



# Science and Technology Directorate Review 2014



Homeland  
Security

Science and Technology



# Letter from the Under Secretary for Science and Technology

In 2013, the Science and Technology Directorate (S&T) celebrated its tenth year of serving as the scientific and analytical core for the Department of Homeland Security (DHS).

During this time, S&T has delivered numerous significant research and development (R&D) solutions, many of which are highlighted in the following pages. We continue to support the Homeland Security Enterprise (HSE)—the Department; its components; first responders; state, local, tribal, and territorial agencies; and critical infrastructure sectors—with scientifically informed analysis addressing the most pressing operational challenges faced in homeland security.



S&T's technologists, engineers, scientists, and researchers are working closely with partners across the HSE to ensure R&D investments address the high-priority needs of today and the growing demands of the 21st century. From border security to biological defense to cybersecurity to explosives detection, S&T is at the forefront of integrating R&D across public and private sectors and the international community to meet homeland security mission needs. S&T's experts continue to develop and transition advanced capabilities and analytics to HSE operators so they may better prevent, protect against, mitigate, respond to, and recover from all hazards and a wide range of homeland security threats.



The Science and Technology Directorate Review 2014 details how S&T delivers on our value added proposition by being operationally focused, bringing forward innovative solutions, and building partnerships to make our country more secure and resilient. While we are proud of our record to date, we recognize that homeland security challenges are varied and growing and therefore require the very best of our collective efforts now and in the future. Our mission to strengthen the security and resiliency of the HSE requires rigorous R&D, including sustained collaboration with a diverse range of groups, such as first responders; state, local, tribal, and territorial governments; academia; private industry; and national laboratories. To do anything less would be irresponsible.

Of course, none of these accomplishments would have been possible without the hard work and dedication of our talented S&T team. Together, they make our country more secure and resilient, and we owe them a debt of gratitude.

A handwritten signature in black ink, appearing to read 'D. M. Gerstein'.

Daniel M. Gerstein, Ph.D.  
Under Secretary (Acting) for Science and Technology  
Department of Homeland Security

# Table of Contents

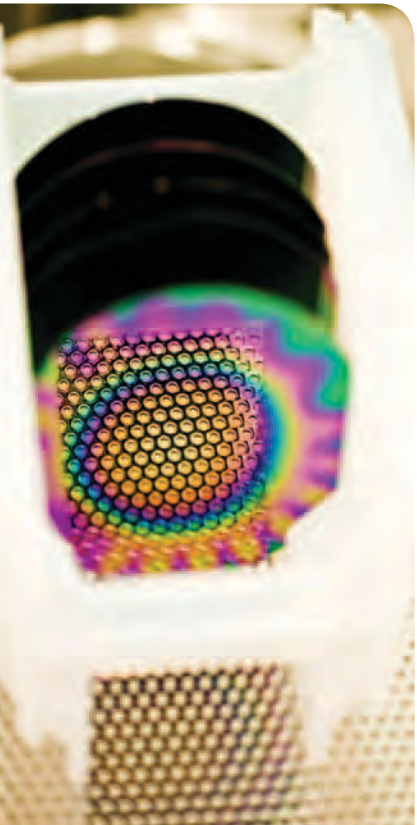
<b>Letter from the Under Secretary</b>	<b>i</b>
<b>Introduction</b>	<b>5</b>
<b>S&amp;T Accomplishments</b>	<b>15</b>
 <b>Support to the Homeland Security Enterprise and First Responders Group</b>	<b>15</b>
Office for Interoperability and Compatibility	<b>16</b>
Responder Technologies	<b>19</b>
National Urban Security Technology Laboratory	<b>21</b>
Communications, Outreach, and Responder Engagement Team	<b>22</b>
 <b>Homeland Security Advanced Research Projects Agency</b>	<b>25</b>
Apex	<b>26</b>
Borders and Maritime Security Division	<b>27</b>
Chemical and Biological Defense Division	<b>29</b>
Cyber Security Division	<b>32</b>
Explosives Division	<b>34</b>
Resilient Systems Division	<b>35</b>
In-Q-Tel	<b>37</b>



# Table of Contents

<b>Acquisition Support and Operations Analysis</b>	<b>39</b>
Research and Development Analysis and Assessment Office	<b>40</b>
Office of Standards	<b>44</b>
Office of Systems Engineering	<b>46</b>
Office of Operational Test and Evaluation	<b>47</b>
Federally Funded Research and Development Center Program Management Office	<b>50</b>
<b>Research and Development Partnerships</b>	<b>55</b>
Office of National Laboratories	<b>55</b>
Office of University Programs	<b>57</b>
International Cooperative Programs Office	<b>60</b>
Office of Public-Private Partnerships	<b>61</b>
Interagency Office	<b>64</b>
<b>The Way Forward</b>	<b>67</b>
<b>Appendices</b>	<b>71</b>
<b>A. Office of National Laboratories Fact Sheets</b>	<b>71</b>
<b>B. Center of Excellence Partners and Labs</b>	<b>76</b>
<b>C. Office of SAFETY Act Implementation/SAFETY Act Projects</b>	<b>81</b>
<b>D. Small Business Innovation Research Program Office,         Research Areas and Projects</b>	<b>86</b>
<b>E. Technology Foraging Projects</b>	<b>89</b>





**Innovation**  
introduction of a  
idea, method, or  
a creation of some  
experimentation

## Strengthening Security through Science and Innovation



## Introduction

Science and technology are essential to fulfilling the Department of Homeland Security's (DHS) missions effectively, efficiently, and safely and addressing emerging challenges and opportunities. To that end, the Science and Technology Directorate's (S&T) mission is to strengthen America's security and resiliency by providing knowledge products and innovative technology solutions for the Homeland Security Enterprise (HSE). Congress created S&T for, among many things, conducting "basic and applied research, development, demonstration, testing and evaluation activities relevant to any or all elements of the Department."

## S&T's Value Added Proposition

S&T serves as the scientific and analytical core of the Department. The foundation of S&T's contributions has been and will continue to be our value added proposition—the idea that our work will be operationally focused; highly innovative; and founded on building partnerships among operators, scientists, and engineers across the dynamic research and development (R&D) landscape. The value added proposition tethers our work directly to our customers and emphasizes the translation of research investments into practical, usable solutions that improve the effectiveness, efficiency, and safety of operators.

Operational focus ensures that considerations of transition to use and mission impact are ingrained into S&T's diverse efforts. Strong relationships with operators throughout DHS and the HSE accelerate S&T's delivery of solutions, as these end users are a key ingredient of generating project requirements based on real-world capability gaps, keeping projects aligned to operator missions throughout their lifespans, and ensuring that each final product delivers a strong return on investment.

Innovation is challenging to achieve and even more so when budgets are tight. The temptation to resource incremental operational capability improvement ahead of future development of new capabilities is natural and often necessary; however, there is a long-term cost to be paid for such a strategy. In S&T we use an approach that allows us to support—in collaboration with DHS components and the HSE—important near-term operational requirements while still looking to the future. To implement this strategy, S&T is developing technology roadmaps in its six commodity areas—first responders, borders and maritime security, chemical and biological defense, cybersecurity, explosives, and resilience—that will reflect this approach and plot S&T's diverse projects in the context of broader purposes and outcomes.

Partnerships across the diverse R&D landscape are the foundation for S&T's successful technology foraging and adaptation of previous R&D investments to homeland security mission needs. S&T's understanding of the operational environment and relationships with operators make the organization an effective catalyst for bringing together our customers with research and subject matter experts from outside federal, state, and local agencies; private industry; and academia across the United States and internationally.

### S&T's Value Added Proposition

**Operationally focused** – Provide strategic, focused technology options and enhance operational processes

**Innovative** – Develop innovative, systems-based solutions to complex homeland security problems

**Building partnerships** – Build technical depth and reach to leverage technology solutions from federal, state, local, and tribal governments; universities; and the private sector across the United States and internationally

## S&T's Value to the Department and the HSE

Through sustained partnerships with end users and operators, S&T continues to play a central role in building the capacity for scientifically informed, analytically based decisions. The Directorate's support to the Department and the wider HSE can be sorted into four general categories of deliverables:

- **New capabilities and knowledge products** – S&T creates new technological capabilities that address DHS operational needs or that are necessary to address evolving homeland security threats.
- **Process enhancements and efficiencies** – S&T conducts systems-based analysis to provide streamlined, resource-saving process improvements to existing operations.
- **Acquisition support and operational analysis** – DHS achieves more effective and efficient operations and avoids costly acquisition failures and delays by leveraging S&T's technical expertise to improve project management, operational analysis, and acquisition management.
- **Understanding of homeland security risks and opportunities** – S&T's relationships across DHS and the HSE contribute to the strategic understanding of existing and emerging threats and recognition of opportunities for collaboration across departmental, interagency, and state and local boundaries.

Projects fall under six primary commodity areas that directly support DHS component missions and fulfill S&T's statutory responsibility to support federal, state, and local first responders:

- **First responders** – Expanding first responder capabilities and improving their effectiveness, efficiency, and safety.
- **Borders and maritime security** – Enhancing security at our nation's borders and waterways without impeding the flow of commerce.
- **Chemical and biological defense** – Detecting, protecting against, responding to, and recovering from chemical and biological incidents.
- **Cybersecurity** – Contributing to a safe, secure, and resilient cyber environment.
- **Explosives** – Protecting citizens and infrastructure from the devastating effects of explosives.
- **Resilience** – Improving the nation's preparedness for natural and man-made catastrophes.

Within these commodity areas, S&T is the U.S. government's lead or primary provider of R&D in four specific areas: unclassified cybersecurity, civilian biodefense, explosives detection in aviation environments, and first responders.





## S&T's Unique Role and Capabilities

S&T has found success embracing its role as a convener and developer of partnerships both within and outside the Department. Within DHS, S&T leverages its unique perspective across the Department to work on crosscutting issues that affect all mission areas and components. For example, S&T recently convened deputies from 10 operational DHS components to discuss big data needs and opportunities. The result was a compilation of 43 requirements and capability gaps that S&T is addressing in close collaboration with the operational components. S&T also continues to work with components to support their analytical and technical requirements. Examples include tailoring a portfolio review process that fits their organizations; helping them align their own portfolios and investments with their strategic priorities; identifying operational enhancements that involve the adaptation of two or more components, such as our support to U.S. Customs and Border Protection (CBP) and U.S. Immigration and Customs Enforcement (ICE) concerning the processing of illegal aliens along the Southwest border; and developing Departmental capabilities and requirements for key mission areas, such as cybersecurity, biodefense, and common-vetting, as part of the Quadrennial Homeland Security Review (QHSR)-mandated pilots.

Outside of government, S&T leverages its position as a federal R&D organization to facilitate communication across barriers that otherwise would prevent cooperation. For example, with the Linking the Oil and Gas Industry to Improve Cybersecurity (LOGIIC) program, S&T brought together five major oil and gas competitors to work with government on the development and distribution of cybersecurity solutions that protect the industry's critical infrastructure. Without S&T's intermediary role as convener and coordinator, the important, ongoing work in LOGIIC and other innovative partnerships would remain undone.

S&T's role also includes serving as the primary interface for the Department for the use of our nation's laboratories, including our own DHS laboratories. S&T is responsible for DHS's five S&T laboratories. These facilities are national assets, providing key research, development, and operational support for safeguarding the homeland:

- **Chemical Security Analysis Center** – Acts as a repository of chemical threat characterization and vulnerability assessments and provider of real-time expert analysis during chemical events.
- **National Biodefense Analysis and Countermeasures Center** – Works to understand the risks posed by biological threats and provide forensic support and analysis for response to bioterror and biocrime.
- **National Urban Security Technology Laboratory** – Serves as a technical authority to first responder, state, and local entities in protecting our cities.
- **Plum Island Animal Disease Center** – Serves as the front line of defense against diseases that could devastate markets for livestock, meat, and other animal products.
- **Transportation Security Laboratory** – Provides research, development, and validation of solutions to detect and mitigate the threat of improvised explosive devices.





S&T is also overseeing construction of the National Bio and Agro-Defense Facility to replace the aging Plum Island lab with state-of-the-art capabilities to study foreign animal diseases, develop countermeasures, and train veterinarians.

In addition to managing DHS's laboratory assets, S&T is a pathway for DHS and the HSE to access vibrant national and international R&D networks. S&T coordinates DHS activity with Department of Energy national laboratories and advises DHS users on best practices for national lab use.

The Directorate also manages nine university-based Centers of Excellence. These centers give DHS access to more than 200 universities throughout the country, tapping subject matter expertise and generating research covering diverse homeland security topic areas, including risk assessment, explosives, food and agriculture security, and border security. Finally, S&T's 13 international

bilateral agreements connect the Department and HSE to non-U.S. partners, enabling operators to tap into international expertise and facilities and to work jointly on common problems in mission areas such as cybersecurity and biodefense.

## How S&T Does Business

S&T has invested significant effort in developing and implementing processes that keep the organization and its portfolio on track and strategically aligned to the priorities of our partners in the Department and HSE. These processes contribute to organizational effectiveness and efficiency and ensure that S&T's time and resource investments have a meaningful, positive impact.

### Science and Technology Resource Allocation Strategy

The Science and Technology Resource Allocation Strategy (STRAS) provides a coordinated framework that ensures S&T efforts are aligned with operational requirements. It captures ongoing work within DHS components and the first responder community, identifies where capability gaps exist, and plots a course to fill these shortfalls. STRAS begins from the premise of the value added proposition—that we must be operationally focused and innovative and build key partnerships to deliver a range of solutions that will enhance the effectiveness, efficiency, and safety of those executing the homeland security missions. The result is that all of our project efforts under the STRAS umbrella are designed to be highly collaborative among S&T, the customer, and other partners who can assist in developmental efforts. We also seek high-level support from our customers to ensure that R&D efforts undertaken by S&T have a path to transition and ultimately are fielded in an operational setting.

With the identification of broad capability gaps and requirements, integrated product teams develop R&D strategies that include S&T technology roadmaps consisting of individual projects and projected outcomes. The integrated product teams are joint—that is, consisting of S&T and customer personnel—and work collaboratively throughout the life cycle of the R&D effort. This methodology is employed for a majority of the R&D projects, with the exception of first responders.

Due to the heterogeneous nature of the first responder community, S&T uses a modified approach to determine requirements for this group. S&T's First Responders Group (FRG) employs a solution development process that helps determine first responders' priority needs. In partnership with the first responder community, FRG then develops solutions to meet those needs. S&T coordinates closely with this community through the First Responder Resource Group (FRRG), which includes DHS operational components and state, local, tribal, and territorial first responders. The FRRG meets quarterly to identify capability gaps and provide operational requirements for first responder R&D efforts. DHS components

participating in the FRRG include CBP, the DHS Office of Health Affairs, the DHS National Protection and Programs Directorate (NPPD), the Federal Emergency Management Agency (FEMA), and ICE.

All S&T support efforts are designed to be captured within the STRAS process. To this end, work in areas such as standards development, systems engineering and operational analysis, and acquisition support for the DHS components in support of their missions is also identified and captured in a component-specific STRAS document. This document is signed by the Under Secretary for Science and Technology and the corresponding component head. STRAS documents are intended to be living documents and therefore are updated as needed throughout the year as component priorities evolve in response to operational requirements and dynamic threat scenarios.

## Ongoing R&D Portfolio Review

In 2010, S&T adopted a process originally developed by Fortune 500 companies and now widely deployed in the private sector and some Department of Defense laboratories for examining and assessing individual R&D projects and our overall portfolio.

S&T utilizes this annual portfolio review process to ensure our R&D portfolio reflects the highest-priority needs of the HSE and aligns with S&T's strategic priorities. The portfolio review process also helps S&T's leadership ensure that projects reflect the organization's emphasis on high return on investment, meaningful impact, and accelerated transition to use.

A panel of experts—including S&T leadership, outside specialists, senior officials from DHS components, and representatives from the first responder community—evaluates prospective and ongoing projects against specific metrics to ensure projects meet Directorate and Department goals. By including operational partners in the R&D portfolio review process, S&T ensures projects are focused on capability gaps and operational challenges faced by end users. The process also provides key input for budget planning and programming and helps S&T and its partners identify projects that may require additional funding for successful transition.

This process provides a method for examining research investments across diverse fields and disciplines using common language, which helps the organization develop a coherent view of both individual projects and the positioning and likely impact of the overall portfolio. The process is disciplined, repeatable, transparent, strategic, and focused on continuous improvement. S&T has seen tangible results.

Since 2010, S&T has raised the percentage of projects benefiting from non-S&T funding from 12 percent to 55 percent. The percentage of projects deemed likely to transition in the near term has risen from 25 percent to 49 percent, and the percentage of investments targeting high-impact, high-feasibility outcomes has increased from 38 percent to 54 percent.

S&T's success with the annual portfolio reviews has inspired other DHS components to develop similar processes. S&T assisted the U.S. Coast Guard in carrying out a version of the portfolio review at its Research and Development Center in New London, Connecticut, and pilots with CBP, ICE, and TSA are in development.



## Systems Analysis

One of S&T's priorities is enabling DHS components to successfully transition operationally focused, best value solutions into usable capabilities. Key to accomplishing this goal is providing operators and end users with systems analysis and engineering support. These analytical techniques assist the components in describing their operational systems, identifying capability gaps, and assessing the risks and opportunities inherent in their missions. The ultimate goal of such analysis is to identify a wide range of enhancements that could be incorporated to improve the efficiency, effectiveness, and safety of homeland security operators.

The value of conducting comprehensive systems analyses is reflected in projects such as the Rio Grande Valley Project. By joining agents in CBP's Rio Grande Valley Sector and directly observing and mapping procedures for surveillance, detection, and apprehension, S&T identified 22 opportunities for improved effectiveness and efficiency through changes to processes, training, and technology. Implementation of just three of these proposals saved the sector nearly 2,000 agent hours in January 2013 alone. S&T is exploring a follow-on, cross-component effort between CBP and ICE to identify further efficiencies and enhancements associated with alien intake and processing procedures.



## Apex Projects

Apex is a framework we implemented in 2011 to focus collective component and S&T efforts on complex, high-priority mission areas. The Apex designation was also developed to break down stovepipes and increase integration with components by fostering top-level commitment, collaborative partnerships, and multidisciplinary teams. Apex projects target near-term, mission-critical issues and are driven by direct involvement from senior leadership from inception through transition. The projects exist to solve problems of operational importance identified by a component leader and focus specifically on what can be accomplished within 24 months. Each Apex project is codified in a signed charter between the head of a DHS component and the Under Secretary for Science and Technology.



Our initial Apex project with the U.S. Secret Service, in which we helped the Service identify efficiencies, save money, and chart future technology insertions, was a major success and became a standard for how S&T does business. Lessons learned from the effort have been applied to other projects and new starts throughout S&T, and several metrics used in S&T's ongoing portfolio review are based on qualities that made the Apex project for the Secret Service a success. S&T's most recent Apex projects include the Border Enforcement Analytics Program with ICE's Homeland Security Investigations Directorate and the Air Entry and Exit Re-Engineering Project with CBP's Office of Field Operations.

## Additional Support to the Department

S&T's subject matter experts are trusted voices throughout the Department and as such, support numerous, major departmental efforts. For example, S&T is a primary contributor to the Biodefense Leadership Group and to the ongoing development and implementation of the Department's next-generation strategy to resources system known as the Integrated Investment Life Cycle Management (IILCM) process. S&T is also deeply involved in the development of the upcoming version of the QHSR. Additionally, in response to a recent Government Accountability Office report on the Department's oversight and coordination of R&D, S&T has developed a DHS-specific definition of R&D that will help the Department avoid overlapping investments and identify opportunities for collaboration across DHS missions and portfolios.

As the scientific and technical arm of the Department, S&T provides numerous additional DHS-wide services that bolster operations and strengthen the Department. By statute and DHS policy, S&T is responsible for the testing and evaluation (T&E) policy and procedures of major acquisitions and for providing independent operational T&E oversight and assessment that help translate the Department's investments into functional procurements. S&T also is the implementing authority for the SAFETY (Support Anti-terrorism by Fostering Effective Technologies) Act, a unique program that incentivizes private sector development of counterterrorism technologies. Mechanisms such as S&T's Small Business Innovation Research program and Long-Range Broad Agency Announcements are pathways for industry to concentrate their efforts and provide direct input to S&T on key areas requiring innovative solutions.

Other examples of S&T services include Department-wide legal support on intellectual property issues; Departmental compliance with treaties, such as the Biological Weapons Convention; advice and guidance on national lab areas of expertise and how components can best leverage that expertise; and access to two DHS-specific Federally Funded Research and Development Centers (the Homeland Security Studies and Analysis Institute and the Homeland Security Systems Engineering and Development Institute).

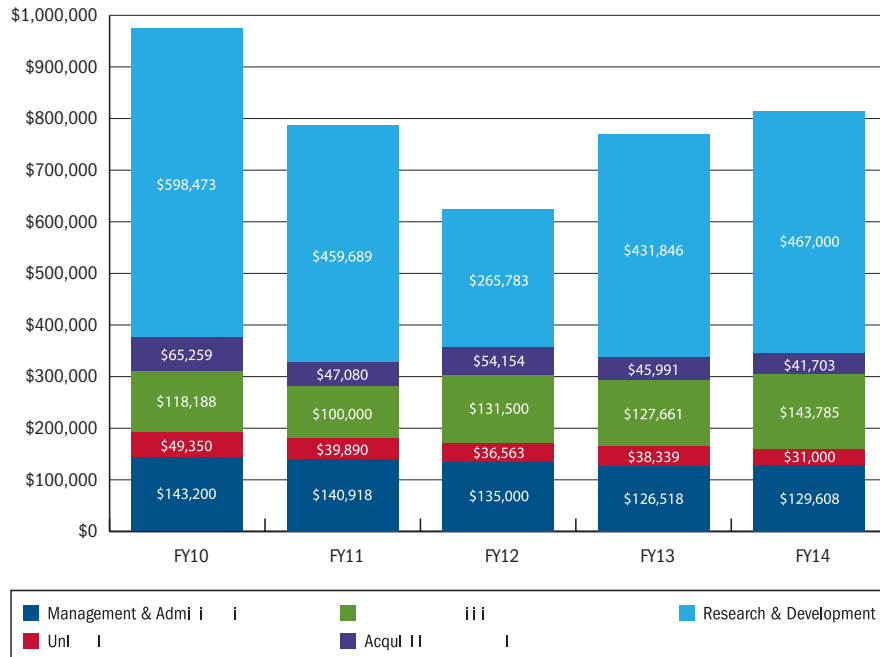
Within the interagency, S&T represents DHS on critical science and technology policy issues. For example, S&T represents the Department in interagency groups responsible for the determination of export control policy, supporting both the President's Export Control Reform Initiative and the commodity jurisdiction process, which ensures that national export controls make sense in the context of the Department's national security missions. S&T's risk assessments provide the foundation for the nation's biodefense, providing requirements for medical countermeasures and the Strategic National Stockpile. By sponsoring ongoing interagency activity, such as Joint Interagency Field Exploration events, S&T provides components with opportunities to see firsthand, adapt, and adopt innovative technology that already exists in the marketplace. As a final example, S&T co-chairs the White House's National Science and Technology Council and provides key staff to interagency science committees. On behalf of the Department, S&T has developed, reviewed, and approved numerous science and technical policies, strategies, and reports. These expansive efforts emanate from the original mission statement of the Homeland Security Act of 2002 but also reflect the evolution of S&T's ability to strengthen essential Department-level projects and efforts with analytically based, technologically informed, systems-focused expertise.



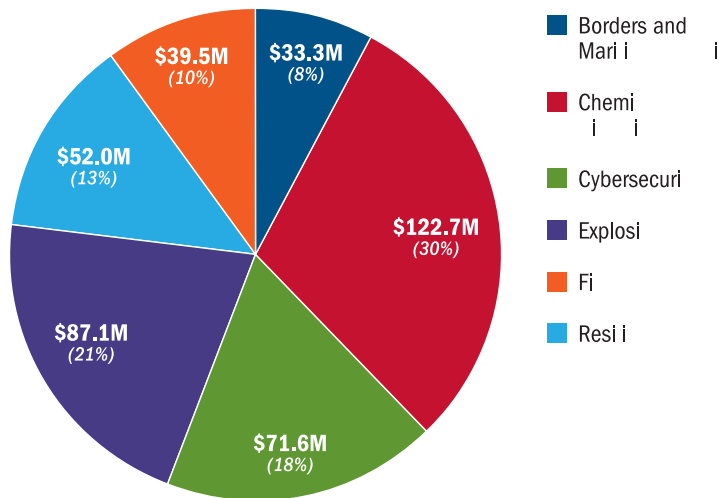
# The S&T Budget

Stable funding is a critical ingredient for a successful R&D organization. R&D projects typically operate on longer timelines with progress measured over several years rather than several months to a year. The inability to fund R&D projects consistently across their lifespan has adverse consequences that disproportionately reduce or prevent return on R&D investments. Fluctuation in funding often leads to cancellation of projects before they have sufficient time to develop into useful applications, loss of forward momentum in key operational areas, and increased difficulty for the organization to retain top-level expertise and talent.

**S&T Funding**  
without NBAF



**FY 2013 Funding in Six Commodity Areas**



The 56-percent reduction in S&T's research, development, and innovation (RDI) accounts from fiscal year (FY) 2010 to FY 2012 reduced the number of projects from more than 250 to 75. It also required S&T to establish priority areas (i.e., biodefense, cybersecurity, aviation security, and first responders) at the expense of other critical mission areas, such as borders and maritime security and resilience. With the restoration of much of the RDI budget, S&T has restructured our priorities to include all six of our commodity areas; as a result, we have grown our portfolio to more than 100 projects for FY 2014.

As a result of the substantial recovery in our RDI accounts in FY 2013, S&T was able to restart work in critical mission areas, such as borders and maritime security and resiliency, as well as open important new lines of research in emerging areas, such as big data, that will significantly bolster the capabilities of multiple DHS components. As S&T's budget continues to recover in FY 2014, S&T looks forward to expanding our portfolio and deepening investment in promising, emerging areas.

Of particular note, the FY 2014 budget as depicted does not include the \$714 million requested for the National Bio and Agro-Defense Facility (NBAF). This omission was made to allow for a proper comparison across the FY 2010 to FY 2014 time frame.

Another important aspect of the S&T budget is the amount of R&D discretionary funding available. In S&T's case, there are a significant number of "must-fund" projects that greatly benefit the Department and the HSE but require various minimum year-to-year investments to sustain. In fact, the total amount of discretionary R&D funding is approximately 50 percent. Examples of "must-fund" projects are the Defense Technology Experimental Research (DETER) cyber testbed, which our Cyber Security Division operates; terrorism risk assessments in chemical, biological, radiological, and nuclear areas, which are foundational elements for government-wide planning and policy development to effectively prevent, respond to, and recover from possible terrorist attacks; and infrastructure upgrades for our five laboratory facilities.

Also of note is the leveraging of resources from others. S&T has developed a collaborative spirit that has resulted in being able to leverage direct resourcing, as well as capitalize on the work of others. For example, since FY 2010, DHS components have contributed more than \$128 million to S&T projects, ensuring that priority R&D areas are adequately funded. S&T has also leveraged the Department of Defense's more than \$6 billion investment in the Joint Tactical Radio System to field the Multi-Band Radio, which will be critical to improving first responder communications capabilities.

