

Department of Homeland Security

Science and Technology

Research, Development, Acquisitions, and Operations



Fiscal Year 2015
Congressional Justification

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BUDGET REQUEST AND SUPPORTING INFORMATION

Science and Technology Research, Development, Acquisitions, and Operations

I. Appropriation Overview

A. Mission Statement for Research, Development, Acquisitions, and Operations:

The mission of DHS S&T is to *strengthen America's security and resiliency by providing knowledge products and innovative technology solutions for the Homeland Security Enterprise*. Congress created the S&T Directorate under the Homeland Security Act of 2002, to among other things “[conduct] basic and applied research, development, demonstration, testing, and evaluation activities relevant to any or all elements of the Department.”¹ S&T also has a statutory responsibility for establishing a system for transferring homeland security developments or technologies to Federal, State, local governments, and private sector entities.

In the past decade, S&T has undergone many changes and continues to evolve. The extraordinary breadth and diversity of DHS's missions requires S&T to address a wide range of programs including DHS Components' near-term needs for new operational capabilities and improved operational effectiveness, efficiency, and safety. S&T also has responsibilities related to understanding and creating solutions to biological and chemical threats, and to conducting the research and development (R&D) required to meet homeland cybersecurity needs. While DHS S&T's work is often identified with technology development, equally important are the Directorate's contributions to homeland security in the form of analyses or “knowledge products.” These include analyses of alternative technology options; assessments of complex issues such as the relative risk of different chemical, biological, radiological and nuclear threats; operational testing and evaluation of technologies proposed for acquisition; detailed technical characterization of potential biological threat organisms to support both human and agricultural biodefense; and the creation of consensus standards that enable cost-effective progress across many fields. S&T also manages five national laboratories that provide unique homeland and national security capabilities and has direct access to the Department of Energy's extensive national laboratory system. In addition, the Directorate's capacity to engage R&D activities worldwide is greatly augmented by S&T's nine university-based Centers of Excellence (COEs) and 13 bilateral international agreements.

In order to meet the broad scope of our mission, S&T has built a highly trained and technically-proficient staff that is DHS's core source of science, engineering, and analytical expertise. Using our staff and budget for maximal impact, we have focused our energies on efforts that have a direct and demonstrable link to improving the efficiency, effectiveness, and safety of DHS's operational missions and enhancing the safety, interoperability, and communications capabilities of the first responder community. S&T's contributions to the Department and the Homeland Security Enterprise (HSE) fall into four general categories:

- *New capabilities and knowledge products* – S&T creates new technological capabilities that address DHS operational needs or 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.

¹ Sec. 302(4) of Public Law 107-296 (codified at 6 U.S.C. § 182(4)).

- *Acquisition support* – The Department 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 strategic understanding of existing and emerging threats as well as opportunities for collaboration across departmental, interagency, and state/local boundaries.

B. Budget Activities:

The Directorate has four RDT&E program, project, and activities (PPA), and various thrust areas, each of which has an important role in implementing research and development activities. These four PPAs are: Acquisition and Operations Support; Laboratory Facilities; Research, Development, and Innovation; and University Programs.

Acquisition and Operations Support (AOS)

AOS provides expert assistance to entities across the homeland security enterprise (HSE) to ensure that the transition, acquisition, and deployment of technologies, information, and procedures improve the efficiency and effectiveness of the operational capabilities across the HSE mission. The five thrust areas of Acquisition and Operations Support are: Operations Research and Analysis; Safety Act; Standards; Technology Transition Support; and Testing and Evaluation.

Laboratory Facilities

The Office of National Laboratories (ONL) manages the Laboratory Facilities Programs. ONL provides the Nation with a coordinated, enduring core of productive science, technology and engineering laboratories, organizations and institutions, which can provide the knowledge and technology required to secure our homeland. ONL executes two thrust areas: Construction and Lab Operations.

Research, Development, and Innovation (RD&I)

RD&I provides state-of-the-art technology and/or solutions to meet the needs of the operational components of the Department and the first responder community. It includes customer-focused and output-oriented RDT&E programs that balance risk, cost, impact, and time to delivery. RD&I includes: APEX; Border Security; CBE Defense; Counter Terrorist; Cyber Security/Information Analytics; and First Responder/Disaster Resilience.

University Programs

University Programs supports critical homeland security-related research and education at U.S. colleges and universities to address high-priority DHS-related issues and to enhance homeland security capabilities over the long term. University Programs includes Centers of Excellence and Minority Serving Institutions.

C. Budget Request Summary:

The S&T Directorate requests 130 positions, 130 FTE, and \$941,671,000 for RDA&O in FY 2015, a decrease of \$149,541,000 from FY 2014. The FY 2015 funding reflects a decrease in the CBE Defense, Counter Terrorist, Cyber Security/Information Analytics, and First Responder/Disaster Resilience RDT&E thrust areas. It also includes an increase of \$0.191 million for a one-percent Federal pay raise.

II. Summary of FY 2015 Budget Estimates by Program/Project Activity (PPA)

Department of Homeland Security
Science & Technology
Research, Development, Acquisitions, and Operations
 Summary of FY 2015 Budget Estimates by Program Project Activity

FY 2015 Request
 (Dollars in Thousands)

| Program Project Activity | FY 2013 | | | FY 2014 | | | FY 2015 | | | Increase(+) or Decrease(-) for FY 2015 | | | | | | | | |
|--|-----------------|------------|------------------|------------|------------|--------------------|------------|------------|------------------|--|-----|--------------------|-----------------|-----|------------------|---------------------|-----|--------------------|
| | Revised Enacted | | | Enacted | | | Request | | | Total Changes | | | Program Changes | | | Adjustments-to-Base | | |
| | POS | FTE | Amount | POS | FTE | Amount | POS | FTE | Amount | POS | FTE | Amount | POS | FTE | Amount | POS | FTE | Amount |
| Acquisition and Operations Support | - | - | \$45,991 | - | - | \$41,703 | - | - | \$41,703 | - | - | - | - | - | - | - | - | - |
| Research Development and Innovation | - | - | \$425,295 | - | - | \$462,000 | - | - | \$433,788 | - | - | (\$28,212) | - | - | (\$28,212) | - | - | - |
| University Programs | - | - | \$38,339 | - | - | \$39,724 | - | - | \$31,000 | - | - | (\$8,724) | - | - | (\$8,724) | - | - | - |
| Laboratory Facilities | 128 | 128 | \$158,083 | 130 | 130 | \$547,785 | 130 | 130 | \$435,180 | - | - | (\$112,605) | - | - | \$320,278 | - | - | (\$432,883) |
| Subtotal, Discretionary | 128 | 128 | \$667,708 | 130 | 130 | \$1,091,212 | 130 | 130 | \$941,671 | - | - | (\$149,541) | - | - | \$283,342 | - | - | (\$432,883) |
| Total, Research and Technology | 128 | 128 | \$667,708 | 130 | 130 | \$1,091,212 | 130 | 130 | \$941,671 | - | - | (\$149,541) | - | - | \$283,342 | - | - | (\$432,883) |
| Subtotal, Enacted Appropriations and Budget Estimates | 128 | 128 | \$667,708 | 130 | 130 | \$1,091,212 | 130 | 130 | \$941,671 | - | - | (\$149,541) | - | - | \$283,342 | - | - | (\$432,883) |
| Less: Adjustments for Other Funding Sources | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Offsetting Collections | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Net, Enacted Appropriations and Budget Estimates: | 128 | 128 | \$667,708 | 130 | 130 | \$1,091,212 | 130 | 130 | \$941,671 | - | - | (\$149,541) | - | - | \$283,342 | - | - | (\$432,883) |

FY 2013 Revised Enacted includes reprogrammings/transfers, and actual FTE/fee collections in FY 2013, as applicable.

