

**U.S. House of Representatives**  
**Committee on Appropriations, Subcommittee on Homeland Security**  
**Testimony of the Honorable Tara O'Toole, M.D., M.P.H.**  
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**Department of Homeland Security**  
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**Introduction**

Good afternoon Chairman Aderholt, Congressman Price, and distinguished Members of the Subcommittee. It is an honor to appear before you today to report on activities within the Department of Homeland Security's (DHS) Science and Technology Directorate (S&T), and to discuss President Obama's Fiscal Year (FY) 2012 budget request for the Directorate.

S&T is the main source of scientific expertise and technological research and development for DHS, and it provides vital homeland security-related knowledge and technologies to the nation's first responders. Congress created S&T as part of the Homeland Security Act of 2002, with the mission to "conduct basic and applied research, development, demonstration, testing and evaluation activities relevant to any or all elements of the Department." S&T also has a statutory responsibility to transfer useful technologies and information to state and local governments and to the private sector.

In the past eight years, S&T has undergone many changes and continues to evolve. Because the mission of the Department of Homeland Security is extraordinarily broad, S&T's work must address a wide and varied array of programs. These range from technical analyses, to the development of new technologies, to the adaptation of existing technologies in support of near-term operational needs. Some of S&T's most important contributions are knowledge products – analyses of alternative solutions to complex issues, objective tests of proposed technologies, and the creation of consensus standards which enable cost-effective progress across many fields.

The President's FY 2012 budget requests \$1.2 billion for the DHS S&T Directorate. I fully recognize that in today's fiscal environment, S&T must be a responsible steward of taxpayers' dollars and must address critical technological challenges facing the Homeland Security Enterprise of today and tomorrow in an efficient and cost-effective manner. The budget request before you represents investments that are critical to the security of our nation.

Since I became Under Secretary in November 2009, the Directorate has established a process of ongoing review of our entire R&D portfolio to ensure that we are investing in technologies that will have significantly improve DHS's efforts to make America secure. We are working closely with Component leaders across the Department to identify and solve high-priority problems. One way we are doing this is through the establishment an office dedicated to serving First Responder needs. This office is led by a former fire chief who reports directly to me. We are also placing more emphasis on ensuring that our research and development projects transition to use in the field, and we have instituted new approaches to make sure we leverage R&D investments and technologies already developed or underway by other federal agencies, universities, and the private sector. We have also sought to be innovative in our business practices as well as in our scientific endeavors.

The Department of Homeland Security cannot fulfill its missions without the creation and effective use of technology. The complexity and breadth of available technologies relevant to DHS' purposes, the rapid pace of technological change, and the scale and varied environments within which DHS must operate make S&T's task extremely challenging. Through these initiatives, combined with the talent of the S&T staff and the support of Congress, the S&T Directorate can meet these challenges to the benefit of the Department and the nation.

### **S&T Strategic Goals**

Shortly after I was confirmed as Under Secretary, S&T instituted an inclusive and comprehensive strategic planning process. The key goals derived from this process are described below:

#### ***S&T Goal #1 - Rapidly develop and deliver knowledge, analyses, and innovative solutions that advance the mission of the Department.***

This first goal is intended to place a strong emphasis on transitioning products to use in the field – a goal which is in keeping with the intense operational focus of the Department and the need for near-term improvements in operational capabilities, efficiencies and security. Research and development efforts are notoriously unpredictable. Research is inherently about discovery – but this path is rarely linear or straightforward. By its very nature, R&D takes a long time. The usual estimate of the time required for a “new idea” – a novel understanding of how nature works – to be translated into effective technologies is about a decade, which is longer than S&T has been around. Moreover, transitioning a proven prototype technology into mass production and regular use is incredibly difficult.

To realize the goal of rapidly transitioning our R&D projects to use, S&T has undertaken several initiatives which address both the “front end” of technology development (understanding the problem, scanning the horizon for possible solutions, and managing the selected R&D effort) and the “back end” (testing the prototype against operational requirements, running field pilots, acquiring the technology, and training people to use it). Two initiatives aimed at gaining improvements in the “front end” of transition efforts are our Portfolio Review and Technology Foraging projects.