## S&T Review 2014

The following pages provide an overview of S&T's work over the past year and the ongoing projects for 2014 and beyond. They reflect the direction articulated in the value added proposition, providing outcomes that are operationally focused and innovative and that result from key partnerships, while developing solutions that will enhance the effectiveness, efficiency, and safety of the men and women of the HSE who work tirelessly to protect our nation.





# Support to the Homeland Security Enterprise and First Responders Group (FRG)





## Support to the Homeland Security Enterprise and First Responders Group

### Strengthening Hometown Security by Improving First Responder Capabilities

Protecting the nation begins with protecting its towns, cities, and people. S&T's First Responders Group (FRG) works closely with local, state, tribal, regional, and federal leaders to improve the safety and security of our nation's first responders and citizens. With the aid of the First Responder Resource Group, which collectively represents 73,000 state and local jurisdictions nationwide, FRG identifies operational needs and facilitates the use of existing and emerging technologies and standards to fulfill them.

FRG's three divisions—the Office for Interoperability and Compatibility (OIC), Responder Technologies (R-Tech), and the National Urban Security Technology Laboratory (NUSTL)—work together to:

- Increase responder safety and effectiveness
- Enable communications among responders
- Provide responders with a common operating picture

The next few pages highlight examples of how FRG is improving first responders' safety and effectiveness and helping them to save lives.



“First responders are an integral part of the Homeland Security Enterprise. These personnel rush to scenes of emergency and disaster, and deserve the best technologies when responding to such situations. In the homeland security context, the need for reliable equipment that will function in hazardous environments and support mass casualty events is paramount.”

— Rep. Daniel Lungren (R-CA), Chairman, House Committee on Homeland Security, Subcommittee on Cybersecurity, Infrastructure Protection, and Security Technologies

## Office for Interoperability and Compatibility

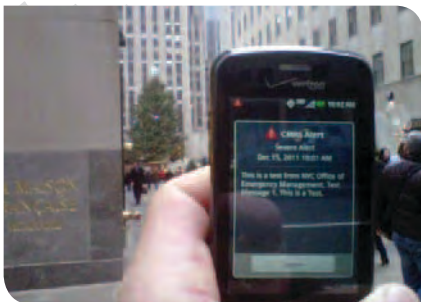
For most people, a dropped call means nothing more than a few moments of frustration. For first responders, a break in communications can mean the difference between life and death. Too often, responders have difficulty communicating across jurisdictions, disciplines, and sometimes even within their own agencies. For several years, OIC has worked with the first responder community and industry partners to bridge these gaps. Specifically, OIC projects focus on high-priority issues, such as interoperable communications, information sharing, future technologies (e.g., public safety broadband), and operational requirements for data and voice communications. Through regular collaboration with its partners, OIC is bringing new and improved capabilities to those who safeguard our communities. Several of OIC's projects are described below.

### Multi-Band Radio

Because emergency response agencies communicate on different radio frequencies, they can have difficulty communicating among themselves during multi-agency operations. This can have dire consequences. To overcome this obstacle, OIC partnered with responders to identify their interoperable communications requirements and launch the Multi-Band Radio (MBR) initiative. The initiative developed radios that can communicate across several frequencies and thus enable seamless communication among agencies operating on disparate channels. The benefits to coordinating both routine and emergency response operations have already proven significant. In February 2013, after completion of final test and evaluation, S&T published a final report of the pilot findings and a procurement guide to assist agencies in purchasing appropriate equipment. MBR equipment is now commercially available.

### Augmenting Public Safety's Existing Land Mobile Radio Systems by Providing Bridging Solutions that Access Broadband Systems

Current land mobile radio systems do not provide first responders the cutting-edge capabilities and flexibility that could be available to them. OIC is partnering with first responders and industry to augment existing systems to take advantage of broadband systems. For example, the 700 MHz Broadband Demonstration Network provides first responders with a test environment for broadband systems. Recognizing that budget limitations will delay the integration of a nationwide public safety broadband network in some communities, OIC is developing solutions to maintain interoperability between the older land mobile radio systems and broadband systems.



### Wireless Emergency Alerts (formerly the Commercial Mobile Alert Service, or CMAS)

As our nation has grown more dependent on mobile devices, mobile communications have become as critical as traditional media platforms (e.g., television, radio). Recognizing the importance of mobile communications, the Federal Emergency Management Agency (FEMA) continues to update the Integrated Public Alert and Warning System, a comprehensive national system that communicates emergency alerts and warnings to target mobile users. As part of this effort, FEMA led the development of Wireless Emergency Alerts (WEA), a system that sends geographically targeted notices to mobile devices (e.g., cellular phones, smart phones, tablet computers) to notify citizens of imminent threats and significant events based on their location. The geo-targeted WEA notifications are broadcast through specific cellular towers, enabling the system to deliver messages only to mobile users in the area.

Working with state and local first responders, FEMA, the Federal Communications Commission, and the wireless industry, OIC is coordinating efforts to evaluate and test improvements to this new capability. In this capacity, OIC partnered with the New York City Office of Emergency Management and FEMA to conduct an end-to-end demonstration of WEA, successfully originating, broadcasting, and delivering a WEA message to geo-targeted mobile devices. OIC is conducting follow-on tests through national laboratories, such as the

Pacific Northwest National Laboratory, to continue improving the geo-targeting of WEA messages to more accurately reach citizens within the notification area. OIC is also conducting research to understand how people respond to alerts and warnings delivered to mobile devices; this research will result in guidance for emergency managers on how to create effective alert messages within WEA's 90-character limits.

## Finding Individuals for Disaster and Emergency Response

When natural disasters or man-made catastrophes topple buildings, search and rescue teams immediately set out to recover victims trapped beneath the wreckage. During these missions, time is imperative—first responders often refer to the “golden hour,” the window of time where a victim’s rescue greatly increases his or her chance of survival. With Finding Individuals for Disaster and Emergency Response (FINDER), responders now have a tool to maximize this window by quickly determining if a survivor is present in debris and then directing resources and manpower to facilitate a rescue.

FINDER, which was developed and tested in coordination with NASA’s Jet Propulsion Laboratory (JPL), was designed to be the size of an airplane carry-on bag for easy transport. The tool uses microwave radar to detect a human heartbeat buried beneath 30 feet of crushed materials, hidden behind 20 feet of solid concrete, and from a distance of 100 feet in open spaces. The device identifies the unique characteristics of human breathing and heartbeat patterns to not only distinguish between humans, animals, and mechanical movement, but also between multiple victims, since each person’s breathing and heartbeat patterns are different. The tool will be key to finding lost individuals following natural disasters, such as hurricanes and tornadoes, and has been hailed by many as one of the biggest advances in urban search and rescue in the last 30 years.



OIC and JPL conducted several tests of FINDER prototypes with first responders in simulated disaster scenarios in 2013, including demonstrations with Virginia Task Force One (in Lorton, Virginia) and Virginia Task Force Two (in Virginia Beach, Virginia). The Fairfax County (Virginia) Fire and Rescue Department and FEMA’s Urban Search and Rescue Program Office were also involved in these demonstrations. In addition, OIC and JPL hosted a FINDER media day in September 2013 that resulted in the technology being featured in nearly 75 local, national, and international press outlets.

With a wealth of feedback and recommendations following these responder evaluations, OIC and JPL are now finalizing development of additional FINDER units that will be distributed to response agencies across the country for field testing during emergencies. OIC anticipates that a commercialized FINDER unit could be ready to be used in search and rescue operations as early as spring 2014.

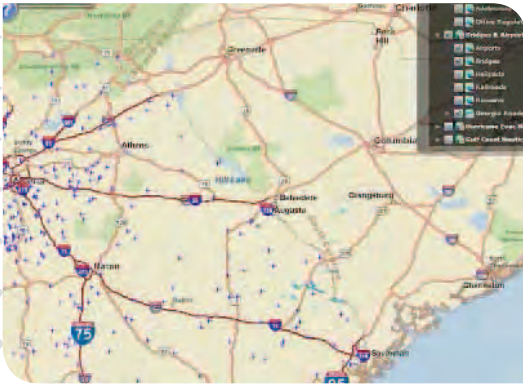
“Virginia Task Force One is excited to continue our partnership with S&T and JPL in testing FINDER during additional field testing in 2014. With more testing and development, we hope FINDER can one day reduce the time it takes first responders to find victims during actual disasters in order to save more lives.”

— Matthew Tamillow, Virginia Task Force One Urban Search and Rescue Team



## Virtual USA®

In an emergency, responders must quickly and easily access relevant, reliable, and up-to-date information from multiple partners. Sharing key pieces of information during a crisis, such as power outages, road closures, traffic incidents, hospital and shelter statuses, and weather, saves lives and ensures the efficient



deployment of resources. Virtual USA (vUSA) improves information sharing between emergency management agencies and their partners; reduces the effects of proprietary emergency response technologies; and allows agencies to make better decisions based on more complete information. The heart of vUSA is the Virtual Library, which enables first responders to access critical incident information in a geospatial context. In real time, users can view this data superimposed on their own geospatial viewers, enabling them to share information seamlessly across their existing platforms.

OIC worked with state and local emergency management agencies and other DHS components to develop vUSA. The system allows agencies to build on existing investments and maintain data ownership, while simultaneously enhancing resiliency and disaster response by building and strengthening partnerships.

vUSA has consistently demonstrated its value in increasing the speed of situational awareness and improving decision-making. For example, during recent wildfires in Northern California, the California Department of Forestry and Protection (CAL FIRE) used vUSA to validate maps in real time rather than depend on those that had become obsolete. vUSA once again demonstrated its unique value during the US-Canada Enhanced Resiliency Experiment II Exercise in 2013, enabling cross-border communications between local and federal assets in the United States and with partner agencies in Canada. Currently, OIC is transitioning the Virtual Library to the National Information Sharing Consortium; this transition should be complete by September 2014.

## Office for Interoperability and Compatibility Projects

- Broadband Demo Network
- Chicago Office of Emergency Management and Communications
- Emergency Data Exchange Language (EDXL)
- Finding Individuals for Disaster and Emergency Response (FINDER)
- Hardening of Devices
- Hybrid Public Safety Microphone (Turtle Mike)
- LiveWall
- Lost Person Locator
- Magnetoquasistatic Precision Outdoor and Indoor Navigation Tracking for Emergency Responders (POINTER)
- Modeling and Analysis for Public Safety Broadband
- New York City Fire Department Electronic Command Board
- Next-Generation Communications Interoperability (NGCI)
- Next-Generation Incident Command System (NICS)
- Project 25 Compliance Assessment Program (P25 CAP)
- Public Safety Broadband Requirements and Standards
- Video Quality in Public Safety (VQiPS)
- Virtual Shooter (formerly Firearms and Ammunition Test Equipment)
- Virtual USA® (vUSA)
- Wireless Broadband Technology Demonstrator
- Wireless Emergency Alerts (WEA) (formerly Commercial Mobile Alert Service [CMAS])

## Responder Technologies

R-Tech provides solutions for high-priority capability gaps through rapid prototyping, technical assistance, and information sharing. It strives to deploy new or improved technologies to first responders that meet at least 80 percent of the operational requirements within 12 to 18 months after identification of the capability gap or need.

### Improved Firefighting Structure Gloves

Firefighters at the scene of structural fires must often remove their gloves to complete tasks that require greater dexterity, such as operating tools or answering their radios. This often leads to accidental injuries. S&T is working with first responders and industry partners to develop a new type of fabric that meets National Fire Protection Administration (NFPA) standards for safety and heat resistance. S&T has partnered with an industry manufacturer to adapt a Kevlar®-based, heat-resistant fabric for use in the gloves. The fabric is durable and can withstand punctures and lacerations that current glove technology can not. These new gloves will provide firefighters with enhanced dexterity, water repellency, and fire resistance, improving firefighter safety and allowing better performance of their duties while wearing gloves.

### Wildland Firefighter Advanced Personal Protection System

Firefighters are often required to respond to emergencies in remote areas. To get there, they must hike long distances and wear and carry heavy gear, usually during the warmest and most humid months of the year. As a result, heat stress is one of the most dangerous factors for wildland firefighters. To address this challenge, S&T is developing an advanced personal protection system for wildland firefighters. S&T leveraged more than \$1.7 million from the Department of Defense, the U.S. Forest Service, and a FEMA grant provided to North Carolina State University to support this project. This work will ultimately improve heat protection; reduce heat stress; improve the form, fit, and function of gear; and upgrade requirements that industry can use to build advanced gear.



S&T initiated a “wear trial” with 1,000 wildland firefighters from CAL FIRE, the U.S. Forest Service, and seven local California fire departments that recently ended. After evaluating the feedback and incorporating changes, as appropriate, S&T will provide the design to manufacturers. This project will ensure vendors produce NFPA-certified garments that directly address the heat stress issue, thus providing a safer environment for firefighters.

“I had command of a Kern County Strike Team of five engines sent to the Springs Fire in Ventura. I was wearing the garment system for several days and found them significantly cooler than my previously issued PPE [personal protective equipment]. The Kern County Fire Department also had our Rio Bravo Hot Shot Crew with 20 personnel wearing our Gen I garments on the same fire. I have received nothing but positive comments on the PPE system.”

— Kirk Kushen, Battalion Chief, Kern County (California) Fire Department

## Virtual Training

First responders need realistic training to enable them to respond effectively and efficiently both in day-to-day incidents and large-scale emergencies, such as an active shooter situation. In what can only be described as frenzied, chaotic environments, first responders must rely on this training to make split-second decisions that will have a significant impact on the successful management of the disaster.

Because conducting live exercises—particularly cross-agency, cross-discipline, or cross-jurisdictional training—can be costly and time-consuming for all involved, first responders indicated that their top need is for a virtual training platform to complement existing classroom and field exercises. To fulfill this need, FRG worked with the U.S. Army Training and Doctrine Command (TRADOC) and the U.S. Army Simulation and Training Technology Center (STTC) to develop a platform called the Enhanced Dynamic Geo-Social Environment (EDGE) virtual environment.

Similar to a video game, EDGE is a 3-D multiplayer online environment that allows first responders to virtually role-play complex scenarios in order to improve coordination and communication, as well as mitigate injuries and loss of lives. Through avatars that represent each discipline, responders from across jurisdictions can come together to role-play a response to an active shooter scenario, execute on-site protocols and procedures, evacuate innocent bystanders, and apprehend the suspect(s). Moving forward, agencies will have access to a number of additional models that can be customized to accurately depict the infrastructure and resources available in their own jurisdictions.

S&T, TRADOC, and STTC piloted the EDGE Virtual Training active shooter scenario with emergency response agencies in Sacramento, California, and held a full-scale user evaluation in 2013 with more than 40 Sacramento first responders. The EDGE active shooter gaming scenario is expected to be available to agencies nationwide in early 2014.

## Ambulance Patient Compartment Design Standards

Emergency medical services (EMS) workers riding in the back of ambulances must care for their patients while protecting themselves during what is often a fast and dangerous ride to the nearest hospital. Statistics indicate that EMS responders have a fatality rate of 12.7 deaths per 100,000 workers, a rate that is three times greater than the average for workers in any other occupation. Ambulance crashes cause more than half of these deaths. S&T is working to develop design standards for ambulance patient compartments to improve the safety of EMS responders and patients. These standards will also improve the ability of EMS responders to provide efficient and effective patient care. This collaborative effort includes support from the National Institute for Occupational Safety and Health, the National Institute of Standards and Technology, representatives of the EMS community, and industry.

## Responder Technology Projects

- Ambulance Patient Compartment Design Standards
- Burn Saver Device
- Conventional Fixed Station Interface
- Firefighter Accountability Proximity Device
- First Responder Support Tools (FiRST) Application
- Improved Structural Firefighting Glove
- Law Enforcement Internet Protocol (IP) Video Encoder
- Low-Light, IP-Based Surveillance Camera
- Mobile Biometrics
- Next-Generation Textiles for Personal Protective Equipment (PPE)
- Project Responder 3/4
- Simulation Tools for First Responders (Virtual Training)
- State and Local Bomb Squad Support
- Structural Collapse Prediction Technology
- Wildland Firefighter Advanced Personal Protection System (WLFAPPS)
- Wireless Patient Monitoring

## National Urban Security Technology Laboratory

S&T operates NUSTL, a laboratory located in New York City that provides unbiased and independent test, evaluation, and assessment of technologies and equipment for homeland security. In addition, NUSTL serves as a technical agent for the DHS System Assessment and Validation for Emergency Responders (SAVER) program, which objectively assesses and validates commercial equipment and systems marketed to emergency responders.

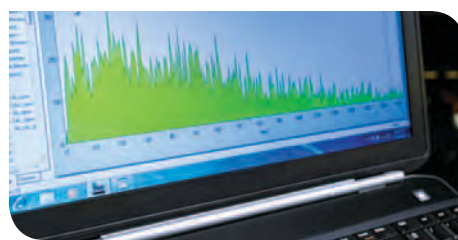


### Response and Recovery from Radiological and Nuclear Attacks

One of NUSTL's research and development programs addresses responses to and recovery from the effects of a nuclear or radiological attack. As part of this program, NUSTL is developing technology and conducting research of alerts and communications, the re-establishment of critical infrastructure, remediation of impact areas, and community and responder health and safety. These efforts require collaboration between NUSTL and regional government officials.



One such example is the Radiological Emergency Management System (REMS). The concept and design for REMS, a fixed-site network of gamma radiation sensors designed for response and recovery after a radiological or nuclear incident, was developed at NUSTL shortly after September 11, 2001. By November 2011, the first REMS sensor was installed and tested on the roof of the NUSTL building. A six-year pilot program with the New York City Office of Emergency Management ended in 2009, at which time the New York Police Department (NYPD) became interested in REMS. NUSTL and a major instrument manufacturer entered into a cooperative research and development agreement to commercialize REMS in April 2009. The first REMS unit was deployed at an NYPD facility in 2011, and since then many more sensors have been added to the REMS network. In 2013, NUSTL published a REMS Lessons Learned and Guidance document. Drawing on the NYPD's experience with REMS, the document provides recommendations for implementing and operating the post-event detection network. First responders may request access to this document by visiting the REMS page on the First Responder Communities of Practice website (<https://Communities.FirstResponder.gov>).



### System Assessment and Validation for Emergency Responders Program

NUSTL supports the SAVER program, which conducts objective assessments of first responder equipment and validates that technologies meet responder requirements. The SAVER program shares the results of these assessments with the first responder community to help inform procurement decisions. As a technical agent for SAVER, NUSTL plays a critical role in providing impartial, operationally focused technology evaluations. In 2013, NUSTL conducted assessments of and published 20 guidance documents on detection equipment (radiation, explosives, biological agents), first responder safety equipment (radiation mitigation blankets, personal cooling systems), computer modeling tools (atmospheric plumes, vehicular escape routes), and other technologies. To learn more about the SAVER program, see page 47.

## National Urban Security Technology Laboratory Projects

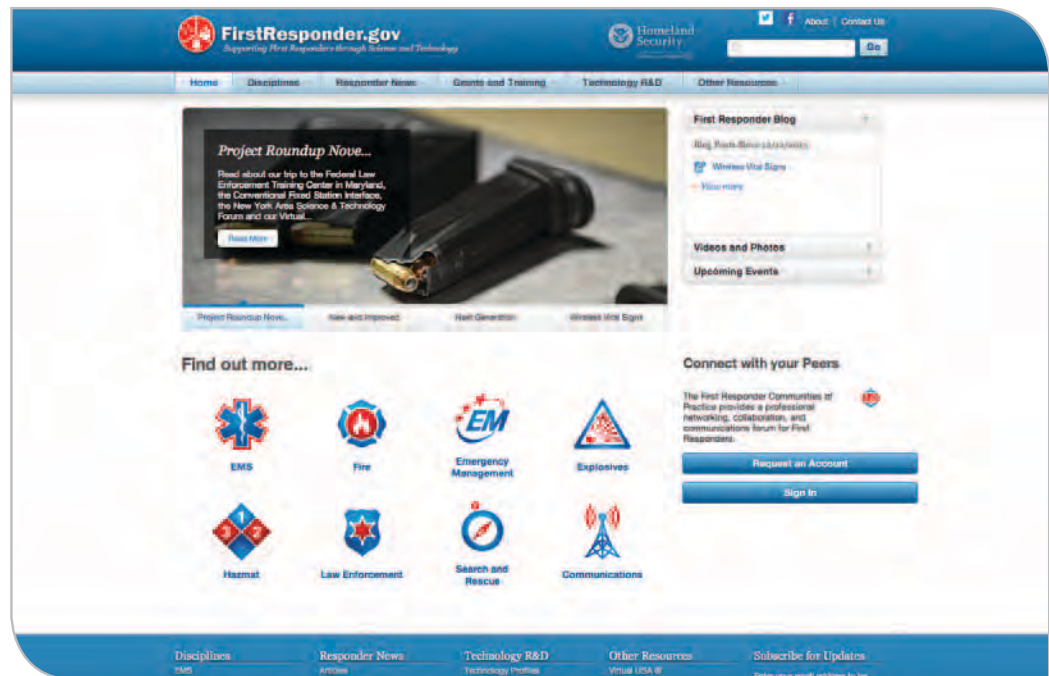
- Neutron Benchmarking
- New York Area Science and Technology (NYAST) Forum
- Performance Testing and Evaluation at NUSTL (PTEN)
- Radiological Emergency Management System (REMS)
- Radiological/Nuclear Response and Recovery Research and Development
- Securing the Cities
- Shielded Nuclear Alarm Resolution (SNAR)
- System Assessment and Validation for Emergency Responders (SAVER) Technical Agent

## Communications, Outreach, and Responder Engagement Team

FRG's Communications, Outreach, and Responder Engagement team gathers requirements and other input from first responders; provides responders with critical information and updates through in-person and virtual communications, print and online resources, and social media; and enables connections and collaboration throughout the responder community.

### FirstResponder.gov

FirstResponder.gov is a public-facing website that provides first responders with information on resources, products, standards, best practices, and other relevant topics. The site includes original news and communications tools to help first responders engage directly with DHS. FirstResponder.gov receives approximately 3,500 unique visits per month, with articles being tweeted and emailed to tens of thousands of other readers. Through the site, FRG publicized more than 70 S&T projects and published more than 35 articles and 72 blog posts in 2013.



### First Responder Communities of Practice

The First Responder Communities of Practice (<https://CommunitiesFirstResponder.gov>) is a professional networking, collaboration, and communications platform for the homeland security community. Created by S&T, this online community focuses on emergency preparedness, response, recovery, and other homeland security topics and issues. This site serves as the host for key documents, including reports published by the Virtual Social Media Working Group, which capture best practices and recommendations on the use of social media for public safety purposes.

## Communications, Outreach, and Responder Engagement Team Projects

- First Responder Communities of Practice (FR CoP)
- FirstResponder.gov





“As with every meeting with S&T there is great synergy between response disciplines and how to resolve problems. The more we work together, the better the resolutions to our issues. Thank you for all the effort to move capabilities forward to keep responders and civilians safer and more prepared.”

— *First Responder Resource Group Participant*



# Homeland Security Advanced Research Projects Agency (HSARPA)



# Homeland Security Advanced Research Projects Agency

## Countering Threats to the Homeland and the American People through Technology Solutions and Knowledge Products

The mission of S&T is to strengthen America's security and resiliency by providing knowledge products and innovative technology solutions for the Homeland Security Enterprise (HSE). In close partnership with DHS components, the Homeland Security Advanced Research Projects Agency (HSARPA) focuses on identifying, developing, and transitioning technologies and capabilities to counter chemical, biological, explosive, and cyberterrorism threats, as well as to protect our nation's borders and infrastructure.

HSARPA is made up of five divisions, each with a specific focus:

- **Borders and Maritime Security Division (BMD)** – Prevent contraband, criminals, and terrorists from entering the United States, while permitting the lawful flow of commerce and visitors.
- **Chemical and Biological Defense Division (CBD)** – Detect, protect against, respond to, and recover from potential biological or chemical events.
- **Cyber Security Division (CSD)** – Create a safe, secure, and resilient cyber environment.
- **Explosives Division (EXD)** – Detect, prevent, and mitigate explosives attacks against people and infrastructure.
- **Resilient Systems Division (RSD)** – Enhance resilience to prevent and protect against threats, mitigate hazards, respond to disasters, and expedite recovery.

HSARPA is evolving to focus on applied technology development and integration into component operations. Its divisions strive to understand and to define operational context by conducting systems analyses of current missions, systems, and processes, and ultimately to identify operational gaps where S&T can have the greatest impact on operating efficiency and increasing capability. HSARPA then employs the concept of technology foraging (“tech foraging”), working with its partners and In-Q-Tel (IQT)—an independent, strategic investment firm—to identify potential solutions already being researched or developed by external partners. HSARPA's end goal is to transition products to the field for operational use.

“Securing our nation from the escalating threat of foreign and domestic terrorism, protecting our nation's borders and stopping cyber attacks on our critical infrastructure—all while ensuring taxpayer dollars are not put to waste—requires qualified and dedicated leadership.”

— Rep. Michael McCaul (R-TX), Chairman, House Committee on Homeland Security

## Apex

An Apex project is a high-priority, high-value, rapid delivery project focused on a DHS component's unique mission and capability needs. It provides the partnering component with the best knowledge, analyses, and innovative solutions available. Apex projects are fully coordinated at the senior leadership levels and have special budget lines to ensure the capabilities developed are operationally relevant and highly impactful. Two recently completed Apex projects include the Science and Technology Operational Research and Enhancement (STORE) and Secure Transit Corridors (STC) projects, done on behalf of the U.S. Secret Service and U.S. Customs and Border Protection (CBP), respectively.

### Border Enforcement Analytics Program (November 2012 to Present)

The Border Enforcement Analytics Program (BEAP) is a collaborative endeavor between S&T and U.S. Immigration and Customs Enforcement's (ICE) Homeland Security Investigations Directorate. ICE investigators currently use multiple, disparate data sets to generate investigative leads related to export enforcement and counter proliferation. The size and nature of these data require time- and cost-intensive human processing that would be more effectively handled by computers. S&T combines academic and operational knowledge to produce new big data solutions, under appropriate privacy and civil liberties controls, that make sense of large amounts of data, while significantly improving the efficiency of ICE's investigative capability. For example, in a preliminary experimental environment, the BEAP system processed 166 million export records and identified items of investigative interest in a few minutes. BEAP is also paving the way for other big data solutions that are enhancing existing capabilities and saving resources across DHS and elsewhere in the HSE.

### Air Entry and Exit Re-Engineering (March 2013 to Present)

The Air Entry and Exit Re-Engineering (AEER) project was initiated by S&T and CBP to increase CBP's capacity to screen travelers entering the United States and to confirm the departure of non-U.S. citizens from U.S. airports. The purpose of the AEER project is to determine how to use new technologies and processes to expedite traveler screening. AEER has three main objectives: 1) to understand the current operations in entry points at airports across different airport environments and configurations; 2) to analyze potential approaches to meet the congressional mandate for an integrated biometric entry and exit system with air ports of entry (POEs); and 3) to develop tools that enable CBP to analyze the impacts of changes in traveler screening operations. All air entry/exit analyses, models, technology prototypes, and knowledge products will be transitioned to CBP for use after AEER concludes.



