or is that a physical obstacle?

Mr. COHEN. Well, it is actually both, sir, but it is an excellent question. I know some of the members who have heard this from me will be boring to them, but in science and technology, we plant a thousand flowers. That is basic research. That is unfettered research. You don't know what you don't know and you have got to go up a lot of alleys to figure out which ones are blind and Einstein said if you knew the answer, it wouldn't be research.

From those thousand flowers, you harvest a hundred projects. That is applied research. From those hundred projects, you determine two to three prototypes. That is advance technology and from that you get the George Foreman grill. That is the profit maker. Now I was the chief of Naval research for 6 years and working for civilian and military leadership Navy and Marine Corps, and all of those leaders put their fingers in my chest and said you have got the wrong model.

Here is your model, you plant one flower. It becomes one project, it becomes a prototype and from that, we get the George Foreman grill. Now, oh, that that could be. The time frames in prototyping and demonstration tends to be in the 1—to 3-year time frame. The time frames associated with basic research tend to be in the 8—to 15-year time frame. And so a $75,000 investment in the mid 1970s in the more precise measurement of time resulted in global positioning because distance is a function of time in 1990. And E equals MC squared gave us nuclear power.

Basic research is ineloquent. It is something that product managers and budgeteers find very uncomfortable. When asked what we will get in 20 years for our basic research dollars today, all I can tell you is if we don't invest, we will have nothing and the history of investment in basic research which only the Federal government has either the resources or the vision to sustain because we don't have the bell labs anymore, and we don't have the IBM labs. Everyone is looking at the quick kill. We will not sustain the S&T or the innovation or the economic strength that has made this country so great.

Mr. GIBBONS. I guess my point was that after a century of technology advancements, we are hoping you can compress that 8—to

15-year time frame into something reasonable so that we, those of us who have to give that ineloquent answer to constituents know that the time between the money we invest, and the defense which they are expecting gets compressed into the minimum of time possible.

You know, we don't want to sacrifice quality, of course, but we do have the very inevitable problem that those who are looking to harm this country aren't going to wait for the scientists to feel comfortable with every avenue looked at in getting that technology in to the hands of those that can help us.

Mr. COHEN. Congressman, you have it exactly right. That is my job, and in my model, 80 percent of my dollars goes to the output function for either near term or breakthrough advancements, and that has been my history over the last 6 years, and I hope to be able to do that in Homeland Security.

Mr. LINDER. The gentleman's time has expired. Dr. Christensen seeks to inquire.

Mrs. CHRISTENSEN. Thank you, Mr. Chairman. Yes, welcome back, Mr. Cohen. Welcome to all of the panelists.

Dr. Marburger in his written statement lists the four main pillars of biodefense: Threat awareness, prevention and protection, surveillance and detection and response and recovery. I would like to ask a question focused more on the response and recovery.

Because under that, you are to create refine comprehensive plans to mitigate the consequences of an attack and provide the newest and most effective medical countermeasures. What new and effective countermeasures have we developed in the last couple of years?

Mr. MARBURGER. Countermeasures?

Mrs. CHRISTENSEN. For biological.

Mr. MARBURGER. For biological are continually evolving in the research labs of the Nation. Under the sponsorship of the National Institute For Allergic and Infectious Diseases, which gets the bulk of bioterrorism funding, there are research programs on vaccines and rapid production of vaccines and the mechanisms of infectious diseases particularly in their programs and modeling and all of the infrastructure that is required.

Centers for Disease Control also have programs to tie together the information capability to identify outbreaks and some of these have already—

Mrs. CHRISTENSEN. That is under the surveillance. But I just don't see anything being developed. I am not sure what Project BioShield has yielded. I have some notes here that says just a small quantity of pediatric iodide and several million doses of anthrax vaccine has been added to the S&S recently. So we have had people come to testify either before the entire committee or one of our sub—maybe the subcommittee, and I don't remember the name of the medication, but one is one to treat radiation sickness, and the other is to stop bleeding. Have they made application, Mr. Cohen, and/or—

Mr. MARBURGER. That is a level of detail that I can't respond to, but I would be very glad to.

Mrs. CHRISTENSEN. I am not seeing anything new coming on line.

Mr. COHEN. If I may, Doctor. I would like to take that for the record, and I am glad to meet with you and with people who have that answer. But I don't have that at the tip of my fingers and I apologize.

Mrs. CHRISTENSEN. To follow up on Mr. Gibbons' questions about the shortening of the time. It seems to me that while maybe for other kinds of countermeasures or technology or detection devices that may be a little more difficult to shorten the time, but we do have some legislation that would direct funding to that research to shorten the time between the time we find the bug and develop—can develop a vaccine. Do you think that is a little more feasible than maybe for some of the other kinds of technologies that you are developing? Because we don't know—we may not have ever seen what the agent is before. And we can't wait 12 years to get a vaccine or, you know, and so wouldn't you think that it would be important for us to direct, devote some attention to shortening the time from bug to drug?

Mr. COHEN. Absolutely. And we have to do better. You have this exactly right. Regrettably, the only area that you can legislate that is in the area of risk management, which you have given me in the Safety Act, and I thank you so much for that, and also in the FDA kind of world of regulation where today, so many discoveries that we fast-track to market, we are finding people aren't even applying for patents because the process takes so long that they believe, and Jobs is a perfect example in this, in iPod, its time to market. Get it to market.

Develop the market share and then do spiral and continuous development and improvement and to heck with the patent because you are getting the money based on the profit times, large number of things that are going out. So we have to be very careful. Just because we legislate or mandate doesn't mean that we will get the desired effect. But where we can streamline regulatory and remove unnecessary requirements, that would be of enormous help, ma'am.

Mrs. CHRISTENSEN. Thank you.

Mr. LINDER. Mr. Dicks.

Mr. DICKS. Thank you, Mr. Chairman. You know on that subject, Secretary Cohen, you have the responsibility to do the material threat assessments. You are aware of that, right?

Mr. COHEN. Yes, sir.

Mr. DICKS. And we think most of the problem has been over in HHS. Maybe Dr. Marburger can help us from the White House to get somebody's attention over there. But the fellow who was in charge of the program left. And with very little having been accomplished. This is one area that I think deserves a lot more attention than it has gotten, and the administration, I think, is very vulnerable to criticism here for the fact that one of the material threat assessments we haven't got anything done, basically nothing has happened, and Congress passed BioShield giving you the money, and you know what is—do you have a philosophy on this? I mean, some people say Dr. Fauci is running the whole thing. I mean, is there anybody in charge of this within the administration who takes it seriously?

Mr. MARBURGER. Absolutely, sir.

Mr. DICKS. Then why hasn't anything happened?

Mr. MARBURGER. Well, I take exception to the notion that nothing has happened. And I would be glad to respond in writing to specifically the progress that has been made since BioShield Act was passed. These are difficult problems. We think we have responsible and competent people working on them. But I do not have that detail at my fingertips to be able to respond to that.

Mr. DICKS. That bothers me that the person in the White House was supposed to be ahead of S&T, this is a major area and still years have gone by here. We have had all of these hearings. I applaud the committee. The committee has had hearings on this. This hasn't been a lack of oversight by Congress. Dr. Cohen—I mean, Secretary Cohen.

Mr. COHEN. I am honored, sir, but I will stick with Mr.

I am the responsible individual and the chairman and Congressman Langevin in the SCIF last week took a very detailed brief. I am so pleased to have Dr. John Vitko here with me today, and he is my division head for chembio. He is the right man, but I was not familiar with this a month ago before I got here, and I will tell you, I believe and will brief you off line, of course.

Mr. DICKS. Right.

Mr. COHEN. As I have in the past in the HPSCI, et cetera, but this, I believe you will find is a success story because of the classification of the consequences, we have not publicly done this. But, I think, you will be pleased and I think they don't have to comment, but I think the chairman and Congressman Langevin understood the extent to which we have accomplished your desired goals.

Mr. DICKS. Why was the decision made to move DNDO out of S&T directorate?

Mr. MARBURGER. I can speak to that, because I was involved in making recommendations to that effect. Because the consequences of detonation of even a small and imperfect nuclear weapon in a major U.S. city are so profound that we felt that it was important to single out this function and give it special leadership and special access to the highest levels within the Department of Homeland Security to enable it to move expeditiously to implement the best technology that we have and the best ideas to protect the Nation from such an eventuality.