#### ***Ongoing Review of the R&D Portfolio***

To ensure that individual R&D projects are meeting the goals established by our partners in the operating components and the broader homeland security enterprise (HSE), S&T has committed to an annual review of our portfolio of basic and applied R&D and all proposed “new start” projects. The review process consists of written materials, an oral presentation by the project manager, and careful analysis of the project's likely impact and feasibility (or “riskiness”) as judged against specific metrics determined by S&T with input from the operating components. These metrics are designed to address elements essential to programmatic success in the context of the DHS's QHSR missions.

A review panel of S&T leaders, the DHS Component representatives, and technical experts evaluates and rates each project. By measuring all of our projects against this framework, we will: provide a transparent and “shareable” view of all R&D within S&T; enable more strategic, longer-term budget decisions; ensure efficient delivery to the component or end user; and nurture

effective communication throughout the process. This particular review model has been used by both federal and private R&D organizations, including the prize-winning Army Engineering, Research and Development Laboratory.

#### *Becoming Best-in-Class at Technology Foraging, Outreach to Private Sector*

Technology foraging refers to a complex process of using scientific periodicals, the internet, and other sources to seek out technologies that are already in use or being developed, and adopting these technologies for new purposes, new environmental conditions, or at new scales. We plan to institutionalize technology foraging best practices to ensure we harvest the best technologies at the lowest cost, and in the timeliest manner possible. One example of how S&T has begun engaging with the private sector is our new partnership with In-Q-Tel. Through this partnership, In-Q-Tel will help S&T rapidly identify near-term technologies to further the DHS mission. In addition to rapidly delivering innovative technologies to their government customers, In-Q-Tel also supports small businesses that may not normally work with the government. In-Q-Tel estimates that following investments via In-Q-Tel, companies have created more than 10,000 jobs.

#### ***S&T Goal #2 - Leverage S&T's technical expertise to assist DHS Components' efforts to establish operational requirements, and to select and acquire needed technologies***

S&T serves as the technical core of DHS, whose missions increasingly rely on technology. While much of S&T's work involves the development of new technologies, we also play an important role in the Department's acquisition of existing technologies.

#### *Test and Evaluation*

When Congress created DHS, it charged S&T with the responsibility for "coordinating and integrating all research, development, demonstration, testing, and evaluation activities of the Department." S&T's Test & Evaluation and Standards Division (TSD) develops and implements robust Department-wide T&E policies and procedures. As the designated independent oversight authority for operational testing within DHS, TSD approves Test and Evaluation Master Plans, which describe the necessary tasks that must be conducted in order to determine system technical performance and operational effectiveness. This critical role ensures that technologies acquired by DHS actually do the job they are intended to do. S&T TSD provides ongoing support for approximately 84 DHS major acquisition programs and projects, ensuring each program complies with DHS Test and Evaluation Policy. Examples of programs/projects include: TSA Advanced Technology 2 (carry-on baggage), CBP SBI-net, and the USCG helicopter MH-60T.

#### *Supporting Departmental Acquisition Requirements and Systems Engineering*

S&T has begun working with the DHS Under Secretary for Management to use our collective expertise and resources to better address the "front end" of the acquisition cycle, namely, the translation of mission needs into testable requirements. A second thrust of this effort is aimed at instilling a more cohesive, systems engineering-based approach to DHS components' use of technologies. To focus efforts in this area, S&T has established an Acquisition Support and Operations Analysis (ASOA) Group, which provides a full range of coordinated operations analysis, systems engineering, test and evaluation, and standards development support to the DHS Components. For example, the ASOA group currently is assisting CBP with the

Automated Commercial Environment (ACE), Mobile Broadband Modernization Program, and the Secure Transit Corridors Program.

