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

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Chairman Wu, Ranking Member Gingrey, Members of the Subcommittee, I am pleased to appear before you today to comment on the role of the Department of Homeland Security's (DHS) Domestic Nuclear Detection Office (DNDO) in securing the homeland against the smuggled nuclear threat, the DNDO's budget priorities, and the extent to which this relatively new office works across the interagency and with relevant partners and stakeholders outside of the federal government.

I am a Senior Fellow with IBM's Global Leadership Initiative[1] and a Managing Consultant for IBM's Global Business Services. I am here to address three items. First, I will discuss select high-leverage and innovative components of the DNDO's budget that I believe strike the right balance between immediate deployment and the vital long-term commitment to basic research. Second, I will address the need for investing in a reorganization that is currently underway at DNDO that reflects its crosscutting mission. And third, I will place this mission in the broader context of a framework that connects the defense against smuggled nuclear materials to the imperative of protecting the stream of cargo, people, conveyances, information, and money flows in the global trade system

IBM has invested in the development of new thought leadership in this field because we, like the Members of this committee, value innovation. Innovation is the key to our competitiveness – both IBM's and the nation's. IBM spends approximately $6 billion per year on research and development (R&D) – much of it on basic research. However, increasingly, IBM and others also are investing in research in emerging areas such as services, which, as you may be aware, make up approximately 80% of U.S. economy, while employing approximately the same percentage of the U.S. labor force. As a country, we need to invest in the skills needed for 21st century jobs that will almost certainly be dominated by the services market. This means funding investment in the emerging academic discipline of services science, including R&D and curriculum development.

[1] The Global Leadership Initiative is a strategy team designed to cut across all IBM business lines to identify new ideas that place IBM at the forefront of companies with the ability to anticipate and serve customer needs in the public sector on a global basis.

My own work at IBM focuses on developing a comprehensive framework for security, resilience, and efficiency in the global movement of goods, people, and information. From 2004 through the early part of this year, I was Director of Homeland Security Projects at the Center for the Study of the Presidency.[2] Beginning in April 2004, I worked with Center President David Abshire to organize the Nuclear Defense Working Group. That group provided the groundwork and rationale for a government reorganization that led to the creation of the Domestic Nuclear Detection Office.

Origins and Initiatives of the DNDO

The single most devastating threat to America remains a nuclear weapon covertly detonated in a major city. Presidents have considered this risk ever since Einstein wrote Franklin Roosevelt in 1939 to warn him that a "bomb of this type, carried by a boat and exploded in a port, might very well destroy the whole port together with some of the surrounding territory."[3] While that risk is much greater today than it was then, some progress in the field of detection has been made.

In April 2004, a talented group of experts gathered at the Center for the Study of the Presidency to consider an intimidating question: Is the nation doing all that it can to reduce the risk of covert nuclear attack at an acceptable cost? Norman Augustine co-chaired the session with then-Deputy Secretary of Homeland Security, Admiral James Loy. Representatives from the Departments of Defense, Energy, and Homeland Security, along with participants from the White House, national laboratories, and think tanks attended.

Two perspectives emerged during that meeting. One held that highly enriched uranium (HEU) or plutonium used in a nuclear weapon is simply too difficult to detect because of the low radiation levels they emit prior to detonation. The other argued that today's technology simply lacks the strength to detect an element as subtle as HEU, but improvements are not impossible. Both groups agreed that, among other things, a better organization within government was necessary to improve detection because existing national efforts simply were too disunified.[4] Solving the political science problem would help solve the physical science problem.

The result was the creation of the DNDO in April 2005 through Homeland Security Presidential Directive 14[5]. The DNDO was born out of the acknowledgement that no single agency had the assets, authorities, or responsibilities needed to address the risk of covert nuclear attack. Since then, this office, under the leadership of Vayl Oxford, and

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[2] The Center for the Study of the Presidency is a non-partisan, non-profit organization founded in 1965 to examine past successes and failures of the Presidency as they apply to present challenges and opportunities.

[3] Albert Einstein, Leo Szilard correspondence to President Franklin D. Roosevelt. August 2, 1939.

[4] See "Report of the Defense Science Board Task Force on Preventing and Defending Against Clandestine Nuclear Attack." http://www.fas.org/irp/agency/dod/dsb/attack.pdf.

[5] The text of HSPD 14 can be viewed at http://www.fas.org/irp/offdocs/nspd/nspd-43.html.

the reorganization of DHS's Science and Technology Directorate, led by Undersecretary Cohen, have led to significant progress in combating the threat of terrorism.

Over the past two years, the DNDO has stood apart as a work in progress and as a place for addressing one of the nation's most urgent security concerns. While the DNDO is still nascent, it is no longer "too early to tell" if it is achieving its goal of integrating and accelerating national efforts to combat the smuggled nuclear weapons threat.