Mr. DICKS. Mr. Oxford, do you think this was a good decision? Do you think this was the right decision?

Mr. OXFORD. I absolutely think it is the right decision. We have brought together the interagency that was not working well together to bring a comprehensive focus. When you see an office dynamic where I have FBI agents, DOD employees, and DOE employees sitting in the same office, day in, day out, working one problem, knowing there is a time frame that we have to work within, it is a concentrated effort that, I think, in some cases could be a model for other efforts, to be honest.

Mr. DICKS. It might help us on the BioShield issue, could be an example. You want to run that?

Mr. OXFORD. No, sir.

Mr. DICKS. All right. In terms of reorganizations, you took the Transportation Security Lab, which was in TSA, and moved it to S&T. Why did you do that? Why was that done?

Mr. MARBURGER. I can't answer that question. That was an internal arrangement that was made within the Department of Homeland Security as it was being set up, and I don't believe that any of my colleagues here on the panel were there at the time that decision was made.

I believe—I can only speculate. I think that it would be inappropriate for me to do so, but I would be glad to respond to the question.

Mr. DICKS. For the record, if you could give us an answer, that would be good.

Mr. COHEN. Congressman, if I may, I was not there for the decision, but I believe it was absolutely the right decision. And I think you are aware I was sworn in on the 10th of August. That was the day that the airline liquid explosives—

Mr. DICKS. Right.

Mr. COHEN. —plot broke.

The very next day I created a team, a rapid response team, using a program manager and engineer, who understand how to get the deliverables and energetics out the door; the scientist who understood the underlying chemistry; and Susan Harwell, who is Director of the Transportation Security Laboratory and understood the culture and the needs of the FAA, the TSA, the air transport environment.

And then immediately, on the 11th of August, I brought to bear our Centers of Excellence, meaning our academic units, as well as the Department of Energy labs, which you so wisely gave me access to. With the moneys and the talent we have invested there in chemistry and physics over the years, we went out with a request for information, paralleled that with a safety act announcement to get people to come forward with solutions.

We have over 40 responses in the month. Within the next 30 days we will be testing those, as well as the COTS, commercial off-the-shelf, devices that the Transportation Security Lab had been testing over the last year, as well as SBIR devices that come forward so that we can give Kip Hawley and the TSA the necessary tools they need to ease their problems and increase the security. I know there is consideration to move the Transportation Security Lab back to TSA.

I know the frustration, which I accept; I am responsible. I came to this job with my eyes open, and I want to be held accountable, will be held accountable; but it would be a terrible mistake, I believe, sir, at this point, for the Nation to move that back. We just need to get on with the solutions.

Kip Hawley and I have signed an MOU that was in the works for 9 months on the Transportation Security Laboratory. We signed that literally days after I got into the job, and I would ask your indulgence to leave the Transportation Security Lab as one of my five organic labs in S&T.

Mr. DICKS. If I—just one last thing, Chairman.

Mr. LINDER. Sure.

Mr. DICKS. What is the current status of the Counter-MANPADS program?

Mr. COHEN. As you are aware, we provided a very comprehensive report to the Congress at the end of July. The initial tests, both by

BAE and Northrop Grumman, were successful. Our large-body aircraft, there are aspects of this that I prefer not to discuss in public, but the Congress very wisely provided a small amount of money for us to look at alternative, nonaircraft-based solutions. We went out with the BAE for that. We have got three excellent proposals. We expect to announce those awards here very shortly, and we will demo that over the next year.

But in my construct—and I know, Congressman, you are aware of what I did with Swampworks and high-risk, high-gain. With a very small 1 percent of my budget, I am looking at even higher risk, higher gain, off aircraft solutions—which again I don't want to discuss in a public venue—that I think industry is excited about; and I hope to experiment with those and then prototype them very soon.

But we know how to defeat the MANPADS. The question now is one of cost, false alarms, misfires and the legalities of having active systems on commercial aircraft.

Mr. DICKS. Thank you.

Mr. LINDER. Time of the gentleman has expired.

We are facing a series of three votes, so I would be happy to excuse the three panelists on the first panel. Thank you for your contributions. Thank you for taking the questions. We will expect some answers from you in writing from you on specific questions.

If the next panel of two gentlemen, Dr. Happer and Dr. Atlas, would be patient with us, we will be back as soon as these votes are over.

[Recess.]

Mr. LINDER. The remainder of the hearing of the subcommittee on nuclear and biological attack will continue.

We thank Dr. Happer and Dr. Atlas for being patient with us. From time to time, we actually have to go and vote at this place. We welcome you here. As we said before, your entire written statement will appear in the record, and we ask you to confine your statements to 5 minutes.

Mr. LINDER. Dr. Happer.

STATEMENT OF WILLIAM HAPPER, Ph.D., CYRUS FOGG BRACKETT PROFESSOR PHYSICS, PRINCETON UNIVERSITY

Mr. HAPPER. Thank you very much, Mr. Chairman and members of the committee. My name is William Happer. I am professor of physics at Princeton.

Although I am in academia now, I have spent a good fraction of my life participating in national issues. I served as the Director of the Department of Energy's Office of Energy Research in the early 1990s; I have been a member of the JASON Group for nearly 25 years; and perhaps most pertinent to our discussion today, I serve, along with Ron Atlas, as a member of the Science and Technology Advisory Committee to the Department of Homeland Security as Director of Research and Development. So we have had a good opportunity to observe there while the committee was functioning.

I also wrote the—or I chaired the panel that wrote the chapter on nuclear and radiological threats for the Academy's report, "Making the Nation Safer." In the course of that, I received, with my panel, many briefings, and there is just no question in my mind—

and I am sure in almost everyone in this room's mind—that the supreme terrorist threat really is a nuclear weapon detonated in one of our cities.

In every study I saw, and I saw lots of them, it is hard to avoid at least 100,000 casualties. So somewhere like that is the minimum that you start with, plus, you know, all the psychic damage, lingering radioactivity. It is a scenario we have just got to prevent.

A point I want to make is that we want to support DNDO as much as we can, but the title says "domestic," and the biggest part of this problem and where I think the biggest payoff is is overseas. And so, as we try to support DNDO and homeland security, we want to be sure that the overall balance of our efforts to defeat nuclear terrorism includes these important offshore activities.

For example, the work on materials protection and accountability that the U.S. has sponsored in the former Soviet Union has been extremely helpful to our security, and huge numbers of kilograms of highly enriched uranium are secure now that weren't when that program started. We want it to continue.

I certainly think that DNDO is doing the right thing by putting most of its focus on nuclear explosives and not dirty bombs. We certainly don't want the dirty bombs going off, but every study I saw when I was on the panel that wrote nuclear and radiological threats for the Academies indicated that it was unlikely that anyone would be killed by the radiation from a dirty bomb, although certainly the explosive itself was very dangerous. There are many things that need to be done there, and I think DNDO has the balance about right.

Also, you know, we have to be realistic about detection. There are not going to be breakthroughs with the detectors that we know about. There were questions earlier about sodium iodide and germanium detectors. These are pretty mature technologies, and a lot can be done to improve the engineering of these, but they are not going to be breakthroughs. They will be better; there may be replacements that don't require so much cooling and may be easier to ship around and maintain, but don't expect miracles.

Another thing I urge you to do is, I put a Web site in my testimony that you can click on and see a picture of Harold Agnew, former Director of Los Alamos on Tinian Island, holding the core of the Nagasaki bomb. Have a look. It is this big; you know, it is the size of a lunch box. He is quite happy. He has no radiation problem, and there isn't much radiation in these materials so we have a hard job ahead of us.

I will not say any more, since I have almost run out of time and I don't want to cut into my colleague's time here. So thank you very much for your attention. I will be happy to answer questions.

Mr. LINDER. Thank you, Dr. Happer.

[The statement of Mr. Happer follows:]

PREPARED STATEMENT OF WILLIAM HAPPER, PH.D.