***S&T Goal #3 - Strengthen the Homeland Security Enterprise and First Responders' capabilities to protect the homeland and respond to disasters***

In addition to serving the technical needs of the DHS Components, S&T is also committed to addressing the needs of the larger HSE – especially first responders – for technologies and knowledge based on the best science. The nation's first responder community incorporates a range of organizations, including law enforcement, fire suppression, emergency management, search and rescue, emergency medicine and public safety communications. Despite a wide array of defined responsibilities, their job descriptions vary based on geography, population, and climate. Above all, they are the groups we call upon to tackle unexpected events as they occur in real time, and must therefore maintain a wide breadth of expertise, adapt at a moment's notice, and protect citizens' lives with relatively few resources. Additionally, communication poses significant challenges with first responder groups because of varying local, state, and national levels of hierarchy. Realizing this, S&T has made serving the homeland security needs of first responders a top priority. To this end, we have created an organization dedicated to understanding first responders' operational needs and delivering technologies, knowledge products, and services to the first responder community.

***S&T Goal #4 - Conduct, catalyze, and survey scientific discoveries and inventions relevant to existing and emerging homeland security challenges***

*Supporting University Centers of Excellence*

S&T relies upon the University Centers of Excellence (COEs) – a consortium of universities and colleges – to tap the expertise and resources of academia to provide critical homeland security tools, technologies, training, and talent. The COEs maximize S&T's investment by working closely with academia, industry, the DHS components, and first responders to develop customer-driven research solutions. Their collective portfolio is a mix of basic and applied research addressing both short- and long-term needs. To better tackle urgent needs, the DHS components can directly engage the COEs for specific research. To date, these DHS offices have invested a total of \$22.6 million in targeted research programs, resulting in over 70 technologies for use across the HSE.

*Stewardship of Laboratory Infrastructure for Homeland Security*

S&T maintains five national laboratories with unique homeland security missions. Additionally, S&T works closely with other federal laboratories – especially the DOE national labs – and international partners to leverage technology innovation and avoid duplication of effort. S&T labs perform long-term research and are also capable of rapid operational analyses. Agriculture is a critical economic and national security sector, susceptible to both natural disease outbreaks and terrorist attacks, and S&T has a leading role in forensic tools and defenses necessary to defeat these threats.

S&T has long recognized the need for and has been actively planning to meet the laboratory facility needs to support comprehensive research programs for the study of foreign animal and zoonotic diseases, including detection, diagnosis, and means of mitigation (drugs, vaccines, and

genomic forensics).” In FY2012, \$150 million is requested to begin construction of the National Bio- and Agro-Defense Facility (NBAF), which will serve as a new, state-of-the-art, biosafety facility. Work performed at NBAF will lead to the development of vaccines and anti-virals, and enhanced diagnostic capabilities for protecting our country from numerous foreign animal and emerging diseases. When completed, the building will provide capability to research agents which cannot currently be investigated in large animals in the United States.

***S&T Goal #5 - Foster a culture of innovation and learning in S&T and across DHS that addresses mission needs with scientific, analytic, and technical rigor.***

#### Build a Culture of Innovation and Learning

The development and translation of science and technology from ideas to products requires technical competence, creativity, agility, sustained effort and strong teamwork. To maintain a high level of success, S&T needs to constantly evolve. We have to approach R&D problems from a multidisciplinary and collaborative perspective that can only be achieved by having experts from all fields working at close proximity in an open environment.

S&T is working to truly achieve an ecosystem of innovation. We encourage collaboration through Apex projects that bring together teams of experts from all of our groups to focus on a single critical problem highlighted by our DHS partners. S&T is increasing the interaction between our program managers and Component operations to better understand operational constraints and conditions and deliver cross-cutting products.

We have recently expanded our access to online scientific journals, which are the lifeblood of scientific discourse. And we are reworking offices and collaborative spaces to create a more open environment while introducing new technologies that can help us communicate ideas and viewpoints. Our staff is highly educated and technical; however, scientists must constantly stay in tune with new developments in the field. We are starting new programs at our COEs to encourage our employees to pursue advanced degrees, increasing S&T’s expertise and effectiveness.