III. Current Services Program Description by PPA

**Department of Homeland Security
Science & Technology
Research, Development, Acquisitions, and Operations
Acquisition and Operations Support
Program Performance Justification**

(Dollars in Thousands)

PPA: Acquisition and Operations Support

| | Perm. Pos | FTE | Amount |
|------------------------------|------------------|------------|---------------|
| 2013 Revised Enacted | - | - | 45,991 |
| 2014 Enacted | - | - | 41,703 |
| 2015 Current Services | - | - | 41,703 |
| 2015 Total Request | - | - | 41,703 |
| Total Change 2014 to 2015 | - | - | - |

S&T requests \$41.703 million for AOS in FY 2015. This will continue current funding levels for Operations Research and Analysis, SAFETY Act, Standards, Testing & Evaluation, and Technology Transition Support. In addition, this project supports S&T’s role in providing support for Department capabilities and requirements analysis including at least \$0.500 million in FY 2015.

CURRENT SERVICES PROGRAM DESCRIPTION:

Acquisition and Operations Support PPA – Provides expert assistance, including systems engineering, to entities across the HSE to ensure that the transition, acquisition, and deployment of technologies, information, and procedures improve the efficiency and effectiveness of the operational capabilities across the HSE mission. This includes providing technological assessment of major acquisition programs in the DHS to help ensure that technologies, concept of operations (CONOPS), and procedures meet operational requirements, technology analysis and technology review of analysis of alternatives at the beginning and throughout an acquisition program’s life; oversight of the T&E of DHS major acquisition programs; standards to support the homeland security mission; and administration of the Support Anti-Terrorism by Fostering Effective Technologies (SAFETY) Act program.

The five thrust areas of AOS are: Operations Research and Analysis; SAFETY Act; Standards; Technology Transition Support; and Testing and Evaluation.

Operations Research and Analysis Thrust – FY 2014: \$6.451 million. FY 2015 Request: \$6.200 million. Provides science-based analytic capability and capacity to DHS to better understand threats and the implications of major decisions, evaluates alternatives, improves DHS mission operations and the use of technology across the HSE, and improves the Department's risk management capabilities.

Homeland Security Studies and Analysis Institute (HSSAI)

HSSAI is a Federally Funded Research & Development Center (FFRDC) working in the public interest to ensure the highest levels of excellence by bringing together the expertise and point-of-view of government, industry, and academia. The Institute works to solve complex Homeland Security Enterprise (HSE) problems based on their core technical capabilities, their long-term relationship with the Department, their special access to data, and their inherent objectivity and independence. HSSAI supports DHS Components by providing specialized expertise in a spectrum of mission-critical capacities, to include program analyses and evaluation, targeted tradeoff studies of mission-level goals and strategies; analyzing operations and operational requirements; assessing DHS organizations and their governance; and evaluating performance metrics to effectively meet the future challenges facing the Nation.

Knowledge Management and Tech Foraging

This program enhances the Directorate's ability to gather and manage accumulated knowledge and essential information for the benefit of the HSE to identify and evaluate existing or developing technologies, services, and emerging trends.

The Knowledge Management program develops and maintains an environment where S&T employees share and access relevant knowledge and lessons learned, and foster collaborative development efforts. Proper management of knowledge and information helps to protect the privacy of all individuals, ensures compliance with Freedom of Information Act (FOIA) requirements, and cost-effectively shares important information with a wide and diverse HSE audience. Knowledge Management works with S&T staff to assess privacy risks, recommend privacy protections, and mitigate improper disclosures and breaches of personal information, while also facilitating efforts to promote an open and transparent government.

Technology foraging is the identification of promising research and existing or emerging technology in government, academia, and industry. Results of foraging improve alternative options, may increase speed of project execution, and may reduce costs for projects. Technology foraging leverages domestic and international public and private sector technologies, products, services, and emerging trends. This approach enables S&T to rapidly match existing or near-term technologies to the operational requirements of the HSE, increasing efficiency in the expenditure of funds and accelerating time to fielding.

SAFETY Act Thrust – FY 2014: \$7.880 million. FY 2015 Request: \$8.043 million. This program creates legal liability protection for providers of qualified anti-terrorism technologies and incentivizes the private sector to commit additional resources to significantly improve anti-terrorism preparedness and resiliency. In accordance with the SAFETY Act of 2002, this program removes barriers to industry investments. This program enables potential providers of effective anti-terrorism technologies to develop, deploy, and commercialize these technologies with liability limitations for claims arising out of, relating to, or resulting from an act of terrorism. In addition, the SAFETY Act Program actively supports DHS programs and initiatives (e.g., TSA's Certified Cargo Screening Program, CBP's Targeting & Analysis Systems Program Office) and critical R&D investments and programs in the S&T Directorate.

Standards Thrust – FY 2014: \$8.220 million. FY 2015 Request: \$8.220 million.

- *Problem:* The need to ensure that technologies and equipment are safe, stable, and successful in the field.
- *Solution:* Identify standards and test methods that verify equipment performance and meet acquisition requirements by working with end users to develop appropriate documentation.

- *Impact:* Ensures that first responders receive quality, high-performing, safe equipment and the right tools to protect the public and their own lives.

Chemical and Biological Systems Standards

This project improves the ability of first responders to access and receive information on CBRN sensor technologies interfaced with other instruments used to respond to developing events and incidents.

The project standardizes device interfaces, facilitates seamless integration, and provides the necessary interoperability of CBRN devices with other equipment to first responders. It supports cost-effective deployment of chemical and biological countermeasure technologies at the Federal, State, and local levels by working with other DHS Components and Federal agencies and by providing an effective, coordinated response to chemical and biological events through standards development. This project has developed validated performance standards, technical methods, and training curricula that encourage capability building at the jurisdiction level that will provide manufacturers, responders, and facility operators with performance specifications, testing criteria, and application guidance.

Prior Year Key Events

- Complete American Society for Testing and Materials (ASTM) regional resiliency planning standards, including radiological response planning standards.
- Complete international x-ray standards development on whole-body imaging technical performance and air cargo inspection.
- Finalize National Fire Protection Association (NFPA) standards for fire and arson resistance.

Current Year Key Events

- Publish guidance and/or standards to communicate metrics and measurement uncertainty for assessing the quantity of microbial agent test materials.
- Publish performance metrics for methods chosen to characterize microbial identity and identify needed standards to support microbial identity measurements.

Budget Year Key Events

- This project will develop standards and test methods to support an integrated response to suspected biological incidents, fostering a coordinated response from first responder through law-enforcement, and forensics.

Explosives Countermeasures Standards

This project enables technologies that keep explosives out of transportation systems, Federal buildings, and critical infrastructure. These technologies detect both small amounts of explosive (i.e., trace detection) on people or objects, as well as larger amounts of concealed explosives (i.e., screening standards). These standards include standard test materials and protocols for next-generation deployed trace explosives detection equipment, including new and emerging explosive threats.

Prior Year Key Events

- Develop standards for the next class of chemical detectors.
- Implement a conformity assessment program for handheld and stationary chemical detectors.

Current Year Key Events

- Develop methods to produce cost effective test materials for mass applications and complete development of particle test materials.

- Initiate standards development for security screening of luggage and liquids for computed tomography-based explosives detection system (CT/EDS) X-Ray.

Budget Year Key Events

- Develop detection standards for prevention and deterrence of homemade explosives.

Responder & Resiliency Standards

This project safeguards the Nation’s HSE by facilitating coordinated responses to emergencies. Specifically, this project supports standards-based capabilities and standardized response plans and training for responders, localities, and communities. This project also develops performance-based design methodologies for buildings and infrastructures subjected to a variety of hazards and defined performance specifications, test methods to determine performance specifications, and guidance related to Federal, State, and local response to emergencies.

Prior Year Key Events

- Complete standard performance specifications for multimodal biometric sensors.
- Expand test methods development to support bomb disposal robot platforms.
- Initiate projects in biometric client technologies, latent fingerprint analysis, biometric quality, and biometric human factors and usability.