Chairman King and members, thank you for the opportunity to appear before the Committee on Homeland Security's Subcommittee on Prevention of Nuclear and Biological Attack to testify on the how the US Researach and Development (R&D) efforts are going in the area of countering nuclear terrorism. I am particularly interested in how well these efforts track the Recommendations of the 2002 National Academies Report, "Making the Nation Safer: The Role of Science and Technology in Countering Terrorism." I was the chair of the panel that wrote the chapter on Nuclear and Radiological Threats in that report. Ours was the first chapter after the introduction, and this reflected the consensus of the National Academies that the supreme terrorist threat to the United States is the detonation of improvised or stolen nuclear weapons in our cites.

My name is William Happer, and I am the Cyrus Fogg Brackett Professor of Physics at Princeton University. Though my present home is Academia, I have a long history of participation in national issues. I served as the Director of the Department of Energy's Office of Energy Research (now the Office of Science) from 1991—1993. I have been a member of the JASON group since 1976, where I first became acquainted with issues associated with nuclear weapons. I serve on the boards of a number of not-for-profit organizations, including the MITRE Corporation. I was a co-founder of a successful medical imaging startup company, Magnetic Imaging Technologies, Inc., which was based on technology developed by my academic research group over the years. Perhaps most pertinent to this testimony, I served as a member of the Science and Technology Advisory of the Department of Homeland Security's Directorate of Research and Development, so I had a good opportunity to observe DHS's research and development activities while the advisory committee functioned.

During the time I served on that committee the Domestic Nuclear Detection Office (DNDO) was established in DHS, and much of my testimony will be focused on how well I think DNDO is doing. I offer several observations for the committee's consideration. These represent my personal views, and not necessarily those of the organizations with which I am associated.

Observation 1: The DNDO is addressing the supreme terrorist threat to our country, the detonation of an improvised or stolen nuclear weapon in one of our cities. While preparing to write its report, The National Academies Panel on Nuclear and Radiological Threats that I chaired received many briefings on research and development projects related to this area. What we learned, much of it at the classified level, left no doubt that the consequences of a terrorist nuclear weapon detonated in a US city would be at least 100,000 prompt casualties, unprecedented property damage, and lingering consequences from radioactive contamination. Helping to prevent these nightmare scenarios is DNDO's most important job, so we should support them in every way we can.

Observation 2: A big part of stopping nuclear terrorism should be activities beyond our shores. Unlike many non-nuclear explosives, or agents for chemical and biological terrorism, neither highly enriched uranium (HEU) nor plutonium can be made without massive infrastructure that could not be supported by a terrorist organization. The special nuclear materials will have to be acquired from states that already possess that infrastructure. The first and most effective line of defense from nuclear terrorism is to prevent terrorist organizations from acquiring special nuclear materials in any way ? for example, from state sponsors, by theft, armed robbery, or by purchase on the black market.

Nuclear weapons and special nuclear materials in the United States are very carefully controlled, so the most likely sources of nuclear weapons or the materials to improvise them will be in foreign countries. Stopping special nuclear materials at their foreign sources is beyond the mandate of DNDO, but as we support DNDO's activities, we should also be sure that those government agencies and programs, charged with keeping these materials out terrorist hands, are appropriately supported. For example, the work on Materials Protection and Accountability that the US has sponsored in countries of the former Soviet Union has made a very important contribution to our nuclear security. I hope that this committee will work other Congressional committees to optimize the entire defense strategy against nuclear terrorism, both the domestic and foreign components.

Observation 3: DNDO should put most of its focus on nuclear explosives, not radiological dispersal devices (dirty bombs). The dispersal of radioactive materials with conventional explosives has gotten a lot of press attention, and we certainly would like prevent the use of a "dirty bomb" like this. But study after study has concluded that dirty bombs are not a very good terrorist weapon. The radiation from the bomb is unlikely to kill anyone, although the dispersing explosive could be lethal. No doubt there would be great public alarm, well out of proportion to the actual damage of a dirty bomb, and it is appropriate to make plans to deal with this, in advance. For example, a more scientific approach to what constitutes radioactive contamination would be very helpful. Because of the higher elevation, the background radiation dose in Denver is several times higher than in New York City or Washington. With good reason, residents of Denver do not worry about this. But with present regulations and public pressure, we might be forced to declare parts of east-cost cities uninhabitable where the residue from a dirty bomb raised the background radiation levels to those of Denver. This would be silly. It would be much easier to make that point now than after an incident. I believe that DHS through its various agencies is already addressing this problem, and they should continue.

The large amounts of radioactive material needed to make a dirty bomb are much easier to detect than the relative feeble signals from HEU or plutonium. But a massive national network of detectors to make life hard for dirty bombers is not a good use of limited resources of funds and competent people. We should certainly consider such a network if it could be effective against real or improvised nuclear weapons in terrorist hands.

Observation 4: Detecting nuclear weapons is very hard. Recalling 1946 Senate testimony by Robert Oppenheimer, Kai Bird and Martin J. Sherwin (April 25, 2005 issue of The Nation) wrote:

> Sometime that year he was asked in a closed Senate hearing room "whether three or four men couldn't smuggle units of an [atomic] bomb into New York and blow up the whole city." Oppenheimer responded, "Of course it could be done, and people could destroy New York." When a startled senator then followed by asking, "What instrument would you use to detect an atomic bomb hidden somewhere in a city?" Oppenheimer quipped, A screwdriver [to open each and every crate or suitcase]."

What was true in 1946 remains true today. It is very difficult to detect special nuclear materials without very close inspection.

Both uranium, and especially plutonium, are radioactive. Their gamma radiation and neutrons can penetrate many packaging materials. Given close access to the uranium or plutonium, sufficient time, and good passive detectors of gamma rays or neutrons, it is possible to identify special nuclear materials. The energy spectrum of the gamma rays is especially useful. But HEU has a very feeble signal and is especially hard to detect. And while plutonium is much more radioactive than HEU, it can be effectively shielded. Lead is a very good shield for gamma rays. It is worth remembering that the sailors of our ballistic missile submarines bunk close to plutonium-containing warheads, but the locations and shielding are such that the sailors do not receive an unacceptable dose of radiation during their sea duty.

Instead of relying on the self-radioactivity of SNM, there have been many proposals to use active probes that irradiate suspicious packages with x-rays, gamma rays or neutrons. I believe that DNDO is sponsoring work on a number of these active devices, and it is entirely appropriate that they do so. We need to assess how well active probes could work in practice.

Given the resourcefulness that terrorist organizations have shown in the past, one would have to assume that they will make every effort to avoid instrumented ports of entry. For example, to avoid detection at unexpected instrumented sites, the SNM could be shielded, or it could be divided into smaller, harder-to-detect pieces to be assembled later in a location that is safe for the terrorists. At the website, *http://www.lanl.gov/history/people/agnew.shtml* you can see a picture of the core of the Nagasaki bomb, held by Harold Agnew, a former director of Los Alamos on Tinian Island. The point is that Harold had no difficulty holding the package, about the size of a shoe box, in his left hand. While somewhat larger amounts of HEU are needed for a bomb than Pu, the materials we need to intercept are not very large and they are relatively easy to conceal and to envelop in radiation shields.

Observation 5: Improvements, but no breakthroughs, can be expected from R&D work on passive detectors. I occasionally read about the need for a Manhattan Project to improve nuclear radiation detection. I am sure that worthwhile improvements in passive detectors are possible, but these are almost certain to be incremental and not breakthroughs. To add a little substance to this discussion, recall that the two most common types of gamma-ray detectors are scintillation detectors and solid-state detectors.

In scintillation detectors the gamma ray is absorbed in a transparent material and produces scintillation, a flash of light in the material. The light flash reveals that the gamma ray has been absorbed and the brightness of the flash can be used to estimate the energy of the gamma ray. Typical scintillating materials for gamma-ray detectors with fairly good capabilities to measure the energy of the gamma ray are crystals of sodium iodide or cesium iodide with trace impurities to increase the brightness of the light flash. A big advantage of most scintillation detectors is that they operate at room temperature and require no special cooling. The main disadvantage is the limited ability of scintillation detectors to measure the exact energy of the gamma ray.

In a second type of detector, the solid-state detector, the gamma ray releases electric charges in a semi conducting material. The pulse of current from these charges reveals the presence of the gamma ray. The amount of charge collected is an excellent measure of the gamma ray's energy, much more precise than for a scintillation detector. The high energy resolution makes it possible to unambiguously identify uranium, plutonium and even the isotopic composition of these materials if they are present in sufficient quantities and there is sufficient time for the measurement. A disadvantage of solid-state detectors is that the best ones, for example, intrinsic high-purity germanium, need to be cooled to liquid nitrogen temperatures.