#### **S&T Realignment Emphasizes Cross-S&T Communications and Multidisciplinary Teamwork**

The structural realignment of S&T provides the organizational framework needed to implement our top strategic goals. The number of direct reports to the Under Secretary was reduced from 21 to 10, streamlining the chain of command. This structure allows efficient interaction among four “Group Leads,” and creates a leadership cadre that spans the extent of S&T’s work. The four Groups are:

- *Homeland Security Advanced Research Projects Agency (HSARPA)* - HSARPA executes S&T’s Research and Development programs, and constitutes a majority of the Directorate’s budget. This unites all of the technical divisions and will encourage collaboration across divisions, enabling the multi-disciplinary work that is required for today’s R&D.

- *Homeland Security Enterprise and First Responders Group (FRG)* - This office is the primary interface with First Responders and other members of the HSE. The office will allow S&T to more effectively respond to the different needs, acquisition methods, implementation requirements, and management structure of first responders. This group will put particular focus on improved best practices, standards for equipment and interoperability, and information sharing.
- *Acquisition Support and Operations Analysis Group (ASOA)* - The ASOA will leverage S&T's critical mass of technical capability within DHS and will work with the Under Secretary for Management to: aid the components in developing high-fidelity, testable operational requirements for their acquisitions; aid in executing an analysis of alternatives to ensure that the most appropriate technical approach is taken; and partner with the components throughout an acquisition so that user needs are translated into real capabilities that can be validated upon delivery and deployed without delay.
- *Research and Development Partnerships Group (RDP)* - The RDP acts as a critical portal to S&T, providing commercial entities with easy access to the information on DHS needs, while enabling S&T program managers to make connections across the entire horizon of R&D in government, universities, the private sector, and abroad.

### **Realignment of the Budget Structure**

Over the past year, S&T has been part of the unprecedented departmental effort to develop and implement the Quadrennial Homeland Security Review (QHSR) and the Bottom-Up Review (BUR), which established a strategic framework and programmatic structure for homeland security missions and goals. In addition to realigning S&T, we realigned our existing projects into a budget structure that provides a framework that effectively supports our strategic goals and initiatives and aligns with the DHS BUR. This budget structure allows greater transparency into S&T R&D work while encouraging multi-disciplinary approaches to solve the diverse problems within the homeland security mission. This structure clearly aligns S&T funding to the functional missions that we are addressing.

**Research, Development and Innovation (RD&I)**

RD&I provides state-of-the-art technology and/or solutions to meet the needs of the operational components of the Departments and the first responder community.

	<b>FY10/FY11CR<sup>1</sup></b>	<b>FY12</b>
<b>Research, Development &amp; Innovation</b>	<b>\$598.5</b>	<b>\$659.9</b>
RD&I APEX STORE	\$0.0	\$17.9
Border Security	\$47.7	\$43.0
Bioagent Threat Assessment	\$59.5	\$44.3
Bioagent Detection	\$47.7	\$50.4
Bioagent Attack Resiliency	\$49.5	\$50.0
Chemical Threat Assessment	\$13.4	\$10.0
Chemical Detection	\$20.6	\$16.7
Chemical Attack Resiliency	\$23.9	\$19.2
Explosives Threat Assessment	\$14.6	\$21.1
Explosives Detection	\$106.2	\$101.2
Explosives Attack Resiliency	\$21.6	\$13.0
Rad/Nuc Detection	\$0.0	\$98.7
Rad/Nuc Resiliency	\$0.0	\$10.3
Natural Disaster Threat Assessment	\$0.0	\$2.5
Natural Disaster Detection	\$0.0	\$1.1
Natural Disaster Resiliency	\$60.0	\$20.2
Information Sharing, Analysis, & Interoperability	\$35.4	\$23.7
First Responder Capability	\$27.5	\$25.7
Cyber Security	\$41.7	\$64.1
Hostile Behavior Predict and Detect	\$22.7	\$14.6
Identity Management	\$6.3	\$12.2

**Acquisition and Operations Support**

Provides expert assistance with transition, acquisition, and deployment of technologies, and information to DHS components and entities across the Homeland Security enterprise.