## Apex Projects

- Air Entry and Exit Re-Engineering Project (AEER)
- Border Enforcement Analytics Program (BEAP)

## Borders and Maritime Security Division

BMD develops and transitions technologies that enhance the security of our nation's borders and waterways without impeding travelers or the flow of commerce. The division works closely with its operational customers to identify and/or generate the best technologies for securing U.S. borders, including POEs and vast stretches of remote terrain and waterways between the POEs, with the ultimate goal of stopping threats before they enter the United States. The following are examples of BMD endeavors.

### Centralized Examination Stations/In-Bond

BMD is developing technology to detect unauthorized intrusion into cargo containers and provide near real-time tracking of cargo throughout the supply chain. In addition to the benefits of security for DHS operations, business efficiency and reduction of illicit commerce are key drivers for CBP, foreign governments, and private industry partners. BMD's Centralized Examination Stations (CES)/In-Bond effort is piloting the use of reusable electronic conveyance security devices (RECONS) at several POEs to operationally evaluate the ability to improve efficiency for cargo processing while securing conveyances in transit from these POEs to the CESs or other POEs. The use of RECONS reduces CBP costs of securing conveyances in CES/In-bond operations and creates process efficiencies that free up CBP resources for other tasks. The project also initiated the development of an internationally accepted RECONS standard that will enable the same efficiencies for other federal government and commercial industry partners and will foster a more secure and efficient global trade environment.



### Mobile Surveillance System Upgrade

BMD is developing land-based sensor systems and command and control systems to better detect, classify, and localize illegal land border activity, especially in remote and difficult terrain and during inclement weather. BMD's Mobile Surveillance System Upgrade (MSS-U) improves automated target detection and tracking, while reducing false alarms by up to 97 percent (in winds greater than 15 mph), thereby allowing operation in inclement weather. The MSS-U has enabled many apprehensions along the southern U.S. border in weather situations where the legacy MSS unit would have been required to shut down. The upgrade also provided stabilized imagery (removing effects of mast sway), eliminated heat scintillation, improved maps and CBP agent tools, and provided a digital video recording capability. All of these features provided operators with a clearer picture of local activity over a larger field of view.

### Pollen Forensics

Currently, CBP is solely dependent on commercial laboratories for the processing of pollen samples collected from cargo. Processing these samples enables CBP agents to determine the country of origin and properly enforce trade compliance. Not only is the current approach expensive, the lengthy processing time often results in lost opportunities to enforce trade law and collect customs revenue. BMD's Pollen Forensics project will demonstrate an in-house pollen processing capability with improved technologies that will enable CBP to more accurately and quickly geo-locate the origin of cargo. The project will use a novel approach to cost effectively develop and populate the pollen databases, supplementing data obtained from field collections with data synthesized by models that take into account the elevation, terrain, and regional environmental conditions. An effective in-house CBP pollen identification and geo-location capability will enable rapid, more comprehensive, cost-effective cargo screening and will be used by CBP to determine trade compliance and to provide evidence for criminal investigations.

## Coastal Surveillance System

The vastness of the maritime borders of the United States creates a huge challenge for the U.S. Coast Guard (USCG) and CBP in detecting and interdicting illicit maritime activity. Domain awareness of the maritime regions of the United States is key to best utilizing the limited interdiction assets available to DHS components. BMD is developing and piloting an enhanced, yet affordable, maritime situational awareness capability to increase the availability of actionable law enforcement information to CBP; USCG; and other federal, state, local, and international law enforcement agencies.

Specifically, BMD is developing advanced detection, identification, and tracking capabilities along the maritime borders and technologies that support a framework for the rapid, coordinated response to maritime anomalies and threats. A preliminary version of BMD's Coastal Surveillance System (CSS) was installed at CBP's Air and Marine Operations Center in December 2012. Leveraging technology from BMD's Port and Coastal Surveillance and Small Dark Vessels projects, CSS provides enhanced maritime domain awareness (MDA) with an open, service-oriented architecture to enable interoperability with USCG and other federal, state, local, and international agencies and the re-use/re-purposing of existing data streams and sensor platforms. Additional data feeds and diagnostics will continue to be identified, developed, and integrated into the CSS to improve MDA, cue interdiction assets, and facilitate interagency coordination.

## Borders and Maritime Security Division Projects

### Cargo Security

- **Cargo Container Security**
  - Central Examination Stations (CES)/In-Bond
  - Maritime Cargo Security Pilot
  - Secure Hybrid Composite Container
- **Cargo Validation**
  - Currency Detection
  - Pollen Forensics
- **Land/Sea Cargo Screening**
  - Mid-Level Energy Scanning System Upgrade

### Land Border Security

- **Air Based Technologies**
  - Airborne Sensors for Wide Area Surveillance
  - Robotic Aircraft for Public Safety
- **Ground Based Technologies**
  - Buried Tripwire
  - Canada-US Sensor Sharing Pilot
  - Mobile Surveillance System Upgrade (MSS-U)
  - Slash CameraPole
  - Unattended Ground Sensors

- **Rapid Response Prototyping**
- **Small Dark Aircraft**
- **Tunnel Detection and Surveillance**
  - Tunnel Activity Monitoring
  - Tunnel Detection

### Maritime Border Security

- Coastal Surveillance System (CSS)
- Detection of People in Water

“CSS will allow us to exploit existing MDA capabilities and bring it into the DHS enterprise in such a way that AMOC [Air and Marine Operations Center] can operationalize it. AMOC's reach goes far beyond the Office of Air and Marine to include the interagency and international partners. Thus, CSS will be supporting hemispheric law enforcement operations. CSS becomes part of the mosaic that AMOC uses to detect, track, and interdict suspect maritime targets with our partners.”

— Tony Crowder, Executive Director, U.S. Customs and Border Protection, Air and Marine Operations Center

## Chemical and Biological Defense Division

CBD works with the DHS Office of Infrastructure Protection, DHS Office of Health Affairs, and other DHS components, along with other sector-specific agencies that are part of the HSE, to increase public and governmental awareness of potential chemical and biological threats and to strengthen the nation's preparedness and response against these threats.

### Threat Characterization

Under Homeland Security Presidential Directives 10, 18, and 22, DHS is mandated to conduct biological, chemical, radiological and nuclear, and integrated terrorism risk assessments. These assessments are used to inform decisions about defense investments, and with the exception of the radiological and nuclear terrorism risk assessments, are performed by S&T every two years. Tailored assessments and analyses, which can employ one or a combination of terrorism risk assessments (e.g., biological, chemical, integrated) are conducted on an ongoing basis to meet the needs of HSE stakeholders. Assessments are designed to: 1) aid in identifying and prioritizing credible, high-impact threats; 2) aid in identifying and prioritizing vulnerabilities and knowledge gaps; and 3) provide an HSE mechanism for optimizing resource allocation and product development to maximize the nation's chemical, biological, radiological, and nuclear (CBRN) defensive posture.

In 2012, DHS published three Biological Terrorism Risk Assessment (BTRA)-based "tailored assessments." The first report to HSE stakeholders provided a reference set of the extensive data collection efforts to date, allowing other agencies to use the information in their own analysis, while increasing analytic transparency and data validation for the BTRA. The two additional reports added significant value to the risk modeling efforts across the HSE. In 2013, the BTRA program initiated development of a countermeasure assessment and planning tool, which when completed, will allow HSE partners to assess specific mitigation strategies against various bioattack scenarios.

The Chemical Terrorism Risk Assessment (CTRA) provides a comprehensive analysis of the homeland security risks associated with a broad range of chemical threat agent materials. S&T published its third end-to-end CTRA in 2012, analyzing 68 more chemicals than it had in its original 2008 publication. Many stakeholders leveraged the CTRA for tailored assessments and sensitivity studies as input to their operational strategies and guidance, including the Federal Emergency Management Agency's Chemical Strategy, DHS Office of Risk Management and Analysis's Policy-Postal Screening, National Institutes of Health's Countermeasure Development, and U.S. Department of Agriculture Food and Drug Administration's Food Risk. Following this success, the CTRA Desktop Tool was successfully developed and transitioned to several users for test and evaluation as a beta version in 2013. Subsequently, the tool was then leveraged on 14 reach-back activities at the Chemical Security Analysis Center.

In 2013, DHS partnered with the Centers for Disease Control and Prevention (CDC), leveraging the Integrated Terrorism Risk Assessment (ITRA) tool to help inform decisions regarding Strategic National Stockpile (SNS) investments and to optimize the contents of the SNS by modeling its performance (and the performance of alternate formularies) against the entire CBRN terrorism risk space. Utilizing a risk-informed approach provides the ability to evaluate the overall effectiveness of the SNS and quantify risk reduction of current and alternate CDC formularies to optimize the stockpile.



## Detect-to-Protect Bio-Aerosol Detection Systems

Major facilities in our national infrastructure, such as subways, stadiums, shopping malls, office buildings, and airport terminals, remain vulnerable to attacks using aerosolized biological organisms. Such substances could disperse quickly through a facility's air handling system or in an enclosed area and affect a large group of people who might not show symptoms until many hours or days later. The Detect-to-Protect (D2P) program was initiated to target this problem by developing technologies that could alert authorities within the first hour of a potential bio-attack. Through close partnership with the city of Boston, the D2P program culminated in an operational demonstration of a rapid and networked bio-sensing system.

The D2P program advanced bio-sensing by developing a number of innovative bio-sensors and a deployment architecture that can rapidly identify a biological organism and provide critical information, such as the size and rate of spread of an attack. In partnership with the Massachusetts Bay Transportation Authority and many state and local health and safety officials in Massachusetts, this architecture of bio-sensors was installed in three adjacent stations of the Boston subway. The system was then tested over a 12-month period with simulated attacks in the form of burst releases of a harmless biological substance. The testing occurred at night, off revenue hours, but trains were run through the stations to simulate normal operation. The results of the testing showed that the system could detect a surprisingly small quantity of a released substance, even in the challenging and dirty environment of a subway where the air is dense with brake dust and other particulates. The D2P program generated invaluable data that will inform the deployment of these sensor systems, as well as future DHS biodetection efforts and strategic investments.





## Foreign Animal Disease Vaccines and Diagnostics

The outbreak of foot-and-mouth disease (FMD) in the United Kingdom (U.K.) in 2001 and South Korea in 2011 resulted in the slaughter of millions of animals and huge economic losses for livestock and food industries. Fearing similar severe consequences if the highly contagious animal disease were to appear in the United States, federal scientists worked for years to develop and gain approval of a unique new vaccine to protect America's cattle, sheep, and pigs. A multi-year collaboration among S&T, the U.S. Department of Agriculture, industry, and academia resulted in a patent for the first successful FMD vaccine technology to be developed in more than 50 years, and the first licensed FMD vaccine approved for manufacture in the United States. The vaccine represents significant progress in the control of FMD, as it can be produced in FMD-free countries without risk of releasing the virus, and common diagnostic tests can be used to distinguish vaccinated animals from those infected with the disease. It is expected that a total of 18 vaccines will be produced by 2021, ensuring protection against the highest-risk serotypes and subtypes of the FMD virus.

The United States has been free from this serious animal disease since 1929 and has strict policies on the trade of livestock products with countries that have experienced problems. While the virus typically spreads among infected animals, DHS officials do not rule out the possibility that it could be intentionally introduced into U.S. livestock herds by terrorists. Although other FMD vaccines have been developed over the years, they carry risks because the live virus must be used during production. Federal law stipulates that no live FMD virus may be introduced for research or manufacture on the U.S. mainland due to risks of contagion. S&T's Plum Island Animal Disease Center is the only U.S. laboratory exempt from this law as it is equipped with specialized research facilities for this purpose. The new vaccine, which does not contain the whole virus and cannot replicate, does not require such specialized facilities and can be produced in domestic industry facilities.

In addition to the FMD vaccine project, S&T's FMD-related efforts include the development of additional assays to differentiate infected from vaccinated animals, novel diagnostic tools, and biotherapeutics to provide rapid protection. The broader agricultural defense program includes enhancement of mitigation efforts for FMD and other high-priority foreign animal diseases through the development of state-of-the-art countermeasures, including novel screening tools, broad-spectrum therapeutics and vaccines, pre-outbreak surveillance, and other tools to minimize the impact on business continuity in the face of an outbreak.

### FMD is one of the main threats to global food security.

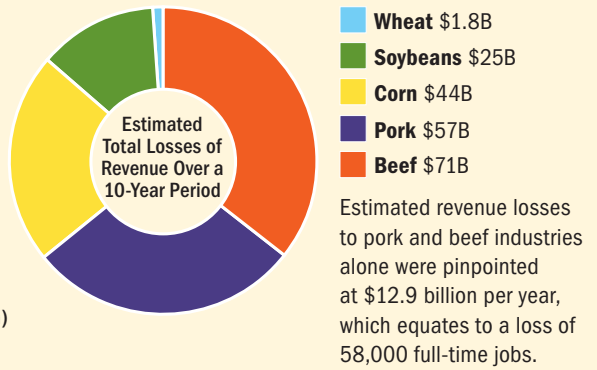
FMD is present today in regions of Africa, Asia, the Middle East, and South America. The most recent outbreaks occurred in Japan (2010), South Korea (2010), and the United Kingdom (2001).

#### Estimated Loss from Recent FMD Outbreaks



\$ = 1 Billion USD in Total Economic Loss (i.e., industry, quarantine, exports, jobs, tourism)  
 🐮 = 1 Million Animals Culled

#### National Impact of an Outbreak in the United States\*



\* Source: Foot-and-Mouth Disease – Fostering a New Preparedness Paradigm: Facilitating a Conversation Among Public and Private Sector Stakeholders (a white paper with information synthesized from April 17-18, 2013, Foot-and-Mouth Disease Symposium in Louisville, KY)

## Chemical and Biological Defense Division Projects

- Adaptive Facility Protection (Bio and Chem)
- Agricultural Screening Tools
- Bioassays
- Bio-Defense Knowledge Center (BKC)
- Bio-Forensics Operations (NBFAC)
- Bio-Forensics Research and Development
- Bio Terrorism Risk Assessment
- Bio-Threat Characterization (BTC)
- Chem-Bio Event Characterization
- Chemical Forensics and Attribution (FAP)
- Chemical Forensics Project
- Chemical Security Analysis Center (CSAC)
- Detect-to-Protect Bio-Aerosol Detection Systems
- Enhanced Passive Surveillance
- Foreign Animal Disease Modeling
- Foreign Animal Disease Vaccines and Diagnostics
- Integrated Consortium of Laboratory Networks
- Integrated Terrorism Risk Assessment
- Livestock Decontamination, Disposal, and Depopulation (3D)
- Multi-Application Multiplex Technology Platform
- National Bio and Agro-Defense Facility (NBAF) Agro Defense and Research Assessment
- Next Gen Bio Detection
- Operational Tools for Response and Restoration
- Rapid Diagnostic Capability
- Underground Transport Restoration
- Viable Bioparticle Capture

## Cyber Security Division

CSD conducts and supports research, development, testing, and evaluation to secure the nation's current critical information infrastructure and to plan for a more secure infrastructure in the future. CSD develops deployable security solutions, including user identity and data privacy technologies, end system security, research infrastructure, law enforcement forensic capabilities, secure protocols, software assurance, and cybersecurity education.

### Experimental Research Testbed

The Experimental Research Testbed project enables cybersecurity researchers to run experiments on a secure “virtual Internet.” The testbed provides contained environments that allow researchers to safely test advanced defense mechanisms against “live” threats without endangering other research or the larger Internet. The project began in 2004 with the creation of the Defense Technology Experimental Research (DETER) testbed, which was originally jointly funded with the National Science Foundation. The DETER testbed is used to test and evaluate cybersecurity technologies by more than 200 organizations from more than 20 states and 17 countries, including major DHS-funded researchers and government, industry, academia, and educational users. Additionally, the DETER testbed has been used in more than 30 institutions in more than 40 classes, involving more than 2,000 students. The DETER testbed provides the necessary infrastructure—networks, tools, methodologies, and supporting processes—to support national testing of emerging and advanced security technologies. Current efforts will support larger and more complex experiments with increased usability.

“... it's now clear this cyber threat is one of the most serious economic and national security challenges we face as a nation ... we will continue to invest in the cutting-edge research and development necessary for the innovation and discovery we need to meet the digital challenges of our time.”

— President Barack Obama

## Cybersecurity Forensics

The role of computers and portable digital media devices (e.g., cell phones, GPS devices) involved in criminal and terrorist activities has increased significantly in recent years. Used as such, these devices may contain vital evidence for investigations, including user information, call logs, location information, text messages, emails, and audio and video recordings. Law enforcement agencies require new capabilities and solutions to analyze information stored in digital media, which has become indispensable in the planning and execution of criminal and terrorist acts. Cybersecurity forensics addresses the specific needs of DHS law enforcement components. Through this project, S&T is collaborating with investigators at various federal, state, and local agencies. For example, following the conclusion of a successful effort to develop a single platform, manufacturer-agnostic GPS forensics tool to automate the collection of evidence from GPS devices, S&T funded expanded pilot training and licenses of the new technology. This pilot included one-year licenses and three-day training classes for the developed GPS forensics tool for 80 law enforcement users across 36 federal, state, and local agencies.

Project requirements for cybersecurity forensics come directly from the Cyber Forensics Working Group (CFWG), which is led by CSD and composed of representatives from federal, state, and local law enforcement agencies. CFWG members discuss capability gaps and prioritize areas of immediate concern to focus technology development and to participate as test and evaluation partners for prototype technologies.

## Transition to Practice

A number of transition paths exist for research and nearly all are affected by the nature of the technology, the intended end user, participants in the research program, and other external circumstances. The federal government funds research that may be conducted by the national laboratories, Federally Funded Research and Development Centers, and academia. How these research projects become commercialized and/or operational in a government environment is often left to chance, with little regard for the federal government's return on investment.

Transition to Practice (TTP) is a major thrust area outlined in the Federal Cybersecurity Research and Development Strategic Plan. The program assists in transitioning cybersecurity technologies developed through federally funded research and development projects into broader utilization in the HSE. The goal of TTP is: 1) to identify mature technologies that address an existing gap in public or private systems that impact national security; 2) to validate the technologies through test and evaluation and pilots and fund necessary incremental improvements; and 3) to increase utilization through partnerships, product development efforts, and marketing strategies. Through TTP processes, technologies, and experimental deployment, partners will be identified and transition plans will be developed. It is anticipated that up to three technologies will be transitioned annually to operational environments within the HSE.

## Cyber Security Division Projects

- Comprehensive National Cybersecurity Initiative (CNCI) Cyber Economic Incentives
- CNCI Leap Ahead Technologies
- CNCI Moving Target Defense
- CNCI Tailored Trustworthy Spaces
- CNCI Transition to Practice (TTP)
- Cybersecurity Assessment and Evaluation
- Cybersecurity Competitions
- Cybersecurity Forensics
- Data Privacy Technologies
- Enterprise-Level Security Metrics and Usability
- Experimental Research Testbed
- Experiments and Pilots
- Homeland Open Security Technologies (HOST)
- Identity Management
- Internet Measurement and Attack Modeling
- Process Control Systems (PCS) Security
- Research Data Repository
- Secure Protocols
- Security for Cloud-Based Systems
- Software Assurance Marketplace (SWAMP)
- Software Quality Assurance

## Explosives Division

EXD aims to protect our citizens and our country's infrastructure against the devastating effects of explosives by seeking innovative approaches and developing effective techniques related to detection and countermeasures. EXD provides concepts, science, technologies, and systems to increase protection from explosives. The division also promotes the development of field equipment, technologies, and procedures to interdict person- and vehicle-borne explosive devices.



### Canine Explosives Detection

Canines are extremely useful in identifying threats to homeland security. They can be trained to detect a wide variety of specific scents, such as drugs and explosives, and alert their handlers to the presence of these hazardous substances. As a result, intelligent dogs with the right temperament and an acute sense of smell to detect hidden contraband are increasingly in demand. For explosives detection, canine training is especially important, requiring effective training aids that will broaden threat detection capabilities and improve the proficiency of explosive detection canine teams.

Currently, the emerging threat of homemade explosives (HMEs) poses a challenge to existing canine training protocols. This has led to a need for the development of low cost, non-hazardous training aids that replicate the odor signature of HMEs. S&T has successfully tested and evaluated HME canine training aids that would allow the Transportation Security Administration (TSA) National Explosives Detection Canine Team Program to safely, and more frequently, train canines on detecting these materials. S&T has conducted independent operational assessments, partnering with TSA on two highly visible pilot programs—third-party canine use for air cargo searches and person-search canines for airline deployments—and on behavioral analysis work that led to improved and validated testing of dogs bred in the TSA breeding program for canine explosive detection work. Results confirmed the approach used to selectively breed canines for specialty detection leads to behaviors that are measurable and predictable.



### Next Generation Passenger Checkpoint

As threats in aviation security continue to evolve, the ability to screen carry-on items for weapons, explosives, and other prohibited items at airport checkpoints is a top priority. To keep pace with the sophistication of these emerging threats, S&T is developing next generation (NexGen) threat detection systems for TSA. They will also have utility for other DHS entities involved in screening.

The NexGen Passenger Checkpoint program will integrate advanced technologies to allow for improved detection of HMEs and liquid-based explosives in carry-on items through the use of phase-based imaging and X-ray diffraction methods. Through the use of integrated technologies, S&T is testing and evaluating screening capabilities, such as integrated, advanced bottled liquid scanner systems and hand-held anomaly resolution tools for secondary screening. S&T has set aggressive objectives for the NexGen Passenger Checkpoint capabilities: increase passenger checkpoint throughput from the current 150 passengers per hour to more than 230 passengers per hour, reduce labor costs by 30 percent, and minimize the footprint of screening equipment by 30 percent.



## Homemade Explosives Characterization

HMEs can be lethal and are designed to cause destruction or death when used in improvised explosives devices. Numerous attacks, like the 2004 Madrid rail bombings and the attempted attacks on U.S.-bound flights in 2006, made it imperative to detect these explosives in the transportation sector. Unlike conventional threats, HMEs are made from common household items—things that people might carry in their luggage. Distinguishing HMEs from these common items makes screening for threats more difficult.

One of DHS's top priorities is the development and improvement of HME detection technologies. To support the Department in this important initiative, S&T is working with TSA to support the evaluation of improved HME detection technologies. We are also collecting and analyzing HME threat detection "signatures" to support TSA's screening systems, and providing information on specific HME threats to improve the development of NexGen detection technologies.

To address program objectives, S&T disseminates comprehensive safety data reports, providing standard operating procedures for the safe handling, preparation, and thermal stability of HMEs and conventional explosives by technicians, which in turn, supports detection technology development. S&T also established collaborative efforts with interagency and international partners to further the understanding of HME properties, as well as our existing detection capabilities. For example, in 2013, S&T began developing joint test programs with Israel and the U.K., and will build a new HME test facility with the Bureau of Alcohol, Tobacco, Firearms and Explosives and FBI in FY 2014 and FY 2015.

## Explosives Division Projects

- Air Cargo
- Aircraft Vulnerability Tests
- Algorithm and Analysis of Raw Images
- Canine Explosives Detection
- Checked Baggage
- Eye Safe Trace Detection
- Homemade Explosives Characterization
- Integrated Passenger Screening System
- Mass Transit
- Next Generation Passenger Checkpoint

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## Resilient Systems Division

With a specific focus on infrastructure and disaster management, RSD aims to improve and increase the nation's preparedness for and response to natural and man-made threats through superior situational awareness, emergency response capabilities, and critical infrastructure protection.

### Actionable Indicators and Countermeasures

The United States was attacked by violent extremists more than 2,000 times between 1970 and 2013. Single events can be catastrophic, causing hundreds of casualties and untold financial and psychological damage. Gaining a better understanding of the nature of these threats is a key element in the U.S. strategy. S&T is working closely with researchers in academia, nonprofit organizations, and national laboratories to conduct groundbreaking research on violent extremism. The Actionable Indicators and Countermeasures project is supporting DHS and U.S. government efforts to assess and counter violent extremism by analyzing terrorist disengagement, re-engagement, and recidivism, and developing an integrated database on terrorism and extremist violence in the United States that incorporates incident, group, and geospatial information. This project is developing a new capability to support more efficient and accurate analysis of the threats posed by violent extremists and evidence-based policies and programs to counter them.

## Resilient Tunnel Project

In 1992, Chicago experienced a tunnel flood that led to nearly \$2 billion in damages to city property. New York City's extensive subway system has experienced a number of floods in recent years, including massive flooding that closed seven tunnels during Superstorm Sandy. The Resilient Tunnel Project (RTP) is developing an inflatable tunnel plug that can rapidly seal underground tunnels to prevent flooding in the event of an emergency. This innovative technology has proven highly effective in testing to date. S&T successfully demonstrated that the plug can contain flooding using the project's full-scale test tunnel, which can simulate the conditions of a flooded tunnel. The project is currently designing and manufacturing an improved plug system to address specific transit agency needs. By working closely with TSA and several major U.S. mass transit agencies, RSD is carefully designing the plug to meet real-world requirements necessary for installation in an operational rail system.

The RTP system consists of an inflatable tunnel plug; a fabric container that is designed to store and protect the plug and deploy it on command; and an inflation and control system that will inflate the plug and



maintain it at a suitable pressure for the required time. The plug is made of three layers of materials that include an air retaining bladder; a high-strength, puncture-resistant liner; and an outer fabric "armor" shell that is a uniquely woven, webbed design that provides the primary pressure retention and puncture resistance. The plug, when inflated, is more than 16 feet in diameter and 32 feet long. Plug manufacturer ILC Dover leveraged previous work on the inflatable space habitats, space suits, and airships, such as the Goodyear blimp, to design the tunnel plug. Additional project partners include Pacific Northwest National Laboratory and West Virginia University.

## Resilient Electric Grid

In the United States, more than 60 percent of the gross domestic product is tied to electricity. Annual losses due to power failures are estimated at more than \$100 billion. In addition, Presidential Policy Directive 21 highlights the energy sector as particularly vital among the nation's critical infrastructure. Currently, power distribution substations are intentionally isolated from one another to prevent power surges, known as fault currents, from cascading through the system and causing serious damage. However, this protective scheme limits the ability to reroute power from one substation to another in the event of an emergency. S&T's Resilient Electric Grid (REG) uses advanced technology to increase the reliability, flexibility, and resiliency of the nation's electric grid. REG developed a new cable that will allow distribution networks to interconnect and share power while eliminating the risk of cascading fault currents. The Inherently Fault Current Limiting, High Temperature Superconducting (IFCL-HTS) cable enables a more flexible architecture, making the grid more resilient. REG has successfully completed laboratory testing of a 25-meter IFCL-HTS cable, and S&T is working on a pilot demonstration with the Department of Energy and Con Edison at substations in New York City in FY 2014. S&T is currently analyzing commercial-scale applications of the technology.

## Resilient Systems Division Projects

- Actionable Indicators and Countermeasures
- Advanced Incident Management Enterprise System
- Blast Analysis of Complex Structures
- Drinking Water Resilience
- Geospatial Location Accountability and Navigation System for Emergency Responders (GLANSER)
- Human Systems Research and Engineering (HSRE)
- Non-Cooperative Biometrics
- Overhead Imagery Data
- Passive Methods for Precision Behavioral Screening
- Rapid DNA
- Resilient Electric Grid
- Resilient Tunnel Project
- Risk-Based Resource Deployment Decision Aid Prediction Project
- Standard Unified Modeling Mapping Integrated Toolkit (SUMMIT)

“Successful implementation of the Resilient Tunnel Project in New York and Washington, D.C., will lead to broader application of the technology, providing stronger assurance of the nation’s ability to secure our critical infrastructure.”