Both types of detectors have been the subject of many years of research and development. But a focused R&D program on passive detectors could lead to improvements in performance and better suitability for DNDO systems. For example, one could probably develop uncooled semiconductor detectors, by using semiconductors with larger band gaps than germanium, but this would come at the unavoidable cost of somewhat poorer energy resolution.

We live in a radioactive world and a gamma ray detector will also detect cosmic rays coming through our atmosphere from outer space, and ionizing radiation from naturally occurring materials. Granite building stone normally includes lots of uranium and thorium, and even bananas or people, with their naturally occurring content of radioactive ^{40}K, are noticeably radioactive and will trigger counts in gamma detectors. A good passive detector for finding special nuclear material will also be a good detector of background radiation. If the expected number of counts from the background is much larger than that of the package containing HEU or plutonium, no amount of detector improvement will help.

Neutrons can also be detected passively, and once again, there has been a great deal of work done over the past half century to improve the performance of neutron detection. Again, I see the possibility of modest improvements in passive neutron detectors but not breakthroughs.

Observation 6: Bigger improvements can be expected from R&D on active detectors than for passive detectors. An active detector uses some external probe to look special nuclear materials. For example, the probe could be a beam of x rays, gamma rays or neutrons. There has been much less work, over the years, on active detectors of special nuclear materials than on passive detectors. So there is more room for improvement here, especially in reducing the cost and making the packages more readily deployable at ports of entry. Active detectors will tend to be much more costly and cumbersome than passive detectors, since the equipment to make the probing beams is often expensive and additional passive detectors are needed as part of the overall system.

Observation 7: It is important to subject both passive and active detectors of special nuclear materials to rigorous experimental testing. Testing detectors for special nuclear materials under realistic conditions will be essential for real progress. Such tests are quite difficult to do. I already mentioned the need to keep special nuclear materials out of terrorist hands. An obvious place for terrorists to acquire such materials is where tests are being done with them. So realistic testing must be done with completely reliable security measures. Before the formation of DNDO there were plans to build a test facility at the Nevada Test Site, where there is long experience in handling special nuclear materials and real nuclear weapons. This was going to be an expensive facility, but I thought it was a good idea, and I hope that these plans are still on track.

Observation 8: An appropriate amount of funding should be set aside for basic research on radiation detection. In my previous observations I have focused on very near-term responses to keeping nuclear weapons out of the US. I think that a focus on these near-term problems is appropriate, given the immediate threats we are facing. But I would urge DNDO to champion a certain amount of basic research that is only loosely related to near-term radiation detection. Most of the instruments that DNDO is using now originated in basic research in nuclear and particle physics. Supporting high quality basic research on radiation detection would be a very wise investment. For example, some of the most exciting mysteries facing contemporary physics and astronomy are the nature of neutrinos. Of all currently known radioactive decay products, neutrinos are hardest to detect. Modest support of basic research in neutrino detection would be perfectly sensible for DNDO or one of its partner agencies with the mission to defeat nuclear terrorism. Another great mysteries of physics and astronomy is the nature of the missing matter in the universe. Several academic groups are pushing the limits of radiation detectors in hopes of detecting this missing matter through hypothetical and extremely rare ionizing events. Dating geological samples with the feeble signals of parent and daughter radioactive isotopes is also an area where technology of interest to DNDO is being pushed to its limits.

DNDO should also support research on improving the detectors we already have. For example, some very promising new materials, both scintillators and solid state detectors, are currently impractical because no one knows how to grow the necessary high-quality crystals affordably and reliably. But this is not what I mean by basic research for the long term. It is hard to keep the most imaginative and motivated people working exclusively on improvements of existing detector technology, since the work does not lead to much peer recognition, publications in prestigious journals or to the excitement of discovery of previously undetectable types of matter.

If history is any guide, the sort of breakthroughs that could make DNDO much more effective in the long term are most likely to come from some unexpected finding in basic research. But since the timing of such breakthroughs is completely unpredictable, the best strategy is to focus on what can be done in the near future with existing or incrementally improved detectors, while keeping some modest fraction of the budget set aside for basic science that is loosely related to DNDO's goals.

Observation 9: An institutionalized red team should be part of DNDO. A planned nuclear attack on the US would probably be staffed with the most capable and technically competent terrorists who could be recruited by the parent organization. They will not be former proprietors of falafel stands, but they will include people trained in nuclear physics. Such experts would work to maximize the likelihood that a nuclear weapon can be successfully smuggled into the US. The US needs a red team of highly competent people that is assigned the same job—to defeat our national radiation detection system. Of course the findings of the red team should be classified, but the team should be encouraged to think expansively and with no constraints. Not only should they consider attempts to smuggle HEU through the instrumented San Isidro crossing near San Diego, but they should consider someone getting the small amounts of material needed across the long US land borders with Mexico or Canada, most of which is very loosely monitored. We have an extensive and beautiful coastline, and small boats regularly set out and return from uninstrumented harbors for deep sea fishing trips. DNDO needs avoid building a Maginot network of radiation sensors that invites the classic response to fixed defenses—to go around them.

Observation 10: DNDO needs a technically competent, independent advisory committee. DNDO should be required to seek advice periodically from independent advisory groups on both the scope and size of their efforts. When I served as the Director of Energy research in the Department of Energy from 1990 to 1993, I and my staff benefited from a number of very knowledgeable advisory groups. We did not always like their advice, but we often got very valuable and timely knowledge about science and technology developments we had missed because of the time pressures on those who work in the federal government. Such a group could provide the agency and the Congress with an independent assessment of the how well the DNDO programs are doing and of the resources needed to sustain an effective national effort.

Observation 11: DNDO needs appropriate and stable funding. Finally, the effectiveness of the DNDO effort will depend to a large extent on the adequacy, both in terms of magnitude and constancy, of the funding provided to undertake the work deemed to be important to homeland security. Regrettably, the threat of nuclear terrorism seems destined to remain with us for many years—technological capabilities to inflict massive harm on U.S. populations are becoming increasingly widespread and potentially accessible to terrorists worldwide. It will be necessary for the United States to mount an aggressive, long-term counter-terrorism R&D effort to stay at least one step ahead of terrorist capabilities.

This concludes my testimony to the committee. I would be happy to clarify my comments or answer committee members' questions. Again, thank you for the opportunity to testify.

Mr. LINDER. Dr. Atlas.

STATEMENT OF RONALD ATLAS, Ph.D., AMERICAN SOCIETY OF MICROBIOLOGY

Mr. ATLAS. Mr. Chairman and members of the subcommittee, I am pleased to present testimony on behalf of the American Society For Microbiology concerning the biodefense research and development activities of the Department of Homeland Security.

One of the Department of Homeland Security biodefense responsibilities, articulated in Homeland Security Presidential Directive 10, Biodefense for the 21st Century, is to play a lead role in environmental detection which has meant the implementation of the BioWatch system. Besides developing the science means for this system, DHS's S&T Directorate actually funds the operational costs, and currently that is about a third of their biological countermeasures budget.

It is a substantial cost to the program, which raises the issue for us of ensuring that the operational costs, as those rise, do not interfere with the necessary R&D efforts of the directorate for future biological threats. We think that BioWatch and the environmental detectors that it employs need to be evaluated on a regular basis if the public health community that is to respond to any signals is to trust those systems and know how to respond.

The Department of Homeland Security S&T Directorate also operates the Plum Island facility where infectious agents of agricultural importance are studied. Indeed, as "Making the Nation Safer" pointed out, agroterrorism is a significant threat to the Nation. Because Plum Island needs upgrading, there is consideration being given to moving that site to the mainland where it could, in fact, foster interactions among leading scientists from various academic excellence centers. That, we think, can be done safely, but the Congress will need to recognize that the most critical pathogens, such as the virus for foot-and-mouth disease currently under U.S. statute can only be studied offshore. So we are going to need congressional action if we, in fact, relocate the site to the mainland.