	<b>FY10/FY11CR</b>	<b>FY12</b>
<b>Acquisition &amp; Operations Support</b>	<b>\$65.3</b>	<b>\$54.2</b>
Operations Research & Analysis	\$13.1	\$11.7
Standards	\$22.2	\$16.5
T&E	\$8.5	\$6.6
Safety Act	\$8.9	\$8.9
Technology Transition Support	\$12.6	\$10.4

<sup>1</sup> FY 10/11 numbers have been adjusted to reflect execution in the current budget structure.

### Laboratory Facilities

The Office of National Laboratories has responsibility to ensure that required infrastructure laboratory facilities will support the ongoing Science and Technology mission of research and development activities.

	<b>FY10/FY11CR</b>	<b>FY12</b>
<b>Laboratory Facilities</b>	<b>\$150.2</b>	<b>\$276.5</b>
NBAF Design & Construction	\$32.0	\$150.0
Infrastructure Upgrades	\$5.0	\$18.2
Laboratory Operations	\$83.2	\$77.4
NBACC Operations	\$30.0	\$30.9

### University Programs

Focuses on building the homeland security expertise within the academic community, creating strategic partnerships among universities and public agencies, and developing the next generation scientific workforce of homeland security experts.

	<b>FY10/FY11CR</b>	<b>FY12</b>
<b>University Programs</b>	<b>\$49.4</b>	<b>\$36.6</b>
Centers of Excellence	\$39.4	\$29.9
Education Programs	\$6.1	\$3.3
Minority Serving Institutions	\$3.9	\$3.3

### Research, Development, and Innovation Activities

The S&T Directorate is supporting over 200 projects in its R&D portfolio. These projects address all five mission areas described in the 2010 Quadrennial Homeland Security Review, and include both late-stage “applied” technology development efforts, and more fundamental research. The purpose of these projects is motivated by mission needs and “capability gaps” identified by DHS components and first responder representatives. Some current projects are long-standing efforts (e.g explosive detection efforts), while others are just getting underway (e.g. bulk currency detection).

The selection of projects described here is not comprehensive, but is meant to be representative of the range and variety of research responsibilities within the Directorate that are supported by the FY 2012 budget request. Many of these projects could warrant an extended briefing, which we would be happy to provide. In addition to the support to NBAF mentioned above, the FY 2012 budget request includes funding to support the following projects.

#### **Mission 1: Preventing Terrorism and Enhancing Security**

##### ***Explosives Detection***

Improvised explosive devices (IEDs) and liquid explosives are a significant, emerging threat. DHS S&T is working to discover the signatures and methods by which this emerging spectrum of threats can be readily identified.

- Home-made Explosives Characterization – identifying, characterizing, and understanding the recipes and effectiveness of home-made explosives.

- Algorithm and Analysis of Raw Data – establishing standards and methods to improve threat detection accuracy for X-ray and other screening infrastructure.
- Automated Carry-On Detection Project- developing advanced capabilities to detect explosives and concealed weapons. The project plans to transition the initial Integrated Checkpoint Framework to the Transportation Security Administration (TSA). The integrated framework incorporates standard data formats, interoperable technologies and remote multiplexed screening for an array of threats.
- Automatic Target Recognition Project- developing and evaluating automated target recognition algorithms for Advanced Imaging Technology with the goal of automatic and reliable detection of threats on passengers, reducing the need for human interpretation and further addressing privacy concerns. This research will guide further enhancements necessary to reach full-scale development and deployment by conducting further testing. Additional research will improve existing technologies, as well as add the ability to upgrade to the currently piloted system.
- Explosives Trace Detection Project- developing advanced capabilities to detect explosives, including IEDs, by developing non-contact portable mass spectroscopy, nuclear resonance imaging and nuclear quadrupole resonance devices. Beyond better detection capabilities, the project will enhance technology for improved operational characteristics such as throughput and maintenance. In FY 2012, the project plans to transition to TSA production-ready trace-detection systems for airport checkpoint applications.
- Air Cargo Project – developing the next generation of screening systems to mitigate the threat of explosives placed in air cargo containers. The technology is designed to reduce reliance on human screeners to detect artfully concealed threats; provide automated equipment to screen air cargo to increase throughput; reduce government oversight costs; reduce industry costs of complying with air-cargo screening regulations; and provide additional layers of security to enhance and verify air cargo supply-chain integrity.