— *Tom Carper, United States Senator; Chris Coons, United States Senator; and John Carney, United States Congressman*

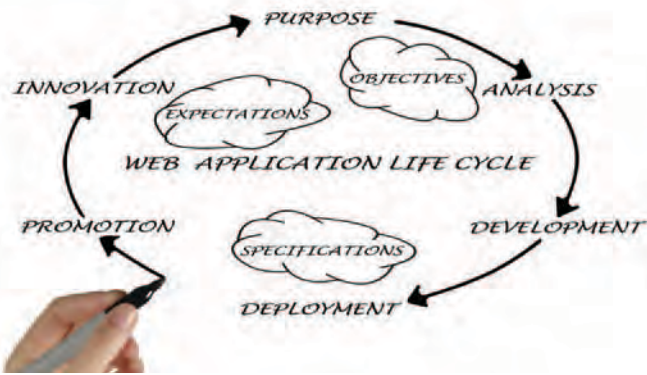
## In-Q-Tel

IQT serves as a bridge between the U.S. intelligence community and start-up firms on the leading edge of technological innovation. Since 2011, S&T has had a successful relationship with IQT, identifying small, innovative companies and investing in them to adapt their emerging commercial technologies for DHS mission needs. Every S&T dollar invested in IQT projects has leveraged almost three dollars of other U.S. government agency funds and more than 10 dollars of private capital. Fourteen S&T projects in diverse fields are underway on behalf of multiple DHS components. One investment has already delivered portable, secure, wireless camera kits that have been deployed by a DHS law enforcement component. Another investment integrated a laboratory’s worth of instruments into a single “lab-in-a-box” to rapidly validate familial relationships and confirm identities using DNA markers. The performance of this system was found to be consistent with existing forensic laboratory instruments, and S&T expects to begin a pilot with U.S. Citizenship and Immigration Services in FY 2014.

## In-Q-Tel Projects

- Big Data NoSQL Database
- Big Data Visualization and Analysis Tool
- Hand-Held, High-Performance Mass Spectrometer for Vapor and Surface Sampling
- High-Resolution, Low-Cost Portable Display System
- Mobile Device Management Tool for Enterprise Information Technology
- Quality Assurance/Quality Control (QA/QC) Tool for Open Source Software Development

S&T’s collaboration with IQT is part of a larger technology foraging process; to learn more about tech foraging, please see page 62.



## Acquisition Support and Operations Analysis (ASOA)





# Acquisition Support and Operations Analysis

## Securing the Nation with Systems Analysis and Engineering

S&T aims to quickly transition operationally focused, best-value solutions to users in the Homeland Security Enterprise (HSE). S&T's Acquisition Support and Operations Analysis (ASOA) group is devoted to achieving this goal—not only within S&T, but across DHS. ASOA applies concepts from systems engineering to improve the efficiency of DHS components' research and development (R&D) and acquisition programs.

To accomplish this, ASOA analyzes a program's operational system in four critical areas: standards development; systems analysis; R&D testing and assessment; and operational testing and evaluation (T&E). Specifically, ASOA assists components in the development of testable requirements that lead to enhanced operational capabilities across the HSE. In addition, ASOA develops, promotes, and facilitates a rigorous systems engineering process to institutionalize a "systems thinking" approach to programs and increase efficiency in transforming customer needs and requirements into operational capabilities.

ASOA's offices include the following:

- Research and Development Analysis and Assessment Office (RAA)
  - Transportation Security Laboratory (TSL)
- Office of Standards
- Office of Systems Engineering
- Office of Operational Test and Evaluation (OT&E)
- Federally Funded Research and Development Centers (FFRDCs) Program Management Office (PMO)
  - Homeland Security Studies and Analysis Institute (HSSAI)
  - Homeland Security Systems Engineering and Development Institute (HS SEDI)

The following pages highlight specific projects each office is currently supporting.



## Research and Development Analysis and Assessment Office

Using practitioner-driven methodologies, RAA advises S&T and DHS components on how to successfully transition technologies and products to the field. RAA defines operational contexts, plans programs, and ensures technical rigor by applying its expertise in systems analysis, acquisition planning, systems engineering, Lean Six Sigma process improvement, and developmental testing.

RAA applies an innovative, systems-based approach to complex problems, assisting the HSE in defining and analyzing needs, gaps, and alternatives. Additionally, the complexity and mission focus of DHS headquarters management mandates the application of RAA's analytic expertise and operational perspective in support of Department-wide strategy, investment, and budget initiatives. The RAA systems-based approach supports this essential mission area by enabling an in-depth understanding of our stakeholders' operational environments and fiscal realities. RAA facilitates the fielding of capabilities, ultimately enhancing the operational mission space and activities of DHS operational end users.

### S&T Integrates Across DHS

Recognizing the challenges of their environment, RGV border patrol agents requested new tools and techniques to better address the constantly evolving and emergent threats they encountered. The CBP Acting Commissioner reached out to S&T for help, resulting in a long-lasting partnership between S&T and CBP.

### U.S. Customs and Border Protection Rio Grande Valley Systems Analysis

One of ASOA's most recent benchmark projects was conducted at the request of, and in partnership with, U.S. Customs and Border Protection (CBP) agents at the Rio Grande Valley (RGV) McAllen Station (MCS). CBP agents patrolling the RGV border are responsible for conducting surveillance of and detecting, apprehending, and processing aliens crossing the border. CBP requested assistance in making their operations more efficient and in increasing their probability of success in accomplishing their missions. At the request of the CBP Acting Commissioner, the RAA team worked with agents at the RGV MCS detention center to gain a first-hand understanding of operations and identify gaps, needs, and potential solutions. Over the course of six months, the RAA team employed a systematic, operationally focused approach, which culminated in the identification of 22 gaps and limitations in the center's technology, training, and organizational processes.

After this initial analysis, S&T recommended improvements to the time-consuming alien intake procedures followed by MCS agents. Between August 2012 and January 2013, the MCS detention center implemented three no-cost process improvements, resulting in significant time and cost savings. Validation activities showed that the implemented no-cost alien intake process improvements eliminated MCS's need to conduct 60 percent of the alien records checks while shortening the process for the remaining 40 percent. This equates to time savings of two hours of administrative time per alien records check (resulting in a total of 2,000 agent hours saved in January 2013 alone).

S&T continues to collaborate with CBP to implement additional process improvements and identify alternative solution options in southwest Texas. The ultimate goal is to implement these process improvements across CBP to yield organization-wide cost savings and agent redeployment opportunities.

“Implementing the [process improvement recommendations] at the earliest convenience will prove to be highly cost effective for the station, sector, and agency.”

— Matthew J. DePaola, Supervisory Border Patrol Agent, U.S. Customs and Border Protection, Rio Grande Valley Sector, McAllen Station

## Integrated Investment Life Cycle Management Capabilities and Requirements Framework

The Integrated Investment Life Cycle Management (IILCM) process is a Department-wide initiative to create a framework to guide the way DHS plans, executes, and manages important investments with the goal of having a mission-critical strategy driving the budget. S&T is leading the IILCM Capabilities and Requirements (C&R) phase, with support from the DHS Office of Program Analysis and Evaluation and the DHS Office of Policy (in conjunction with various other organizations across DHS). The C&R phase is a pivotal element of the IILCM process because it provides analytically based assessments to support Department-wide decisions on critical investments in capabilities.

S&T developed a comprehensive C&R framework that focuses on achieving the Department's strategic outcomes at a functional level by engaging key stakeholders, defining the operational contexts and performance targets, identifying the current capabilities and activities, scouring the field for alternative investment concepts, and optimizing the capability portfolio. A capability-based assessment process will be integral to the IILCM C&R phase because it will enable capability and gap identification, operational risk assessment, gap prioritization, and solution recommendations.

As part of the Quadrennial Homeland Security Review, three areas will undergo IILCM pilots: cybersecurity, biodefense, and common vetting. S&T is actively supporting these efforts. Cybersecurity—a DHS mission area with approximately \$908 million in FY 2013 funding (\$992 million planned in FY 2014)—is the first pilot portfolio beginning in the C&R phase. The primary goal of the cybersecurity pilot is to establish and validate the linkage between the C&R phase and the subsequent Programming and Budgeting phase within the IILCM. The cybersecurity pilot is currently ongoing and is designed to vet the process, identify strengths and weaknesses, and prepare for full IILCM implementation. As of this publication, S&T is beginning the C&R phase of the biodefense pilot.

S&T continues to collaborate with more than 60 IILCM stakeholders across DHS to implement and pilot cybersecurity, screening and vetting, and biodefense projects through the C&R phase.

## Wireless Broadband Technology Demonstrator

In a field once dominated by land mobile radios (LMRs), wireless broadband technologies are gaining traction within the HSE. Wireless broadband tools provide new, highly beneficial capabilities that are not possible using LMRs alone. CBP is currently working to modernize its LMR system to improve tactical communications, operational effectiveness, and interoperability.

ASOA partnered with CBP to develop a Wireless Broadband Technology Demonstrator that assesses whether current broadband technologies meet CBP's tactical communications needs. After significant research and analysis, ASOA managed and executed the Wireless Broadband Technology Demonstrator Broad Agency Announcement, which included leading the review and evaluation of 78 white papers and 20 full proposals. ASOA then received approval from the Tactical Communications Executive Steering Committee to award the top three solution providers an award totaling \$6 million.

Using the demonstrator, ASOA assisted with the evaluation of a variety of wireless broadband technologies at the Naval Postgraduate School's Joint Interagency Field Exploration event. Technologies were assessed for their ability to support LMR, voice, data, and video communications on a single integrated network. Ultimately, ASOA's work will be used to inform requirements development for CBP's wireless broadband capabilities.

## Transportation Security Laboratory

TSL is the leading federal laboratory supporting the development of explosive detection equipment and blast mitigation solutions for aviation security and other DHS operational needs. TSL is also the Transportation Security Administration's (TSA) designated qualification test authority for all airport security technology. Recently, TSL filed four patents related to aviation security T&E; performed numerous blast tests related to the vulnerability of commercial aircraft; and conducted 40 qualification and certification tests of airport security technologies—including explosive detection equipment for checked baggage, carry-on luggage, passenger screening, and bottled liquid scanners—for TSA. These tests ensured that equipment manufacturers produce technologies that meet TSA-required performance standards.

TSL worked in partnership with six manufacturers of checked-bag explosive detection systems to prepare these systems for qualification testing against TSA's new, more challenging detection requirements. These tests involved several non-conventional explosives and required the cooperation of TSL test designers

and test staff working at Tyndall Air Force Base. TSL also provided qualification readiness assistance for passenger screening technologies, including advanced imaging technology and bottled liquid scanners; supported a small business's efforts to develop a carry-on bag X-ray system; and completed numerous special studies requested by TSA.

### Serving the Department and Beyond

TSL offers its unique services to all 22 components of DHS. The FBI took advantage of this expertise by requesting TSL's help in planning, executing, and analyzing the Bureau's live-fire tests on commercial aircraft. The laboratory has also provided rapid response detectability testing of explosive compounds based on new intelligence about threats. The test results were presented to the President of the United States.

TSL worked with four explosives trace detection (ETD) system developers in FY 2013, providing developmental assistance with specialized test articles, technical feedback on system improvements, and qualification testing. Working with TSL, Implant Sciences Corporation became the first American ETD manufacturer with a non-radioactive source system to meet TSA's trace detection requirements. TSL also worked closely with other vendors to improve and verify system performance, enabling TSA to install qualified upgrades to thousands of fielded ETDs.

Leveraging more than two decades of aircraft blast vulnerability experience, TSL conducted blast vulnerability testing of structures of mutual interest to U.K. and U.S. authorities. Results of these tests are being used to calibrate explosive vulnerability prediction models being developed for the U.K.'s Department for Transport and TSA.

TSL received the Federal Laboratory Consortium Northeast Region Regional Laboratory Recognition Award for its efforts to advance the field of explosives and contraband detection technologies through technology transfer.

## Transportation Security Administration Next Generation Architecture

TSA is challenged with maintaining the security of the U.S. air transportation system as the system, its operating environment, and its adversaries change and available budgets shrink. To address this problem, TSA engaged ASOA analysts to facilitate a review of TSA governance architecture and acquisition decision making and to provide strategic direction and project management for two task execution plans for the FFRDC performers on this project.

The results of the studies were a documented "as-is" TSA governance architecture, a threat-to-capability matrix that informs discussion about TSA's future threat environment, a documented "to-be" governance architecture, and recommendations for implementation.

## Research and Development Analysis and Assessment Office Projects

- CBP-U.S. Immigration and Customs Enforcement Alien Processing Systems Analysis
- Department of Defense/DHS Homeland Air Surveillance Analysis of Alternatives
- Integrated Investment Life Cycle Management (IILCM) Biodefense Pilot
- IILCM Capabilities and Requirements Phase Framework
- IILCM Cybersecurity Pilot
- IILCM Screening and Vetting Pilot
- National Urban Security Technology Laboratory Mission Analysis
- Response and Defeat Operations Support (REDOPS) Requirements Analysis
- Rio Grande Valley Systems Analysis
- Risk Modeling and Analysis
- Executive Steering Committee
- TSA Adaptive Commercial Air Transportation Security System
- TSL Strategic Planning
- Wireless Broadband Technology Demonstrator

“I wanted to write to thank [TSL] for your perseverance, personal engagement, and ongoing communication throughout the past year. It was invaluable and [Morpho] is better off because of it.”

— Cameron Ritchie, Vice President of Technology and Chief Technology Officer, Safran/Morpho Detection Inc.

## Transportation Security Laboratory Projects

- Acceptance Tests of Explosives Trace Detection Consumables
- Acceptance Tests of Virginia Diodes Inc. 100-1000 GHz Wide Dynamic Range Frequency Extenders
- Certification Readiness Assistance for Checked Baggage Explosive Detection System – Conventional Explosives
- Certification Readiness Assistance for Checked Baggage Explosive Detection System – Homemade Explosives
- Certification Readiness Testing of Checked Baggage Explosive Detection System – Conventional plus Homemade Explosives
- Certification Tests of Checked Baggage Explosive Detection Systems
- Limited Certification Readiness Testing of Checked Baggage Explosive Detection System with Homemade Explosives Algorithms
- Qualification Readiness Assistance and Testing of Explosives Trace Detection Systems
- Qualification Readiness Assistance for Bottled Liquid Scanner Systems
- Qualification Readiness Testing of Advanced Technology Systems
- Qualification Tests of Bottled Liquid Scanner Systems
- Qualification Tests of Carry-On Bag Advanced Technology
- Qualification Tests of Explosives Trace Detection Systems
- Qualification Tests of Passenger Screening Advanced Imaging Technologies
- Regional Jet Sidewall Panel (Blast Mitigation Technology Evaluation)
- Regional Jet Vulnerability Assessments

## Office of Standards

Standards are often the invisible glue of the HSE. Standards ensure technologies and equipment are safe, stable, and successful in the field. S&T's Office of Standards identifies standards and test methods that verify equipment performance and meet acquisition requirements. In cases where standards do not exist but are needed, the Office of Standards works with end users to develop appropriate documentation.

The work of the office has a real, lasting impact on stakeholders, such as first responders. Called upon to put their lives on the line every day, responders need the right tools to protect the public and their own lives. The Office of Standards works actively to ensure responders receive quality, high-performing, safe equipment through standards development and testing. One example is the office's work with search and rescue robots. These robots can be used to reduce exposure in dangerous situations and increase response times, so the office is developing a series of robot response standards and test methods that evaluate the capabilities of remotely operated ground, aquatic, and unmanned aerial robots, such as sensors, communications, mapping, and safety. This guidance will ensure manufacturers produce proficient urban search and rescue and bomb robots that meet responders' needs.

In a separate project, the office used test methods to identify a critical flaw in first responders' self-contained breathing apparatus. Through testing, the office determined an immediate need to replace lenses with cracks, crazing, bubbling, deformation, discoloration, gaps, or holes to protect firefighters from potential injury. With this information, the National Fire Protection Association issued a safety alert to more than one million firefighters across the nation.

The Office of Standards also played a key role in the development of biometric standards. Biometric information (e.g., fingerprints, "mug shots," iris scans) provides a scientific way to verify a person's identity. However, these metrics are often time-consuming to use, requiring the exchange of personal identification information and biometric data across jurisdictional boundaries or between systems made by different manufacturers. At borders, agents only have a few seconds to clear an individual for entry, so biometric validation is not a viable option. Recognizing this problem, the Office of Standards set out to develop a cost-effective way to integrate and coordinate biometric information collection, query, and exchange. The office developed a series of standards that have improved biometric technologies, fingerprint analysis, biometric quality, and interoperability across systems from different manufacturers. In addition, one of the standards developed through this program has become the most widely used standard for biometric data around the world; it will form the basis for major federal biometric and forensic databases and systems in the future.

Working with the DHS Office of Health Affairs (OHA), the Office of Standards has also developed standards for the detection of chemical threats, supported the deployment of equipment in testbeds, sponsored field testing of critical technologies, and coordinated across the federal government to support the development of new guidance on how to decontaminate large numbers of people following a chemical incident. Combining our measurement standards program and network of experts, the Office of Standards supported a successful joint OHA/TSA testbed of chemical detection technologies for transit security. The Office of Standards published two chemical detection standards and supported OHA's testbed of chemical detection systems with TSA's Transit Security Grants, resulting in the development and publication of two standards.

“As a result of [biometrics] standards development and implementation, the cost to maintain and operate biometric systems has been reduced by 50 percent. Over four years, our cost to procure subsystems for biometric matching was reduced from \$120 million to \$24 million.”

— Will Graves, Chief Biometric Engineer, US-VISIT (United States Visitor and Immigration Status Indicator Technology)

## Office of Standards Projects

### Biological Countermeasure Standards

- Development of Standards for Threat Detection Equipment
- Metrics for Microbial Material Characterization to Support Biological Agent Detection Test and Evaluation
- Standardized Field Test Method Development to Support Biological Agent Detection Test and Evaluation
- Test and Evaluation of Pre-Screening Technologies for Suspicious Powders

### Biometrics Equipment Standards

- Support for Biometric Web Services Standards
- Usability of Biometric Systems

### Chemical Countermeasure Standards

- Instrument Standards for Chemical Detection
- Mass Chemical Decontamination Working Group

### Explosive Countermeasure Standards

- Development of a Standards and Measurement Infrastructure for Calibration, Verification, and Optimization of Trace Explosives Detection Systems
- Metrology and Standards for Canine Olfactory Detection of Explosives

### Infrastructure and Community Resiliency Standards

- Cargo Security Standards
- Improving Building and Infrastructure Disaster Resilience
- Incident Management Standards Development
- Performance Metrics and Transmission Standards for Radio Frequency-Based Emergency Equipment
- Performance Metrics and Transmission Standards for Radio Frequency Personal Alert Safety System (RF-PASS) Devices
- Thermal Exposure Measurement Method for First Responder Electronic Equipment

### Mobile Platform Standards

- Bomb Squad Robot Training Standards and Test Method Coordination
- Response Robots Test Methods

### Standards Infrastructure

- American National Standards Institute (ANSI) Membership
- ASTM E54 Standards License
- InterAgency Board (IAB) Membership
- InterNational Committee for Information Technology Standards (INCITS) Technical Committee Membership
- Office of Law Enforcement Standards Development Coordination
- Open Geospatial Consortium (OGC) Membership

### X-Ray Screening Equipment Standards

- Standards for X-Ray Inspection Systems

## Office of Systems Engineering

As threat environments become more complex and require operators to respond with more sophisticated technology, trial-and-error approaches to systems development cost valuable time and resources. The Office of Systems Engineering is coordinating across DHS to institutionalize a “systems thinking” approach for managing programs that increases efficiencies and transforms needs and requirements into operational capabilities.

In support of this new approach, the office established the DHS Systems Engineering Center of Excellence (SECOE)—a collaborative forum designed to provide advice to DHS components and connect project managers with systems engineering products and services. These tools and training guides will help managers balance costs, schedules, and performance objectives throughout a program or project’s life cycle. To date, the SECOE has provided systems engineering guidance to the Under Secretary for Management, Office of Program Accountability and Risk Management, and DHS Chief Information Officer.

### Systems Engineering Life Cycle Guidebook

A major initiative of the ASOA-led SECOE was the development of a new DHS Acquisition Systems Engineering Life Cycle (SELC) Guidebook. It was designed as a uniform systems engineering methodology to be implemented across DHS. Its primary goal is to ensure that systems engineering activities are implemented to effect critical thinking and comprehensive planning and to secure compliance with federal laws, including the Federal Acquisition Regulation and the Clinger-Cohen Act. This Guidebook emphasizes the integration of advanced science and technology and the importance of conducting technology assessments, thereby affording S&T opportunities for early involvement in a program life cycle.

### Systems Engineering Workforce Development

Systems engineers are integral to the success of DHS acquisition programs. With the proper experience and training, systems engineers can produce more efficient programs and streamline processes that yield substantial cost savings. ASOA helped the DHS Policy and Acquisition Workforce Division draft certification policy for Levels I, II, and III of the DHS Acquisition Systems Engineering Certification program. Focus was placed on educating, training, and building experience around core competencies required for certifying the DHS systems engineering acquisition workforce. This policy provided the foundation for the development of systems engineering courses required to obtain certification. These courses were designed to enhance DHS’s systems engineering workforce and produce qualified system engineers to implement a rigorous systems engineering process throughout DHS. Additionally, a team of systems engineering experts helped establish a Level I Web-based systems engineering certification course.

Through the SECOE, S&T assisted the Homeland Security Acquisition Institute with the development of systems engineering 200- and 300-level, instructor-led courses that are required for Levels II and III of the DHS Acquisition Systems Engineering Certification. These newly developed courses align with the new DHS SELC Guidebook and will replace the Department of Defense courses currently required for DHS certification. The first DHS systems engineering 201 certification classes will start in FY 2014.

## Office of Systems Engineering Projects

- DHS Systems Engineering Center of Excellence
- S&T Systems Engineering Technology Transition Process Project
- S&T Technology Development Framework Project
- S&T Technology Maturation Process Development Project
- Systems Engineering Life Cycle Process Update Project
- Systems Engineering Workforce Development Project



## Office of Operational Test and Evaluation

To ensure DHS is making smart investments, OT&E was tasked with providing oversight for the Department's 135 major acquisition programs. OT&E ensures each acquisition has a robust T&E strategy that verifies progress toward specific requirements and ensures that acquisitions meet operational requirements through formal validation via operational T&E. Recently, OT&E developed a risk-based T&E approach for DHS's major information technology acquisitions that focuses on an acquisition's design, architecture, and impact to the mission if failure occurs.

For example, OT&E conducted operational tests in simulated scenarios and threat environments that revealed critical reliability deficiencies with the main diesel engines for the U.S. Coast Guard (USCG) Fast Response Cutter. Findings were key for USCG contracting officials and caused engine manufacturers to conduct a detailed root cause analysis and complete an engine redesign to meet USCG mission requirements. This enabled USCG to avoid costly engine repair and redesign costs. Robust T&E allowed for the early identification of a problem that would have negatively impacted the 50+ ship freight class (time loss from conducting patrols) and would have increased the life cycle costs to the USCG (increased maintenance costs).

### T&E Becomes an Integral Part of DHS Programs

To further support acquisition programs across the DHS components, OT&E established the T&E Center of Excellence. DHS program managers rely on the center for T&E expertise and guidance in the form of T&E best practices, tools, templates, and a T&E certification course.

## System Assessment and Validation for Emergency Responders Program

OT&E also manages the System Assessment and Validation for Emergency Responders (SAVER) program, which assists federal, state, and local first responders with making informed procurement decisions. SAVER conducts impartial, practitioner-relevant, operationally oriented assessments of responder equipment. In FY 2013, SAVER produced more than 115 assessments, market surveys, focus group reports, and other products. This information enables responders to better select, purchase, use, and maintain emergency response equipment.

For example, the Police Executive Research Forum, working in collaboration with the Department of Justice, needed to develop a number of in-depth reports on the viability of wearable camera systems to capture and store audio and video evidence for law enforcement officers in the field. Development of these reports was going to be time-consuming and costly, so the Police Executive Research Forum used SAVER's already-published market survey and assessment reports of commercially available wearable camera systems as the foundational documents to develop their reports. The Department of Justice and the Police Executive Research Forum saved time, money, and resources by not having to duplicate reports and providing the law enforcement community with critical information on how best to use and procure these systems.

## Office of Operational Test & Evaluation Acquisition Program Engagements\*

### DHS Analysis and Operations

- Homeland Security Information Network (HSIN)

### DHS National Protection and Programs Directorate

- Continuous Diagnostics and Mitigation (CDM)
- National Cybersecurity Protection System (NCPS)
- Next Generation Networks Priority Services (NGN-PS)
- United States Visitor and Immigrant Status Indicator Technology (US-VISIT)

\* List reflects S&T program engagements at DHS components.