I would point out that the Department of Homeland Security Centers for Excellence are creating a university-based resource for our biodefense efforts, and it is our feeling that these need to be allowed sufficient time to develop and nurture. In this regard, we are concerned about the proposed provision in the Senate's version of the fiscal year 2007 Homeland Security appropriation bill that would preclude universities from recompeting for funding as Centers for Excellence. In contrast, it is our belief that Congress should be seeking sustained excellence, and therefore, we should be assessing these centers carrying out the necessary peer review, but then allowing them to move forward.

Many of the provisions of HSPD–10 involve coordination by the Department across multiple agencies, and this is absolutely critical, as we heard earlier, in efforts like BioShield and other biodefense efforts carried out by NIH and other agencies in guiding and providing the necessary strategic guidance for those programs.

Much of our concern today centers around the ability of the DHS and, specifically, its S&T Directorate to obtain critical science advice. This has also been expressed by the National Academy on recent reports. We do know, at DHS's request, the Academy established a Committee on Biodefense Analysis and Countermeasures to advise on national biodefense countermeasure systems of DHS. Hopefully, that will function very well. It is absolutely essential if we are to have international partners not suspecting that the U.S. biodefense program is, in fact, a centrifuge for elicit activities.

I guess my time is almost up. As Dr. Happer indicated, he and I did serve on Homeland Security's Technology Advisory Committee, which had been mandated by the Congress. When the date for the charter of that committee ran out, its activities were suspended, and I would urge this committee and the Congress, in fact, to reauthorize that committee. It was a committee, I think, that— Dr. Happer and I would tell you, it included the full span of individuals from scientists like ourselves through physicians in public health through the chief of police to the firefighters, so that we were able to provide the under secretary the true end-to-end assessment of the Department's activities that I think are truly critical.

In final conclusion, I think I would urge the directorate to reach out to the scientific community to help guide its efforts; and while that is difficult when, in fact, secrecy needs to be maintained, I still think, and the ASM thinks, that the peer review system can work and help to ensure that the R&D efforts of the S&T Directorate are of the highest quality and that we are fully engaged with the Department in trying to protect the Nation against acts of bioterrorism.

I and the American Society for Microbiology stand ready to help the Department in any way we can in those efforts. Thank you.

Mr. LINDER. Thank you, Dr. Atlas.

[The statement of Mr. Atlas follows:]

PREPARED STATEMENT OF RONALD M. ATLAS, PH.D.

Mr. Chairman, members of the Subcommittee, my name is Ronald Atlas and I am pleased to present testimony on behalf of the American Society for Microbiology (ASM) concerning research and development activities of the Department of Homeland Security (DHS). I am Graduate Dean at the University of Louisville, where I also co-chair the Center for Health Hazards Preparedness. I also co-chair the Committee on Biodefense of the ASM Public and Scientific Affairs Board. The ASM is the largest single life science society with more than 42,000 members, and its principal goal is the study and advancement of scientific knowledge of microbiology for the benefit of human welfare. ASM members are involved in research, clinical, and public health efforts, focused on developing new preventions, therapies, and cures for infectious diseases.

The ASM supports and encourages the efforts by the DHS Science and Technology (S&T) Directorate to provide effective programs that protect our nation against bioterrorist threats. Science and technology play a critical role in homeland security whether disasters are caused by terrorist or natural events. DHS has made significant strides to improve cutting-edge technology and systems that enhance emergency response capabilities. We believe, however, that the nation's scientific community can and should be better engaged by DHS in this effort to ensure that the best approaches are developed and employed to protect against the potentially catastrophic effects of bioterrorism. In this regard, the ASM strongly supports the recommendations of the National Academy of Sciences (NAS) to increase the involvement and guidance of the broader scientific community with the DHS. The need for greater scientific input is particularly important because of DHS's role in making risk assessments about biothreats that identify countermeasure needs not only for the R&D programs of DHS S&T but also for the public health programs at other agencies, including the Department of Health and Human Services (HHS).

It is important that the DHS S&T Directorate build public confidence in its activities, that they be effectively coordinated with other federal agencies with a biodefense focus, and that they be based on sound science policy. In our view, it is especially important for the DHS S&T Directorate to have clear and robust peer review processes to ensure the merit and high quality of its biodefense-related research programs. We urge Congress to reauthorize the charter for the Homeland Security Science and Technology Advisory Committee (HSSTAC) and also for the DHS to establish appropriate external advisory panels. Our testimony will also focus on the need to improve threat assessment and other DHS assigned activities through greater engagement with the scientific community, including greater involvement of peer review; the need for funding for the DHS university based Centers of Excellence, fellowships and training programs to encourage students to pursue areas of study related to homeland security; the need for more R&D on environmental detectors; the continuation of efforts to improve the BioWatch system of environmental surveillance; and the need for a centralized animal health organization.

DHS Should Develop a Strategic Plan and Seek Scientific Input to Set Priorities for Funding

The terrorist events of September 11, 2001, and the subsequent anthrax attacks led to a substantial restructuring of government agencies to defend against terrorist attacks. Part of that change was aimed at bringing forth the best efforts of the scientific, medical, public health, and engineering communities to meet these national needs. In June 2002, the Administration proposed to establish the Department of Homeland Security (DHS), and the Congress quickly mandated the DHS through the Homeland Security Act of 2002. This Act provides for an Undersecretary for Science and Technology to oversee DHS research activities aimed at developing countermeasures for acts of terrorism, including bioterrorism.

To refine the specific responsibilities of the DHS in defending against bioterrorism, the Administration issued Homeland Security Presidential Directive 10 (HSPD–10), Biodefense for the 21st Century. According to that Directive, "The Department of Homeland Security, in coordination with other appropriate federal departments and agencies, is developing comprehensive plans that provide for seamless, coordinated federal, state, local, and international responses to a biological attack." The ASM believes that HSPD–10 establishes an appropriate division of responsibilities in the area of biodefense and that DHS has an appropriate lead role in formulating coordinated plans.

The ASM believes that development of those plans requires critical inputs from the scientific community. The ASM also agrees with the House and Senate Homeland Security Appropriations Committee directives calling for the DHS to develop a strategic plan that delineates how it will coordinate with other federal agencies involved in biodefense. Importantly, the development of that plan requires critical input from the scientific community. The strategic plan also should be published in the Federal Register for review and comment.

The DHS Needs To Interact More Fully with the Scientific Community

Soon after the anthrax crimes in 2001, the National Academies of Science (NAS) undertook a comprehensive study which provided advice on protecting the nation against bioterrorism. The report, "Making the Nation Safer: The Role of Science and Technology in Countering Terrorism," includes chapters, that I and other members of the ASM, helped to write. It recommends a series of actions, including the development of new tools for the surveillance, detection, and diagnosis of bioterrorist threat agents; greatly expanded research programs aimed at increasing our knowledge of pathogenesis of and immune responses to biological agents; and research critical to deterrence, response, and recovery, particularly in areas involving decontamination and bioterrorism forensics.

Many recommendations in that report by the NAS were incorporated into the DHS R&D agenda. Moreover, the Congress assigned critical segments of those public health and research programs to the HHS. Thus, DHS plays a strategic role in defining the threat and identifying needs for vaccines, therapeutics, diagnostics and detection and warning systems while the HHS maintains the major role in researching and stockpiling vaccines and therapeutic agents to protect the public against disease agents that could produce mass casualties through a bioterrorist attack.

The ASM strongly supports the HHS continuing to play this critical biodefense R&D function. Specifically, the ASM supports the lead role of the National Institutes of Health (NIH) and the National Institute of Allergy and Infectious Diseases (NIAID) in basic research and training and research resources, including an emphasis on translating basic research into the development of critical vaccines, diagnostics and therapeutics to combat infectious diseases and agents of bioterrorism.

Congress and the Administration appear to agree that major funding for biomedical research for biodefense should remain in the HHS. The ASM supports this approach because robust linkages between NIAID and the wider scientific community ensure that the best researchers are engaged in biodefense research. Moreover, the strong peer review system of the NIH further ensures the high quality of this research, and is suited to integrating basic biomedical research investigating emerging and re-emerging infectious diseases with other more applied research that will be needed to protect human health and national security against the threat of bioterrorism. By establishing Regional Centers of Excellence, NIAID is fostering efforts in both the academic and private sectors to develop defenses against a variety of infectious diseases—from anthrax to avian influenza. This capacity to derive dual benefits from research investments is proving critical for advancing human health and for meeting national security needs.