### ***Preventing and Detecting a Chemical or Biological Terrorist Attack***

Chemical and biological weapons pose a complex set of challenges for the country's preparedness and response posture. DHS S&T is developing an integrated set of prevention and detection capabilities to assist first responders, medical and public health professionals and law enforcement.

- Bioterrorism Risk Assessment – providing senior leadership across the interagency with a strategic assessment, updated biennially, that integrates the findings from the intelligence and law enforcement communities with fundamental threat characterizations to assess the risk posed to the homeland of a possible bioterrorist event.
- Chem/Bio Personal Protective Equipment (PPE) to Support First Responders – delivering a new suite of PPE for DHS components and first responders to protect them from chemical and biological threats.
- Integrated Consortium of Laboratory Networks (ICLN) – integrating existing federal and state public health lab capacity to deliver the analytical services necessary to enable detection and response to a chemical or biological attack.
- Bioassays, Near Term – developing validated standards for Public Safety Actionable Assays (PSAAs) and Public Health Actionable Assays (PHAAs) which enable end-to-end analysis of suspicious samples in the field by first responders to confirmatory testing in the CDC Laboratory Response Network (LRN). These standards are designed to provide first

responders with greater confidence that the tools they buy will perform effectively and will enable them to make critical decisions.

- Chemical Forensics – developing sampling and analytical methods to enable agent identification and attribution of an attack.
- National Biodefense Analysis and Countermeasures Center (NBACC) – DHS S&T supports this laboratory to provide critical biological threat analysis and forensic capability for the country through the National Biological Threat Characterization Center, and the National Bioforensic Analysis Center, which routinely provides forensic support to FBI investigations of bio-crimes.
- Multi-Application Multiplex Technology Platform Project- developing a multiplex technology platform that will allow an end user to screen for multiple pathogens from a single sample, and provide a user-friendly concept for multi-agency use and application where assay cartridges may be changed, based upon facility- or agency-specific needs. The project will ensure that different assay cartridges are validated for use by specific agencies.

### ***Preventing Agro-terrorism***

An outbreak of Foot and Mouth Disease (FMD), African swine fever, Rinderpest or any one of an array of foreign animal diseases would have significant economic impacts from losses in livestock production as well as restrictions on trade of susceptible animal species. S&T is developing a new FMD vaccine and other tools to effectively manage an outbreak, should one occur.

- The Foreign Animal Disease Vaccines and Diagnostics Project – developing a new molecular vaccine for FMD for which conditional licensure is expected by the end of 2011.
- Ag Screening Tools Program (Bioagent Detection) – developing tools to detect foreign animal disease threats like FMD, African swine fever, and many others at ports of entry, inspection stations, and elsewhere.
- Decontamination, Disposal and Depopulation Project – will develop animal disease emergency response tools and CONOPS to ensure that, in the wake of an animal disease outbreak, response activities are handled as rapidly and as humanely as possible.

### ***Infrastructure Protection***

The volume and diversity of U.S. critical infrastructure requires an equally diverse approach to addressing threats in a risk-based fashion. S&T is working across government and industry to develop technology solutions to protect the highest priorities.