## DHS Office of Health Affairs

- BioWatch

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## DHS Office of the Chief Financial Officer

- Financial Systems Modernization (FSM) Program

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## Federal Emergency Management Agency

- Integrated Public Alert and Warning System (IPAWS)
- Logistics Supply Chain Management System (LSCMS)

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## Transportation Security Administration

- Electronic Baggage Screening Program (EBSP) – Auto/ Dual-Use Explosives Detection System (EDS)
- EBSP – High-Speed EDS
- EBSP – Medium-Speed EDS
- EBSP – Reduced-Size EDS
- Passenger Screening Program (PSP) – Advanced Imaging Technology (AIT)
- PSP – Advanced Technology X-Ray (AT)
- PSP – Bottled Liquids Scanner (BLS)
- PSP – Credential Authentication Technology and Boarding Pass Scanning System (CAT/BPSS)
- PSP – Next Gen Explosives Trace Detector (ngETD)
- PSP – Shoe Scanner Detection (SSD)
- Security Technology Integrated Program (STIP)
- Technology Infrastructure Modernization (TIM) Program

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## U.S. Citizenship and Immigration Services

- Benefits Provision – Verification Information System (VIS)
- Transformation

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## U.S. Coast Guard

- Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) Program
- Fast Response Cutter (FRC)
- HC-144A Maritime Patrol Aircraft (MPA)
- Long Range Surveillance Aircraft (C-130H/J)
- National Security Cutter (NSC)
- Nationwide Automatic Identification System (NAIS)
- Offshore Patrol Cutter (OPC)
- Rescue 21

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## U.S. Customs and Border Protection

- Air and Marine Operations Center (AMOC) – Phase B
- Automated Commercial Environment (ACE)
- Integrated Fixed Towers (IFT)
- Strategic Air and Marine Plan (STAMP) – Multirole Enforcement Aircraft (MEA)
- TacNet
- Tactical Communication (TACCOM) Modernization
- TECS Modernization

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## U.S. Immigration and Customs Enforcement

- Detention and Removal Operations Modernization (DROM)
- Electronic Health Record (eHR) System
- Student and Exchange Visitor Information System (SEVIS I and II)
- TECS Modernization

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## U.S. Secret Service

- Information Integration and Technology Transformation (IITT)

# Systems Assessment and Validation for Emergency Responders Program Projects

- Active Shooter Training Simulators Technology Guide
- Aerial Radiation Detection Systems Assessment Report
- Aeryon Scout Small Unmanned Aerial Vehicle Technical Report
- Atmospheric Plume Dispersion Models and Applications for Emergency Response and Recovery Handbook
- Bar Code Reading and Printing Equipment Market Survey Report
- Biological Agent Detection Equipment for First Responders' Field Use TechNote
- Blast Resistant Trash Receptacles Market Survey Report
- Blast Resistant Trash Receptacles TechNote
- Closed Circuit Television Handbook
- Command and Control Training Simulators TechNote
- Covert Wearable Camera Systems Assessment Report
- Covert Wearable Camera Systems Focus Group Report
- Covert Wearable Camera Systems Market Survey Report
- Data Fusion Considerations and Guidelines
- DraganFlyer X6 Small Unmanned Aerial Vehicle Technical Report
- Environmental (Weather) Surveillance Equipment TechNote
- Escape Route Modeling Tools Market Survey Report
- Escape Route Modeling Tools TechNote
- Explosive Entry Breaching Frames Assessment Report
- Explosives Detection Portals TechNote
- Fiber Optic Kits Assessment Report
- Fingerprint Processing and Identification TechNote
- Gasoline-Powered Rotary Rescue Saws Assessment Report
- Handheld Ion Mobility Spectrometry Trace Explosives Detectors Market Survey Report
- Handheld Ion Mobility Spectrometry Trace Explosives Detectors TechNote
- Handheld Raman Spectrometers Assessment Report
- Handheld Underwater Metal Detectors Focus Group Report
- Hazmat Chemical, Biological, Radiological, Nuclear, and Explosives Mobile Apps Application Note
- Hazmat Chemical, Biological, Radiological, Nuclear, and Explosives Mobile Apps TechNote
- Homeland Security Information Network Announcement
- Ion Mobility Spectrometry-Based Chemical Agent Detectors TechNote
- Laser Aiming Devices Assessment Report
- Laser Aiming Devices Market Survey Report
- Laser-Based Explosives Detectors TechNote
- License Plate Recognition Database Software Focus Group Report
- License Plate Recognition Database Software Market Survey Report
- License Plate Recognition Standards TechNote
- Line Safety Ropes Focus Group Report
- Line Safety Ropes Market Survey Report
- Magnifying Patrol Rifle Scopes Focus Group Report
- Mobile Computing through the Cloud TechNote
- Non-Magnifying Patrol Rifle Sights Assessment Report
- Non-Magnifying Patrol Rifle Sights Market Survey Report
- Personal Cooling Systems TechNote
- Personal Flotation Devices TechNote
- Personal Protective Equipment Selection Guide
- Personnel Physiological Monitoring Systems TechNote
- Photo Ionization Detectors Focus Group Report
- Pistol Mounted Lights Assessment Report
- Pistol Mounted Lights Market Survey Report
- Portable IV Pumps Assessment Report
- Portable Radiological Equipment Technical Guide
- Potable Water Distribution Systems Procurement Guide
- Pre-Hospital Ventilators Assessment Report
- Radar Systems for Through-the-Wall Surveillance Focus Group Report
- Radiation Mitigation Blankets Market Survey Report
- Radiation Mitigation Blankets TechNote
- Rapid Abrin Detection Assay Evaluation and Validation Tetracore Lateral Flow Assay Study Report
- Rapid Ricin Detection Assay Evaluation and Validation Tetracore Lateral Flow Assay Study Report
- Ruggedized Tablets Focus Group Report
- Shelf Stable Ready-to-Eat Food Packs Market Survey Report
- Shelf Stable Ready-to-Eat Food Packs Technical Guide
- Standoff Radiation Detection Focus Group Report
- Standoff Radiation Detection TechNote
- Subsistence and Sanitation Market Survey Report
- Subsistence and Sanitation Technical Guide
- Tactical Communications Market Survey Report
- Touch Screens for Ruggedized Computers Technical Guide
- Video Analytics Systems Market Survey Report

## Federally Funded Research and Development Center Program Management Office

The FFRDC PMO provides technical and contractual oversight, as well as programmatic support for two FFRDCs—unique entities established to directly support DHS. Leveraging non-profit private-sector resources, the FFRDCs provide independent analyses of homeland security issues. HSSAI focuses specifically on homeland security strategy, threats, and policy studies, while HS SEDI addresses enterprise systems engineering issues and complex acquisition program support. During 2013, the FFRDC PMO received and processed 117 interagency agreements and 216 procurement requests. These PMO efforts resulted in more than \$124 million in combined funding awarded in FY 2013 to the two FFRDCs for the initiation of 99 new projects directly serving 13 DHS components, the Department of Education, and the Department of State.

The goal of each FFRDC is to provide objective technical expertise, advice, knowledge products, research, and technology solutions to improve DHS and the entire HSE. For example, HSSAI worked with U.S. Immigration and Customs Enforcement to conduct a study of human smuggling networks along the southern border of the United States. Through the research that followed, HSSAI was able to identify attributes of irregular migrants and their financial transactions and illustrate these findings in a regionally based organizational architecture. HSSAI also completed a review of the Chemical Facility Anti-Terrorism Standards methodology to address congressional and industry concerns. Congressional concerns focused on DHS’s lack of progress in identifying and regulating high-risk U.S. chemical facilities, while the chemical industry objected to the approach used to identify “high-risk” facilities.

HS SEDI developed an analysis of alternatives to evaluate architectures for a next-generation system to help the DHS National Protection and Programs Directorate’s Office of Biometric Identity Management meet future biometric identity needs. This effort included the integration of current systems capabilities; incorporation of new capabilities, such as facial and iris scans; and improvement of the system’s reliability, capacity, and performance, all while reducing costs. HS SEDI also applied agile systems engineering to the U.S. Citizenship and Immigration Services (USCIS) Electronic Immigration System to support the transformation of immigration benefits and employment verification to a Web-based platform. This effort will help USCIS prepare for potential comprehensive immigration reform.

The next two pages list various studies conducted by the FFRDCs and the organizations supported.



# Federally Funded Research and Development Center Program Management Office Projects

## DHS Science and Technology Directorate

- **Acquisition Support and Operations Analysis (ASOA)**
  - Science and Technology Resource Allocation Strategy (STRAS) Support
- **First Responders Group (FRG)**
  - Big Data Analysis
  - Enterprise Integration Task
  - Integrated Public Alert and Warning System/ Wireless Emergency Alerts – Developmental Test and Evaluation
  - Project Responder 4
  - Radiological/Nuclear Response and Recovery Research and Development Investment Plan
- **Homeland Security Advanced Research Projects Agency (HSARPA)**
  - Big Data and Predictive Analytics
  - Operational Context Analysis
  - Purchase Requisition Analysis
- **HSARPA Borders and Maritime Security Division (BMD)**
  - Apex Air Entry and Exit Re-Engineering Project
  - Apex Border Enforcement Analytics Program
  - Pollen Identification for Geolocation
  - Polymerase Chain Reaction Phase II Collection Efficiency Study
  - Small Dark Aircraft Detection Data Fusion Analysis, Integration, and Transmitter
  - Small Dark Aircraft Detection Long Duration Bistatic Radar Validation
  - Tunnel Detection Multi-Component System Analysis
  - Tunnel Detection Verification and Validation
- **HSARPA Chemical and Biological Defense Division (CBD)**
  - Portfolio Assessment 2013
  - Review of Interagency Strategic Plan for Validation of Anthrax Contamination Detection Methods
  - Technology Readiness Assessment Reviews and Training
- **HSARPA Cyber Security Division (CSD)**
  - Cyber Mobility
  - Mobile Wireless Investigations Assessment
  - Privacy Enhancing Technology Evaluation
- **HSARPA Explosives Division (EXD)**
  - Standoff Detection Program
- **HSARPA Resilient Systems Division (RSD)**
  - Analytical Support to Improve Federal Emergency Management Agency Recovery Operations Using Remote Sensing/Geographic Information System Technology
  - GPS Resiliency for Critical Infrastructure
  - Rapid DNA Requirements Analysis and Concept of Operations Development
- HSSAI FFRDC Core Research (Base Funded)
- HSSAI FFRDC Core Research (Mission Funded)
- HS SEDI FFRDC Core Research Program
- **Research and Development Partnerships (RDP)**
  - Interagency Office's Special Projects Office – Focused Analytic Technology Foraging
  - SAFETY Act Best Practices in Anti-Terrorism Security Tier II

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## DHS Directorate for Management

- Office of the Chief Information Officer (OCIO) Chief Information Security Officer – Acquisition and Systems Engineering Technical Expertise and Assessments
- OCIO Information Technology Services Office – Independent Program Assessment, Technical Advisory, and Mission Engineering Services

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## DHS National Protection and Programs Directorate

- Office of Cybersecurity and Communications, Network Security Deployment – Systems Engineering and Acquisition Expertise
- Presidential Policy Directive/PPD-21 – Implementation Planning

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## DHS Office of Policy

- Office of Strategy, Planning, Analysis, and Risk – Analytic Support
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## DHS Office of Health Affairs

- National Biosurveillance Integration Center
- Workforce Health and Medical Support Division – Acquisition Planning Electronic Health Information System

## DHS Office of Intelligence and Analysis

- Fusion Center Performance Program Support
- Process Engineering, Development, and Integration Analysis

## Domestic Nuclear Detection Office

- Chief Information Officer – Information Systems Security, Architecture, and Life Cycle Management Expertise and Guidance
- Radiation Portal Monitor Analysis of Alternatives

## U.S. Customs and Border Protection

- Office of Technology Innovation and Acquisition – Acquisition and Systems Engineering Assessments
- Operational Integration and Analysis Directorate – New and Emerging Technology Program Technical Assessment

## U.S. Citizenship and Immigration Services

- Office of Transformation Coordination, Transformation Program – Systems Engineering and Technical Integration
- Strategic Framework for Electronic Immigration System Integration

## U.S. Coast Guard

- Maritime Joint Targeting Roadmap – Analysis of Alternatives
- Operational Risk Assessment Model – Optimization Modeling

## Federal Emergency Management Agency

- Analytic Support to Federal Emergency Management Agency Public Assistance Six Sigma Project
- Response and Recovery Doctrine

## Transportation Security Administration

- Office of Intelligence and Analysis – Technology Infrastructure Modernization Program
- Risk-Based Approach to Low-Risk Air Traveler Populations – Independent Review

## U.S. Department of State

- Integration Phase of the Export Control and Related Border Security (EXBS) Program Assessment Tool
- Summation of the EXBS Program Assessment Tool



“DHS major acquisition programs play a critical role in protecting the homeland. They include surveillance systems watching for terrorists and drug traffickers along our borders and machines screening airport passengers for explosives and other deadly threats, among other programs. These programs represent a significant investment for the American taxpayer.”

— Rep. Michael McCaul (R-TX), Chairman,  
Subcommittee on Oversight, Investigations, and Management



## Research and Development Partnerships (RDP)





## Research and Development Partnerships

### Delivering Valuable Research and Innovation through Mutually Beneficial Partnerships

The Research and Development Partnerships (RDP) group builds enduring partnerships that rapidly deliver technology solutions and knowledge products to the Homeland Security Enterprise (HSE) with an eye towards maximizing each partner's investment. Each of its five offices reaches out to a defined sector of industry, government, or academia to find innovative solutions to evolving and emerging challenges to our nation's security. RDP also provides access to advanced scientific expertise, capabilities, and science-based solutions through a coordinated network of S&T laboratories, Department of Energy (DOE) national laboratories, and academic research centers.

#### Office of National Laboratories

As mandated by the Homeland Security Act of 2002, the Office of National Laboratories (ONL) was established to develop and utilize a coordinated network of S&T laboratories and DOE national laboratories to facilitate the delivery of enduring capabilities vital to DHS and the national homeland security mission. This extensive network of laboratories houses some of the most advanced scientific expertise in the world. As a result, the HSE is able to leverage, transfer, and apply this wealth of expertise to inform policy, improve operations, and advance research in support of the homeland security mission.

#### Department of Energy National Laboratories

ONL has created a trusted and robust relationship between DHS and the DOE national laboratory complex. The national labs provide multi-disciplinary, world-renowned research teams coupled with distinctive, powerful, and secure world-class research facilities. As the DHS liaison to the DOE national laboratories, ONL facilitates access to the vast array of scientific expertise, research, and unique capabilities offered by this nationwide network.

In the last two years, S&T and ONL have increased research and development (R&D) coordination with the DHS components and the DOE labs to address homeland security's difficult, multi-disciplinary, and cross-cutting technology challenges. The use of these labs by DHS is reflected in the 921 appropriateness reviews of interagency agreements recently conducted by ONL that resulted in research, development, test, and evaluation by the DOE national laboratories. Because of migration to a Web-based, paperless environment, these reviews were completed 50 percent faster, resulting in significant savings in administrative costs and processing time. This research has resulted in multinational advances in common identity vetting, which is essential in our global world. By melding scientific insights from cognitive and social psychology, cybersecurity, forensics, biometrics, and computer science, S&T and the DOE national labs tackled the complex nature of identity. Other research explored the impact of severe weather events on the electrical grid and associated infrastructure. The outcomes of this research will ensure faster response and recovery in the future.

Together with DHS components and a consortium of DOE laboratories, S&T is leading two projects in the areas of big data and radiological and nuclear response. Using a cross-disciplinary process, the multi-component teams are defining the issues and conducting capability gap analyses that will provide well-defined R&D roadmaps consistent with homeland security needs. These roadmaps will be used by S&T and the DHS components to develop coordinated acquisition plans for operationally robust technical solutions in both areas.

## S&T National Laboratories

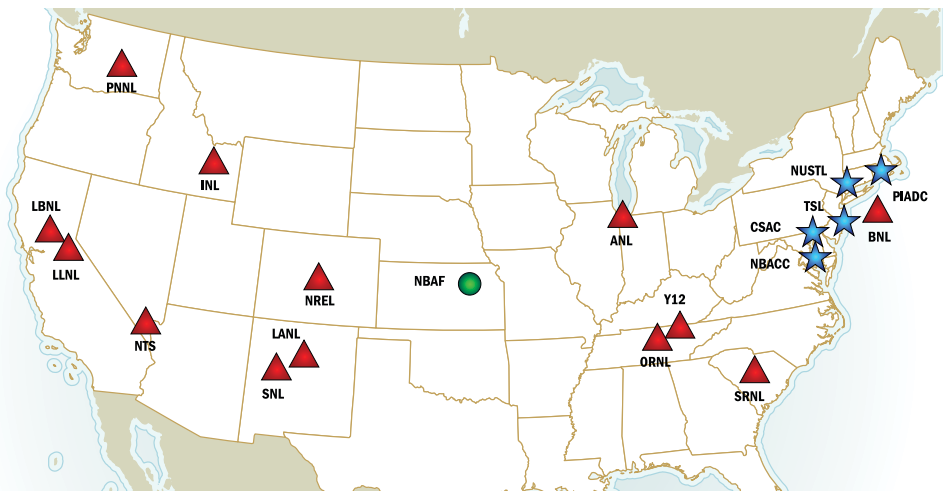
In addition to facilitating the use of the DOE national laboratory complex, ONL operates, maintains, and when needed, constructs and upgrades S&T-owned laboratories to ensure access to the state-of-the-art capabilities necessary for meeting current and emerging homeland security needs. The existing five labs are focused on operationally critical 24/7 bioforensics and threat characterization (National Biodefense Analysis and Countermeasures Center); accurate and rapid detection of explosives at transportation hubs (Transportation Security Laboratory [TSL]); objective test and evaluation of tools critical to first responders (National Urban Security Technology Laboratory); timely knowledge products essential for informed planning and response to chemical threats (Chemical Security Analysis Center [CSAC]); and diagnostics and vaccines vital to protecting our nation's \$168 billion livestock industry from foreign animal diseases (Plum Island Animal Disease Center [PIADC]). The National Bio and Agro Defense Facility, a next-generation lab being built in Manhattan, Kansas, will replace the aging Plum Island facility and provide Bio Safety Level 4 capabilities, as well as advanced biotechnology development capabilities, for protecting the nation's large livestock population from the most serious emerging and zoonotic diseases for which no countermeasures currently exist.

The S&T labs also use cooperative research and development agreements (CRADAs) to establish partnerships with industry, academia, and consortia to advance technology transfer and commercialization activities in cybersecurity, transportation security, chemical-biological defense, and first responder technologies. The S&T labs are currently conducting research as the result of 53 new CRADAs. Through CRADAs with industry, PIADC is transitioning S&T's foot-and-mouth disease vaccine to manufacturing, resulting in new ways to reduce cost and increase availability, and TSL is maturing explosives detection equipment. Additionally, CSAC's CRADA with the Chlorine Institute resulted in the transfer of critical information for planning and response, leading CSAC to be recognized with the Federal Laboratory Mid-Atlantic Regional Award for Technology Transfer.

The S&T labs and their accomplishments are further detailed in Appendix A.

### LEGEND

- ★ **DHS S&T Laboratory**  
Five labs that support DHS core mission areas
- **Proposed DHS S&T Laboratory**  
NBAF is proposed replacement for Plum Island Animal Disease Center
- ▲ **DOE National Laboratories**



### Science and Technology Laboratories

- Chemical Security Analysis Center (CSAC)
- National Biodefense Analysis and Countermeasures Center (NBACC)
- National Urban Security Technology Laboratory (NUSTL)
- Plum Island Animal Disease Center (PIADC)
- Transportation Security Laboratory (TSL)

### Department of Energy National Laboratories

- Argonne National Laboratory (ANL)
- Brookhaven National Laboratory (BNL)
- Idaho National Laboratory (INL)
- Lawrence Berkeley National Laboratory (LBNL)
- Lawrence Livermore National Laboratory (LLNL)
- Los Alamos National Laboratory (LANL)
- National Renewable Energy Laboratory (NREL)
- Nevada Test Site (NTS)
- Oak Ridge National Laboratory (ORNL)
- Pacific Northwest National Laboratory (PNNL)
- Sandia National Laboratories (SNL)
- Savannah River National Laboratory (SRNL)
- Y12 National Security Complex (YNSC)

## Office of University Programs

The Office of University Programs (OUP) taps the expertise of the nation's colleges and universities to address pressing homeland security needs through three unique programs: the University Centers of Excellence (COEs) program, OUP Education program, and Minority Serving Institutions (MSI) program. Additionally, OUP sponsors the service academies program to provide opportunities for teams of faculty and students from the U.S. service academies to participate in S&T-sponsored research projects.

OUP serves as the conduit between the COEs and potential users of technology and knowledge products and assists the COEs in transitioning their products to the HSE. Through an end-to-end program management strategy, OUP increases researchers' interactions with end users at every phase of the R&D process. By improving communications and understanding of operations, researchers are able to produce more targeted, relevant research. Since 2012, OUP sponsored three workshops to assist the COEs in generating formal transition plans that have enabled several COE technologies to be piloted or transitioned to operational use. S&T currently supports nine COEs, which address homeland security mission areas: six COEs align to operational missions and three COEs cut across the HSE mission areas. These centers have teams of universities that combine to provide a consortium of more than 200 colleges and universities, as well as national labs and industry, from across the United States and internationally.

“The Centers of Excellence are a cost-effective, collaborative partnership ... They have proved immediately effective in optimizing our port operations ... this partnership is paying dividends to Coast Guard operations.”

— *Vice Admiral Robert C. Parker, Commander of the Atlantic Area and Defense Force East, United States Coast Guard*

### University Centers of Excellence

The University COEs develop customer-driven homeland security science and technology solutions and educate the next generation of homeland security experts. In recent years, the COEs responded to 191 requests for assistance from DHS components and 900 requests for assistance from other federal, state, and local government entities within the HSE, and were awarded nine patents. Since 2007, the COEs have received \$74.5 million in follow-on funding from S&T and other sources. Of that amount, \$33 million came from sources other than S&T.

The following highlights illustrate the value and breadth of the COEs' contributions to homeland security mission areas. Included are one or two of the most notable projects from each COE.

#### **National Center for Risk and Economic Analysis of Terrorism Events (CREATE), led by the University of Southern California**

- Received verification for operational use of its Assistant for Randomized Monitoring Over Routes project by the U.S. Coast Guard (USCG). USCG also presented the Coast Guard Meritorious Team Commendation Ribbon to the joint CREATE–USCG project team for their work on the Port Resilience Operational Tactical Enforcement to Combat Terrorism tool.
- Developed a model for U.S. Customs and Border Protection (CBP) to reduce U.S. entry border-crossing wait times. The project estimated the value of reducing wait times at points of entry and the macroeconomic impacts and security benefits of increased staffing.

**National Center for Border Security and Immigration (NCBSI), co-led by the University of Arizona in Tucson and the University of Texas at El Paso**

- Assisted the DHS Office of Policy and DHS Office of Immigration Statistics in developing more accurate estimates of the annual flow and probability of apprehending aliens. Additionally, this study’s goal was to more clearly understand the economic, family, and crossing experience profile of unauthorized aliens crossing the Southwest land border.

**Coastal Hazards Center (CHC), co-led by the University of North Carolina at Chapel Hill and Jackson State University**

- Increased the usability of the Advanced Circulation (ADCIRC) Storm Surge/Flood Model for operational end users, such as the Federal Emergency Management Agency (FEMA), USCG, and Army Corps of Engineers. FEMA used ADCIRC post-Superstorm Sandy hind casts of storm water levels to aid with rapid damage estimates for loss of life and property and is also using ADCIRC modeling to update National Flood Insurance Program rate maps along the East Coast.

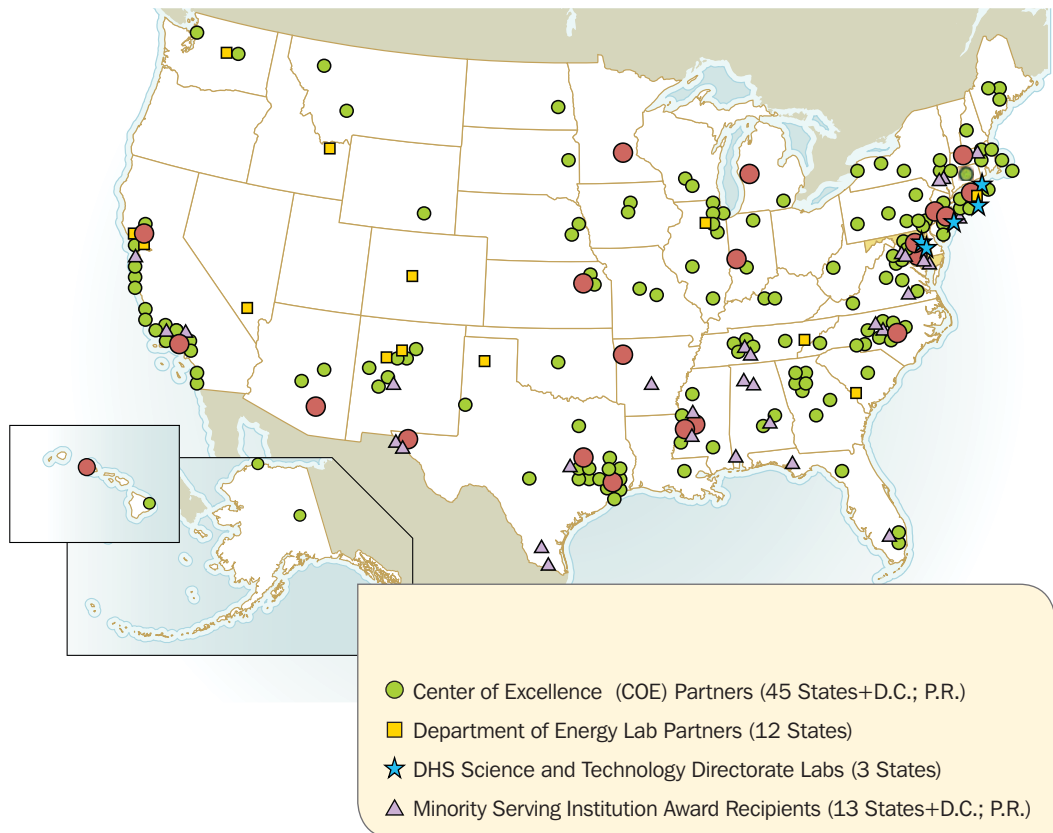
**National Center for Food Protection and Defense (NCFPD), led by the University of Minnesota**

- Developed a prototype model, known as the Criticality Spatial Analysis tool, that enables privately owned food companies to assess and mitigate risks and threats. This tool aims to collect spatial data of food systems, improve system and sub-system documentation, and objectively quantify risks.

**Center for Maritime, Island and Remote and Extreme Environment Security (MIREES), co-led by the University of Hawaii and Stevens Institute of Technology**

- Developed a passive acoustic array that can provide a low-cost, highly portable acoustic surveillance capability for port security. The signal processing is based on the cross-correlation of signals received by several hydrophones. The patented system was licensed to Sonardyne International Ltd. for specific applications.

**DHS S&T Centers of Excellence Partnership Network**



**Center for Visualization and Data Analytics (CVADA), co-led by Rutgers University and Purdue University**

- Developed the cgSARVA tool, which was used during Superstorm Sandy to allocate resources and prioritize rebuilding efforts. The USCG used cgSARVA to rapidly and accurately determine the number of incidents that various stations had responded to in previous years, making it easy to determine which stations should be prioritized.
- Developed a model as part of the S&T Boat Allocation Module project to inform senior USCG leaders' decisions regarding asset capabilities, acquisitions, and allocations; unit locations; policies and concepts of operations; and mission tradeoffs.

**National Center for Zoonotic and Animal Disease Defense (ZADD), co-led by Texas A&M University at College Station and Kansas State University**

- Developed a proof-of-concept system, AgConnect, which demonstrates the ability to integrate, aggregate, and analyze data streams required to support business continuity for the agriculture sector. The proof-of-concept was the first time that diagnostic laboratory data had been linked through a common system to animal movement data within the United States.

**National Consortium for the Study of Terrorism and Responses to Terrorism (START), led by the University of Maryland**

- Served as subject matter experts on terrorism and provided analysis regarding terrorist attacks in 2013 to major media outlets. Following the Boston marathon bombings, START researchers gave more than 100 interviews on live television, radio, and over the phone to major news outlets, including the Associated Press, The New York Times, The Wall Street Journal, National Public Radio, MSNBC, Fox News, Reuters, The Guardian, O Globo, Al Jazeera Arabic, BBC News, and Voice of Russia.

**Center for Awareness and Localization of Explosives-Related Threats (ALERT), led by Northeastern University**

- Developed the Video Anomaly Sensing and Tracking testbed with Cleveland Hopkins International Airport to identify “in-the-exit” security breaches and to provide video to the airport command center, helping Transportation Security Officers to apprehend exit lane violators.
- Completed the ninth Algorithm Development for Security Applications technical symposium on new signatures for explosive detection that brought together academia, government, and industry representatives to develop improved explosive detection equipment for aviation security.

**National Center for the Study of Preparedness and Catastrophic Event Response (PACER), led by Johns Hopkins University**

- Developed a suite of downloadable applications to help hospitals and first responders plan and prepare for disasters. These tools are designed to assist a wide range of health care providers plan and respond more effectively to disasters and help senior policy officials develop more effective public health protocols, plans, and guidelines for critical events that may affect large numbers of people and institutions.

