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Before

The Committee on Homeland Security and Governmental Affairs
U.S. Senate

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on
"The Global Nuclear Detection Architecture: Are We Building Domestic Defenses That Will Make the Nation Safer?"

Chairman Lieberman, Ranking Member Collins, and other Members of the Committee:

Thank you Mr. Chairman for the opportunity to testify before the committee today. My name is Dana Shea, and I am a Specialist in Science and Technology Policy with the Resources, Science, and Industry Division of the Congressional Research Service at the Library of Congress. At the request of the Committee, I am here today to discuss the global nuclear detection architecture. With your permission, I request that my written testimony be placed in the hearing record.

My testimony today has three parts. First, I will provide a brief overview of the requirement to develop a global nuclear detection architecture. Second, I will summarize the approach taken by the Domestic Nuclear Detection Office (DNDO) within the Department of Homeland Security (DHS) in meeting this requirement. Third, I will identify several policy issues that may be of interest to the committee and Congress.

Establishment of the Global Nuclear Detection Architecture

To start with the overview: The SAFE Port Act (P.L. 109-347) gave DNDO the statutory responsibility to develop an "enhanced global nuclear detection architecture." This architecture is to be implemented by multiple federal agencies, including the Departments of State, Homeland Security, Energy, and Defense. Similar language was included in Homeland Security Presidential Directive 14. This directive established the Domestic Nuclear Detection Office within the Department of Homeland Security (DHS) in 2005.[1]

[1] Executive Office of the President, The White House, *Domestic Nuclear Detection*, Homeland (continued...)

Neither the Presidential directive nor the SAFE Port Act explicitly defined the global nuclear detection architecture. Therefore, the meaning of this phrase is open to interpretation.

The DNDO interpreted this phrase and describes the global nuclear detection architecture to be:

- a multi-layered structure of radiological and nuclear detection systems, deployed both domestically and overseas;
- a well-defined and carefully coordinated network of interrelationships among them; and
- a set of systems engineering-based principles and guidelines governing the architecture's design and evolution over time.[2]

Their global nuclear detection architecture consists at least of deployed federal detection systems, the programs that support them, the data they generate, the mechanisms that coordinate them, and a process for future growth and development.

DNDO's Implementation of the Global Nuclear Detection Architecture

The global nuclear detection architecture aims to prevent the detonation of a radiological or nuclear weapon within the United States. It is a system of systems, that is a structure that aligns nuclear detection systems and the programs that support them into geographically based layers. The global nuclear detection architecture has both physical and conceptual components. The physical component is composed of the sensor systems deployed by federal agencies. The conceptual component is the mechanism for organizing and analyzing program capabilities in this system-of-systems context.

The DNDO global nuclear detection architecture has three layers (exterior, border, and interior) organized by their geographic scope. Each layer is composed of several sublayers. Each layer provides an independent opportunity to detect the radiological or nuclear threat. With this layered approach, the likelihood that a particular threat will be detected is increased. This is because each layer of the architecture provides an opportunity to detect the threat. While it is likely that no single layer will provide perfect detection,[3] the combination of these less than perfect layers may be sufficient to detect the threat.

Several federal programs are aligned with each architecture layer. By comparing the requirements of these layers and the capabilities developed by the aligned programs, experts may identify gaps in the global nuclear detection architecture. Such a "gap analysis" is one example of the benefits of creating an overarching architecture. While the existing federal

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[1] (...continued)
Security Presidential Directive HSPD-14/National Security Presidential Directive NSPD-43, April 15, 2005.

[2] Domestic Nuclear Detection Office, Department of Homeland Security, *Congressional Justification FY2009*, p. DNDO RD&O-2.

[3] The DNDO acknowledges that "no single layer of protection can ever be one hundred percent successful." (Domestic Nuclear Detection Office, Department of Homeland Security, *Congressional Justification FY2009*, p. DNDO ACQ-8.)

programs may have been meeting their individual program goals, an architecture structure allows a focus on identifying gaps between programs.

The DNDO has identified baseline funding and participation levels in the architecture. According to DNDO, the global nuclear detection architecture has been used to identify gaps in the Nation's abilities to detect radiological and nuclear materials. Also, that DNDO is in the process of addressing these identified gaps.

Potential Issues for Congress

Several key issues face decision-makers when considering the global nuclear detection architecture and its use. I will discuss four of these issues:

- the architecture's ability to meet its primary goal of detecting radiological and nuclear material;
- the prioritization of current and future investments in the architecture;
- the criteria for policymakers to judge the architecture's success; and
- DNDO's ability to sustain and evolve the architecture in the future.

Effectiveness of the Global Nuclear Detection Architecture. The global nuclear detection architecture aims to prevent the detonation of a radiological or nuclear weapon in the United States. A failure of the architecture will likely become readily apparent; the success of the architecture may not be so clear. The success of the architecture will depend not only on detecting these materials, but also on interdicting these materials. The DNDO has identified the protection of radiological and nuclear sources as part of the global nuclear detection architecture. These components beyond detection require the coordination and cooperation of multiple agencies, potentially in multiple countries, and the ability to correlate and combine data from multiple sources.

Accurate information gathered by DNDO regarding the performance and benefits of the architecture's programs is essential to the architecture's effectiveness. However, such information may be difficult to generate, measure, or even estimate. This information involves terrorist intent and capability, the effectiveness of deployed and future sensor systems, and the value of nontangible concepts, like deterrence. System evaluation and analysis efforts to validate the performance of these systems in the field may be necessary. Absent such validated information, policymakers may find judgments regarding success in meeting architecture goals hard to make.