- Mass Transit Tunnel Protection – providing solutions to protect underwater tunnels from attacks, emphasizing prevention of catastrophic losses. Ongoing collaboration with local transit authorities includes the Port Authority of New York and New Jersey who invested \$50 million to implement one such solution developed by S&T.
- Wide Area Surveillance – developing a high-resolution, 360-degree field-of-view camera allowing infrastructure owners to examine multiple objects-of-interest simultaneously. This project is currently in operational testing at Boston's Logan Airport.
- Recovery Transformer – developing a transportable, modular replacement for electrical transformers to restore electrical service in considerably less than the estimated 12-18 months required now when transformers fail. The Electric Power Research Institute (EPRI) is an equal partner, matching government funding from NPPD, S&T, and DOE.

## **Mission 2: Securing and Managing Our Borders**

S&T is developing technologies to stop criminal and terrorist activity, while supporting the legitimate flow of goods and people across our nation's borders that is essential for our economy.

- Currency Detection – finding effective methods to detect the concealed currency that funds cartels and other organizations who smuggle billions of dollars across our borders each year.
- Tunnel Detection – conducting the underlying science needed to build tools that detect and locate clandestine tunnels used as conduits for illegal immigration and smuggling activities.
- Tunnel Activity Monitoring – piloting new sensor networks to detect the presence of illicit activity in city storm water and sewer tunnels and alert officials to help them track and apprehend smugglers moving humans or goods under border cities.
- Small Dark Vessels – developing new sensors and integrated systems to detect and track small, self-propelled, semi-submersible boats carrying illegal drugs and other illicit cargo.
- Port and Coastal Surveillance – adapting the National Oceanic and Atmospheric Administration's pre-existing coastal high frequency surface wave radar system to track boats along the entire U.S. coastline and integrate that data into USCG's common operating picture.
- Supply Chain Secure Corridors Pilot Project – enabling U.S. Customs and Border Protection to determine the efficacy of the secure locking device, developed by S&T, to collect and relay the location and status of the lock and the conveyance doors to which it is attached. Tracking the locking device and knowing it was not opened or tampered with during transit will assist CBP in understanding the appropriate concepts of operation for different supply routes, and provide an immediate operational capability to allow secured cargo to transit the United States.

## **Mission 3: Enforcing and Administering Our Immigration Laws**

### ***Identity Verification***

DHS processes millions of people each year at ports of entry, border check points and official processing centers where verification of identity and familial relationships is key to their mission.

- Rapid DNA Analysis – developing a DNA analyzer that can determine identity and familial connections that's small enough to be easily portable and fast enough to return results in less than an hour, at a dramatically reduced cost. S&T will conduct preliminary testing with U.S. Citizenship and Immigration Services (USCIS) pursuant to current authorities.

## **Mission 4: Safeguarding and Securing Cyberspace**

### ***Protecting Internet Usage***

The security of networks is essential to enable trusted transactions and secure infrastructure controls. DHS S&T is the principal government agency supporting the development of scientific tools to protect civilians and the private sector from cyber attack. S&T provides solutions to industry for global distribution.

- Domain Name Service Security (DNSSEC) – leading the deployment of secure communications protocols to ensure that users communicate with the intended and authentic internet sites. Major companies in the cyber industry, such as Verisign, Microsoft and Comcast have incorporated this standard into their respective products to improve security and prevent criminal exploitation.

### ***Protecting the Internet Infrastructure***

Internet infrastructures depend on public and private networks, increasing opportunities for disruptions or failures. DHS S&T is developing defenses to protect the internet infrastructure from attack.

- Defense Technology Experimental Research (DETER) – providing a DHS-NSF experimental research test bed that continues to serve as venue to safely test new software products and cyber security countermeasures in a realistic data and network environment.

### ***Protecting the User***

Security solutions must guard against the unauthorized access to network resources. DHS S&T has been very successful in creating tools that protect individual users online.

- Cyber Small Business Innovation Research (SBIR)– annual Cyber SBIR efforts have resulted in several successful technologies with commercial applications, such as a malware detection tool developed by a company that has been acquired by McAfee.