While supporting the paramount role of the NIH/NIAID in overseeing research to protect against infectious diseases and bioterrorism, the ASM also supports the strategic role of DHS in biodefense. That role includes prioritizing investments in biodefense-related research, development, planning, and preparedness. Biannual risk assessments should guide the setting of those priorities. However, the ASM is concerned that the DHS and the intelligence community are not adequately involving the broader science community in making threat assessments. This concern also was expressed in the NAS report, "Globalization, Biosecurity, and the Future of the Life Sciences," which calls for strengthening and enhancing the scientific and technical expertise within and across the security communities.

The ASM recommends stronger interactions among the DHS, intelligence, and scientific communities to develop a broad consensus on biothreats and to provide appropriate strategic guidance to the DHS S&T Directorate and the HHS Office of Public Health Emergency Preparedness. Such a consensus will also help to guide the Project BioShield countermeasure procurement process and the research agenda. The ASM and the broader scientific community stand ready to provide the guidance needed for developing medical countermeasures.

The DHS Centers of Excellence and Training Programs Need Sustained Support

The DHS has established six Centers of Excellence to create a university based capacity to engage the expertise of academia in addressing the science and education needs of the department. Ongoing merit review and evaluation of the work of these centers assures high quality performance and focus on the evolving needs of the DHS. Even in their formative phase, the value of the centers is being recognized as well as the need for eligibility for sustained support that will lead to dual benefits by meeting both national security as well as public health needs. The centers should be allowed sufficient time to demonstrate their contributions to the DHS S&T mission and at the local and state levels to enhance planning, prevention and emergency response. In this regard, we are concerned about the proposed provision in the Senate's version of the FY 2007 Homeland Security Appropriation bill that would preclude universities from re-competing for funding as a DHS Center of Excellence. In contrast, we believe that Congress should be seeking sustained excellence. We believe that the activities of these centers, as well as all other R&D activities of DHS S&T, can and should be assessed by continuing ongoing rigorous peer review to assure the public of their value.

The ASM considers fellowship and training programs an essential activity for DHS S&T to encourage students to pursue areas of study related to homeland security. While it is still too early to judge the outcomes of the fellowship support programs of DHS, it appears that they are attracting high quality students who can participate in the future protection and security of the nation. Like the Centers of Excellence, the ASM believes that these training programs need time to develop and should be supported and regularly assessed.

The ASM also believes it is important to build career tracks for those considering a career in DHS. As part of its training initiative, DHS should consider building a program modeled after the two-year epidemic intelligence service (EIS) program at CDC, begun soon after the inception of that agency. This program has led to a steady flow of bright young talented professionals in diverse fields, which have populated many of the leadership positions in CDC and in parallel state agencies in the following years. These EIS graduates have served the government in the field of public health with remarkable competency through the decades, and a similar program should be valuable for DHS.

Maintain NAS Committee that Advises the DHS and Strengthens Peer Review of DHS S&T programs

The ASM supports the role of the NAS Committee on Biodefense Analysis & Countermeasures, which was formed following a request from the DHS, in advising the department on technical issues and studies related to the DHS National Biodefense Analysis and Countermeasures Center (NBACC). The NBACC is managed by the DHS S&T Directorate and is part of the national interagency Homeland Security Biodefense Campus at Fort Detrick.

NBACC programs provide knowledge of infectious properties of biological agents, effectiveness of countermeasures, decontamination procedures, and forensics analyses to support policy makers and responders in developing policies, programs, and technologies. The technical advice from this committee should be viewed as critical for the NBACC to achieve its mandate in conducting biodefense R&D.

The ASM believes that the advice from the Committee on Biodefense Analysis & Countermeasures can help to allay concerns that have been raised about public oversight of the NBACC activities. In particular, this committee should help to address compliance issues regarding the Biological and Toxin Weapons Convention (BWC), which permits research only for defense against biological weapons. Oversight of such activities in federal facilities is very important for maintaining transparency and international confidence in the legitimacy of US biodefense programs.

Going beyond the role of the Committee on Biodefense Analysis & Countermeasures, the ASM recommends that the DHS and the NBACC have a formal peer review system—one that will have to balance secrecy requirements with the need for transparency to ensure the quality of research and development programs as well as and the legitimacy of the NBACC threat characterization efforts. Properly designed studies, formal advisory boards, and a robust system of peer review will reassure the Congress and the public of the value of the DHS S&T and NBACC investments. Coordinating the appropriate biodefense-related NBACC and HHS efforts is also important.

Congress Should Reauthorize the DHS Homeland Security Science & Technology Advisory Committee

The Homeland Security Act of 2002 directed the Secretary of the Department of Homeland Security to establish the Homeland Security Science and Technology Advisory Committee (HSSTAC). However, the DHS disbanded the HSSTAC as soon as the Congressional mandate for this committee expired. The ASM urges the Congress to reauthorize the HSSTAC charter. This committee, on which I served, brought together scientists, physicians, members of the business community, and first responders to provide the Undersecretary for S&T with broad advice and technical support.

The DHS and FBI Should Work Together on Microbial Forensics

The Administration designated NBACC the lead federal agency for forensic analysis of materials recovered following a biological attack. This is a new field of microbiology that requires coordination among scientists from several disciplines along with the law enforcement community. Separately, the FBI established a Scientific Working Group on Microbial Forensics to provide advice on the development of forensic methods and protocols, particularly those that can meet standards suitable within the US legal system. Although the DHS participates in those advisory meetings, it has not established a comparable advisory group. In the interest of addressing these important national biodefense needs, the ASM recommends that the DHS work more closely with this FBI Scientific Working Group and also consider establishing its own external microbial forensics advisory group.

BioWatch, Environmental Detection, and Decontamination Need Ongoing Assessments

Environmental detection is a critical activity for the DHS S&T. Early detection of infectious diseases—whether from natural outbreaks or bioterrorist attacks—is critical for curtailing morbidity and mortality. In terms of medical diagnoses, we rely on the medical and public health communities, giving a key role to the federal Centers for Disease Control and Prevention (CDC) for recognizing suspicious disease outbreaks.

For bioterrorism, however, early environmental detection can avert the catastrophic spread of disease or facilitate early treatments. The DHS S&T implemented the BioWatch system in several major cities to detect biothreat agents that can spread as aerosols. The DHS S&T Directorate funds the operational costs of the BioWatch system, which currently represent about a third of the S&T biological countermeasures budget. Because of the substantial cost of Biowatch within the S&T biological countermeasures budget, we must ensure that it does not divert funding from core research and development activities. Thus, we recommend that Congress and the Administration ensure the adequacy of the funding of S&T R&D activities to protect against future biological threats.

We further recommend that the DHS S&T Directorate focus on the research and development efforts needed to provide the nation with optimal environmental detectors. In particular, more research and development is needed to build a better system—one that could provide instantaneous accurate detection. Progress upgrading the current detection system and making it more cost-effective will help toward gaining the full confidence of the public health community. To meet the expectations of BioWatch the ASM recommends that this program, and the environmental detection systems it employs, be evaluated on a regular basis to determine their general effectiveness and reliability. As with other DHS S&T programs, the ASM believes that BioWatch should have a peer review system to ensure that it focuses on the most significant biothreat agents.

Although the Environmental Protection Agency is assigned the lead role, the DHS S&T should continue to play a critical role developing decontamination systems. Several DHS systems for environmental detection and decontamination are based on programs under way at several of the Department of Energy National Laboratories. Although seemingly innovative, these programs and the prototype detection systems that they are producing should be subject to rigorous peer review to ensure their quality. Lacking such review, the broader community may not develop confidence in these systems when a warning goes off or a facility is said to be decontaminated following a bioterrorism attack.

Finally, the Administration assigned major public communication responsibilities to the Department of Homeland Security. With other appropriate federal departments and agencies, the DHS is charged with developing comprehensive communication strategies in the event of a bioterrorism attack. However, the NAS study, "How Clean is Safe," concluded that public acceptance of status reports is inevitably based on whether they trust what government officials tell them. Thus, communications from DHS need to be credible if they are to be effective. The best methods for decontaminating facilities and the finest techniques for detecting bioterrorist outbreaks are of little use if the public does not believe in them.