Current Year Key Events

- Host robot evaluation and training at National Institute of Standards and Technology (NIST) and other locations.
- Design and develop an executive management module for usability tests and symbols for fingerprint, face and iris collection.
- Develop and publish a conformance testing suite for the web services (WS)-biometric device profiles.

Budget Year Key Events

- This project plans to initiate projects in biometric client technologies, latent fingerprint analysis, biometric quality, and biometric human factors and usability.
- This project plans to finalize standards for fire and arson resistance as well as complete regional resiliency planning standards, including radiological response planning standards.
- Support to APEX Secure Transit Corridors for performance standards and test methods.
- Design and retrofit strategies for resilience.

Standards Infrastructure

This project supports S&T’s participation in national and international standards organizations and activities to ensure that DHS equities are addressed and that the development and use of standards meet Departmental mission needs. It enables DHS and its customers to procure and acquire reliable, interoperable, and effective technologies and processes. This project promotes and maintains relationships with standards-development organizations to ensure communication with and commitment to partnerships, as well as ongoing infrastructure such as databases and working groups. This project also supports programs across DHS and the Federal space with standards and test methods for key applications within DHS Components.

Prior Year Key Events

- Complete draft performance specification standards for biological detection technologies according to capability (i.e., screening tools, autonomous monitors, portable and laboratory based polymerase chain reaction (PCR) assays) and develop proficiency testing protocols in concert with users.
- Develop standard test materials and protocols for next generation deployed trace explosives detection equipment, including new and emerging explosive threats.
- Supported component needs in standards activities, including key report generation, access to standards, and requirements gathering.
- Supported DHS representation in national and international standards organizations.

Current Year Key Events

- Support DHS representation in national and international standards organizations.

Budget Year Key Events

- Draft, develop, adopt, and/or update standards, standard test/reference material, technical performance standards, test methods, and/or protocols for DHS equipment, systems, and programs/projects.
- Finalize standards for RF PASS devices.

Human Systems Engineering

This project improves DHS customer component capability to design and develop products that include human performance requirements resulting in systems that are more safe, reliable, affordable, supportable, and easy to use. It develops and defines requirements, methods, and measures to influence and evaluate the design of user interfaces for new and existing systems and technologies. To date, the project successfully transitioned the process to the USCG and has a second technology transition agreement (TTA) in place with Immigration and Customs Enforcement's (ICE) Office of the Chief Information Officer. Future TTAs with various other Operational Components are in progress.

Human Systems Research

This project maximizes the understanding of human performance capabilities of DHS end-users to increase overall system efficiency and effectiveness by analyzing current and emerging human performance risks and issues in DHS technology development and deployed systems, as well as considering the use of modeling and simulations tools and techniques as predictors of human performance. This project plans to complete research and transition of a Checkpoint Screening Human Performance Research Roadmap for aviation security operations to the TSA, provide an improved safe and efficient patient compartment ambulance design to the first responder community, and enhance current human performance modeling practices. Future efforts include investigating human performance issues for DHS end- users in trace detection methodologies and information display commonalities across the Components.

Technology Transition Support Thrust – FY 2014: \$13.813 million. FY 2015 Request: \$13.790 million. This thrust facilitates the transition of S&T Directorate solutions to customers. These activities involve integrating technology development efforts across the S&T Directorate to develop the most cost-effective and timely solutions and processes to meet customer requirements, including first responders.

Acquisitions Support and Operations Analysis (ASOA)

This project provides S&T and DHS with leadership and oversight of: 1) standards, 2) systems analysis, 3) research and development testing and evaluation (T&E), and 4) operational T&E. Working with the Under Secretary for Management, ASOA leverages S&T's critical mass of scientific and

engineering expertise to ensure that DHS develops and/or procures technologies that work as expected, and that are delivered or transitioned on time and on budget. ASOA serves as the Executive Agent for DHS's two FFRDCs: Homeland Security Systems Engineering and Development Institute and HSSAI. In addition, this project supports S&T's role in providing support for Department capabilities and requirements analysis including at least \$0.500 million in FY 2015.

Interagency Programs

This program addresses high-priority homeland security needs through operational experimentation, facilitation and collaboration with cooperative science, technology, research, development, testing, and evaluation (RDT&E) endeavors with other federal agencies. It leverages the capabilities and investments of external organizations to reduce duplication and identify unmet needs pursuant to §302 (13) of the Homeland Security Act of 2002. Outreach is conducted with federal, state, local, territorial and tribal government partners to strengthen collaborative efforts of and to collect input on their technology gaps.

International Cooperative Programs

- *Problem:* As security challenges continue to emerge and evolve, S&T is developing relationships with international allies to enhance our innovative R&D knowledge, funding, and other unique capabilities and resources.
- *Solution:* Develop understandings and agreements and facilitate the planning and implementation of international cooperative activity to address the strategic priorities developed for the Department in support of the Homeland Security Enterprise.
- *Impact:* The United States and its allies in the global war on terrorism will mutually benefit from the sharing of technological expertise to combat domestic and international terrorism.

Prior Year Key Events

- Facilitated nine bilateral meetings for the Under Secretary and Deputy Under Secretary for S&T.
- Jointly funded project on Malware on Smartphones: Collection, Analysis and Defensive Measures with the Visual Analytics for Command, Control, Interoperability Environments (VACCINE) Center and the University of California--Santa Barbara (UCSB) to execute.
- Jointly funded project on Dynamic Ink Aging to determine the optimized parameters for assessing the short term age of a ballpoint writing ink.
- Funded additional work packages for four international grants awards from prior fiscal years.

Current Year Key Events

- Facilitate nine bilateral meetings for the Under Secretary and Deputy Under Secretary for S&T.

Budget Year Key Events

- Facilitate nine bilateral meetings for the Under Secretary and Deputy Under Secretary for S&T.
- Jointly funded European Union – U.S. Supply Chain Security Demonstration Pilot Project.

Program Transition

This project establishes and implements a technology development program to focus near-term S&T work on the transitioning projects and capabilities needed by DHS Operational Components, Directorates, and their external customers. This includes partnering with In-Q-Tel, the not-for-profit venture capital firm that invests in high-tech companies for the Central Intelligence Agency (CIA), on projects for homeland security in high-tech, cutting-edge technologies such as DNA analysis, standoff explosives trace detection, cybersecurity, and secure covert surveillance. This program administers a

requirements-driven, delivery-oriented effort that draws upon technologies that can be developed, matured, and delivered to DHS acquisition programs, commercialized, or validated as a standard within a three-year period.

Testing and Evaluation Thrust – FY 2014: \$5.339 million. FY 2015 Request: \$5.450 million. The T&E Thrust establishes policies and procedures and coordinates T&E resources to verify attainment of technical performance specifications and to evaluate operational effectiveness/suitability prior to system deployment. T&E works to ensure that DHS integrates a uniform and centrally managed departmental T&E process into the systems engineering and acquisition lifecycle. The infrastructure area will assess, integrate, and coordinate DHS and non-DHS test assets to ensure that adequate test capabilities are available to support DHS programs and projects.

First Responder Technologies (System Assessment and Validation for Emergency Responders [SAVER])

This project provides high-quality, impartial, operationally relevant evaluations, and specification verification for critical emergency responder-related equipment based on current national challenges and the needs of first responders. SAVER provides decision makers and responders with information to better select, procure, use, and maintain emergency response equipment. This sharing of information is a life-saving and cost-saving asset for DHS, as well as for Federal, State, local, and tribal users of emergency response equipment.

Oversight T&E Activities for DHS T&E Products

This project increases the quality of information provided to decision makers and improves the quality of systems and technologies fielded to the end-user by working directly with all DHS major acquisition programs on the DHS Major Acquisition Oversight List that require T&E to assist in the development and execution of a robust T&E program. This project meets Clinger-Cohen Act requirements for Information Technology (IT) programs, and similarly supports acquisition T&E oversight of non-IT Programs by increasing the quality of information relating to progress towards meeting operational requirements.