Mr. Chairman, your invitation to testify before this committee included the important indicators to gauge the success of this experiment: Does the new budget request – the third for this office – advance the highest priorities for combating smuggled nuclear weapons? Do those priorities reflect an adequate read of the risk? Are current research efforts producing results that support the DHS mandate? Is DNDO collaborating effectively with other federal agencies?

When the DNDO first was created, it was understood by its authors that as the threat of nuclear terrorism and proliferation would evolve, America's relevant technological base would evolve, as would other significant international factors – such as the wars in Iraq and Afghanistan and Nunn-Lugar programs. It was therefore critical that, as a hub for national efforts to combat the smuggling of nuclear material, the DNDO begin with a net assessment of the nation's capabilities matched against a current snapshot of the threat.

The DNDO's "Global Nuclear Detection Architecture" is based on that assessment. It includes guidance on how best to operate the nuclear detection assets, authorities, and responsibilities. What emerges is a clear list of gaps in America's covert nuclear detection capabilities. Those gaps lead to the DNDO's list of priorities.

The Global Nuclear Detection Architecture is an interagency product designed to provide a plan for improving the status quo through a deliberate systems engineering approach to a gradual – and perhaps someday rapid – reduction of the risk of covert nuclear attack. Its success depends upon a multilayered system of systems that must knit together initiatives contributing to a reduction of the risk in the U.S., across the maritime and air domain, and in foreign territories.

DNDO priorities reflect a shared perception of the threat as it evolves over time. The real challenge is setting a budget that balances the imperative of deploying available detection capabilities now with conducting basic and applied research that push the limits of today's technology and help create new capabilities for tomorrow. Interwoven with that strategy is a more strategic asset: an integrated forensics mission that reaches across the U.S. government.

To adequately combat the risk of smuggled nuclear material, the DNDO invests in exploratory research that challenges assumptions about the limits of technology. It takes the gaps in the Global Nuclear Detection Architecture and makes longer-term R&D commitments to promising solutions. These efforts can lead to major game-changing

improvements in our ability to combat nuclear terrorism. Some promising examples include the following:

1) First, the FY08 budget request includes about $12 million for a technology demonstration called the Verification of Shielded Special Nuclear Material (SNM). This initiative addresses the risk caused by a proliferator or perpetrator who seeks to foil many currently deployed detectors by moving critical bomb-making material while hiding it behind lead or other shielding.

2) Second, the budget includes about $11 million for the Intelligent Personal Radiation Locator, or IPRL. The technology represents a move from search to surveillance, and it amounts to a transformation of the current version of the "pager" devices now used, which are little more than personal Geiger counters. The IPRL investment addresses, albeit in a limited way, the gap that was identified in the Global Nuclear Detection Architecture showing the need for increased numbers of smaller, more mobile detectors to help locate stolen nuclear material or weapons at a late stage of deployment. The new locators – presently at a very early demonstration stage – are worn on a belt and can provide the wearer with indications of where the source is located and the type of isotope within range. They also have the ability to communicate wirelessly with other locaters so as to rapidly close in on a suspicious source. All of this is done with increasing range and with greater reliability.

3) Third, the DNDO is developing the advanced Stand-off Detection capability, which focuses on increasing the distance from dangerous nuclear material while decreasing dwell time near that material. Both are critical. However, the challenge of nuclear material is its subtle radiological signature, which usually requires a detector to be both close to the suspected source and in its vicinity for enough time to gather telltale radiation. By soliciting competing teams of partners among private industry, national laboratories, and academia, this research may deliver more detailed imaging capabilities at a range that is increased by a factor of 10 or more. This same effort could produce detectors capable of working effectively, while moving at a rate of 20 miles per hour. The result of faster detection at a greater distance from the source material – combined with intelligence tools for better targeting – will not only protect the public and the nation's critical assets, but it also will facilitate the movement of cargo through ports without sacrificing security.

4) Fourth, the FY2008 budget request includes $16.9 million for the National Technical Nuclear Forensics Center (NTNFC), which supports DNDO's technical forensics responsibility. This money would support not only an R&D investment, but also a much-needed reorganization. Nuclear forensics cuts across the entire mission space from deterrence and dissuasion, to detection through consequence management, to attribution and response. It is a core part of the mission of combating smuggled nuclear weapons.

The NTNFC should be considered a priority given the significant return on investment that progress in this area can deliver. While the Department of Homeland Security is not

responsible for the entire spectrum of forensics, the NTNFC represents a step forward in two clearly needed capabilities:

1. Across the government, unify various competencies and programs that are focused on aspects of the forensics mission.
2. Develop, enhance, and maintain technical forensics capabilities for pre-event needs.

DNDO Collaboration

This Committee asked specifically whether the DNDO is collaborating effectively with other federal agencies. I believe that combating the smuggled nuclear weapons threat is, by nature, a collaborative mission. This mission was at the center of the interagency debates in 2004, and the DNDO of today reflects this imperative. This is an area in which the DNDO has made progress.