Centralized Organization for Animal Health Issues Needed

Agriculture can be the target of bioterrorist attacks. The NAS report, "Making the Nation Safer," recommended establishing a centralized animal health surveillance organization equivalent to the CDC. It also recognized the need for increased R&D efforts to protect our food resources. The DHS S&T Directorate established two academic Centers of Excellence, one at Texas A&M University and the other at the University of Minnesota, for addressing agro-security issues. The DHS S&T Directorate also operates the Plum Island facility where infectious agents of agricultural importance are studied.

We need a first class facility where the most dangerous animal pathogens can be studied. Because the Plum Island facility needs significant upgrading, DHS is considering a number of alternate, more cost-effective, and more readily accessible sites for a facility. Constructing and operating an animal health facility on the mainland can be done safely; however, it may require the Congress to enact legislation permitting several animal pathogens, including those responsible for foot and mouth disease and rinderpest, to be studied on the US mainland. Such research is critical for the development of vaccines, therapeutic drugs, and detection methods to protect against diseases that could severely damage US agriculture and our economy. To foster the highest quality research it will be advantageous to have the facility interact with the NIH and DHS academic Centers of Excellence on key areas of research.

Conclusions

In conclusion, the ASM supports the critical roles given to DHS by HSPD–10 which make the DHS S&T programs of central importance for making the nation safer against threats of bioterrorism directed against humans and agriculture. We believe that HSPD–10 appropriately distributes shared responsibilities across the Federal government assigning to DHS a critical coordination role that is essential for defending the nation against a bioterrorist attack. The ASM strongly supports recommendations from the NAS to increase the involvement of the broader scientific community in assessing specific bioterrorist threats and, more generally, in guiding the efforts of both the DHS and the HHS in developing detection systems, medical countermeasures, decontamination methodologies, and other biodefense-related measures. Improved intelligence and threat characterization are also critical to these efforts.

The DHS S&T Directorate should reach out to the scientific community to help guide its efforts. Without such input, it will be difficult to build an effective public health response, one that the medical community and the public will trust. We think that the DHS should have robust peer review systems to guide its S&T efforts and to ensure the quality of its R&D efforts. We urge the Congress to reauthorize the charter for the HSSTAC and for the DHS to establish additional external advisory panels to guide its R&D efforts. We recognize that the need for secrecy may conflict with the need for broadly based peer evaluations, but believe that these difficulties can be overcome. We strongly believe that DHS should provide enhanced support for agrosecurity since they are charged with this responsibility and the area is critically important to biodefense. The ASM stands ready to assist the DHS S&T directorate as well as all other agencies involved in defending our nation against bioterrorism.

Mr. LINDER. Dr. Atlas, do you agree with Dr. Happer that the supreme threat to this country is a nuclear explosion?

Mr. ATLAS. I think that there is a difference between biologists and my colleagues in nuclear physics in that the biologists think that some agents can equal—maybe not exceed, but equal a nuclear threat; and they are easier to obtain and develop. So we have seen biological on a par at points with nuclear.

But I think, as Dr. Happer said—the comments I heard suggested a dirty bomb is not up there and, likewise, the chemical threats are not at the same level, so that when we were advising the previous under secretary on the committee, I think biological and nuclear kept rising to the top.

And, Will, you may or may not agree with that. But those two stood out above, in my mind, the other sorts of threats that we face. Which is not so say that we didn't suggest to the under secretary that the more common, not mass-casualty sorts of weapons, like conventional bombs needed real concern by the Department. We were on board with that.

Mr. LINDER. I happen to agree with you that nuclear and biological are at the top of the list. It makes me curious as to why we spend one out of eight of our dollars for homeland security on airline protection and less than 2Rrcent on intelligence, which is the only thing that is going to bring us a breakthrough on the spread of nuclear and biological intelligence.

It does seem to me that our priorities are not very rational.

Dr. Happer, if you would agree that one of the threats to us is financial, how can we cripple this country financially? A dirty bomb in Lower Manhattan may not kill a lot of people immediately and it may not cause a radioactive disease, but wouldn't just the cleanup effort be hugely costly and take years to do?

Mr. HAPPER. I would be surprised if it would take years to do it.

We recently renovated a building at Princeton that was contaminated with radioactivity from the 1930s, and it cost us several hundred thousand dollars, you know, and we had to pull out some stuff. You wouldn't have wanted to be in the parts that were contaminated before we cleaned it up, but there are companies that do this and have experience doing this. And I personally think that we would handle it.

Mr. LINDER. You go out of your way to tell us that these things are not going to be breakthroughs, that much of the science is mature in radioactive detection?

Mr. HAPPER. That is because I am alarmed about calls for a Manhattan Project. There is no way you can spend that amount of money wisely on radiation detectors.

Mr. LINDER. What could be a breakthrough? What might come along that is totally new?

Mr. HAPPER. Well, one thing I mentioned in my testimony is that if you look at breakthroughs in the past, for example, nuclear weapons themselves, that was an accident, you know; in fact, the hero was a woman. You know, Lise Meitner, who was looking at some work for which Fermi got the Nobel Prize, thinking he had made plutonium; and in fact, he realized, this isn't plutonium at all, this is barium. And nobody thought of that.

You know, but she was a good enough chemist to recognize it, and so it was she really who is responsible for discovering fission.

So these things happen in a very unpredictable way. But to give an example that—you know, the basic science community is now trying to detect neutrino, if you think it is hard to detect highly enriched uranium, plutonium, it is much harder to detect neutrino from the sun and outer space. So I guess, if I were running the program, I would put a little bit of money into very loosely connected science that was pushing the limits on something that was even harder than nuclear material.

So I would support some work on neutrino detection or maybe looking for dark matter—you know, a big mystery, what is it? And again, we have got very bright, motivated, driven people, you know, thinking, how can I detect this? How can I detect this? And I think that is where a breakthrough might come from.

Mr. LINDER. Dr. Atlas, when are we going to reach a point when the BioWatch program is actually use could help avert at least the distribution, as it occurred 5 years ago in the anthrax attacks.

Mr. LINDER. Doesn't this entire program require a human being to go out and pick it up and bring it in and test it? At what point can we get some reading directly off satellites that there is something going on at this point?

Mr. ATLAS. And I think the answer to that is, they would not need major new breakthroughs in technology. We, in fact, have the capability to do autonomous detection of micro-organisms where the samples can be relayed to a central location.

There has been a first-generation BioWatch. There have been other developments under way at DHS; and I think the issue that I raised when I questioned how much effort goes into operation versus how much can be offered in the future generations, in fact, rests there. In my view, some new systems can be made available, are being made available, a plan to replace that first generation. We need to move forward in that way.

Mr. LINDER. Thank you. My time has expired.

Mr. Langevin.

Mr. LANGEVIN. Thank you, Mr. Chairman.

Gentlemen, thank you for your testimony here today.

Dr. Happer, I would like to follow up on a comment you made during your testimony, and the chairman had raised during his questioning period. You said that we shouldn't expect any breakthroughs in the area of nuclear detection technology, and I wonder if you could again just expand on that a little bit, only because we know that technology squares every 18 months.

And, yes, I know that doesn't apply to the laws of physics, but it does apply to technology. So why couldn't we, or shouldn't we, expect breakthroughs in nuclear detection?

Mr. HAPPER. Well, I maybe have misrepresented myself slightly in that I did mention that there is always a possibility of an accidental breakthrough, and we discussed that a few minutes ago. But let's talk about the two detectors that you brought up, which are sodium iodide and high-frequency germanium. Both of those have been around for many decades.

In fact, when I was a student, I counted gamma rays with sodium iodide; and when I look at the detectors today, they are not very different from the ones I used in the 1960s.

And germanium is a little bit newer, and as was mentioned by Mr. Oxford, one of the problems with germanium is just the practicality of always pouring liquid nitrogen in it; so there is a big infrastructure to keep it operating that you don't need for sodium iodide.

So I think, although you might not have a breakthrough, you could have some other material that would not require so much cooling. You would then maybe have not quite as good resolution, but I wouldn't call that a breakthrough. I would call that very, very useful for a system.

