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

HEARING CHARTER

Aviation Security Research and Development at the Department of Homeland Security

Thursday, April 24, 2008
1:00 – 3:00 p.m.
2318 Rayburn House Office Building

1. Purpose

On Thursday, April 24, 2008, the Subcommittee on Technology and Innovation will hold a hearing to review the aviation security-related research, development, testing, and evaluation (RDT&E) activities of the Department of Homeland Security (DHS). This hearing will also explore how the Transportation Security Laboratory and other components of DHS support the needs of the Transportation Security Administration, the aviation industry, and passengers generally through research, development, and education.

2. Witnesses

Dr. Susan Hallowell is the Director of the Transportation Security Laboratory (TSL), a component of the Department of Homeland Security's Science and Technology Directorate (DHS S&T).

Mr. Adam Tsao is the chief of staff of the Office of Operational Process and Technology of the Transportation Security Administration (TSA).

Dr. Jimmie Oxley is a professor of chemistry at the University of Rhode Island and co-director of the DHS Center of Excellence for Explosives Detection, Mitigation, and Response.

Dr. Colin Drury is a distinguished professor and chair of the Department of Industrial Engineering at the University at Buffalo.

3. Brief Overview

- The Transportation Security Administration (TSA) was created in 2001 to act as a centralized federal authority to manage transportation security efforts in the United States. The Transportation Security Laboratory (TSL) provides support for TSA's mission through research, technology development, testing and evaluation, and technical support for deployed technologies. TSL became part of the Department of Homeland Security Science and Technology Directorate in FY 2006. Previously, TSL was managed by the Federal Aviation Administration.

- Research priorities at TSL are generally set through the transportation security Integrated Product Team, which convenes stakeholder components of DHS, including TSA, to discuss capability gaps and determine which R&D projects are most likely to meet users' needs. Additionally, TSL coordinates with DHS S&T's explosives division and will work with the newly formed Center of Excellence for Explosives Detection, Mitigation, and Response. The lab also tests and certifies equipment submitted by outside vendors for eventual inclusion on TSA's qualified product list (QPL), which allows vendors to sell those products to TSA.
- Technology development priorities are also influenced by outside requirements stemming from intelligence or publicity of particular threats, such as the liquid explosives incident in August 2006.
- TSL has particular expertise in testing and evaluation, and hosts specialized laboratories capable of handling explosives for technology validation. However, TSL currently does not have the capacity to test screening technologies in a realistic setting, where a network of devices are used to detect potential threats. Additionally, TSL does not carry out field tests of technology, but does provide technical support to TSA for technologies in use at airports.

4. Issues and Concerns

Will the ongoing research, development, testing and evaluation projects at the Transportation Security Laboratory (TSL) meet the Transportation Security Administration's present and future needs? Is there adequate investment in basic research at TSL to allow the lab enough flexibility to address rapidly emerging threats? TSA is responsible for setting technology development priorities at TSL through the Integrated Product Team process, but budget limitations and demand for immediate technological responses to high-profile threats (such as liquid explosives or shoe bombs) can distract the lab from longer term needs. Additionally, because of variations in airport design and passenger capacity, TSA cannot have a standard checkpoint design that works at every airport. A good solution to these conflicting pressures is strong investment in basic research, which provides the scientific basis to allow the laboratory to be flexible in its response to emerging threats and varying needs.

Does TSL's testing and evaluation of aviation security technology provide adequate information to the end users at TSA? How are the tests designed, and what are the criteria for success? Are technologies that are tested or certified by TSL ready for deployment? If not, what additional efforts are necessary to bring technologies to full readiness, and how does TSL contribute to those efforts? TSL's testing and evaluation (T&E) protocols are considered a model for the Department of Homeland Security, but some technologies are deployed by TSA in spite of technical or operational issues (TSL does not control deployment schedules). Many of these issues could be identified or resolved if TSL was able to test devices in a realistic checkpoint scenario that incorporates a networked system of devices and carries out tests based on screeners' and passengers' needs and capabilities. Moreover, as technology develops, TSL must continually update performance and technical standards to address new capabilities and new requirements.