A complete list of COE partners by state, territory, and country is available in Appendix B.

## OUP Education Program and Minority Serving Institutions Program

OUP administers academic grants that develop the homeland security science and engineering workforce. OUP awards Career Development Grants (CDGs) to the COEs to build a qualified technical homeland security workforce. OUP also awards Scientific Leadership Awards (SLAs) to MSI colleges and universities that have homeland security science and engineering programs or those linked to the COEs. In 2013, the OUP Education Program awarded 12 CDGs and 55 HS-STEM summer internships to COEs. In 2013, the OUP MSI Program awarded four SLAs and 12 Summer Research Team grants to MSIs for student scholarships, faculty development, and high-priority homeland security education and research. To date, approximately 75 percent of graduating CDG-supported students and dozens of SLA-supported students at MSIs have entered the homeland security workforce.

## International Cooperative Programs Office

As security challenges continue to emerge and evolve, S&T is developing relationships with our international friends and allies to enhance our S&T knowledge. These partnerships will provide us with access to innovative R&D knowledge, funding, and other unique capabilities and resources. The International Cooperative Programs Office (ICPO) works closely with S&T and DHS components to understand HSE operational requirements, identify relevant technologies or knowledge products in the international domain, and facilitate the development of cooperative relationships that enhance security for both the United States and its partner nations. To date, S&T has established bilateral agreements with Australia, Canada, France, Germany, Israel, Mexico, the Netherlands, New Zealand, Singapore, Spain, Sweden, the United Kingdom, and the European Commission.

On an annual basis, the Under Secretary for Science and Technology convenes bilateral meetings with his foreign counterparts to review the status of ongoing projects, exchange current priorities, and examine the potential for future engagements. Such bilateral meetings include site visits to key research, test, and evaluation facilities conducting work on behalf of the respective governments and operational sites where these innovative capabilities are being implemented. For example, in 2013 DHS hosted senior-level foreign visits to the National Operations Center, National Biodefense Analysis and Countermeasures Center, Transportation Systems Integration Facility, and TSL. In 2013, DHS senior staff also conducted site visits to the Netherlands' National Institute for Public Health and the Environment and Central Veterinary Institute's Bio Safety Level 4 laboratories; Israel's Jerusalem Old City security command and control facility; and New Zealand's Integrated Targeting and Operations Centre, which evaluates the risk of threats and contraband in cargo and agricultural imports.

Many of the projects we share with our international partners address common threat areas, such as cybersecurity, chemical and biological defense, explosives detection, first responder tools and technologies, maritime and border security, and critical infrastructure protection. Currently there are 98 ongoing cooperative projects in which our international partners have invested approximately \$12.4 million.



## Office of Public-Private Partnerships

S&T's Office of Public-Private Partnerships (PPP) develops and implements programs that identify, evaluate, and commercialize technologies as products or services that meet the requirements of DHS's stakeholders. PPP accomplishes this through the work of six offices: the Office of SAFETY (Support Anti-terrorism by Fostering Effective Technologies) Act Implementation, Small Business Innovation Research (SBIR) Program Office, Technology Transfer Office, Technology Foraging, Commercialization Office, and Long-Range Broad Agency Announcement (LRBAA) Office.

### Office of SAFETY Act Implementation

The SAFETY Act of 2002 provides critical incentives for developing, deploying, and commercializing technologies and services that could save lives in the event of a terrorist attack. The Act creates legal liability protections for providers of qualified anti-terrorism technologies (QATTs). S&T's Office of SAFETY Act Implementation manages the program for the federal government, evaluates anti-terrorism technologies, and makes recommendations for the Under Secretary for Science and Technology to consider when deciding whether to designate a particular technology or service as a QATT. SAFETY Act applicants may submit applications for products, equipment, services, devices, or technologies that are designed to prevent, detect, identify, deter, or respond to acts of terrorism. The prospect of receiving SAFETY Act coverage for technology integration and command and control functions has resulted in a notable increase in investment and attention to these critical components of a complete anti-terrorism capability. The private sector is incentivized to commit additional resources to significantly improve anti-terrorism preparedness and resiliency, thereby strengthening the nation's homeland security.

A wide range of companies have applied for SAFETY Act protections, from small, young companies to larger entities with substantial R&D and technology development capabilities. In recent years, approximately 40 percent of program applicants are from smaller businesses. The program office has maintained an accessible, customer-focused culture, which has created true government-private sector collaboration to ensure the safety of our homeland.

The program office has made special efforts to reach out to companies that are developing innovative technologies, as they often hold special promise for addressing the most challenging HSE priorities. Examples of innovative technologies recently approved include:

- A security screening kiosk that can simultaneously screen five individual parcels for a variety of threat items
- An integrated situational awareness capability designed for rail transit systems that uses computer processing, analytics, and real-time analyst support
- An anti-terrorist detection, collection, and analysis tool for the detection of terrorism surveillance and pre-attack planning
- An evacuation planning tool for sports stadiums that uses simulations to model evacuations

In FY 2013, the office received 130 applications, some of the most complex and significant in the ten-year history of the program, including layered security systems and anti-terrorism capabilities for major sports venues, financial institutions, and other prominent facilities nationwide, such as commercial facilities, ports, airports, and transportation systems. From those applications, the office approved approximately 60 technologies, with an aggregate projected annual technology revenue totaling \$1.2 billion, which supports more than 50,000 private sector jobs.

A listing of the Office of SAFETY Act Implementation projects for FY 2013 is available in Appendix C.

### Small Business Innovation Research Program Office

One of the largest public-private partnerships in the United States, the SBIR program encourages small businesses to pursue quality research and develop new processes, products, and technologies in support of the missions of the federal government. By engaging the small business community, S&T's program aims to

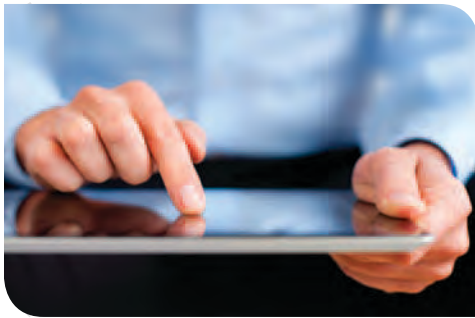


stimulate technological innovation and increase private sector commercialization of innovations derived from federal R&D, increasing competition, productivity, and economic growth. The program consists of three phases—Phase I conducts feasibility-related experimental research to demonstrate a proof of concept; Phase II continues the research completed during Phase I, culminating in a prototype demonstration; and Phase III commercializes and transitions the SBIR research or technology into the marketplace. During FY 2013, the SBIR Program Office issued two solicitations, received 248 Phase I proposals from small businesses, and awarded 29 Phase I contracts totaling \$2.9 million to companies located in 16 states. During this time frame, 11 Phase II contracts totaling approximately \$7.5 million were awarded. In addition, three Phase III contracts totaling \$3.5 million in non-SBIR funding were issued. For a complete listing of SBIR research areas and SBIR awards, see Appendix D.

### Technology Transfer Office

The Technology Transfer Office promotes R&D partnerships and evaluates, protects, markets, licenses, and manages the Department's inventions and other intellectual property, as mandated by the Federal Technology Transfer Act of 1986.

In FY 2013, the Technology Transfer Office executed 84 CRADAs with non-federal partners and four memoranda of understanding with R&D partners. In addition, the office determined the patentability of six new DHS inventions, which resulted in two patents: inert and non-toxic explosive simulants and method of production and an Ion mobility spectrometer to mass spectrometer interface.



### Technology Foraging

RDP institutionalized technology foraging processes to assist program managers and group leads in researching and evaluating specific technology landscapes of interest to the HSE. By identifying potential technology development partners, program managers are able to reduce redundant research and costs to the taxpayer while simultaneously expediting the delivery of solutions to the HSE. Technology foraging is required prior to beginning any new project or program, thereby ensuring S&T capitalizes on existing and developing technologies and markets. In FY 2013, RDP conducted more than 40 technology foraging projects for S&T's Homeland Security Advanced Research Projects Agency, Acquisition Support and Operations Analysis group, and Support to the Homeland Security Enterprise and First Responders Group (FRG) in topics such as social media analytics and tools for communication, automated agents to determine credibility, predictive incident modeling for response and training, cargo security devices, remote responder monitoring, ground and maritime sensors, human interoperability, intelligence analysis tools, commercialization best practices, and location-based service technologies for location and tracking.



A complete listing of the FY 2013 tech foraging projects is available in Appendix E.



## Commercialization Office

S&T's Commercialization Office reaches out to the private sector to identify and evaluate privately owned technologies that meet the detailed operational requirements of DHS stakeholders. When successful, the Commercialization Office matches a willing supplier of new technology with a willing customer from the HSE.

The Commercialization Office continues to expand S&T's situational awareness of private sector capabilities. To accomplish this task, the Commercialization Office expanded its Corporate Overview Repository. Originally housing information about more than 700 companies and 3,500 technologies, products, and services that offer potential applications for DHS stakeholders, the repository recently expanded to include information on an additional 200 companies and 600 technology capabilities. Moreover, the office signed memoranda of understanding with the Security Industry Association and General Dynamics EDGE<sup>®</sup> Innovation Network in order to expand its ability to forage and alert private sector partners of new requirements.

The office proactively engages the private sector by initiating periodic emails that detail upcoming S&T outreach events, such as industry days, webinars, solicitations, and requests for information. These resources help the office connect with several thousand members of industry and discuss strategic items of interest that can greatly contribute to S&T technology foraging activities. Based on responses from the private sector, the Commercialization Office works with program managers to identify strategic teaming partners and external experts for technology development. For example, in coordination with the DHS Office of Infrastructure Protection, the Commercialization Office recently participated in R&D working groups with stakeholders in the commercial facilities and nuclear sectors to identify solutions for a variety of technology challenges. The Commercialization Office's outreach approach maintains an open dialog with industry and increases situational awareness for both the private sector and S&T.

## Long-Range Broad Agency Announcement Office

The LRBAA Office manages S&T's open solicitation vehicle, seeking proposals for advanced, innovative, and disruptive technologies that address capability gaps in the HSE. In FY 2013 alone, the office received 331 white papers and 53 full proposal submissions. Once proposals have been reviewed and approved, the LRBAA Office awards funds to a variety of small, medium, and large businesses, universities, and other R&D organizations. Recent awards funded technologies in critical areas for the HSE, including mass spectrometry for explosives threat detection; computational adaptive X-ray imaging; integrated geo-targeting and effective crisis communications; and canine behavioral, physiological, and genetic identifiers.



## Interagency Office

The Interagency Office (IAO) builds partnerships between S&T and other federal and state organizations engaged in R&D. These partnerships focus on sharing information and identifying areas for collaboration, allowing each partner to dictate the use of its own resources while leveraging those of their partners.

### Joint Interagency Field Exploration (JIFX)

With a focus on understanding end-user requirements and priorities, JIFX identifies innovative solutions for improving common response and recovery challenges, including geospatial mapping and tagging, disaster modeling, and communications tools that provide better situational awareness and decision making.

Governmental and industry partners use JIFX to align to stakeholder needs and customize transitioning planning, often saving millions of dollars across the HSE.

IAO expanded coordination with the Department of Defense (DOD) through the Under Secretary-level DOD–DHS Capability Development Working Group, which has been the primary process for DHS–DOD technology coordination since 2005. Joint efforts address areas such as biodefense, countering weapons of mass destruction, countering improvised explosive devices, biometrics, explosives detection, and acquisition management. Additionally, IAO collaborated with U.S. Transportation Command’s Science and Technology Office to advance an “environmentally green” process to decontaminate biological agents on equipment and structures. IAO also partnered with U.S. Northern Command on a Joint Capabilities Technology Demonstration for the Smart Power Infrastructure Demonstration for Energy Reliability and Security program, which will demonstrate a microgrid capable of operating independently during power grid outages and will feature cybersecurity provided by the DHS National Protection and Programs Directorate.

IAO worked closely with its DHS partners, the Office of the Secretary of Defense and the Naval Postgraduate School (NPS), to design and conduct seven Joint Interagency Field Exploration (JIFX) events. These events provided unique, hands-on opportunities to experiment with potential solutions to HSE needs. During each event, the private sector, academia, government agencies, and non-profit organizations explored homeland defense and security gaps identified by interagency partners (including the Department of Health and Human Services,

Department of Justice, DOE, FBI, and FEMA). FEMA applied knowledge from the JIFX experiences to real-world solutions, including for their Roving Disaster Recovery Center and Disaster Survivor Assistance teams after a devastating set of tornados ripped through Moore, Oklahoma. Drawing on JIFX knowledge, FEMA used crowd-sourcing analysis and new processes for capturing aerial imagery to aid in the recovery from Superstorm Sandy.

Using its relationship with NPS as both a foundation and a springboard, IAO identified several partnering opportunities with its interagency partners in the state and local first responder communities. These partnerships played a critical role in enhancing emergency response capabilities. For example, the Independently Powered Command, Control and Communications for Monterey County First Responders project provided essential Internet capability to the incident command post

“[JIFX] is an opportunity to solve real-world problems with real-world solutions in a safe environment, bringing people together in a truly collaborative effort.”

— Richard Serino, Deputy Administrator, Federal Emergency Management Agency

for the North Pass Fire Department in Covelo, California, during real-world deployment collaboration with NPS and S&T's FRG. Additionally, the Command and Control Technology Integration for a Tactical Picture for the Salinas (California) Police Department provided actionable intelligence to combat gang violence during a recent law enforcement operation. These are just two examples of how S&T enhances the capabilities of first responders as they work to keep our nation safe.

Building on such partnership successes, IAO expanded its experimentation program to collaborate with the Army Research Laboratory through Technical Support Operational Analysis events, which focus on austere environments and special missions, such as border protection.

### Special Projects Office

The IAO Special Projects Office (SPO) represents S&T on several interagency groups involving the U.S. Intelligence Community, including the National Intelligence Science and Technology Committee, Mission Executive Council, S&T Intelligence Committee, S&T Leadership Council, Joint Planning and Development Office, North American Air Domain Awareness Surveillance (NAADAS) Analysis of Alternatives, and Homeland Air Surveillance Integrated Product Team. SPO used technology foraging to leverage significant investments in emerging and disruptive technologies. SPO took the lead on a classified interagency project that will significantly enhance the application of science and technology to address mission requirements for CBP and Transportation Security Administration aviation security.

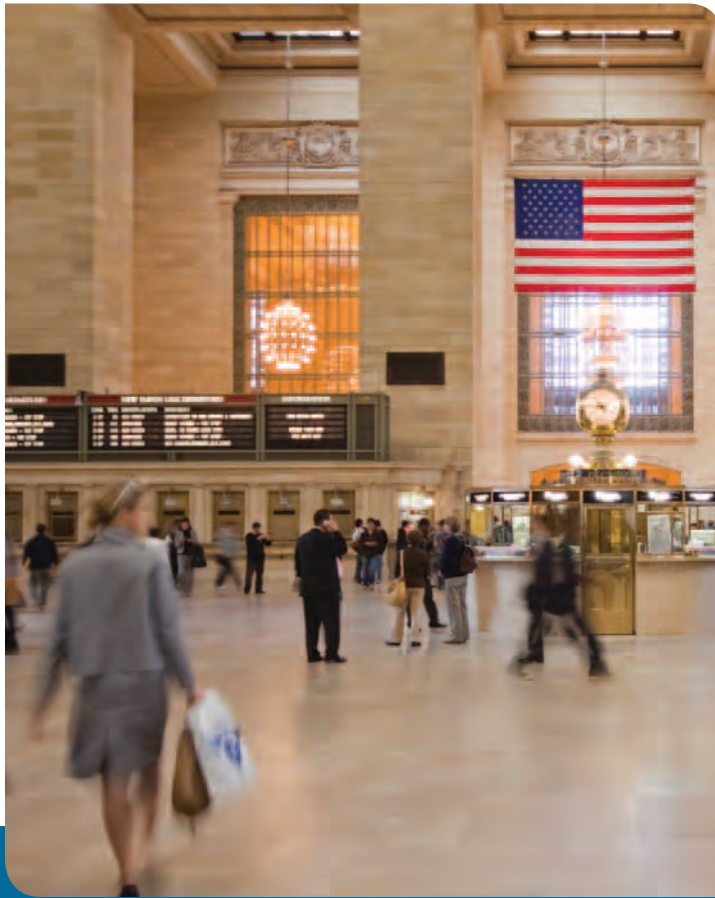
In FY 2013, SPO participated in various planning and analytical working groups and committees associated with the NAADAS Analysis of Alternatives, a joint DHS-DOD study to identify viable, cost-effective solutions to reduce aviation surveillance gaps and shortfalls. SPO continues to investigate and address technology solutions to offset aviation radar interference caused by the emerging wind turbine industry in collaboration with DHS, DOE, DOD, the Department of Commerce, and the Department of Transportation.

### Homeland Security Science and Technology Advisory Committee

The Homeland Security Science and Technology Advisory Committee (HSSTAC) is the formal external advisory committee, operating under the Federal Advisory Committee Act, that advises the Under Secretary for Science and Technology and senior staff. The Homeland Security Act of 2002 created HSSTAC as a statutory body. In 2009, when the statutory authority expired, HSSTAC was reconstituted as a discretionary committee. Secretary Napolitano conducted a review of all advisory committees within DHS in 2011 and HSSTAC was again reconstituted. New members were appointed in May 2012. During the past year, HSSTAC has advised S&T on its cybersecurity programs and engagement with industry. A new task force was created to support the Transportation Security Agency during a technology pilot for third party pre-screening. HSSTAC is expected to focus on S&T's interaction with the DHS components during the coming year.

“I applaud DHS S&T for continuing this committee, even when not required to do so. It helps ensure that the Under Secretary hears fresh perspectives and objective external advice.”

— Phil Depoy, Chairman, Homeland Security Science and Technology Advisory Committee



# The Way Forward



# The Way Forward

If history is any guide, our future will be filled with opportunities and challenges. In the Science and Technology Directorate (S&T), our goal is to understand these opportunities and challenges; develop appropriate strategies for dealing with them; and improve the effectiveness, efficiency, and safety of the Homeland Security Enterprise (HSE).

To this end, we will build upon our successes and partnerships to find operationally focused, innovative solutions developed by multidisciplinary teams. Through our proven framework of systems-based analysis and integrated research and development (R&D) planning across disciplines of researchers, scientists, private industry, and end users, S&T will continue to address wide-ranging, short- and long-term priorities for our HSE customers in the field.

As we see more evolving threats, critical infrastructure vulnerabilities, and unprecedented disasters, we must think differently about the types of challenges and opportunities facing homeland security. Recent hurricanes, wildfires, and tornados call for improved prevention, protection, mitigation, response, and recovery capabilities, and S&T is well positioned to lead the development of innovative R&D solutions that meet these crosscutting challenges. We must also continue to focus on countering violent extremism and look for new strategies to strengthen our nation's preparedness and response capabilities.

In looking to the future, several important trends in science and technology have emerged which bear mentioning. All have great importance for improving the human experience now and in the future but, as we have seen throughout the history of technology, also have the potential for misuse with potentially profound and catastrophic consequences. Advanced manufacturing and 3-D printing will fundamentally change commerce and security and will pose major challenges to export controls and weapons screening at checkpoints. The global explosion in information and communication technology will provide the capacity for acquiring, storing, and analyzing increasingly large amounts of data. The potential for increasingly effective and sophisticated cyberattacks places our critical infrastructure at great risk. In the biological sciences, the combination of microbiology, nanotechnology, neuropharmacology, and bioinformatics will give us an unprecedented understanding of the essence of life but will also be available to a growing sector of society, some of whom may look to use such knowledge for nefarious purposes. Weapons technologies and robotics, including small unmanned aerial vehicles, will also proliferate across the globe, and energy will continue to be part of the global competitive environment.

These trends all illustrate the potential for state-like capabilities in the hands of small groups and potentially even lone actors, undoubtedly complicating S&T's mission to strengthen America's security and resiliency by providing knowledge products and innovative technology solutions for the HSE. The need for scientifically informed and technologically based decisions has never been greater, and the ability to make judgments in compressed time frames is essential.

## Notable Science and Technology Trends

Advanced Manufacturing (Nanotechnology, Micromanufacturing, Advanced Lasers)

- 3-D Printing (Weapons, Human Tissue and DNA), Additive Manufacturing

Information and Communication Technology (ICT) and Data Proliferation

- Cybersecurity Consequences
- Big Data Management

Biological Sciences

- Genetic Engineering, Biofuels, Genomics

Weapon Technology and Robotics

- Improved Detection and Safe Disposal, Enhanced Capabilities

Energy

- Alternative Energy and Power Storage, Smart Energy Management Solutions

Scientifically Informed, Technologically Based Decisions

- Operational and Systems Analysis, Modeling, Simulation



To meet the diverse needs of the HSE, S&T will continue to build capabilities around six high-impact areas: (1) first responder technologies, (2) borders and maritime security, (3) chemical and biological defense, (4) cybersecurity, (5) explosives, and (6) resilience. To ensure we have the necessary expertise, our R&D business processes will continue to focus sharply on systems-based analysis and strategic portfolio reviews with an emphasis on transitioning technologies to HSE operators as quickly as possible.

Enhancing R&D collaboration across the HSE and with international partners remains critical to S&T's ability to confront a hyper-connected world in which science and technology are pursued and produced on a global scale. Coordination, information sharing, and engagement across disciplines is increasingly linked to innovation and discovery. To this end, S&T has developed two core practices—the Science and Technology Resource Allocation Strategy (STRAS) and technology foraging—that ensure we use our resources efficiently and advance the capabilities of HSE operators.

STRAS supports S&T's work with DHS components by facilitating the sharing of information on ongoing projects and needs and the collection of end-user operational requirements that are critical to technology development. In years ahead, STRAS will be the template necessary to provide our partners with the rigorous analysis and R&D support they require. We are developing individual roadmaps for each of our commodity areas that lay out shared actions, milestones, and activities. These roadmaps will eliminate redundancy, re-direct cross-domain collaboration, and shape investments against short- and long-term budget decisions.

Through technology foraging, S&T's experts are working closely with national and international R&D leaders to adapt existing and up-and-coming technologies for HSE needs. The combined efforts of STRAS and technology foraging are measurably improving our ability to execute projects more efficiently and effectively.

S&T's experts are dedicated to finding effective solutions that strengthen our nation's security and resiliency and reinvigorate our ability to work together across disparate organizations.

To this end, we look forward to serving you and meeting the challenges of today and the threats of tomorrow.



“... there are those who say we cannot afford to invest in science, that support for research is somehow a luxury at moments defined by necessities. I fundamentally disagree. Science is more essential for our prosperity, our security, our health, our environment, and our quality of life than it has ever been before.”

— *President Barack Obama*





# Appendices





## Appendix A: Office of National Laboratories Fact Sheets

### Chemical Security Analysis Center

The Department of Homeland Security (DHS) established the Chemical Security Analysis Center (CSAC) in 2006 to assess and identify vulnerabilities and respond to potential chemical threats and hazards to the homeland. Housed at Aberdeen Proving Ground in Maryland, CSAC supports the Homeland Security Enterprise by providing a robust knowledge repository of chemical threat information; a science-based threat and risk analysis; and a robust, technical-based reach-back capability. CSAC addresses the following core competencies:

#### *Knowledge Management*

- Delivered the Interagency Nontraditional Chemical Agents Virtual Library to the White House's Office of Science and Technology Policy.
- Improved the Chemical Agent Reaction Database.
- Enhanced the Homeland Secure Data Network website, which contains all CSAC reports, chemical threat relevant databases and data libraries, and key reports from interagency partners.
- Wrote and published more than 25 publications.

#### *Design and Execution of Laboratory and Field Tests*

- Developed updated source terms for chlorine and ammonia releases.
- Participated in and transitioned results from the Jack Rabbit testing to several training organizations, including the InterAgency Board, the Ammonia and Fertilizer Training Institute, and the Chlorine Institute.
- Initiated planning for the Jack Rabbit II series of chlorine release tests.
- Established a cooperative research and development agreement with the Chlorine Institute for transferring information essential for operations planning and response, garnering a Federal Laboratory Mid-Atlantic Regional Award for Technology Transfer.

#### *Assessment of the Hazard and Risk of Toxic Chemicals*

- Published the 2012 Chemical Terrorism Risk Assessment; transitioned assessment methodologies to the Department of Defense (DOD).
- Developed and delivered a beta version of the Chemical Terrorism Risk Assessment Lite Calculator Tool.
- Completed and delivered hazard assessments on Food and Drug Administration and U.S. Department of Agriculture food products.
- Delivered three reports on emerging chemical threats to the Committee on Homeland and National Security.

#### *Safer Design Strategies for Chemical Engineering Processes*

- With industry, developed a set of risk-based metrics to evaluate safety and security measures for various chemical processes and the supply chain.

#### *Support to the Homeland Security Enterprise*

- Developed and delivered a process and data to the Federal Emergency Management Agency to support a scenario-based chemical defense strategy.
- Developed and delivered to the DHS Office of Health Affairs a series of medical management guidelines on chemical threat materials.
- Established a joint project with DOD to assess and evaluate emerging threat chemical materials.
- Provided responses to 126 reach-back inquiries from 23 different organizations.



**Location:** Aberdeen Proving Ground, Maryland

**Core Competencies:** Knowledge Management, Design and Execution of Laboratory and Field Tests, Assessment of the Hazard and Risk of Toxic Chemicals, Safer Design Strategies for Chemical Engineering Processes, and 24/7 S&T-Based Reach-Back

**Accreditations:** Sensitive Compartmented Information Facility (SCIF)

**Key Customers:** CBP, DOD, EPA, FBI, FDA, FEMA, HHS, I&A, IC, NOC, NPPD, OHA, TSA, USDA, and the Chemical Industry

## National Biodefense Analysis and Countermeasures Center

The National Biodefense Analysis and Countermeasures Center (NBACC) is the first national laboratory created by the Department of Homeland Security. NBACC addresses unmet needs in homeland security and provides a continuously available national security biocontainment laboratory capability for newly identified biological threats. NBACC's mission is to provide the scientific basis for the characterization of biological threats and bioforensic analysis to support attribution of their planned or actual use. Components include the National Bioforensic Analysis Center (NBFAC) and the National Biological Threat Characterization Center (NBTCC).



**Location:** National Interagency Biodefense Campus, Fort Detrick, Maryland

**Core Competencies:** Aerobiology; Biocontainment Operations; Bioforensics, Comparative Medicine; Quality Management; Genomics and Bioinformatics; and Broad Capabilities in Bacteriology, Virology, Toxinology, and Business Operations

**Accreditations/Registrations:** ISO 17025 Quality (A2LA), CDC/USDA Select Agent for BSL-2, 3, and 4, Association for the Assessment and Accreditation of Animal Care International, Institutional Biosafety Committee, Nuclear Regulatory Commission, Drug Enforcement Administration Controlled Substance, Alcohol and Tobacco Tax and Trade Bureau Industrial Alcohol User Permit

**Key Customers:** Law Enforcement and Interagency Biological Threat Characterization Stakeholders

### NBACC Accomplishments

- Provided safe and compliant operations for more than 50,000 square feet of Bio Safety Level (BSL) 2, 3, and 4 laboratories, including continuous operational support to law enforcement.
- Registered and maintained Centers for Disease Control and Prevention (CDC) and U.S. Department of Agriculture (USDA) Biological Select Agent and Toxin Program (BSAT) compliant BSL-4 laboratory operations, including an annual CDC/USDA inspection. Activated an additional 27,600 square feet of BSL-3 laboratories and expanded registration with the CDC/USDA.
- Achieved a “Superior” Defense Security Service (DSS) rating.
- Established a “Work for Others” program that makes the NBACC national security biocontainment capabilities more broadly available to federal agencies.
- Recognized for staff volunteerism and the Battelle National Biodefense Institute’s philanthropic contributions to regional STEM (Science, Technology, Engineering, and Mathematics) education.

