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

HEARING CHARTER

Next Generation Border and Maritime Security Technologies: HR 3916
Thursday, November 15, 2007
10:00 a.m. – 12:00 p.m.
2318 Rayburn House Office Building

1. Purpose

On Thursday, November 15, 2007, the Committee on Science and Technology's Subcommittee on Technology and Innovation will hold a hearing to discuss H.R. 3916 and examine the current and future priorities in border and maritime security research, development, and technology for the Department of Homeland Security's Science and Technology Directorate (DHS S&T).

2. Witnesses

Dr. Robert Hooks is the Director of Transition for the Department of Homeland Security's Science and Technology Directorate.

Mr. Ervin Kapos is the Director of Operations Analysis for the Department of Homeland Security's Science and Technology Directorate. He acts as the executive director of the Homeland Security Science and Technology Advisory Committee (HSSTAC).

Dr. Brian Jackson is an Associate Physical Scientist for the Science and Technology Policy Institute at the RAND Corporation.

Mr. Jeff Self is Division Chief of the U.S. Border Patrol.

3. Brief Overview

- The U.S. Customs and Border Protection (CBP) processes approximately 1.18 million people entering the United States through established ports of entry every day. CBP is also responsible for monitoring between legal entry points along the Northern and Southern borders and intercepting individuals attempting to cross the border. Border patrol officers also act as first responders, rescuing individuals in danger from extreme weather or violent situations at illegal entry points.
- Surveillance technology acts as a "force multiplier," which allows border patrol agents to augment their patrols with ground based and aerial observation capabilities. Examples of currently in-use security technologies include infrared sensors, automated cameras, and seismic sensors to detect motion, as well as air based observational equipment to monitor a large area.
- Many promising technologies are still not feasible for full implementation along the border because of numerous barriers: high cost, lack of robustness in harsh conditions, lack of personnel trained to properly use high-tech equipment, and technical problems. DHS S&T has primary responsibility for bringing new technologies to full readiness, with support from other

agencies such as the National Institute of Standards and Technology, which provides testing and validation services.

- Additionally, many capability gaps, including situational awareness and officer safety, have been identified by end users that require further basic and applied research to meet existing or anticipated challenges. DHS S&T has several mechanisms to receive advice on R&D priorities, including Integrated Product Teams (IPTs), which bring together stakeholders from other components of DHS, including CBP, in a regular, formal process to determine short term technology needs. Advice on longer term research priorities comes from a number of sources, including the Homeland Security Science and Technology Advisory Committee (HSSTAC), the Homeland Security Institute (HSI), and the National Academies.
- The Border and Maritime Security Division of the DHS S&T Directorate has ongoing research projects focusing on advanced sensing capabilities, decision making software tools, non-intrusive search capabilities, and other priorities. Additionally, the U.S. Coast Guard (USCG) and National Institute of Standards and Technology (NIST) carry out some border and maritime security technology research. USCG research includes officer protection, boarding, and suspect apprehension tools such as net guns for trapping fleeing boats. NIST has been conducting research on facial recognition technologies and fingerprint analysis, and technical tests of the RFID technology being incorporated into new electronic passports being issued by the State Department to prevent document counterfeiting.

4. Issues and Concerns

How does the DHS Science and Technology Directorate (DHS S&T) set overall research and development priorities? Under Secretary Jay Cohen, who took over leadership of DHS S&T in 2006, has established six research divisions that focus on specific technical areas. These divisions are Explosives, Chemical/Biological, Human Factors, Border/Maritime, Infrastructure/Geophysical, and Command, Control, and Interoperability. Funding for each division is determined by the Under Secretary.

Short term technology research priorities within each division are established by a formal mechanism based on a program at the Naval Research Laboratory (NRL). Integrated Product Teams (IPTs) bring together stakeholders from the mission components of DHS, such as the Transportation Security Administration (TSA) or Customs and Border Protection (CBP). The IPTs are organized by theme, and stakeholders first determine outstanding capability gaps and then rank research projects by order of urgency. Of the 11 IPTs, three deal with issues related to H.R. 3916: Border Security, Maritime Security, and Cargo Security.

Short-term projects determined through the IPT process account for roughly seventy percent of the DHS S&T budget and are managed by the Transition Portfolio Director. Longer-term basic research currently accounts for approximately thirteen percent with an announced goal of increasing this share to twenty percent over the next few years.