Congress may face the issue of what constitutes an acceptable level of risk in the architecture. It is unlikely that any single sublayer in the global nuclear detection architecture will be 100% effective. Thus, the global nuclear detection architecture will leverage the detection capabilities of a series of less than perfect detection opportunities. The global nuclear detection architecture may be able to detect a radiological or nuclear threat more effectively if it incorporates a mixture of detection approaches. What constitutes an acceptable level of risk will likely be a major policymaking decision, especially in the case where additional small benefit may come at substantial cost.

Use for Prioritization and Planning. The system-of-systems approach embodied in the DNDO global nuclear detection architecture can be a powerful tool for prioritization and planning. If DNDO can establish an overall view of radiological and nuclear detection, it may attempt to optimize the total architecture. It might do this both by refining investment in existing programs as well as identifying areas where investment in new programs would yield particular benefit. A key component of this approach is the development of an accurate representation of the architecture, a model. The DNDO might use this model to identify trade-offs and alternative approaches, establish the risk-reduction benefits and economic costs of these approaches, and inform policymakers' critical decisions regarding further investment. Examples of such critical decisions might include whether to provide additional resources to programs that increase the barrier to acquiring nuclear or radiological material or to programs that prevent such material from entering the United States. While both investments would reduce the risk of a successful terrorist attack, an architecture analysis may be able to identify which investment would provide the greater risk reduction at the lower cost.

The DNDO has undertaken efforts to coordinate between global nuclear detection architecture participant agencies. Detailees from these agencies have positions within DNDO. The DNDO has established formal coordination mechanisms between agencies. Yet, the priorities of the global nuclear detection architecture may not exactly align with the priorities of the participating agencies or their individual programs.

The DNDO is a coordinating office, not an implementing agency. Its acquisition programs support implementation by other DHS components. Other federal agencies have invested heavily in nuclear detection programs. The DNDO does not control other agency budgets or have the ability to require other agencies to revise or adjust their funding investments.

Therefore, a key issue for Congress is priority setting for the global nuclear detection architecture's implementation. If the future priorities of participating agencies conflict with the results of DNDO's architecture analysis, policymakers may need to choose between these priorities when appropriating funds and supporting agency or architecture needs. Congressional comparison of the priorities identified by DNDO's analysis of the architecture's performance and participating agency requests for appropriations may be a key component in the architecture's effectiveness and implementation.

One possible mechanism to achieve such oversight is to provide the DNDO Director with the authority to review and assess the budgets of other participating agencies. A similar authority for telecommunications system security was granted to the Director of the National Security Agency.[4] Another mechanism might be to require the compilation and submission of an annual, unified global nuclear detection architecture budget supplement, similar to that of the National Nanotechnology Initiative. Linking the identification and reporting of the nuclear detection architecture to the budget cycle could provide Congress with several advantages. Congress would likely see how the priorities of the architecture are being translated and implemented by the various participating agencies. Congress would also obtain an overarching view of the implications of changing funding levels among programs.

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[4] The Director of the National Security Agency has this type of authority for the purposes of telecommunications systems and automated information systems security. Executive Office of the President, The White House, *Telecommunications and Computer Security*, National Security Decision Directive 145 (NSDD-145), September 17, 1984.

Determining Success. The robustness of the global nuclear detection architecture likely depends on three factors:

- the information DNDO receives from other agencies,
- DNDO's interpretation of that information into metrics and benchmarks essential for the architecture, and
- DNDO's continual reassessment of the architecture based on this information.

Clear strategic goals, performance metrics, and other benchmarks relevant for the architecture are needed to assure that important aspects of other agency activities are provided and incorporated. Without these performance metrics and benchmarks, factors not essential to the mission of the architecture may become the criteria by which success is judged. For example, the number of sensors deployed may not be an appropriate metric if the sensors duplicate other investments, are in an low-risk area according to the architecture analysis, or provide relatively small additional value.

To promote the timely implementation of the global nuclear detection architecture, Congress could solicit from DNDO timelines, milestones, and funding requirements for portions of the global nuclear detection architecture along with a series of implementation alternatives. By identifying the different stages for implementation of the global nuclear detection architecture, Congress may be able to determine what criteria qualify as a near-term success while still allowing for growth and completion of longer-term goals.

Long-term Maintenance. The DNDO has identified the architecture as having an evolving component to it, where future iterations of the architecture may address concerns that cannot be best addressed with current technology. The efforts of DNDO to maintain the global nuclear detection architecture will depend on its ability to document and pass on the rationale for critical architecture decisions. The DNDO draws upon subject matter experts and detailees from other parts of DHS and from other agencies to provide unique expertise and necessary interagency input and coordination. This use of detailees may pose unanticipated challenges to the long-term maintenance of the global nuclear detection architecture due to the limited duration of their positions.

Congressional oversight of the architecture's evolution is a key component to maintaining adequate resources for a long-term activity and assuring that such activities have achievable milestones and metrics. Congress might require DNDO to provide reports identifying the

- main goals of the architecture layers,
- time lines for achieving these goals,
- agencies and programs best suited in DNDO's opinion to meeting these goals,
- cost of these programs,
- alternative approaches considered and rejected, and
- any dissenting opinions from partner agencies in the architecture.

Such reports might provide Congress with the detailed understanding necessary to balance the important goals of the architecture with other policy objectives that may need to be considered. Congress might also address the issue of maintaining institutional knowledge.

One way to address this issue is to require DNDO to identify those positions best filled by permanent staff rather than detailees. Another way might be to establish specific mechanisms to maintain institutional knowledge, such as mentoring or mandating documentation of lessons learned and key decision-making criteria.

Mr. Chairman, that concludes my prepared statement. I would be happy to answer any questions that you or other Members of the Committee might have.

ATTACHMENT: CRS Report RL34574, *The Global Nuclear Detection Architecture: Issues for Congress*, by Dana A. Shea, July 16, 2008.