T&E Infrastructure Development

This project provides the Department with a searchable database to identify existing testing infrastructure available for DHS use, such as facilities, equipment, and analytical capabilities, by creating an inventory of current T&E infrastructure resources that identifies infrastructure needs and eliminates excess. This project decreases the cost of testing through efficient infrastructure utilization while increasing the awareness of test capabilities available for use by the T&E community, program managers, and other users.

T&E Policy Analysis and Development

This project improves the quality of T&E conducted throughout DHS by developing T&E policies and procedures that define T&E activities required of all DHS Components throughout the acquisition process to verify the attainment of technical performance specifications and to evaluate operational effectiveness/suitability prior to system deployment. This project continually maintains and revises the T&E directives, guidebooks, and training courses that support T&E efforts throughout the Department.

Department of Homeland Security
Science & Technology
Research, Development, Acquisitions, and Operations
Laboratory Facilities
Program Performance Justification
(Dollars in Thousands)

PPA: Laboratory Facilities

| | Perm. Pos | FTE | Amount |
|------------------------------|------------------|------------|----------------|
| 2013 Revised Enacted | 128 | 128 | 158,083 |
| 2014 Enacted | 130 | 130 | 547,785 |
| 2015 Adjustments-to-Base | - | - | (432,883) |
| 2015 Current Services | 130 | 130 | 114,902 |
| 2015 Program Change | - | - | 320,278 |
| 2015 Total Request | 130 | 130 | 435,180 |
| Total Change 2014 to 2015 | - | - | (112,605) |

The S&T Directorate requests \$435.180 million for this activity in FY 2015. This \$112.605 million decrease includes a one-percent Federal pay raise, and includes the following adjustments to base:

- Decrease of \$433.250 million for Laboratory Construction
- Increase of \$0.191 million for the 2015 pay raise

CURRENT SERVICES PROGRAM DESCRIPTION:

Laboratory Facilities PPA – ONL manages the Laboratory Facilities Programs. ONL provides the Nation with a coordinated, enduring core of productive science, technology, and engineering laboratories, organizations, and institutions, which can provide the knowledge and technology required to secure our homeland.

Construction Thrust – FY 2014: \$433.250 million. FY 2015 Request: \$315.230 million. This program oversees the planning, budgeting, and management of laboratory infrastructure construction and upgrade projects. Construction projects provide and maintain R&D capabilities to support the missions of the S&T Directorate, the Department, and other government agencies that have interrelated homeland security missions. The investments include the construction of future laboratories, where a current capability does not exist, and upgrades to extend the life and capabilities of present laboratory facilities.

Infrastructure Upgrades Project

This project ensures that S&T Directorate Laboratories do not reach a point where obsolete or insufficient infrastructure prohibits continued R&D operations. Capital upgrades are more than routine operations and maintenance or expected upkeep of infrastructure. In addition to major repairs of infrastructure systems (e.g., electrical, water/sewage), they may include new construction, renovation, or remodeling to structures that enable scientists to pursue new capabilities based on customer

requirements. These efforts are planned and coordinated to help prevent an unmanageable and unaffordable situation where multiple key facilities require upgrades simultaneously. The highest priority for lab facility upgrades is the Plum Island Animal Disease Center (PIADC), to ensure that there is operational continuity until NBAF comes on line. In FY 2015, construction is expected to begin for the Waste Water Decontamination System at PIADC.

Laboratory Operations Thrust – FY 2014: \$114.535 million. FY 2015 Request: \$119.950 million. This program manages the operations, core capabilities, maintenance, and personnel requirements of the DHS S&T Laboratories and infrastructure. This program also oversees the continued operations of facilities to meet the mission requirements while maintaining safe, secure, compliant, and efficient operations.

Chemical Security Analysis Center (CSAC) Operations

This facility develops and informs risk assessments related to national chemical defense. CSAC is co-located at the DOD Edgewood Chemical Biological Center (ECBC) at the Aberdeen Proving Grounds in Maryland. CSAC supports a variety of customers within DHS, the Federal Government, and the HSE, to include the S&T Directorate's Chemical and Biological Division, DHS components such as the National Protection and Programs Directorate (NPPD) and TSA, and Federal agencies, such as the Environmental Protection Agency (EPA), Federal Bureau of Investigation (FBI), and DOD. CSAC also provides science- and technology-based quality assurance information regarding chemical threats to support the unified national effort to secure the Nation. The DOD Sample Receipt Facility at ECBC houses CSAC, providing the capability to integrate knowledge across the full chemical threat spectrum. Operational costs for this facility include rent, security, utilities, and information technology.

National Urban Security Technology Laboratory (NUSTL) Operations

NUSTL provides T&E capabilities to the S&T Directorate and other DHS Components such as the Domestic Nuclear Detection Office (DNDO). NUSTL also is the liaison for the deployment of experimental technologies in the New York City metropolitan area and provides technical support to the regional first responder community. NUSTL is a government-owned, government-operated laboratory located in the borough of Manhattan, New York, NY. Major operational costs include rent, information technology, and security.

National Biodefense Analysis and Countermeasures Center (NBACC) Operations

NBACC provides the capability to characterize current and future biological threats, assess their impacts, and inform the development of countermeasures and vaccines in response to events and identified threats. The NBACC mission is to provide the Nation with the scientific basis for characterization of biological threats and bioforensic analysis to support attribution of their planned and actual use. NBACC is part of the National Interagency Biodefense Campus that includes the Department of Health and Human Services (HHS), DOD, and Department of Agriculture (USDA). The unique missions of threat characterization and bioforensics enhance the Nation's overall biodefense capabilities. NBACC closely collaborates with the FBI and other law enforcement agencies. NBACC also continues to examine opportunities for the cooperative use of existing capacity for work needed by other Federal agencies. S&T operates NBACC as an FFRDC. The FFRDC plans, manages, and executes the NBACC research programs and operates the facility. NBACC has achieved all of the required certifications and registrations for its biosafety level (BSL) 2, 3, and 4 laboratories.

Plum Island Animal Disease Center (PIADC) Operations

PIADC conducts research on contagious foreign animal diseases (FAD) (e.g., foot-and-mouth disease [FMD]) and develops strategies and vaccines to protect the Nation’s animal industries and exports from foreign animal diseases accidentally or deliberately introduced into the United States. DHS and USDA jointly perform the R&D work at PIADC. The combined work of both agencies supports the S&T Directorate’s agro-terrorism countermeasures programs. Research at the facility occurs in BSL-2, BSL-3, and BSL-3Ag laboratory spaces. DHS is responsible for the management, operations and maintenance of the facility. The laboratory is a self-sustaining operation, with its own power plant, fuel storage, fire protection, waste disposal, and security systems. S&T provides the only ferry transport to and from the island and is responsible for operating and maintaining the ferries, docks, and harbor. S&T delivers the day-to-day operational support, including the operations work force. Major operational costs include security, an operations & maintenance contract, utilities, and fuel.

Transportation Security Laboratory (TSL) Operations

TSL performs research, development, and validation of solutions to detect and mitigate the threat of explosives. TSL is an RDT&E laboratory that develops promising explosive detection technologies to the point of operational T&E. TSL supports S&T’s Explosives Division and ASOA, and TSA. The real property and facilities belong to the Federal Aviation Administration (FAA). Major operational costs include rent, operation support contracts, building maintenance, utilities, security, and information technology. TSL is located at the FAA William J. Hughes Technical Center in Atlantic City, N.J.

Salaries and Benefits

Funds salaries and benefits for non-headquarters, Federal employees located at S&T’s field laboratories. These employees operate and execute programs at the S&T Laboratories in support of S&T divisions, DHS components, and other government agencies.