Currently, there is no strategic plan guiding longer-term research priorities. The agency turns to a number of resources for advice on long term planning, including internal groups such as the Homeland Security Science and Technology Advisory Committee (HSSTAC) and the Homeland Security Institute (HSI) as well as outside think tanks and advisory bodies such as the National Academies. However, there is no mechanism to coordinate the efforts of the various advisory groups. The results of

the efforts of these groups are unclear, however, as DHS S&T has not released a strategic plan outlining specific long term research priorities.

TABLE 1: DHS S&T BUDGET

Budget category	FY 2006 Enacted [1]	FY 2007 Enacted	FY 2008 Request	FY 2008 House mark	FY 2008 Senate Mark	$ change/ request and House
Management and Administration	80.3	135.0	142.6	130.8	140.6	-11.6
Border and Maritime	**43.3**	**33.4**	**25.9**	**25.9**	**25.5**	**0**
Chemical and Biological	387.0	313.5	228.9	215.1	216.0	-13.8
Command, Control, and Interoperability	108.1	62.6	63.6	61.1	61.8	-2.5
Explosives	261.5	105.2	63.7	63.7	81.7	0
Human Factors	6.4	6.8	12.6	12.6	6.7	0
Infrastructure and Geophysical	86.1	74.8	24.0	24.0	64.0	0
Innovation	0	38.0	59.9	51.9	46.0	-8.0
Laboratory Facilities	83.2	105.6	88.8	88.8	103.8	0
Test, Evaluation, and Standards	34.6	25.4	25.5	28.5	24.2	+3.0
Transition	19.2	24.0	24.7	26.0	23.9	+1.3
University Programs	62.4	48.6	38.7	48.6	38.7	+9.9
TOTAL	**1487.0** [2]	**973.1**	**798.9**	**777.0**	**832.9**	**-21.9**

[1] Including 1 percent rescission.

[2] Includes funding for Domestic Nuclear Detection Office (DNDO) which received separate appropriations in FY 2007.

What are the current short and long term priorities in border and maritime security technology R&D? Is ongoing R&D helping to overcome some of the barriers to implementing specific border security technologies, such as unmanned aerial vehicles? Border and Maritime Security research is run through the Border and Maritime Division of DHS S&T, currently headed by Acting Director Captain Dave Newton (USCG). Additional border security research is carried out by other divisions within the S&T Directorate, most notably the Command, Control and Interoperability (C2I) and Human Factors (HF) divisions as well as other agencies including the U.S. Coast Guard (USCG) and National Institute of Standards and Technology (NIST). Because of the many players in the border security technology realm, there are not consistent priorities across the many agencies and divisions. However, within DHS S&T, the divisions involved in border security research work to coordinate their efforts through the IPT process.

Currently, DHS S&T efforts are focused on situational awareness (the collection and harmonization of information about a situation from numerous sources), officer safety, and cargo security. The associated research projects span a variety of fields, including sensor technologies, command and control systems and software, connectivity tools, modeling and simulation, non-intrusive search tools, and cargo monitoring tools.

How will HR 3916 affect ongoing and future R&D at DHS S&T? HR 3916, introduced by Ranking Member Hall on October 22, 2007, strives to provide guidance to DHS S&T on the process of setting research priorities, ensuring that technology meets the needs of end-users, and on specific border security research priorities.

5. Background

This hearing will examine HR 3916, a bill introduced by Ranking Member Ralph Hall with the goal of improving long term planning for research and development at the Department of Homeland Security, especially in the area of border and maritime security technology. The bill authorizes specific border security technology programs, and instructs DHS S&T to improve processes for setting research priorities and serving the needs of technology end users.

Section by Section Discussion

Section 1: Requires the Department of Homeland Security Science and Technology Directorate (DHS S&T) to clearly define the operational requirements of technologies they are developing for Customs and Border Patrol and other end-users. These 1-3 year product development projects are part of the Transition portfolio at DHS S&T and comprise the bulk of research and development spending (approximately 70 percent).

This section is intended to ensure that both DHS S&T and the DHS customer component that will eventually own and operate the equipment developed have agreed to baseline requirements for operational as well as technical objectives. This requirement can be met through the Technology Transition Agreements (TTAs) that S&T currently negotiates for development work.