## **Mission 5: Ensuring Resilience to Disasters**

### ***Critical Infrastructure Resilience***

DHS S&T develops technologies to address the continuum from pre-disaster to response and recovery, seeking to maintain critical functions while maximizing effective response, thereby shortening recovery periods for critical infrastructure.

- Resilient Electric Grid – developing cutting-edge superconducting cables so that substations can be connected to share power and prevent cascading power effects, partnering with ConEdison and American Superconductor, who have contributed ~\$6.5 M to date.
- Process Control Systems – securing the information systems that control the country’s energy infrastructure, including the electrical grid and oil and gas refineries and pipelines, to reduce vulnerabilities as legacy, stand-alone systems are networked and brought online.
- Data Integration for Incident Management – delivering middleware and viewer software for real-time exchange of emergency management data among multiple jurisdictions and private companies operating different software applications with various data formats. One product, Virtual USA, allows participating agencies make data available to others as a web feed and pull others’ web feeds to display in their own map viewers. In fact, Virtual USA was operationally utilized in the Deepwater Horizon response and will be used for the upcoming National Level Exercise.
- Underground Transportation Restoration – response and recovery tools and techniques for restoring transportation systems after a chemical or biological attack. This project includes a rapid characterization of the event and clearance of the facility and conveyances for public use.

### ***Tools for the First Responder***

First responders are in need of new tools to help them respond to terrorist attacks or natural disasters safely and effectively. DHS S&T is developing a suite of new technologies to be deployed to the first responder community.

- Self-Contained Breathing Apparatus – apparatus made from composite materials resulting in less weight and more mobility for firefighters and other first responders.
- Geospatial Location Accountability and Navigation System for Emergency Responders – next generation geospatial location system to track first responders inside enclosed areas.

- Man Portable Interoperable Tactical Operations Center – delivering an integrated suite of commercial-off-the-shelf tools that enhance communications, situational awareness, and radio/voice/data interoperability for first responders.

### ***Resilience to Chemical, Biological, Radiological, and Nuclear (CBRN) Attacks***

Attacks using CBRN weapons pose a unique set of challenges for response and recovery. DHS S&T has a set of programs to identify and address these challenges.

- Chem-Bio Event Characterization – developing a capability for the response community to rapidly determine the extent of chemical or biological contamination following an event, giving responders the information they need to act appropriately and save lives.
- Intelligent Personal Radiation Locator – an affordable, pocket-sized, spectroscopic radiation locator that detects radiological and nuclear emissions, delineates source type, and locates the source.
- Radiological and Nuclear Response and Recovery – protocols, techniques and technologies for responders to address the response to a radiological or nuclear attack. The ability to make sound decisions for a coordinated response in the first minutes or hours after an event can make an enormous difference in mitigating the overall impact and saving lives.

### **Conclusion**

Thank you for the opportunity to discuss the mission, strategy and some representative R&D projects being pursued by the DHS S&T Directorate. The President's FY 2012 Budget request reflects a commitment to prudent investment that will allow us to counter the evolving threat and build a strong, agile homeland security enterprise capable of meeting the challenges of the future. As Congress recognized when it created the S&T Directorate in 2002, DHS' missions cannot be realized without a strong research and development effort.

S&T strives to provide cutting edge scientific knowledge, technical analysis, and innovative technologies to the third largest federal agency, to first responders, and to the HSE. The missions and technical needs of homeland security are broad in scope, varied, and constantly evolving. To meet the challenges of this mission, S&T must also evolve. I believe that the implementation of the strategic plan and our organizational and budget realignment are important steps toward effectively and efficiently realizing the technical needs of homeland security.

Investments in science and technology are vital to the security of the nation. S&T is well positioned to capitalize on this, leveraging partnerships with both the private and public R&D communities. S&T is fully engaged, both in the US and internationally, including efforts with universities, the National Laboratories, and others, and this positions us to take advantage of emerging ideas and solutions wherever they arise.

Thank you for inviting me to appear before you today. I look forward to answering any questions you may have.