MAJOR ACQUISITIONS:

| FY 2013 Activity Funding (\$ thousands) 62,832 | FY 2014 Activity Funding (\$ thousands) 438,132 | FY 2015 Activity Request (\$ thousands) 337,156 |
|---|--|--|
| <p><i>NBACC Operations</i></p> | <ul style="list-style-type: none"> The NBACC facility is comprised of the National Bioforensic Analysis Center (NBFAC) and the National Biological Threat Characterization Center (NBTCC). The NBFAC conducts bioforensic analysis of evidence from a biocrime or terrorist attack to attain a “biological fingerprint” to help investigators identify perpetrators and determine the origin and method of attack. The NBFAC supports the FBI in conducting and facilitating technical forensic analyses and interpretation of material recovered following a real or suspected bioterrorist attack. The NBTCC conducts studies and laboratory experiments to fill in information gaps to better understand current and future biological threats; to assess vulnerabilities and conduct risk assessments; and to determine potential impacts to guide the development of countermeasures such as detectors, drugs, vaccines, and decontamination technologies. The NBACC is a key component in implementing the President’s National Strategy for Homeland Security, as it addresses the need for substantial scientific research to better anticipate, prevent, and mitigate the consequences of biological attacks. The NBACC provides dedicated, secure, and responsive | |

| | |
|--|--|
| | <p>biocontainment laboratories to conduct biothreat characterization and vulnerability assessments, as well as dedicated bioforensics operational capacity; and capacity for high-containment research and development.</p> <ul style="list-style-type: none"> • Construction of the facility (one unit) has been completed and the NBACC is now operating in steady-state mode. • FY 2013: 32,132; FY 2014: 34,132; FY 2015: 37,156 |
| <p><i>NBAF Construction</i></p> | <ul style="list-style-type: none"> • The proposed NBAF is an integrated foreign animal and zoonotic disease research, development and testing facility that will support complementary missions of DHS and USDA to protect the United States from the numerous infectious foreign animal and zoonotic diseases present throughout the world that could threaten our public health, agriculture, and economy, and bring effective countermeasures and vaccines to industry for further development. Several Presidential Directives and congressional mandates assign agricultural defense responsibilities to both DHS and USDA. Any animal disease outbreak posing a nationally significant impact on U.S. agriculture is within DHS's Homeland Security Presidential Directive 9 (HSPD-9) coordination responsibilities. DHS was authorized as the lead for bio- and agro-defense research and development at PIADC by the Homeland Security Act of 2002. PIADC is at the end of its lifecycle – as a facility it does not meet modern bio-containment standards and has several critical capability limitations. It does not possess large animal biosafety level 4 (ABSL-4) laboratory space, meaning that any outbreak of emerging or zoonotic disease requiring this bio-containment level could not involve direct livestock research, which would severely inhibit U.S. response capability. As a BSL-3 facility, PIADC also has a limited capacity to perform R&D. NBAF will provide the U.S. with these capabilities to protect our agricultural economy, food supply, and public health. NBAF will provide the U.S. with BSL-4 diagnostic and research capabilities rather than relying on limited large animal ABSL-4 facilities located in other countries. • NBAF will be incrementally constructed in three segments as follows: 1) site Preparation (complete), 2) central utility plant (in progress), and 3) main laboratory. • FY 2013: 30,700; FY 2014: 404,000; FY 2015: 300,000 |

Department of Homeland Security
Science & Technology
Research, Development, Acquisitions, and Operations
Research Development and Innovation
Program Performance Justification
(Dollars in Thousands)

PPA: Research Development and Innovation

| | Perm. Pos | FTE | Amount |
|------------------------------|------------------|------------|----------------|
| 2013 Revised Enacted | - | - | 425,295 |
| 2014 Enacted | - | - | 462,000 |
| 2015 Current Services | - | - | 462,000 |
| 2015 Program Change | - | - | (28,212) |
| 2015 Total Request | - | - | 433,788 |
| Total Change 2014 to 2015 | - | - | (28,212) |

The S&T Directorate requests \$433.788 million for RD&I in FY 2015. The \$28.212 million decrease in FY 2015 reduces R&D work in areas such as: CBE Defense; Counter Terrorist; Cyber Security/Information Analysis, and First Responder/Disaster Resilience.

CURRENT SERVICES PROGRAM DESCRIPTION:

RD&I PPA – Provides state-of-the-art technologies and solutions to meet the needs of the operational components of the Department and the first responder community. Includes customer-focused and output-oriented RDT&E programs that balance risk, cost, impact, and time to delivery. The six thrust areas of RD&I include: APEX; Border Security; CBE Defense; Counter Terrorist; Cyber Security/Information Analytics; and First Responder/Disaster Resilience.

APEX – FY 2014: \$15.013 million. FY 2015 Request: \$15.013 million. Consists of crosscutting, multi-disciplinary projects agreed to by the requesting DHS Component Head and the Under Secretary for Science and Technology.

Apex Air Entry/Exit Re-Engineering (AEER)

- *Problem:* Increases in international travel have strained CBP resources, resulting in increased wait times and delays for passengers to clear some Federal Inspection Service areas. In addition, DHS is required by law to implement a cost-effective biometric exit process to increase CBP’s ability to confirm the identity of persons departing the U.S.
- *Solution:* Analyze current entry operations, and implement technologies and enhancements to existing airport operations, to increase CBP’s capability to expedite screening of travelers entering the U.S. AEER will also develop recommended approaches and implement technologies for cost-effective and integrated biometric exit capabilities to meet the Congressional mandate for biometric exit. Throughout the project, AEER will actively engage its industry stakeholders to understand the challenges and impacts of current operations and proposed changes.

- *Impact:* With S&T’s assistance, CBP will increase its ability to confirm the identity of persons entering and departing the U.S., fulfill its obligation to implement a biometric air exit solution, and ensure that processes are efficient and keep pace with growth in international air travel.

Prior Year Key Events

- Engaged industry stakeholders to discuss project goals, gather operational requirements, and address potential concerns.
- Delivered Survey Methodology for OFO POE Operations Data Collection.
- Completed Test Bed Facility architecture design and engineering drawings.
- Completed eight Airport Operational Surveys and documented findings in an As-Is Operational Survey Report.
- Drafted entry and exit capability gap assessment, and included targeted areas for potential solutions.

Current Year Key Events

- Conduct joint working session with key industry stakeholders to discuss pros and cons of notional biometric exit CONOPs.
- Conduct a biometric technology market survey of initial device capabilities and maturity report.
- Establish Test Bed Capability and Facility.
- Complete iris, fingerprint, and face biometric device laboratory qualification testing.
- Validate biometric air entry/exit CONOPs and technologies with scenario based testing.
- Conduct performance and cost-benefit analysis of biographic and biometric exit.
- Complete airport entry/exit analytical tools and document for transition to CBP.

Budget Year Key Events

- Select biometric technology candidates for field evaluation.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|-------|-------|-------|
| N/A | N/A | N/A | 7,500 | 7,506 | 7,506 |

APEX Border Enforcement Analytics Project (BEAP)

- *Problem:* ICE Homeland Security Investigations (HSI) requires data driven business models for lead development, senior agent knowledge capture, and improved access to a wide variety of authorized information sources.
- *Solution:* S&T is partnering with ICE HSI to develop and deliver emerging Big Data capability in the form of new information architectures and algorithms that improve the efficiency of law enforcement operations.
- *Impact:* S&T will provide a scalable and efficient information analytics system that can assimilate authorized data sets to improve lead development and law enforcement operations using the best of breed commercially open source technology. This will improve ICE investigation capabilities and improve ICE’s ability to interdict illegal exports.

Prior Year Key Events

- Program Charter Agreement between ICE and S&T Leadership.
- Statistical reports relevant to export control reform.
- Established S&T processing enclave for algorithm development.

Current Year Key Events

- Transition Initial Operational Capability to DHS Data Center.
- Evaluation of Geocoding Algorithms.
- Evaluation of leading emerging analytic and storage technologies.
- Demonstration of algorithms that reflect best analytic practices of senior ICE investigative agents.