Section 2: Extends the S&T Advisory Committee, which was last extended through December 31st, 2008 in the SAFE Ports Act of 2006. Currently S&T is appointing new members and has recently begun new meetings. The Committee briefly lapsed in November 2005. Further extends the Advisory Committee through December 31, 2012.

The HSSTAC was created with the original Homeland Security Act, but lapsed once and has produced little for the department. Since coming onboard last year, Under Secretary Cohen has reconstituted the committee and begun seeking their advice on specific topics. However, the committee will lapse again in December of 2008 without congressional action. The usefulness of the HSSTAC is largely determined by the Under Secretary's willingness to engage them in his decision-making, but letting them lapse would remove the only independent, S&T-focused advisory body immediately available to the department.

Section 3: Calls for an NRC study to provide a roadmap for research activities in the border/maritime division.

One of the primary gaps in DHS S&T's planning is the lack of a long term research strategy. In 2002 the National Academies completed a 90-day study titled "Making the Nation Safer" that gave a general overview of how DHS S&T could support the then-fledgling Department. However, DHS S&T has failed to set specific long term strategic priorities to guide research and development decisions. This section would allow the NAS to look specifically at one division of DHS S&T. The document produced by the NRC would give program managers at DHS a longer-term perspective than is

provided through the 1-3 year IPT process. If successful, similar reports could be commissioned for the other major DHS S&T divisions, such as Explosives or C2I.

Section 4: Reminds DHS of their role as a potential operator of Unmanned Aerial Vehicles (UAVs) in the national airspace and directs them to continue their work in the Joint Planning and Development Office accordingly. Currently, operation of UAVs in national airspace requires considerable advance planning and approval from the Federal Aviation Administration. Requires DHS to seek the ability to routinely and safely operate UAVs for border and maritime security missions. Authorizes DHS to take part in pilot projects to obtain whatever data is necessary to make an informed decision about how UAVs can be safely included in the airspace.

Several laws enacted in the 108th and 109th Congresses instructed DHS to work towards implementing a UAV surveillance program for border security. Numerous challenges have prevented DHS from launching a broad UAV program, including safety concerns. UAVs currently have an accident rate 100 times greater than that of manned aircraft. They are also more susceptible to adverse weather conditions than manned aircraft. These safety issues can likely be solved through further research, but flight tests will be an integral part of improving UAV technology. However, under current FAA regulations, UAVs cannot fly in the U.S. without special permission.

DHS is involved in an inter-agency planning group, the Joint Planning and Development Office (JPDO), to design the nation's next generation air traffic control system, including UAV use. However, DHS's involvement to date is principally through the TSA. Given the high likelihood that DHS components would operate UAVs in the U.S., the Department should take a more active role now in planning for their introduction.

Section 5: Requires DHS to create a formal research program in the area of tunnel detection, and to coordinate with similar DoD activities. Calls for priority to be given to technologies that would allow real-time detection of tunnels and would allow for immediate action by Customs and Border Protection (CBP) officers.

Various advanced fencing and surveillance technologies are currently being tested as part of the Secure Border Initiative. However, in San Diego, where the double-layer Sandia fencing has been constructed, smugglers have dug numerous tunnels underneath the border fence, including one concrete-reinforced, kilometer-long tunnel. This is just one example of the systemic challenges that face border patrol agents. With time and resources, committed individuals can avoid most border surveillance by simply digging right past them. Furthermore, detecting tunnels is remarkably difficult and solutions in the 1-3 year time-frame are not likely. This has led DHS S&T and CBP to focus on other near-term priorities. This section asserts Congressional interest in a long-term tunnel detection program.

Section 6: Requires the Under Secretary for S&T and Director of NIST to begin a joint R&D project of anti-counterfeit technologies and standards. Furthermore, this designee is charged with coordinating research activities with other federal agencies engaged in related research. Requires a report to Congress on the research programs undertaken under this section one year after enactment.

Counterfeit documents are a major problem at legal ports of entry, with individuals attempting to enter the U.S. using fraudulent passports, identification, or birth certificates. CBP intercepts over 200 fake documents daily at the Nation's borders, but technology for creating counterfeit documents is growing increasingly sophisticated and fraud is increasingly difficult to detect. The Federal

government has begun to support research activities to development technology for verifying documents, but currently activity in this area is broadly distributed with DOD, Treasury, Immigrations and Customs Enforcement, State, and Justice all pursuing various aspects. DHS S&T, however, has not been actively involved despite the clear impact on agencies such at ICE and CBP.