Since the National Technical Nuclear Forensics Center is in many ways a microcosm of the DNDO, I would like to highlight a few examples here that represent a broader collaborative effort now underway. At the NTNFC, the FBI provides an expert as Deputy Assistant Director, and it also provides a senior liaison from the FBI lab. The Department of Defense provides a detailee, and the Department of Energy is assigning an expert of its own.

The Forensics Center has a Working Group, made up of members from each relevant federal agency and members of the intelligence community, which meets regularly to address high priority issues. There is an "Interagency NTNF Program & Budget Crosscut" that is under development to help align relevant programs and harmonize budget requests. Lastly, the NTNFC – and the DNDO in general – work with interagency partners in planning and executing exercises that support the research, development, and deployment of technologies, as well as shared concepts of operations, or CONOPS.

DNDO works mostly with the Department of Energy's (DOE's) Office of Nonproliferation Research and Development, known as NA-22, and DOD's Defense Threat Reduction Agency. The interactions include serving as proposal evaluators on each other's programs, deconflicting projects by comparing portfolios, and jointly participating in project reviews and technical reports.

The Advanced Technology Demonstrations (ATDs), such as Standoff Detection and Verification of Shielded Nuclear Material, include teams that have developed technology with funding from DNDO, DOE, DOD, and other sources. The purpose of an ATD is to develop and test a technology that addresses a critical need and which has reached a proof-of-concept stage, usually with payoff for more than one agency. In this way, DNDO takes advantage of work that is funded by others, but it also supports R&D that can be useful to other agencies.

For example, some efforts at DNDO could contribute to Maritime Domain Awareness (MDA)[6], a major program developed by the Coast Guard to identify threats and intercept them before they arrive onshore. In MDA, the Coast Guard and Department of Defense require better intelligence, as well as detection and interdiction capabilities to accomplish their goals. In the context of nuclear terrorism, a successful mission depends upon the ability to detect threatening material or people at the greatest possible distance. The ability of DNDO to contribute to that mission should be a measure of its return on investment.

Placing Detection R&D Within a Broader Framework

Congress must view the effort to combat the smuggled nuclear weapons threat as one of several interlocking objectives, many of which should benefit from R&D investments. Doing so requires a framework that connects the search for nuclear materials to the broader flows of cargo, people, conveyances, information, and money in the global trade and travel system. And that framework should reach across DHS, DOD, DOE, State, and other departments to improve the resilience and security of the global trade and travel system, while ensuring its security.

The DNDO – and DHS S&T – should figure prominently in this mission. Ultimately, the federal R&D management process must more effectively link the strategic planning process at DHS with the broader mission of bringing transparency, efficiency, security, and resilience to one of the most attractive targets of WMD terrorism: the global flow of trade and travel.

IBM has developed a framework like this that also acknowledges an existing incentive for the private sector, which is to satisfy the economic imperative to improve the efficient and reliable flow of people, cargo, conveyances, money and information.

At IBM, we call this framework "Global Movement Management."[7] It is a means by which the technology requirements of today's homeland security measures can provide for both efficiency and security in the global movement of cargo, people, information, and finance. This new framework adds resilience to this critical system of movement without imposing inefficiencies that risk outweighing the security benefits to the numerous stakeholders that use these systems of trade and travel.

For the DNDO, finding a smuggled nuclear weapon on a ship in the Port of Portland is too late. That threat must be identified, verified, and interdicted before it ever

[6] MDA is the principle strategy articulated in "The National Plan to Achieve Maritime Domain Awareness," which was released by the Department of Homeland Security in October 2005. As directed by National Security Presidential Directive-41/Homeland Security Presidential Directive-13, it is one of eight plans developed to support the National Strategy for Maritime Security.

[7] Global Movement Management (GMM) is a comprehensive governance structure and system architecture for monitoring and securing the key flows of global commerce – people, goods, conveyances, money, and information. It provides the framework to safeguard the global economy against disruptive threats by fostering new levels of visibility, accountability, and resiliency.

approaches. The DNDO investments that I highlighted go a long way in generating the transparency needed to identify a threat, but the broader strategy should consider, in this example, that the shipping system itself must be able to withstand a disruption, terrorist or otherwise. This is because, as global movement becomes ever more interdependent, a disruption – let alone an actual attack – would be catastrophic.

Conclusion

The country needs a strategic framework to overarch our R&D investments for maximum benefit to both our homeland security interests and our economic competitiveness. DNDO and DHS lack this strategic framework today. Nevertheless, DNDO has chosen successfully several important pilots, including those I mentioned. Indeed, Congress should view DNDO's work as being on track after three years.

But Congress also should consider how the individual investments can serve a greater goal of resilience, security, and efficiency. The DNDO, and the Executive Branch as a whole, should be measured by the ability of their R&D investments to do just that.

Thank you. I would be happy to respond to any questions that you may have.