Budget Year Key Events

- Transition exploratory methodology mapping capabilities to ICE.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|-------|-------|-------|
| N/A | N/A | N/A | 7,500 | 7,507 | 7,507 |

Border Security – FY 2014: \$43.856 million. FY 2015 Request: \$51.100 million. DHS secures the borders, territorial waters, ports, terminals, waterways, and air, land, and sea transportation systems of the United States. S&T invests in border security research and development for technologies and solutions to prevent the illicit movement and illegal entry or exit of people, weapons, dangerous goods, and contraband, and to manage the risk posed by people and goods in transit.

Cargo Security – FY 2014: \$16.456 million. FY 2015 Request: \$18.300 million. This program develops technologies to ensure the integrity of cargo shipments (including sea, air, and land conveyance) and enhances the end-to-end security of the supply chain, from the manufacturer of goods to final delivery, while ensuring economic throughput for the U.S. economy. This work will reduce the risk of terrorists manipulating cargo as it conveys across various transit modes in the international supply chain.

Air Cargo Screening

- *Problem:* Current screening systems offer inadequate detection performance across the full range stream of commerce. There is a need for more effective and affordable air cargo screening equipment and the cost of adequately effective equipment is an issue that affects Independent Air Cargo (IAC) facilities and Air Carrier procurement decisions.
- *Solution:* Develop the Opacity and Complexity Assessment Software Tool (OCAST) to automatically predict the likelihood that an explosive threat could be reliably detected by a human operator using an X-ray image for a particular package, develop palletized screening X-ray systems offering Computed Tomography (CT) images to enable effective screening of medium and high-density pallets, and develop field deployable Mass Spectrometry (MS) for Explosives Trace Detectors (ETDs) to enable more effective identification of complex homemade explosives.
- *Impact:* The development of low cost air cargo screening systems, offering improved probabilities of detection, would enhance TSA's ability to ensure a more effective air cargo screening capability by enabling the procurement of these systems by IACs and Air Carriers at costs that are deemed acceptable.

Prior Year Key Events

- Completed preliminary design of handheld trace direct analysis tool for break bulk and palletized air cargo screening.
- Developed prototype palletized cargo screening systems through critical design phase.

Current Year Key Events

- Deliver Opacity and Complexity Assessment Software Tool (OCAST) to assist personnel in air cargo screening.
- Complete development and test Quantum Magnetics’ prototype palletized cargo screening system.
- Demonstrate new portable trace detection systems for air cargo screening.
- Complete meta-study to determine effectiveness of screening systems against various streams of commerce. Study will include recommendations to address technology gaps.

Budget Year Key Events

- Complete development and test Astrophysics’ prototype palletized cargo screening systems.
- Complete “ground truth” cargo IED study to determine available trace signatures for ETDs.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|--------|--------|--------|--------|-------|-------|
| 11,795 | 15,920 | 12,083 | 11,944 | 2,000 | 5,000 |

Cargo Container Security

- *Problem:* The lack of actionable information used in the targeting of cargo for inspection, diverts resources from higher risk shipments, while reducing the efficient flow of low risk/legitimate cargo. Inefficient targeting and lack of confidence in the security of containerized cargo in the global supply chain, costs U.S. importers billions in lost revenue per year. Moreover, the volume of inbound cargo to U.S. ports-of-entry (POEs) is projected to continue to increase from year to year while CBP manpower will not be increased proportionately. As such, new or improved technology can be a force multiplier or enabler to help address these problems.
- *Solution:* This project develops technologies for collecting additional cargo security data, while also investing in the analysis methods for transforming new and existing cargo security data into actionable information in the form of improved targeting that leads to a higher probability of detecting illegal or hazardous materials in cargo while expediting the delivery of legitimate cargo.
- *Impact:* Improved targeting and improvements in container security through the use of technology will reduce the number of containers requiring scanning and/or manual inspection saving CBP millions annually in labor and facility costs, while increasing the throughput of legitimate cargo. The use of technology could yield millions of dollars of additional tax revenue and would allow the automation of manual processes at the Points of Entry (POEs), freeing up thousands of hours/yr of CBP labor.

Prior Year Key Events

- Delivered performance specification for the Secure Hybrid Composite Container (SHCC) to CBP.
- Delivered two fabricated Secure Hybrid Composite Containers. One container for testing and one for delivery to the Government of Singapore (funded by Singapore Ministry of Home Affairs).
- Developed and delivered US-EU Maritime Cargo Security Pilot Project Charter to the European Union (EU) for review and signature.

Current Year Key Events

- Pilot a supply chain management system using RECONS for CBP’s Centralized Examination Station (CES) and In-bond Operations.
- Pilot a supply chain management system using RECONS to secure deliveries in the National Capital Region for the Federal Protective Service (FPS).
- Deliver Secure Hybrid Composite Container draft standard to International Organization for Standardization (ISO) for certification/adoption.

- Deliver Secure Hybrid Composite Container Environmental Testing Report.
- Deliver Secure Hybrid Composite Container Operational Evaluation Report.
- Finalize US-EU Maritime Cargo Security Pilot Test Plan.

Budget Year Key Events

- Preliminary assessment of the efficacy of various cargo security devices for use in the US-EU Maritime Cargo Security Pilot.
- Deliver CES/In-Bond prototype to CBP.
- Deliver National Capital Region Secure Delivery prototype to FPS.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|--------|-------|-------|-------|-------|-------|
| 12,760 | 1,450 | 1,000 | 2,812 | 3,450 | 1,400 |

Cargo Validation

- *Problem:* CBP has limited capability to collect and analyze evidence from cargo and cargo containers to enforce trade law. Currently, CBP Agriculture Inspectors search for pests/invasive species using time-consuming manual techniques. CBP/ICE has limited ability to detect/interdict counterfeit merchandise entering the U.S. and the estimated \$65 billion in bulk cash being illegally smuggled out of the U.S. each year.
- *Solution:* This project provides CBP with the capability to (1) detect the transport of contraband, counterfeit merchandise, or invasive species for inbound and outbound cargo at the POEs and (2) detect and prosecute illegal activity through the forensic analysis of material collected from suspicious cargo/packages.
- *Impact:* Improved tools and methods to validate cargo and enforce trade compliance, and detect invasive species will: 1) increase throughput of legitimate cargo, 2) increase the availability of forensic evidence enabling enhanced trade compliance enforcement, and 3) reduce industry complaints/ costs caused by delaying the processing of cargo at the POE. Improved enforcement of trade law will allow for the collection of millions of dollars of currently uncollected tariffs and duties.

Prior Year Key Events

- Developed seedling/Tech Foraging report that identifies one or more paths forward for developing low power microwave and passive acoustic technology that can be used to detect a broad spectrum of invasive species that infest both shipping containers and bulk cargo.
- Developed seedling Study report that determined that sufficient DNA can be collected off of highly compromised surfaces and that it is feasible to develop a sampling kit to collect and preserve the integrity of a DNA sample.
- Determined that existing Ion Mobility Spectrometry (IMS) equipment being used for drug detection at Ports of Entry (POEs) can be modified to also detect currency.

Current Year Key Events

- Test IMS system with real currency samples and backgrounds. Develop algorithms to optimize signal use and analytical figures of merit. Deliver3 Tech Foraging report on bulk currency detection using X-ray technology.
- Determine the size, mobility, and water content range of detectable pests and vermin via microwave and acoustic sensor modalities to support design trades for invasive species detection equipment.

- Identify unique physical properties of key counterfeit goods that can be exploited with the use of non-invasive sensors.