Additionally, at its current capacity, TSL will likely have an increasingly difficult time keeping up with TSA's needs. According to the Director of TSL, their work for TSA has tripled since April 2006 while funding for the lab has decreased. If this imbalance continues, T&E capabilities at TSL will continue to suffer.

Does TSL adequately incorporate human factors engineering and human-technology interface principles into technology design and testing? How do TSA and TSL test and evaluate whether human-technology interface principles have been properly applied in the design and manufacturing of aviation security technologies? To move passengers and luggage efficiently through checkpoints, screeners need technology to help them search for contraband or dangerous items. As the list of forbidden items grows in response to newly identified threats, screeners' jobs become more and more difficult and need improved technological responses. The best technologies take into account screeners' technical skills and needs and looks at the "human-technology interface;" how well technology meshes with those skills and needs. Moreover, since these technologies are used in a public setting, passenger acceptance is also crucial. Designers must consider whether passengers would object or be seriously inconvenienced by technologies before they are deployed to avoid public outcry that might ultimately harm the aviation industry by driving away customers. Some recent controversies, such as the deployment of the backscatter machine—which appears to virtually strip-search passengers—could have been avoided through careful attention to human-technology interface issues.

5. Background

Technology plays a major role in aviation security operations. Screeners employed by the Transportation Security Administration (TSA) employ a variety of sensors to scan passengers and luggage for dangerous items quickly and efficiently. Many of these technologies, as well as other security devices, are developed, tested, or certified at the Transportation Security Laboratory (TSL) in Atlantic City, NJ. This lab, part of the DHS S&T Directorate, conducts research, development, testing, and evaluation (RDT&E) for explosives detection and other transportation security related technologies with the goal of deploying these technologies to TSA.

The Transportation Security Laboratory, a component of the Federal Aviation Administration (FAA) and TSA before its transfer to the DHS Science and Technology Directorate in FY 2006, hosts specialized facilities for research, development, testing, and evaluation of innovative technologies for detecting threats to the transportation sector. In addition to basic and applied research and technology development, TSL carries out certification, qualification, and assessments of technologies developed by private industry for use by TSA.

The laboratory has built capacity in a number of technology areas critical to transportation security, including bulk and trace sensors, devices for understanding the physics of explosions, technology for enhancing explosion survivability, communications equipment, and access control technologies. There are also six laboratories at TSL dedicated to testing explosives and weapons detection equipment. Finally, in addition to its RDT&E capacity, TSL also maintains

models of all deployed technologies at the Atlantic City facility for troubleshooting and technical support purposes.

RDT&E priorities for TSL are generally set by TSA, though they are influenced by the work of other DHS S&T components, including the Homeland Security Science and Technology Advisory Committee (HSSTAC) and the DHS S&T Explosives Division. DHS S&T uses a formal process that convenes Integrated Product Teams (IPTs) comprised of officials from DHS components who advise the S&T Directorate on their technology needs, thus informing specific research priorities. The planned transportation security IPT will be lead by TSA and will include stakeholders such as U.S. Customs and Border Protection (CBP), Immigration and Customs Enforcement (ICE) and the U.S. Coast Guard (USCG) who will select transportation security related technology development projects for TSL to undertake. To date, TSA has indicated that they are especially interested in projects for enhancing checkpoint security. TSL also coordinates with the Explosives Division of DHS S&T, which is guided by a separate but related explosives IPT that is currently focusing on standoff detection of improvised explosive devices (IEDs).

TSA is also responsible for guiding testing and evaluation (T&E) priorities at TSL. Tests are constrained by the various lab capabilities, but TSL is able to carry out testing and validation for a wide array of technologies, including devices for baggage and personnel inspection, cargo inspection, infrastructure protection, and conveyance protection. The technologies that are tested at TSL include those developed internally, as well as by outside industry. TSA can specifically request certification of outside products for a qualified product list (QPL) that TSA uses to determine whether a technology is suitable for procurement and deployment. The laboratory will also begin developing plans to create a testing facility to model a full airport checkpoint, which would examine the technical performance of various technologies when they are integrated into a realistic system. TSA is also planning to build a similar facility for field testing technologies that are integrated into a checkpoint, but the aim of that facility would be technology operations and robustness.