### NBFAC Accomplishments

- Supported more than 65 investigations of potential biological crimes by federal law enforcement and other agencies.
- Activated unique, purpose-built BSL-3 bioforensic laboratories with ISO 17025 accreditation for casework operations.
- Established and maintained ISO 17025 accredited processes and assays that create an operational capability for more than 60 high-priority human, animal, and plant pathogens and toxins.
- Established ISO 17025 validated sequencing and bioinformatics methods for bioforensic casework that are enabling new types of investigations.
- Developed a new operational capability that supports investigations of genetically modified and *de novo* synthetic agents.

### NBTCC Accomplishments

- Installed and CDC/USDA registered unique national BSL-3 and BSL-4 capabilities, which are required to obtain key scientific data that informs biodefense planning and response.
- Provided scientific data addressing 12 specific biological agent knowledge gaps that improved hazard, risk, and threat assessments in support of biodefense planning and response. This information significantly improves the fidelity of hazard and threat/risk assessment modeling of aerosol and other bioterrorism scenarios for bacterial, viral, and toxin threat agents, as well as a specific food contamination scenario.

## National Urban Security Technology Laboratory

The National Urban Security Technology Laboratory (NUSTL) directly supports first responders by conducting tests, evaluations, and assessments of technologies and systems both in the lab and in operational settings. Leveraging its New York City location, NUSTL partners with influential state and local agencies to inform and provide key knowledge products to the national first responder community. These products are intended to help first response agencies acquire and deploy the best technologies and systems to plan, protect, and respond to homeland security threats and events.

### *Test, Evaluation, and Assessments*

NUSTL conducts unbiased and independent tests, evaluations, and assessments of technologies and equipment for homeland security operations. Staff members are skilled in identifying test needs; establishing test objectives; serving as test directors, scientists, and team members; preparing detailed test plans; analyzing test results; preparing test reports; and providing federal coordination of test activities. Resulting knowledge products, such as test reports, market analyses, and lessons learned, are provided to the national first responder community. Recent accomplishments include:

- Published 20 knowledge products for the System Assessment and Validation for Emergency Responders Program, including Market Survey Reports, TechNotes, a Focus Group Report, and a Handbook.
- Completed testing of more than 400 radiation detectors for the Department of Homeland Security (DHS) Securing the Cities program.
- Conducted tests of In-Q-Tel-sponsored technologies (e.g., prototype millimeter wave technology) with first responder organizations (e.g., New York City Police Department).
- Characterized operational parameters and response of personal radiation measurement devices, which helped the Fire Department of New York with acquisition decisions.
- Conducted operational field assessments of R-Tech technologies, including heads-up displays for firefighters and an access card reader for financial crimes investigations.

### *Technical Advisors to Emergency Responders*

NUSTL's scientists, engineers, and technicians have ongoing, daily professional interactions with homeland security operational personnel. NUSTL is well situated to provide a bridge between technology developers and end users, effectively communicating first responder issues and needs to the developers while informing end users of solutions that are available or under consideration for development by the technology development community. Recent accomplishments include:

- Organized and hosted five New York Area Science and Technology (NYAST) forums for technology developers and end users. In total, more than 250 NYAST members attended in person and more than 1,000 viewed webcasts nationwide.
- Supported the installation, operation, and testing of gamma radiation detectors, which will provide data for response and recovery operations in the event of a radiological or nuclear incident in New York City.
- Supported training courses and exercises for more than 350 state and local first responders by utilizing licensed radioactive sources and support materials.
- Participated in writing groups for national and international standards on various aspects of radiation measurements, including environmental dosimetry (ANSI N13.37), personal radiation detectors (N42.32), emergency dosimeters (N42.49), and neutrons (ISO TC85).



**Location:** New York City, New York

**Core Competencies:** Test, Evaluation, and Assessments; Technical Advisors to Emergency Responders

**Accreditations:** ISO 9001 (in preparation), ISO 14001, ANSI/AIHA Z-1017000 (compliant)

**Key Customers:** State and Local First Responders

## Plum Island Animal Disease Center

Since 1954, the Plum Island Animal Disease Center (PIADC) has served as the front line of the nation's defense against diseases that could devastate markets for livestock, meat, milk, and other animal products. PIADC is the only laboratory in the nation that can conduct initial diagnostic testing for foot-and-mouth disease (FMD). The U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) provides this service and conducts training for federal and state veterinarians who serve as the first responders in a potential outbreak of a foreign animal disease (FAD). The USDA's Agricultural Research Service (ARS) conducts research on high-consequence FADs at PIADC and develops diagnostic tools, vaccines, and other means for preventing FADs. The Department of Homeland Security's (DHS) Science and Technology Directorate takes vaccines developed by ARS, academia, and industry through the regulatory process to develop and license new vaccines and diagnostics for high-threat FADs.



**Location:** Plum Island, New York

**Core Competencies:** Diagnostics, Training, North American Vaccine Bank, Bioforensics, Basic and Applied Research, Vaccines and Biological Countermeasures, and Vaccine Licensure

**Accreditations/Registrations:** USDA APHIS Select Agent Permit, Drug Enforcement Administration Controlled Substance Registration, APHIS lab is a reference lab with the Food and Agriculture Organization and World Organisation for Animal Health for FMD

**Key Customers:** U.S. Livestock Producers, National Veterinary Stockpile, National Animal Health Laboratory Network, FBI, USDA ARS and APHIS, Centers of Excellence, Private Industry, and Academia

### *DHS PIADC Transboundary Animal Disease Countermeasure Development Branch*

In partnership with ARS and industry, PIADC performs advanced development of vaccines and other biological countermeasures needed to effectively respond to an incursion of a FAD. Laboratory diagnostic test development is also conducted in partnership with APHIS. Recent accomplishments include:

- Completed licensing of the first molecular FMD vaccine that can be manufactured in the United States. The vaccine supports a vaccinate-to-live strategy as the absence of specific viral components provides opportunities to develop better diagnostic tests that differentiate between vaccinated and infected animals.
- Coordinated a contract with Merial to license additional high-threat FMD vaccine strains and transition them to manufacturing.
- Established a cooperative research and development agreement with the vaccine manufacturer, Merial, to improve the vaccine for swine.
- Established 10 cooperative research and development agreements with industry supporting research and development of new FAD vaccines and diagnostics.

### *USDA APHIS*

USDA APHIS provides diagnostic services for the nation for FADs. Recent accomplishments include:

- Designated as an FMD reference lab by the Food and Agriculture Organization of the United Nations and World Organisation for Animal Health.
- Developed a companion diagnostic test for the new molecular FMD vaccine and began validation.

### *USDA ARS*

USDA ARS provides research services on high-consequence FADs. Recent accomplishments include:

- Established a new research program to develop a vaccine for African swine fever, an emerging pathogen for which no vaccine exists.
- Identified how the FMD virus infects cattle and the pathogenesis of the disease, which infects the pharynx and then moves to the lung and is blood-borne throughout the body.

## Transportation Security Laboratory

The Transportation Security Laboratory (TSL) is a national asset that matures, evaluates, and certifies emerging explosives detection technologies. TSL helps the detection equipment industry meet performance requirements established by the Department of Homeland Security (DHS) and other customers. TSL also directly supports DHS acquisition through testing and evaluation. TSL addresses the following core competencies:

### *Explosives Detection Equipment Certification/Qualification Testing*

- Conducted 40 certification or qualification tests supporting the Transportation Security Agency's (TSA) acquisition of Explosive Detection Systems for checkpoint, checked luggage, and cargo screening.
- Conducted more than 20 special studies to identify and correct detection vulnerabilities in checkpoint equipment.

### *Design and Execution of Laboratory Tests*

- Developed test protocols and procedures for new TSA standards for checkpoint, checked baggage, and cargo detection technology.
- Designed safety protocols for novel explosives.
- Delivered test articles (explosive simulants, phantoms, and standards) to DHS, other government agencies, and industry.

### *Industry Partnerships*

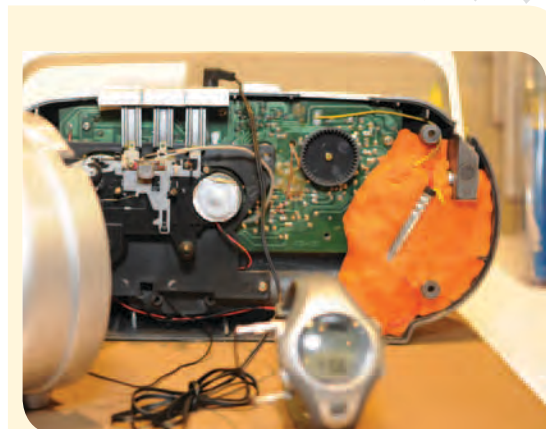
- Established 37 cooperative research and development agreements, resulting in the maturation and implementation of emerging explosives detection technologies, including automated threat detection, enhanced advanced imaging technology, enhanced checked baggage and carry-on baggage systems, and new bottle screening technology.

### *Next Generation Explosive Detection or Mitigation Technologies*

- Determined aircraft vulnerabilities through live fire range testing and developed and tested mitigation strategies.
- Created databases of explosive signatures for industry and government use.
- Conducted specialized training on handling explosives.

### *Information and Innovation Products*

- Produced 400 technical reports, 24 external presentations, six peer-reviewed articles, and 13 patent initiatives (four patent applications published). Two patents were awarded in 2013:
  - Inert and Non-Toxic Explosive Simulants and Method of Production
  - Ion Mobility Spectrometer to Mass Spectrometer Interface



**Location:** Atlantic City, New Jersey

**Core Competencies:** Detection Science Expertise, Explosives Mitigation/Vulnerability Expertise, Test Articles/Test Phantoms, Test Standards and Methodologies, Small-Scale Safety Testing, Technology Assessment, Readiness Assistance, Certification/Qualification Testing, Special Operations Studies, and Rapid Response

**Accreditations:** Test and Evaluation of Contraband Detection Technologies for DHS; ISO 9001 and 17025 Accredited

**Key Customers:** DOD, DHS Science and Technology Directorate's Explosives Division, and TSA

## Appendix B: Centers of Excellence Partners and Labs

Through its Centers of Excellence (COEs), the Science and Technology Directorate works with the academic community to generate groundbreaking tools, technologies, and knowledge products for the Homeland Security Enterprise. The following list highlights the national and international academic partners, private organizations, and laboratories that participate in the COE network.

\*= Minority Serving Institution

### Centers of Excellence by State and Territory

#### *Alabama*

- Auburn University – ZADD
- Tuskegee University\* – CVADA; ZADD

#### *Alaska*

- Ilisagvik College\* – PACER
- University of Alaska, Fairbanks – MIREES

#### *Arizona*

- Arizona State University – CREATE; NCBSI
- University of Arizona (**co-lead institution**) – NCBSI; START

#### *Arkansas*

- University of Arkansas – START

#### *California*

- California Institute of Technology – ALERT
- California Polytechnic State University – ZADD
- California State University, Dominguez Hills\* – CVADA
- California State University, Long Beach – CREATE
- California State University, Los Angeles\* – CREATE
- Claremont McKenna College – CREATE
- Lawrence Berkeley National Laboratory
- Lawrence Livermore National Laboratory
- Naval Postgraduate School – START
- RAND Corporation – NCBSI
- San Diego State University\* – NCBSI
- Stanford University – CREATE; CVADA; START
- University of California, Davis – ZADD
- University of California, Irvine – CREATE; NCBSI
- University of California, Los Angeles – CREATE; PACER; START; ZADD
- University of California, San Diego – CREATE
- University of Southern California (**lead institution**) – CREATE; CVADA; NCBSI
- University of Southern California, Information Sciences Institute – CVADA

#### *Colorado*

- National Renewable Energy Laboratory

#### *Connecticut*

- University of Connecticut – NCBSI
- Wesleyan University – START

#### *District of Columbia*

- American University – START
- Brookings Institution – PACER
- Georgetown University – CREATE
- George Washington University – PACER
- Howard University\* – CREATE; CVADA; PACER; START
- Migration Policy Institute – NCBSI

### Centers of Excellence

**ALERT** – Center for Awareness and Localization of Explosives-Related Threats

**CHC** – Coastal Hazards Center

**CREATE** – National Center for Risk and Economic Analysis of Terrorism Events

**CVADA** – Center for Visualization and Data Analytics

**MIREES** – Center for Maritime, Island and Remote and Extreme Environment Security

**NCBSI** – National Center for Border Security and Immigration

**NCFPD** – National Center for Food Protection and Defense

**PACER** – National Center for the Study of Preparedness and Catastrophic Event Response

**START** – National Consortium for the Study of Terrorism and Responses to Terrorism

**ZADD** – National Center for Zoonotic and Animal Disease Defense

## Centers of Excellence by State and Territory, continued

### Florida

- Florida International University\* – ALERT; CVADA
- University of Florida – ZADD
- University of Miami – MIREES

### Georgia

- Emory University – START
- Fort Valley State University\* – NCFPD
- Georgia Institute of Technology – CVADA; NCFPD
- Morehouse College\* – ALERT; START
- Morehouse School of Medicine – PACER
- Spelman College\* – ALERT
- University of Georgia – ZADD

### Hawaii

- University of Hawaii (**co-lead institution**) – MIREES; CHC
- University of Hawaii, Hilo\* – CREATE

### Idaho

- Idaho National Laboratory

### Illinois

- Argonne National Laboratory
- Illinois Institute of Technology – NCFPD
- Institute of Food Technologists – NCFPD
- University of Chicago – PACER
- University of Illinois – ALERT
- University of Illinois, Chicago – START
- University of Illinois, Urbana-Champaign – CVADA

### Indiana

- Indiana University – CVADA
- Purdue University (**co-lead institution**) – CVADA; ALERT
- University of Notre Dame – ALERT; CHC

### Iowa

- Iowa State University – ZADD
- U.S. Department of Agriculture, National Veterinary Services Laboratory – ZADD

### Kansas

- Arthropod-Borne Animal Diseases Research Unit – ZADD
- Haskell Indian Nations University\* – CREATE
- Kansas State University (**co-lead institution**) – ZADD; NCFPD

### Kentucky

- Kentucky State University\* – ZADD
- University of Kentucky – CREATE; NCFPD; ZADD

### Louisiana

- Louisiana State University – CHC

### Maine

- Maine Compost School – ZADD
- University of Maine – ZADD
- University of New England – ZADD

### Maryland

- Chemical Security Analysis Center
- Johns Hopkins University (**lead institution**) – PACER
- Morgan State University\* – CVADA
- National Biodefense Analysis and Countermeasures Center
- University of Maryland (**lead institution**) – START; CREATE
- University of Pittsburgh, Center for Health Security – PACER

### Massachusetts

- Boston University – ALERT
- Massachusetts General Hospital – ALERT
- Massachusetts Institute of Technology – MIREES
- Northeastern University (**lead institution**) – ALERT
- Tufts University – ALERT; START
- University of Massachusetts, Lowell – CVADA

### Michigan

- Michigan State University – START; ZADD

### Minnesota

- University of Minnesota (**lead institution**) – NCFPD; NCBSI; START; ZADD

### Mississippi

- Alcorn State University\* – CHC; NCFPD
- Center for Defense Integrated Data – CHC
- Jackson State University\* (**co-lead institution**) – CHC; CVADA; ZADD
- Northrop Grumman Center for High Performance Computing of Ship Systems Engineering – CHC
- Tougaloo College\* – CHC
- University of Southern Mississippi – NCFPD

### Missouri

- Missouri University of Science and Technology – ALERT
- University of Missouri, Columbia – ZADD

## Centers of Excellence by State and Territory, continued

### Montana

- Blackfeet Community College\* – PACER
- Montana State University – ZADD

### Nebraska

- University of Nebraska, Lincoln – ZADD
- University of Nebraska, Omaha – NCBSI; START

### Nevada

- Nevada Test Site

### New Hampshire

- Dartmouth College – NCBSI

### New Jersey

- Monmouth University – MIREES
- Princeton University – CREATE; CVADA
- Rutgers, The State University of New Jersey (**co-lead institution**) – CVADA; MIREES; NCFPD; START
- Stevens Institute of Technology (**co-lead institution**) – MIREES
- Transportation Security Laboratory
- University of Medicine and Dentistry of New Jersey – CVADA

### New Mexico

- Los Alamos National Laboratory
- Navajo Technical University\* – CVADA
- New Mexico Consortium – NCFPD
- New Mexico Institute of Mining and Technology\* – NCBSI
- New Mexico Highlands University\* – ZADD
- New Mexico State University\* – ALERT; NCBSI; NCFPD; ZADD
- Sandia National Laboratories – NCFPD; START
- University of New Mexico\* – NCBSI; START

### New York

- City College of New York\* – CVADA
- Columbia University – ZADD
- Cornell University – ZADD
- Icahn School of Medicine at Mount Sinai – ZADD
- John Jay College of Criminal Justice, City University of New York\* – START
- National Urban Security Technology Laboratory
- Plum Island Animal Disease Center – ZADD
- Purchase College, State University of New York – START

- Rensselaer Polytechnic Institute – ALERT; CHC; CVADA
- University at Albany, State University of New York – START
- University at Buffalo, State University of New York – CREATE; START
- University of Rochester – ALERT

### North Carolina

- Appalachian State University – CHC
- Duke University – CREATE
- Johnson C. Smith University\* – CHC
- North Carolina Agricultural and Technical State University\* – NCFPD
- North Carolina Central University\* – START
- North Carolina State University – CHC
- Renaissance Computing Institute – CHC
- Research Triangle Institute International – NCBSI
- University of North Carolina, Chapel Hill (**co-lead institution**) – CHC
- University of North Carolina, Charlotte – CVADA

### North Dakota

- North Dakota State University – NCFPD; START

### Oklahoma

- University of Oklahoma – CHC; START

### Pennsylvania

- Bryn Mawr College – START
- Carnegie Mellon University – CREATE; CVADA
- King's College – START
- The Pennsylvania State University – CVADA; NCBSI; START
- University of Pennsylvania – CREATE
- Villanova University – START

### Puerto Rico

- University of Puerto Rico, Mayagüez\* – ALERT; CREATE; MIREES
- University of Puerto Rico, Ponce – CREATE

### Rhode Island

- University of Rhode Island – ALERT

### South Carolina

- Savannah River National Laboratory
- University of South Carolina – CHC

### South Dakota

- South Dakota State University – ZADD



## Centers of Excellence by State and Territory, continued

### *Tennessee*

- Meharry Medical College – PACER
- Oak Ridge National Laboratory
- St. Jude Children’s Research Hospital – ZADD
- Tennessee State University\* – CVADA
- University of Tennessee – PACER
- Vanderbilt University – CREATE
- Vanderbilt University Medical Center – PACER

### *Texas*

- Center for Career and Technology Education – NCBSI
- Texas A&M University, College of Veterinary Medicine and Biomedical Sciences – ZADD
- Texas A&M University, College Station (**co-lead institution**) – ZADD; NCBSI
- Texas A&M University, Galveston – CHC
- Texas Center for Applied Technology – ZADD
- Texas Southern University\* – CHC; CVADA
- Texas Tech University – ALERT
- Texas Veterinary Medical Diagnostic Laboratory – ZADD
- University of Houston\* – CHC
- University of Houston, Clear Lake\* – CHC
- University of Houston, Downtown\* – CVADA
- University of Texas, Austin – CVADA
- University of Texas, Dallas – CREATE
- University of Texas, El Paso\* (**co-lead institution**) – NCBSI

- University of Texas, Medical Branch – ZADD
- University of Texas, Pan American\* – NCBSI
- University of Texas, San Antonio\* – CREATE

### *Virginia*

- American Indian Higher Education Consortium – PACER
- George Mason University – START; ZADD
- MITRE Corporation – PACER
- University of Virginia – CREATE
- Virginia Polytechnic Institute and State University – CVADA; ZADD
- Virginia State University\* – NCFPD
- Virginia Union University\* – NCFPD

### *Washington*

- Pacific Northwest National Laboratory
- University of Washington – CVADA; NCFPD; ZADD
- Washington State University, Pullman – ALERT

### *West Virginia*

- West Virginia University – NCBSI

### *Wisconsin*

- University of Wisconsin, Madison – CREATE; NCFPD; START; ZADD
- Wisconsin Veterinary Diagnostic Laboratory – ZADD

### *Wyoming*

- University of Wyoming – ZADD

## Centers of Excellence by Country

### *Australia*

- Elizabeth Macarthur Agricultural Institute – ZADD
- Macquarie University – START
- Monash University – CREATE
- University of Queensland – START

### *Bangladesh*

- Chittagong Veterinary and Animal Sciences University – ZADD

### *Canada*

- Canadian Food Inspection Agency – ZADD
- Carleton University – CVADA
- Dalhousie University – CVADA

- Government of Alberta – ZADD
- Justice Institute of British Columbia – CVADA
- Manitoba Agriculture, Food and Rural Initiatives – ZADD
- Nova Scotia Agricultural College – ZADD
- Risk Sciences International – NCFPD
- Simon Fraser University – CVADA
- University of British Columbia – CVADA
- University of Calgary – CVADA
- University of Guelph – NCFPD
- University of Manitoba – CVADA
- University of Ontario Institute of Technology – CVADA
- University of Victoria – CVADA

## Centers of Excellence by Country, continued

*Egypt*

- Government Veterinary Science – ZADD

*Finland*

- Laurea University of Applied Sciences – MIREES; NCBSI

*Germany*

- Freie Universität Berlin – ZADD
- University of Stuttgart – CVADA

*Israel*

- Bar Ilan University – START
- Ben-Gurion University of the Negev – ALERT
- Hebrew University of Jerusalem – ALERT
- Interdisciplinary Center Herzliya – START
- Technion – Israel Institute of Technology – CREATE
- Weizmann Institute of Science – ALERT

*Kazakhstan*

- Kazakhstan Veterinary Reference Laboratory – ZADD

*Kenya*

- Ministry of Agriculture, Livestock and Fisheries – ZADD

*Macedonia*

- University of Macedonia – START

*Netherlands*

- TNO, Netherlands – CREATE

*Pakistan*

- National University of Sciences and Technology – ZADD
- Pakistan National Vet Laboratory – ZADD

*Philippines*

- University of the Philippines – MIREES

*Scotland*

- University of St. Andrews – START

*Singapore*

- Nanyang Technological University – START

*South Africa*

- Onderstepoort Veterinary Institute – ZADD

*Sweden*

- Lund University – START
- Swedish National Defence College – START

*Switzerland*

- Prionics – ZADD

*Tanzania*

- Ministry of Livestock and Fisheries Development – ZADD
- Sokoine University – ZADD

*Thailand*

- Chulalongkorn University – ZADD

*Turkey*

- Bilkent University – START

*Turkmenistan*

- Ministry of Agriculture – ZADD

*Uganda*

- Makerere University – ZADD
- National Agricultural Research Organisation – ZADD

*United Kingdom*

- King's College, London – START
- London School of Economics and Political Science – CREATE
- Middlesex University – CVADA
- Swansea University – CVADA
- University of Liverpool – START
- University of Oxford – CVADA

## Appendix C: Office of SAFETY Act Implementation/ SAFETY Act Projects

The Support Antiterrorism by Fostering Effective Technologies (SAFETY) Act of 2002 creates legal liability protections for providers of qualified anti-terrorism technologies. The SAFETY Act incentivizes developing, deploying, and commercializing critically-needed anti-terrorism technologies that could save lives. The SAFETY Act applies to a broad range of technologies, including products, services, and software, or combinations thereof. There are two levels of SAFETY Act liability protections:

- I. **Designation:** The seller's liability for products or services that are deemed "Designated Technologies" is limited to the amount of liability insurance the Department of Homeland Security (DHS) determines the seller must maintain. A Developmental Testing and Evaluation Designation may be obtained for promising technologies that are undergoing testing and evaluation.
- II. **Certification:** In addition to the benefits provided under Designation, Certification allows a seller of a qualified anti-terrorism technology to assert the Government Contractor Defense for claims arising from acts of terrorism. Technologies that receive Certification are placed on an Approved Products List for Homeland Security.

The following qualified anti-terrorism technologies were approved by DHS in fiscal year 2013. For additional information about these technologies, as well as other qualified anti-terrorism technologies, visit [www.safetyact.gov](http://www.safetyact.gov).

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### *SAFETY Act Designations and Certifications*

**Baggage Screening Systems and Services** – Five Star Airport Alliance Inc. provides a set of services for the design, installation, and commissioning of automated baggage handling systems for checked baggage, including the programming necessary to achieve routing of baggage (in accordance with Transportation Security Administration [TSA] specifications). This Designation and Certification will expire on October 31, 2018.

**Reactive Skin Decontamination Lotion** – Emergent Protective Products USA Inc. provides a formulation for the treatment of skin that has been contaminated with toxic chemical agents. This Designation and Certification will expire on September 16, 2016.

**MagnumSpike! Tire Deflation System** – Phoenix International Ltd. provides a portable tire deflation system composed of an expandable array of interlocking, nylon slats from which metal alloy spikes protrude. The technology is intended to either stop a moving vehicle that represents a threat or, alternatively, to detain a suspicious stopped vehicle. This Designation and Certification will expire on September 30, 2018.

**Enhanced Security Flight Deck Door Technologies** – The Boeing Company provides specialized flight deck doors and other features designed to protect the flight crew and certain flight-critical equipment on commercial aircraft. This Designation and Certification will expire on September 30, 2018.

**Security X-Ray Inspection and Screening System** – L-3 Communications Security and Detection Systems Inc. provides an X-ray inspection and screening system that detects threat objects, including explosives, weapons, narcotics, and other contraband, in baggage and packages. This Designation and Certification will expire on October 31, 2016.

**Private Screening Services** – Trinity Technology Group Inc. provides trained and skilled personnel to operate screening equipment, conduct pre-board passenger screening, and conduct carry-on and checked luggage and accessible property screening to prevent prohibited items from entering the sterile area of an airport. This Designation and Certification will expire on July 31, 2018.

**WFC Security and Emergency Program** – Brookfield Office Properties Inc., a subsidiary of Brookfield Asset Management Inc., provides a set of policies, procedures, and personnel which, when used together, are designed to deter, delay, and mitigate terrorist activity at the World Financial Center located in New York, New York. This Designation and Certification will expire on July 31, 2018.

**Criminal Information Sharing Services** – Raytheon Company and its wholly owned subsidiary, Raytheon Technical Services Company LLC, provide a set of systems engineering and integration services used to aid in the creation of a secure network system that enables law enforcement agencies to share cross-jurisdictional information to provide assistance in the prevention or investigation of Acts of Terrorism. This Designation and Certification will expire on June 30, 2018.

**eXaminer System** – L-3 Communications Security and Detection Systems Inc. and L-3 Communications Corporation provide a computed tomography-based explosives detection system that mediates the screening of checked airline baggage and parcels for explosives, as well as other threat materials. This Designation and Certification will expire on June 30, 2018.