Budget Year Key Events

- Laboratory prototype and testing of microwave and acoustic systems for detection of invasive species. Performance comparison will be made with human operators.
- A currency detection system will be field tested at a border crossing in order to assess performance under real conditions. Detection performance, usability, and operational reliability will be evaluated.
- DNA and metadata evidence collection, characterization and database development.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|--------|-------|-------|-------|-------|
| N/A | 12,633 | 2,000 | 5,302 | 8,406 | 8,300 |

Land/Sea Cargo Screening

- *Problem:* Several CBP non-intrusive cargo scanning systems are reaching the end of their service life and are exhibiting reduced performance and rising maintenance costs. Other scanning systems are using technology that needs to be refreshed to maintain parity with the smuggling threat. In addition, CBP lacks the capability to non-intrusively detect contraband hidden in the walls of refrigerated cargo containers and in structural voids of conveyances and vehicles, requiring them to use time intensive manual inspection techniques.
- *Solution:* This project develops software and hardware upgrades for the legacy cargo scanning units, infusing state-of-the-art technology which will enhance their detection performance and extend their service life, and prototypes non-intrusive scanning capabilities for refrigerated cargo containers and structural voids.
- *Impact:* The S&T Directorate’s efforts will enhance CBP’s effectiveness in detecting contraband at Ports of Entry while increasing the throughput of legitimate cargo. Upgrades to CBP cargo scanning systems will improve performance, while significantly reducing O&M costs.

Prior Year Key Events

- None

Current Year Key Events

- Contract award of the Mid-Level Energy Scanning System Upgrade.
- Technology foraging report identifying the option(s) for development of a Refrigerated Cargo Container Scanner.
- Technology foraging report identifying the option(s) for development of a Void and Anomaly Detector.
- Technology foraging report identifying the option(s) for development of the Mobile Backscatter Scanning System Upgrade.

Budget Year Key Events

- Critical design of the Mid-Level Energy Scanning System Upgrade.
- Preliminary design of the Refrigerated Cargo Container Scanner.
- Preliminary design of the Void and Deck Anomaly Detector.
- Preliminary design of the Mobile Backscatter Scanning System Upgrade.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|------|------|------|-------|-------|
| 1,963 | N/A | N/A | N/A | 2,600 | 3,600 |

Land Border Security – FY 2014: \$16.342 million. FY 2015 Request: \$22.550 million. This program develops and transitions technical capabilities that strengthen U.S. land border security by safeguarding lawful trade and travel and by helping to prevent illegal goods and people from crossing the border.

Air Based Technologies

- **Problem:** DHS operating components have the responsibility to detect and interdict illegal entry and smuggling activity along the vast expanses of U.S. land and maritime borders between the POEs. DoD-developed airborne surveillance systems could be repurposed/adapted/leveraged to dramatically improve CBP’s situational awareness of remote regions of the U.S. border. Small unmanned aircraft systems (SUAS) are unavailable for DHS component and First Responder use due to limited access to the National Air Space (NAS).
- **Solution:** This project identifies, tests, and evaluates sensors mounted on fixed and rotary wing manned aircraft, unmanned aerostats, and small unmanned aircraft systems (SUAS) for possible use by DHS components for improved detection, classification, and tracking of illicit activity. It also provides DHS components and the First Responder community unbiased evaluation of available airborne sensors in realistic, operationally relevant scenarios for improved situational awareness for both law enforcement and during emergency events (e.g. floods, forest fires). In addition, the project is developing technologies to enable/enhance SUAS access to the NAS.
- **Impact:** Airborne sensors and sensor systems can provide DHS operating components and First Responders with invaluable situational awareness before making the decision to dispatch agents/assets to respond to and engage in potentially dangerous operations. The project will improve CBP, USCG, and the first responder community’s awareness and understanding of the utility of mature airborne sensor systems and platforms for border security and public safety missions.

Prior Year Key Events

- Posted online operational field assessment reports of Small Unmanned Aircraft Systems (SUAS) for improved detection, identification, and classification of illicit activity and improved situational awareness during emergency events (e.g. floods, forest fires).

Current Year Key Events

- Continue to post online operational field assessment reports of SUAS for improved detection, identification, and classification of illicit activity and improved situational awareness during emergency events (e.g. floods, forest fires).
- Deliver Wide Area Airborne Surveillance System Operational Evaluation Report to CBP.

Budget Year Key Events

- Publish reports assessing performance of SUAS in the maritime operational context.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|-------|-------|-------|-------|-------|
| N/A | 1,219 | 5,000 | 4,469 | 2,618 | 5,250 |

Ground Based Technologies

- *Problem:* CBP is in need of new or improved border surveillance capabilities, especially for difficult terrains, harsh weather, and remote locations. Border Spotters interfere with U.S. law enforcement efforts.
- *Solution:* In 2008, the S&T Directorate established the Border Surveillance Working Group comprised of Border Patrol personnel and other subject matter experts to: (1) assess capability gaps on both the Northern and Southern borders and (2) develop the Border Surveillance Technology Roadmap (2009). This project is pursuing technologies to provide the capabilities outlined in the roadmap including radars, imagers, unattended ground sensors (UGS), tripwires, and related communication/power technologies. The recently developed Border Patrol Research and Development Strategic Plan validates the roadmap and the technologies being pursued under GBT. The project is also identifying methods and technology to effectively counter Border Spotters.
- *Impact:* CBP's improved situational awareness of U.S. terrestrial borders between the POEs will result in higher interdiction rates of illegal activity through higher detection rates, fewer false alarms, and better utilization of Border Patrol agents and assets.

Prior Year Key Events

- Developed Mobile Surveillance System Upgrade (MSS-U) Agent Feedback Compilation report.
- Delivered MSS-U capability to BP for Operational Assessment.

Current Year Key Events

- Turnover Buried Tripwire capability to CBP for Operational Assessment.
- Turnover Automated Scene Understanding (ASU) Surveillance Capability to CBP for Operational Assessment.
- Turnover Slash CameraPole capability to CBP for Operational Assessment.
- Conduct Canadian-U.S. Sensor Sharing Pilot (CUSSP) implementation and engineering test.

Budget Year Key Events

- Provide technical assessment of key Border Spotter design issues

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|--------|-------|-------|-------|-------|-------|
| 11,099 | 5,385 | 4,000 | 4,002 | 5,219 | 8,400 |

Rapid Response Prototyping Team

- *Problem:* CBP/OTIA needs the ability to inexpensively and rapidly field prototypes for use and assessment in order to gather input for future OTIA acquisitions.
- *Solution:* This project enables short term delivery of high priority new technology prototypes to the field. This project will jointly assess COTS or near-COTS solutions for use in areas of critical need for border security. The need will be identified by CBP; the near-term requirements will be jointly evaluated, and the S&T Directorate will provide one or more prototype units for field use and evaluation.
- *Impact:* This project will enhance CBP's ability to quickly adopt available technology to improve their capabilities and/or reduce O&M costs of existing capability.

Prior Year Key Events

- Installed Forward Operating Base (FOB) Camp Grip power assessment and fuel efficient generator.

Current Year Key Events

- Transition FOB Camp Grip power assessment and fuel efficient generator to CBP.

Budget Year Key Events

- Provide engineering analysis and system design for a fuel efficient power system for FOB in Ajo, Arizona.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|-------|------|-------|
| N/A | N/A | N/A | 1,045 | 979 | 1,100 |

Small Dark Aircraft

- *Problem:* Unmanned Air Vehicles (UAVs) in the form of small-factor Remote Control (RC) aircraft are becoming highly proliferated and represent a potential threat to the entire Homeland Security Enterprise. DHS/S&T/HSARPA is studying the nature and intent of means to detect UAVs/RCs being used improperly or as a threat to Responders, notionally at Public gathering spaces or other targets within an urban environment.
- *Solution:* This project aims to validate the usefulness of continuous, distributed RF spectrum monitoring in an urban environment to provide a “change recognition” capability that will detect the presence of anomalous signals associated with the operation of remotely controlled small UAV devices.
- *Impact:* Development and demonstration of an effective and affordable capability to detect (and counter) remotely controlled UAVs will provide additional capability to our HSE Law Enforcement and Responder partners to address the improper or terrorist use of these readily available and exploitable threats.