What I mean by "breakthrough" is something like the discovery of fission, right, or the discovery of, you know, semiconductors to replace electronic tubes. That is what I had in mind as a "breakthrough."

Mr. LANGEVIN. Thank you.

Gentlemen, this panel focuses obviously on threats usually more characterized as WMD, or to be more specific, CBR, chemical-biological-radiological, or nuclear or explosive; and we have a large number of threats that have to be addressed. Now, the DNDO is focused on nuclear radiological threats while the rest of the S&T Directorate is tasked with chemical, biological and explosive.

The nuclear weapons as, we have mentioned many times here today and in previous hearings, are judged to be the most difficult of these threats to acquire, but also the most catastrophic. So given the relative dangers across the CBRNE spectrum, do you think that the funding priorities of the President's budget of $536 million for DNDO, $83 million for chemical countermeasures, $86.5 million for explosive countermeasures and $337 million for biological countermeasures is the correct balance?

Mr. ATLAS. I think that is a difficult question in that whatever the next attack is, the Congress and the public are going to look and ask, why weren't we adequately protected against that? So whatever we are investing in does seem appropriate. But also I have no doubt we will second-guess it if we are attacked with one of the other weapons; and that, I think, is a difficulty, that—none of us have a crystal ball.

We would like to know where and what the next real threat is going to be. Given that, we place the emphasis on those agents that we think will cause or have the potential to cause the greatest harm; and in that regard, we seem to be appropriately making decisions that nuclear-biological get more than chemical or explosives. But I venture to say, if we started seeing bombs going off on mass transportation systems, the public would be hollering to indicate the question, Why weren't we paying more attention to those? That, I think, is the reality.

Mr. LANGEVIN. Let me take it a step further. Even the right balance maybe is not the right way to approach it.

Are you surprised by how much or how little we are spending on any one of the things that I just read? Does it shock you that we might not be spending more in a particular area?

Mr. HAPPER. Let me try and step in for just a minute here. I do think that we could use some more money spent on conventional chemical explosives not only for our country where, God forbid, we might have something like Madrid or London, but, you know, the War in Iraq where we are losing most of our—you know, troops to improvised explosive devices. And yet if you look at the money that is being spent on conventional explosives, it is very modest.

Now, again, that is a very mature technology. It is a little bit like nuclear detectors. It is hard to make a breakthrough, but we should still probably be trying harder than we are.

Mr. ATLAS. Let me in the biological arena point out, as this committee has noted, we have split responsibilities between DHS and other agencies like HHS; and there is significant biodefense funding outside of DHS. The one area within the DHS biological program that I think one might point to with concern is the agroterrorism area; there, we don't have the equivalent sort of funding outside of DHS on this. Certainly the Department of Agriculture is involved to an extent, but nothing like what we have in the DHHS programs for human biodefense.

Mr. LANGEVIN. Chairman, thank you.

Mr. LINDER. Mr. Dicks.

Mr. DICKS. You suggested a Red Team. I have always been in favor of red teams in situations like this, somebody to challenge the conventional wisdom. And one of the things that was mentioned in the 9/11 Commission report was a need for imagination.

I think a Red Team could be a very big benefit. Tell us why you why you suggested that.

Mr. HAPPER. Well, I am worried that in the effort to try and put something out in the field, we will put something out all right, we will spend a lot of money, but it could well be that it is very easily defeated.

And so that is the classic problem; it was the problem the French had when they built the Maginot Line. They didn't have a Red Team, in fact. Or they did have a Red Team, but it wasn't very official; and it got the right answer, but it was ignored.

So I just—I would like to feel that we are not going to build a marginal detection system that has the same fate as every other marginal detection system. You just go around it somehow. And the best way I think to avoid that is to try to figure out, how would I defeat that myself. I know everything about it. My job is to defeat it. I am not going to put it in the press, but I am going to give Mr. Oxford hell about his current design and he is going to have to respond to it, and it is going to be entirely internal and private.

Mr. DICKS. You also suggested that DNDO needs a technically competent independent advisory committee. Do they not have one now?

Mr. HAPPER. I am a little out of date. I spoke to Mr. Oxford and—just as the meeting was breaking up for your vote, and he invited me over to see what is happening now. And I will try to do that.

But—to the best of my knowledge, they don't have an official advisory committee, but that may be just because I don't know about it.

Mr. DICKS. Now on the BioWatch, the whole thing, Dr. Atlas, we have—you know, DHS has to do these material threat assessments which have been rather slow in coming. Maybe they picked up a little bit, but for a while they were very slow. But HHS is seen just to be totally unable to respond. What is your take on all this? I mean what needs to happen here to get, you know—or should something happen?

I mean, some people say we ought to wait. I can't believe that we can't have some better preparation than just sitting on our hands.

Mr. ATLAS. And I am not sure about the validity of whether HHS can or has not responded. Certainly from the scientific community's view, HHS, through the National Institute of Allergy and Infectious Disease, has gotten way out in front in terms of them being able to foster the development of new vaccines and drugs that will be effective in the future.

Now, admittedly, a lot of that is basic research, but they are all rushing towards translation into production. And they do depend on DHS for strategic direction, and I am not sure that early on that strategic direction was forthcoming. ASM, myself included, was involved in advising the Congress and testifying on that decision to split responsibilities between DHS, strategic function, and giving HHS tactical function.

If you are referring to BioShield, which is the new

Mr. DICKS. Right.

Mr. ATLAS. —which is—this newer wrinkle on BioShield is this procurement device whereby DHS designates what is of concern and then HHS undertakes the activity that leads to procurement. I believe that only four agents have so far come forward as the designated threats for which HHS procures. So we have a bunch of talks and threats about radiological devices, and my understanding is, those are entering the stockpile.

The question is whether or not the BioShield should also have an advanced development function, so that when something is not ready for procurement, there needs to be development. I think that is where we need better direction, perhaps from the Congress, to help guide that relationship between DHS and HHS so that, in fact, the needs of the Nation are properly being met.

Mr. DICKS. Who would do that? I mean, the advanced research would be done by the universities and by—

Mr. ATLAS. They are most likely to be done by biotech companies. In truth, many universities are spinning off biotech companies and building bioparks to foster that.

It tends to be more an industrial development scheme, and I suspect the Congress is hearing more calls from that sector for action, that they are not being well served under the current version of Bio—but this has been in its development and, I suspect, will continue to be an extraordinarily complex effort and act as to where the Congress really wants to have investments made.

Is it to bolster industry? And if so, how do we ensure that the right devices are being picked for that development? And I think that is across the board.

Mr. DICKS. Exposure to nuclear weapons, I mean, to radiation from a nuclear blast is a major problem area; and you know—what do you think we should do then?

Mr. HAPPER. Well, you know, most people in Hiroshima and Nagasaki were killed by the blast. The number who died of radiation was quite small. I would be surprised if it was more than a few percent. But the real problem from a nuclear weapon is the blast.

And with respect to exposure, you know—I pointed out in my notes that, you know, we have sailors in our ballistic missile submarines who bunk right by the missiles; they are loaded with plutonium. The amount of radiation from plutonium, which is much more radioactive than HEU, is manageable, so even with their 6 months of sea duty, you know, every year, they don't get very much of a dose.

So unless you actually have a weapon, the amount of radiation is not going to be very great.

Now, a dirty bomb, there is the additional problem—well, you get something that is really radioactive, cesium, cobalt, and you try to blow it up and disperse it. But if you actually try to do that—and people have done experiments and kept running models—it is very hard to disperse it.

You know, I remember I used to watch people spraying, for the boll weevil in North Carolina. You know, the guy gets up in the airplane in the morning. He sprays back and forth. It is noon, he is still spraying. It is a dispersal problem.

It is just very hard to disperse things, whereas a blast, it moves at the speed of sound everywhere. So within a fraction of a second it has wiped out the city.

Mr. DICKS. That has to be number one—

Mr. HAPPER. Yes. Yes.

Mr. DICKS. —in your judgment.

Thank you, Mr. Chairman.

Mr. LINDER. Thanks to the both of you. Thank you for your patience today. You have been very helpful.

Dr. Atlas, it is good to see you again. Dr. Happer, I think we will be seeing more of you, too. Thank you.

This hearing is adjourned.

[Whereupon, at 4:24 p.m., the subcommittee was adjourned.]

○