**Vulnerability Assessments and Mitigation Services** – Raytheon Company provides vulnerability and threat assessments, security planning services, and technical assistance primarily to the Department of Defense and Defense Threat Reduction Agency, and emergency management training for the Federal Emergency Management Agency (FEMA). This Designation and Certification will expire on April 30, 2018.

**Critical Infrastructure Protection and Security Services** – Bank of America Corporation provides an integrated security system consisting of policies, procedures, services, and component systems designed to provide a centralized capability to assess changing threat conditions and activities that could pose a threat to the bank's enterprise and to take actions to mitigate and respond to such risks. This Designation and Certification will expire on March 31, 2018.

**Cross Match Live Scan Suite** – Cross Match Technologies Inc. and Cross Match Technologies GmbH provide a range of optical technologies for the capturing of finger, palm, and full-hand prints; iris scans; and facial images for identification purposes. This Designation and Certification will expire on January 31, 2018.

**Metal Detectors** – CEIA USA Ltd. provides walk-through metal detectors, hand-held metal detectors, and ground search metal detectors. The technology uses weak continuous wave electromagnetic fields to detect potential metallic threat objects. For the hand-held metal detectors the Certificate of SAFETY Act Designation applies. This Designation and Certification will expire on December 31, 2017.

**Brijot Imaging Systems Weapons Detection System** – RF Integrated Solutions provides a concealed threat detection system consisting of two models, the Prime 1603 and GEN2 (and GEN 2A). Both versions use passive millimeter wave technology to identify concealed weapons. This Designation and Certification will expire on December 31, 2017.

**Cargo and Vehicle Inspection Systems** – Rapiscan Systems Inc. provides the Rapiscan GaRDS and Eagle, which use either X-ray or gamma ray radiation to scan vehicles, containers, rail cars, and cargo. This Designation and Certification will expire on December 31, 2017.

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### *SAFETY Act Designations*

**DataVantage Global** – Direct Computer Resources Inc. provides a single, scalable, multi-tier enterprise-wide software solution that implements and supports obfuscation and sharing of sensitive, but unclassified, information including personally identifiable data. This Designation will expire on October 31, 2018.

**Traffic Management Infrastructure Systems Security Services** – The Boeing Company provides a range of services used to secure air traffic management infrastructure systems against unauthorized activities to support the safe and secure movement of goods and people. This Designation will expire on October 31, 2018.

**Radiation Portal Monitor System (AT-980 System)** – Science Applications International Corporation provides a device that uses gamma ray and neutron detection modules to passively monitor closed, moving vehicles, containers, and/or railcars for the presence of radioactive materials. This Designation will expire on October 31, 2018.

**NaviGate™** – Lauren Innovations LLC provides a Web-based crisis management portal application for preventing, identifying, and deterring Acts of Terrorism and limiting the harm from such acts in a building or group of buildings. This Designation will expire on October 31, 2018.

**LaGuardia Airport Security Program** – The Port Authority of New York and New Jersey provides physical and electronic security measures, tools, and procedures. This Designation will expire on September 30, 2018.

**Security System Equipment Installation and Integration Services** – The Boeing Company provides a set of services intended to design, assess, evaluate, engineer, research, recommend, install, integrate, and test security technologies in support of TSA security programs. This Designation will expire on September 30, 2018.

**Shopping Center Security Terrorism Awareness Training Program** – The International Council of Shopping Centers Inc. provides a Web-based "Awareness Level" anti-terrorism training course certified by FEMA as FEMA course number AWR-304-W. This Designation will expire on September 30, 2018.

**V5 Intrusion Detection and Access Control Systems** – Honeywell International Inc., d/b/a Honeywell Vindicator Technologies, provides a system of devices that provides for remote monitoring of security cameras, access control stations, and intrusion detection sensors. This Designation will expire on August 31, 2018.

**Willis Tower Security and Life Safety Services** – U.S. Equities Asset Management LLC and U.S. Equities Realty Partners LLC provide a security management program designed to plan for and respond to emergencies, control access, conduct screening of packages and parcels entering, and provide for the evacuation of Willis Tower. This Designation will expire on August 31, 2018.

**Event Security Services** – Contemporary Services Corporation provides a set of core activities and a set of enhanced, customer-driven activities, including physical security, access control, and crowd management. This Designation will expire on August 31, 2018.

**Platinum CS Protection** – CS Solutions Inc. provides a software solution that has the ability to create snapshots of a company's operating system and applications for the purposes of recovering end-user systems if the system becomes corrupted by malware, worms, virus infections, or other reasons. This Designation will expire on July 31, 2018.

**Citi Field Security Program** – Queens Ballpark Company LLC, a wholly owned indirect subsidiary of Sterling Mets LP and other listed Sellers, provides an integrated security program composed of physical and electronic security measures, tools, procedures, and personnel designed to detect, deter, prevent, respond to, and mitigate Acts of Terrorism at Citi Field during Major League Baseball game days, non-game days (in season), non-season days, and special events. This Designation will expire on August 31, 2018.

**Armor Protective Solutions** – Hardwire LLC provides a multi-layered, multi-functional suspension and stay cable bridge armor designed to provide protection for critical elements of suspension and stay cable bridges against various terrorist threats, including improvised explosive devices, ballistics, blasts, fires, and other potential threats. This Designation will expire on July 31, 2018.

**SpiNut** – Selective Site Accessories Inc. provides a matching locking bolt and socket set designed to protect structural bolts on large structures, such as electrical transmission towers, cellular towers, and other critical infrastructure. This Designation will expire on June 30, 2018.

**TSA-Certified Cargo Screening Facility** – A. Royal Shipping Line Inc., d/b/a American Royal Shipping Line, provides a cargo screening facility designed to aid in meeting the congressional mandate that 100 percent of cargo placed on passenger airplanes be screened. This Designation will expire on June 30, 2018.

**TSA-Certified Cargo Screening Facility** – Robinson Holding Company, a wholly owned subsidiary of C.H. Robinson Worldwide Inc., provides a cargo screening facility designed to aid in meeting the congressional mandate that 100 percent of cargo placed on passenger airplanes be screened. This Designation will expire on May 31, 2018.

**United States Liquidity Center (USLC)** – The New York Stock Exchange Euronext provides a layered physical security system comprised of physical security, alarm systems, integrated closed-circuit television systems for surveillance, canine explosive teams, and security officers to protect the USLC 24 hours per day, year-round. This Designation will expire on May 31, 2018.

**BPSI Sentry One Products** – Building Protection Systems Inc. (BPSI) provides a technology that integrates third-party chemical and radiological sensors, which have been modified according to BPSI's specifications and standards, into customized Chemical Sensor Arrays and Radiation Area Detectors, respectively. This Designation will expire on May 31, 2018.

**Nextiva Enterprise Class Video Management Platform** – Verint Systems Inc. provides an IP (Internet Protocol) video management software that simplifies management of large volumes of video and geographically dispersed video surveillance operations. This Designation will expire on May 31, 2018.

**Aviation Security Services** – The Boeing Company provides aviation security services for Boeing's commercial aircraft deliveries destined for U.S. sterile terminals under a TSA-approved Boeing Security Program. The technology consists of personnel screening and training; passenger and cargo screening processes, equipment, materials, software and data; and subscription services. This Designation will expire on May 31, 2018.

**TSA-Certified Cargo Screening Facilities** – Commercial Freight Services Inc. provides secure facilities established in accordance with directives issued by TSA for the screening and securing of cargo that will be transported on passenger aircraft. This Designation will expire on May 31, 2018.

**TSA-Certified Cargo Screening Facilities** – Final Mile Logistics Inc. provides secure facilities established in accordance with directives issued by TSA for the screening and securing of cargo that will be transported on passenger aircraft. This Designation will expire on May 31, 2018.

**Agentase Enzyme-Based CAD Kit and Detection Spray** – FLIR Systems Inc., Agentase LLC, and FLIR Detection Inc. provide a tool designed to detect and differentiate the following chemical warfare agents: nerve agents (G and V Series), blood agents (cyanide), and blister agents (sulfur mustard). This Designation will expire on April 30, 2018.

**IWSAlerts** – AtHoc Inc. provides a network-centric mass notification and emergency communications system that automates the end-to-end emergency communication process, delivering physical security, force protection, situational awareness, and personnel accountability. This Designation will expire on March 30, 2018.

## *SAFETY Act Designations, continued*

**FJC Physical Security Services** – FJC Security Services Inc. provides physical security services comprised of multi-disciplined security guard forces consisting of both armed and unarmed security personnel who deliver security services to private and government facilities. This Designation will expire on March 31, 2018.

**GuardianCoil®** – Cascade Coil Drapery Inc., d/b/a Cascade Coil Defense Systems, provides a curtain system consisting primarily of a wire mesh that is designed to absorb debris in the event of an explosion. This Designation will expire on January 31, 2018.

**Security Systems Integration Services** – SFI Electronics LLC and Universal Services of America provide systems capable of aiding in deterrence, prevention, and detection, and can provide alerts to a variety of security threats, including but not limited to disaster control, workplace violence, and terrorism. This Designation will expire on January 31, 2018.

**Biometric Credentialing Systems and Services** – Lockheed Martin Corporation provides a technology that integrates products (hardware and software) and services that provide a biometric credentialing capability and assists the customer in identifying and authenticating the identity of the holder of a Personal Identity Verification card. This Designation will expire on February 28, 2018.

**Sodium Nitrite Injection, Sodium Thiosulfate Injection, and Nithiodote™** – Hope Medical Enterprises Inc., d/b/a Hope Pharmaceuticals, provides a co-packaged kit of sodium nitrite injection and sodium thiosulfate injection for use in accordance with U.S. Food and Drug Administration-approved dosages and means of administration for the treatment of acute cyanide poisoning judged to be life-threatening. This Designation will expire on January 31, 2018.

**Emergency Response Information Portal** – SafePlans LLC provides a secure, Web-based system that improves preparedness by integrating critical incident planning, mapping, and training. This Designation will expire on January 31, 2018.

**Certified Cargo Screening Facilities** – Covenant Aviation Security LLC provides secure facilities established in accordance with directives issued by TSA for the screening and securing of cargo that will be transported on passenger aircraft. This Designation will expire on December 31, 2017.

**Intruder Detection System** – CNIGuard LLC provides a wired or wireless intruder detection system for protecting access to treated water via hatches typically deployed at water treatment works or service reservoirs. This Designation will expire on January 31, 2018.

**Fido®** – FLIR Systems Inc. and its wholly owned subsidiaries, Nomadics Inc. and ICx Technologies Inc., provide a line of trace detection systems that detect vapors and particles from various explosive compounds. This Designation will expire on December 31, 2017.

**American National Standards** – The National Fire Protection Association Inc. has developed a set of codes and standards that address anti-terrorism technologies in the areas of personal protective garments, equipment, professional qualifications for first responders and preparedness planning for infrastructure and enterprise protection, fire protection systems, and critical electrical and building systems. This Designation will expire on December 31, 2017.

**Certified Cargo Screening Facilities** – JAS Forwarding (USA) Inc. provides secure facilities established in accordance with directives issued by TSA for the screening and securing of cargo that will be transported on passenger aircraft. This Designation will expire on November 30, 2017.

**Guardian™ System** – Northrop Grumman Security Systems LLC, Northrop Grumman Systems Corporation, and Northrop Grumman Corporation provide an infrared countermeasures system designed to provide protection for aircraft from infrared-guided man-portable air defense systems. This Designation will expire on November 30, 2017.

### SAFETY Act Developmental Testing and Evaluation Designations

**eqo™** – Smiths Detection Inc. provides a flat-panel millimeter-wave body-imaging scanner used for detecting hidden objects under clothing at security checkpoints. This Developmental Testing and Evaluation Designation will expire on September 30, 2016.

**Qylur Security Kiosk** – Qylur Security Systems Inc. provides a security screening kiosk that provides for the simultaneous screening of five individual parcels for a variety of threat items, including explosives, knives, guns, and radioactive materials. This Developmental Testing and Evaluation Designation will expire on May 31, 2016.

**Passive Millimeter Wave Imaging System (PMMWIS) Intellectual Property** – The Boeing Company provides intellectual property associated with the PMMWIS set to be delivered to and finalized by the United

States Navy. The intellectual property includes design specifications, prototype hardware, and a test plan. This Developmental Testing and Evaluation Designation will expire on January 31, 2016.

**Wisdom** – 4D Security Solutions Inc. provides a software platform designed to provide operators with real-time situational awareness information collected from a network of sensors. This Developmental Testing and Evaluation Designation will expire on December 31, 2015.

**JUNO®** – Chemring Detection Systems Inc. provides a hand-held vapor detector designed to detect various toxic industrial chemicals, chemical warfare agents, and other potential threats. This Developmental Testing and Evaluation Designation will expire on October 31, 2015.

### Procurement Pre-Qualification Designation Notices

These notices represent applications successfully submitted by a federal, state, or local government entity to request streamlined protections for technologies to be procured under a specific contract or solicitation.

#### Domestic Nuclear Detection Office (DNDO) – Handheld Radioisotope Identification Devices (RiiDs)

July 25, 2013 – The Applicant provides DNDO with RiiDs, which are manned portable systems used for the detection, localization, identification, and reporting of radiological or special nuclear materials during small area searches and secondary screenings (e.g., of containerized cargo, privately owned vehicles, buses, pedestrians).

#### Transportation Security Administration – Integrated Logistics Support (ILS) Services for Passenger Screening Program/Airport Checkpoint Security Equipment

July 16, 2013 – The Applicant provides TSA the ILS Services for Passenger Screening Program/Airport Checkpoint Security Equipment consistent with maintenance and technical services that ensure that screening equipment installed throughout the United States, including advanced imaging technology, advanced technology, explosive trace detectors, cabinet X-ray systems, enhanced metal detectors, and explosive detection systems (collectively screening systems) function properly and are available to detect threat items.



# Appendix D: Small Business Innovation Research Program Office, Research Areas and Projects

The Science and Technology Directorate's Small Business Innovation Research (SBIR) Program Office engages small businesses in federal research and development (R&D) programs to produce innovative homeland security solutions. Twice a year, SBIR posts solicitations to the small business community. The Phase I awards listed below resulted from topics that were solicited in FY 2013, while Phase II awards reflect R&D projects that were solicited in FY 2012. The research areas provide additional details about these projects.

## *SBIR Research Areas*

- **Affordable Non-Destructive Anomaly Detection for Perceived Hollow Spaces** – Develop a device to determine if perceived hollow spaces are empty or densely packed (e.g., bicycle, baby stroller, and wheelchair frames; tires; handles).
- **Automated Threat Recognition (ATR) Algorithms using Standardized Image File Formats** – Develop ATR algorithms for X-ray screening systems that provide output image data that is consistent with the Digital Imaging and Communication in Security standardized image file format.
- **Bulk Currency Vapor Detection in Confined Spaces** – Develop and field a portable bulk currency vapor detection prototype device.
- **Burn-Saver Device** – Develop a heat-sensitive helmet device that provides an audible warning system for the firefighter, as well as the incident command center to note when the ambient temperature rises to an unsafe degree.
- **Capability for the Tracking of Any and Every Person within a Security Perimeter** – Develop an accurate, low-cost, reconfigurable capability that enables safe, continuous, high confidence tracking of persons within a security perimeter.
- **Commodity Goods Counterfeit Detection** – Provide a means for detection (“sampling” in nature as opposed to bulk in-situ processing) of counterfeit goods, particularly commercial consumer products, along the entire supply chain, including cargo containers, distribution warehouses, points of retail sales, and ad hoc points of sale.
- **GPS Disruption Detection and Localization** – Develop a low-cost suite of sensing and reporting technologies to detect and localize fixed and mobile sources (intentional and unintentional) of GPS receiver disruption.
- **Hardening for Commercially Available Hand-held Computing and Communications Devices for First Responders** – Develop cost-effective protective mechanisms to enhance the reliability and durability of commercially available hand-held computing and communications devices operating in a public safety environment.
- **Hybrid Analysis Mapping** – Develop a risk management framework and standards to bridge mappings between static and dynamic software analysis tools for improved vulnerability detection.
- **Lost Person Locator for First Responders** – Develop guidance protocols and strategies on initial actions to be taken when searching for lost persons.
- **Management of Mass Casualty Triage** – Develop an affordable information-technology-based solution for the automated management of patient tracking during triage activities in a mass casualty incident.
- **Moving Target Defense** – Research moving target defense technologies that enable users to create, analyze, evaluate, and deploy diverse mechanisms and strategies that continually shift and change over time to increase the complexity and cost for attackers, limit the exposure of vulnerabilities and opportunities for attack, and increase system resiliency.
- **Next Generation Textiles for Multi-Threat Personal Protective Equipment (PPE)** – Develop a fabric that can be used in first responder PPE that protects against multiple threats that could be encountered on scene by first responders.
- **Non-Freezing Portable Vehicle Wash Tunnels** – Improve emergency response to foreign animal disease outbreaks by developing low-cost, durable, non-freezing portable vehicle wash tunnels to clean and disinfect contaminated vehicles.
- **Objective, Quantitative Image Quality Measurements and Metrics for Screener Imaging Technologies** – Define tools and a methodology to objectively quantify image quality on various screening imaging technologies (e.g., carry on, checked baggage X-ray).
- **Pre-Shot Sniper Detection in Urban Environments** – Develop a manufacturable prototype that can detect a sniper before the weapon is fired.
- **Quick Disconnect Cables for Utility Power Distribution Systems** – Develop a quick disconnect system for utility power distribution cables that allows for graceful system degradation to enable rapid recovery following an event.
- **Radio Frequency (RF) Sensing of Personnel in Wooded Areas** – Develop a battery-powered RF sensor network with a one-year lifetime that will detect and track personnel in a wooded environment.



- **Replicating Human Functionality during Firearms and Ammunition Testing with a Mechanical Device** – Develop test equipment for acceptance and proof testing of handguns and handgun ammunition where the solution takes into account natural gun recoil characteristics when held by a broad demographic range of shooters.
- **Safe Standoff Detection of Bulk Explosives on a Person** – Develop a safe method to chemically detect explosives concealed on or carried by a person at a distance.
- **Software-Based Roots of Trust for Enhanced Mobile Device Security** – Develop a software-enabled solution that provides trustworthy security elements on commercial mobile devices.
- **Solid State Storage Investigative Tools for Law Enforcement** – Develop forensic solutions for law enforcement analysts to address solid state storage, specifically solid state drives.
- **Structural Collapse Prediction Technology** – Develop a technology that can accurately predict structural collapses so that interior response operations can be abandoned and evacuation of first responders occurs safely.
- **Swarm Robotic Sensing Platform for Search and Rescue** – Improve the quality of response for first responders by developing a prototype-sensing platform to enhance awareness during a situation.

### SBIR Phase I Awards

Company Name	Proposal Title	Period of Performance
Applied Visions Inc.	Code Ray: Software Assurance Risk Management Framework for Hybrid Analysis Mapping	05/01/2013 – 10/31/2013
Coherent Navigation Inc.	GPS EMitter LOCalization (GEMLOC)	05/01/2013 – 10/31/2013
Data Access Technologies Inc.	Tool Output Integration Framework (TOIF) Upgrade for Hybrid Analysis Mapping	05/01/2013 – 10/31/2013
Denim Group Ltd.	Hybrid Analysis Mapping (HAM)	05/01/2013 – 10/31/2013
Integrated Solutions for Systems Inc.	Intelligent In-Line Power Disconnect System	05/01/2013 – 10/31/2013
Intelligent Automation Inc.	ARGUS: Scalable And Reliable RF sensing for Long-duration Personnel Tracking	05/01/2013 – 10/31/2013
NAVSYS Corporation	GPS JLOC Sensor Suite for Critical Infrastructure	05/01/2013 – 10/31/2013
Scientific Systems Company Inc.	FoxHunt: GPS Disruption Detection and Geolocation System	05/01/2013 – 10/31/2013
SkySight Technologies LLC	Quick Release Connector	05/01/2013 – 10/31/2013
Streamline Automation LLC	Quick Disconnect System for Power Distribution Hardening and Resiliency	05/01/2013 – 10/31/2013
TDA Research Inc.	Helmet-Mounted Thermal Sensor for First Responder Burn-Saver Device	05/01/2013 – 10/31/2013
Toyon Research Corporation	Civilian Interference Detection and Estimation Receiver (CIDER)	05/01/2013 – 10/31/2013
TrellisWare Technologies Inc.	RF Sensing of Personnel in Wooded Areas	05/01/2013 – 10/31/2013
Xandem Technology LLC	RF Tracking in Wooded Areas	05/01/2013 – 10/31/2013
Innova Designs	Burn-Saver Device	05/06/2013 – 11/05/2013
BlueRISC Inc.	Lean Software Roots of Trust	09/20/2013 – 03/19/2014
Civionics LLC	A Rapid-to-Deploy Agent-Based Wireless Sensing Architecture for Autonomous Structural Collapse Prediction	09/20/2013 – 03/19/2014
Constellation Technology Corporation	Innovative Materials Analysis to Differentiate Counterfeit from Authentic Products	09/20/2013 – 03/19/2014
dbS Productions LLC	Search and Rescue Initial Response Tools	09/20/2013 – 03/19/2014
Def-Logix	Physical Unclonable Functions for Mobile Device Roots of Trust	09/20/2013 – 03/19/2014

Company Name	Proposal Title	Period of Performance
Engineering Science Analysis Corporation	Contraband Element Imager Technology	09/20/2013 – 03/19/2014
Galois Inc.	Practical Roots of Trust for Mobile Devices	09/20/2013 – 03/19/2014
HexEffect LLC	DynaTrust	09/20/2013 – 03/19/2014
InCadence Strategic Solutions	Mass Casualty Triage System (MCATS)	09/20/2013 – 03/19/2014
KWJ Engineering Inc.	Isolation and Identification of the Optimum Clandestine Currency Detector	09/20/2013 – 03/19/2014
Nevada Nanotech Systems Inc.	Bulk Currency Vapor Detection in Confined Spaces	09/20/2013 – 03/19/2014
RAM Laboratories Inc.	Software Based Roots of Trust for Enhanced Mobile Device Security	09/20/2013 – 03/19/2014
Summit Safety Inc.	System for Advanced Warning of Structural Collapse	09/20/2013 – 03/19/2014
TIAX LLC	Detection of Counterfeit Commodity Goods	09/20/2013 – 03/19/2014

*SBIR Phase II Awards*

Company Name	Proposal Title	Period of Performance
Endeavor Systems Inc.	Multi-layer Ever-changing Self-defense Service (MESS)	05/01/2013 – 04/30/2014
Radiance Technologies Inc.	Virtual Shooter	05/01/2013 – 04/30/2014
Integrated Solutions for Systems Inc.	Non-freezing Portable Vehicle Wash Tunnels	05/01/2013 – 04/30/2015
Polestar Technologies Inc.	Portable Imager for Stand-off Detection of Person-Bourne Bulk Military and Homemade Explosives	05/01/2013 – 04/30/2015
Robotic Research LLC	Sensor-Smart Affordable Autonomous Robotic Platforms (SAARP)	05/01/2013 – 04/30/2015
SA Photonics	Hardening for Commercially Available Hand Held Computing and Communications Devices for First Responders	08/22/2013 – 08/21/2015
Charles River Analytics Inc.	Objective X-ray Image Display Evaluation (OXIDE)	09/03/2013 – 09/02/2014
Charles River Analytics Inc.	Remote Identification and Tracking of Non-Cooperative Subjects (REMIT-NCS)	09/03/2013 – 09/02/2015
TeleSecurity Sciences	Automatic Threat Recognition Algorithm for Volumetric CT Data	09/03/2013 – 09/02/2015
S34A Inc.	Integrated Solution for SSD Forensics	09/20/2013 – 09/19/2014
Kappler Inc.	Next Generation Textiles for Multi-Threat Personal Protective Equipment (PPE)	09/20/2013 – 09/19/2015

*SBIR Phase III Awards*

Company Name	Proposal Title	Period of Performance
Queralt Inc.	Location-based service providing attribute-based, physical access control for Federal Identity, Credential & Access Management	03/09/2012 – 10/04/2014
Lynntech Inc.	Detection of Persons-In-Water Wide Area Search and Cueing	02/18/2013 – 05/13/2014
Innovative Wireless Technologies Inc.	Coyote™ Sensor System for Unattended Ground Sensor (UGS) Field Demonstration	03/11/2013 – 09/25/2013

## Appendix E: Technology Foraging Projects

The Science and Technology Directorate (S&T) employs technology foraging, a high-impact process that identifies and evaluates existing or developing technologies, products, services, and emerging trends that may address homeland security needs. S&T then partners with public and private organizations to develop solutions for operational users in the Homeland Security Enterprise. This approach increases the speed of execution and reduces redundant research and development efforts across the government.

The following list identifies technology foraging projects and customers in FY 2013.

### *DHS Office of the Chief Information Officer*

- Human Interoperability

### *DHS Office of Intelligence and Analysis*

- Intelligence Analysis Tools

### *Science and Technology Directorate*

- Future Technology Trends

### *S&T Acquisition Support and Operations Analysis (ASOA)*

- Automated Agents to Determine Credibility
- Communications Usability
- Federally Funded Research and Development Centers Market Research
- Ground and Maritime Sensors
- Secure Communication Enhancements

### *S&T First Responders Group (FRG)*

- Location-Based Services Technology for Location and Tracking
- Next-Generation Textiles for Personal Protective Equipment
- Predictive Incident Modeling for Response and Training
- Remote Identification for Tracking and Triage
- Remote Responder Monitoring
- Standoff Detection of Trapped Victims
- Technology Development Consortium Models
- Vehicle Proximity Alert Systems
- Virtual Training for First Responders

### *S&T Homeland Security Advanced Research Projects Agency (HSARPA)*

- Automated Pollen Recognition
- Biometrics
- Cargo Conveyance Security Devices
- Chemical Sampling
- Climate Change Adaptation
- eGovernment Portals
- Federal Emergency Management Agency Projects
- Flood Mitigation for Substations

- Fuel Cells
- Geocoding
- Infrastructure Protection Projects
- Insider Threats
- Metric Insights
- Missile Deflection
- Mobile Device Management
- NoSQL Databases
- Ozone Widget Framework
- Photo Ballistics
- Platfora/Datameer Competitors
- Portable Sensitive Compartmented Information Facility (SCIF)
- Robotic Systems and Camera Integration
- Sensors for Small Unmanned Aerial Systems
- Social Media Analytics
- Social Media Tools for Federal Communication
- Tensator Information and Competitors
- Text Analytics
- Undergrounding Cables
- Video Recovery

### *S&T Research and Development Partnerships (RDP)*

- Automated Agents to Determine Credibility
- Commercialization Best Practices
- Stadium Security

### *U.S. Customs and Border Protection*

- Narcotics Destruction

### *U.S. Immigration and Customs Enforcement*

- Seized Information Exploitation

“The President’s FY 2014 budget reflects the wise recognition that investing today in science, innovation, and STEM education is the best way to maintain America’s edge in the development of transformative technologies, the industries of future, and breakthrough solutions to national and global challenges. We have seen time and again that fueling the American R&D engine not only results in new tools to solve our toughest problems but also opens new doors to jobs and opportunities for all Americans.”

— *Dr. John P. Holdren, Director,  
White House Office of Science and Technology Policy*