Prior Year Key Events

- Tested, demonstrated, and evaluated the Small Dark Aircraft (SDA) developmental system operating on the northwest border over all weather conditions and in challenging terrain.
- Augmented the existing system with a visual/IR camera that could be slewed by track sensors to take a picture of the target of interest and to display the target image with all track data of that target.
- Conducted system analysis of the sensor performance and identification of additional sensors and/or data processing techniques to ensure robust performance in multiple environments under extreme weather conditions.

Current Year Key Events

- Conducted Analysis of Alternatives Study of methods to detect Radio Frequency signals and characteristics typically associated with Remote Control UAV devices.
- Performed an end-to-end Systems Study addressing engineering issues associated with the detection, processing, tracking, and identification of small remotely controlled UAVs.
- Conducted a RDT&E “rodeo” of candidate detection technologies found in the AoA study.
- Conducted a “background environment” study of the RF signals present in a typical urban environment.

Budget Year Key Events

- Use the FY14 Analysis of Alternatives Study to select candidate technology for a full-scale end-to-end system development effort.
- Conduct a large scale urban environment “Pilot” using a prototype setup of the selected detection and signal processing capability.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|-------|------|-------|-------|-------|
| N/A | 1,015 | N/A | 2,759 | 2,900 | 2,000 |

Tunnel Detection and Surveillance

- *Problem:* Cross-border tunnels are dug by transnational criminal organizations to smuggle contraband into the U.S. Current detection capabilities rely on random tips and a laborious human intelligence (HUMINT) collection process, and when tunnels are discovered, CBP/ICE lack the ability to exploit the tunnel to arrest and prosecute those involved in the creation and use of the tunnel.
- *Solution:* This project provides CBP and ICE the capability to locate clandestine tunnels, and the ability to perform forensic analysis of a detected tunnel to support investigations and prosecution.
- *Impact:* Using the S&T Directorate-developed tools, there should be a 50% increase in the number of detected tunnels resulting in a reduction in the flow of contraband smuggled into the U.S. via tunnels, keeping 100s of tons of drugs off U.S. streets while saving thousands of CBP labor hours. Forensic tools/processes developed will increase the ability to arrest and prosecute individuals involved in the creation/use of tunnels for smuggling.

Prior Year Key Events

- Delivered geophysical data sets of the 50 mile “high priority intervals” along the SW border.
- Delivered noise data sets of the 50 mile “high priority intervals” along the SW border.
- Identified a physical mechanism that can be measured with available laboratory equipment to determine the age of a tunnel.

Current Year Key Events

- Deliver Sensor Performance Tool & Sensor Guidebook to help CBP make better use of tunnel detection equipment they already bought and better understand their performance limitations.
- Demonstrate Sensor Performance Tool on southwest border with currently deployed CBP Tunnel Van being used for tunnel detection, location, surveying, and remediation efforts.
- Determine key physical attributes to discriminate tunnels from underground clutter and identify one or more sensor modalities that can utilize those attributes effectively.

Budget Year Key Events

- Demonstrate method for sample collection and analysis to determine tunnel age in a controlled (lab) environment Demonstrate prototype system in a field environment.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|------|-------|-------|-------|
| 3,077 | 1,524 | N/A | 2,894 | 4,626 | 5,800 |

Maritime Border Security – FY 2014: \$11.058 million. FY 2015 Request: \$10.250 million. This program develops and transitions technical capabilities that enhance U.S. maritime border security by

safeguarding lawful trade and travel and helps to prevent illegal use of the maritime environment to transport illicit goods or people.

Arctic Communications

- *Problem:* The Coast Guard is extending operations into the Arctic in areas that were once inaccessible but are now ice-free during summer months. The vast distances, lack of communications infrastructure, harsh weather, and high latitude ionic disturbances combine to make communications in the Arctic difficult.
- *Solution:* The S&T Directorate, in close coordination with the USCG Research and Development Center, will identify and evaluate appropriate terrestrial radio frequency (RF) and space-based solutions to support USCG missions in the Arctic region.
- *Impact:* Terrestrial and space-based communication and protocol solutions will guide the USCG in the acquisition and implementation of reliable communications capabilities in the Arctic, essential for safe and effective operations.

Prior Year Key Events

- Determine paths toward identifying and evaluate terrestrial-based radio and antenna solutions to support USCG missions in the Arctic region.

Current Year Key Events

- Deliver modeling report of existing communications propagation in the HF, VHF, and UHF frequency bands including modeling of likely radio and antenna locations to improve communications reliability.
- Conduct all planning (logistics, test plan development, etc.) to support a field test of space-based systems to determine communications signal strength and clarity.
- Execute an abbreviated test of candidate communication solutions at latitudes exceeding 70 degrees north.

Budget Year Key Events

- Based on FY14 test results, determine candidate solutions.
- Demonstrate and analyze candidate solution(s) performance during USCG’s Arctic Shield 2015.
- Develop a preliminary Life Cycle Cost projection for high likelihood solutions.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|------|------|------|
| N/A | N/A | N/A | 101 | N/A | 750 |

Port and Coastal Surveillance

- *Problem:* DHS operating agencies have limited capability to detect, track, identify, and interdict maritime threats such as self-propelled semi-submersible (SPSS), fully submersible vessels (FSV), and small vessels transporting contraband or people unlawfully into the U.S.
- *Solution:* This project develops solutions to improve maritime situational awareness, informational analytics, and information sharing/distribution to enable an appropriate and rapid tactical response to maritime threats as well as enhancing strategic planning/resource allocation at the regional and national level.
- *Impact:* The S&T Directorate developed technology will dramatically improve the maritime domain awareness of DHS components in the coastal regions of the U.S., increasing small vessel interdiction efficiency eight fold in five years.

Prior Year Key Events

- Coastal Surveillance System (CSS) pilot installation at CBP’s Air and Marine Operations Center.
- Smart Chart AIS app for android smart phones developed and made available via Google.

Current Year Key Events

- Expand CSS Pilot to include USCG Sector Los Angeles.
- Deliver CSS Mission Needs Statement.
- Expand CSS Pilot to include USCG Sector San Diego.
- Expand CSS Pilot to include CBP OIC Detroit.
- Deliver Smart Chart AIS app for other smart phone platforms.

Budget Year Key Events

- Deliver CSS Information Sharing Tools.
- Expand CSS Enterprise to USCG Sector Seattle.
- Integrate new data sources into CSS.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|-------|-------|-------|-------|
| 5,128 | 6,306 | 3,134 | 6,683 | 7,250 | 9,500 |

CBE Defense – FY 2014: \$141.848 million. FY 2015 Request: \$125.426 million. S&T Directorate invests in R&D to support prevention and protective strategies and coordinated surveillance and detection to address CBE threats. R&D work includes: prevention of terrorism; reduction of vulnerability of critical infrastructure from terrorist attacks and other hazards; and prevention of the illicit movement and illegal entry or exit of people, weapons, dangerous goods, and contraband by providing technology, methods, and procedures to detect CBE threats.

Bioagent Detection – FY 2014: \$39.570 million. FY 2015 Request: \$35.676 million. This program conducts research and develops and identifies tools to enable rapid detection and provide advanced warning of attacks or releases of biological threat agents against the population and agriculture of the United States. It defines the intended use and application, develops the requirements, and executes the technology developmental efforts to support early detection and warning of potential bioagent threats to humans and animals.

Agricultural Screening and Surveillance

- *Problem:* High-priority foreign animal diseases in livestock and wildlife threaten the U.S. agricultural critical infrastructure.
- *Solution:* This project will develop and standardize technologies and protocols, including immunoassay-based approaches and real-time polymerase chain reaction processes, to identify infected animals and thereby address current and emerging agricultural threats.
- *Impact:* The screening tools developed and deployed to the USDA National Animal Health Laboratory Network (NAHLN) will help prevent high-priority foreign animal diseases such as foot-and-mouth disease, and Rift Valley fever.

Prior Year Key Events

- Completed development of priority Pen-side assays for use in the NAHLN for the detection of foreign animal diseases including foot-and-mouth disease, classical swine fever, and rift valley fever.

Current Year Key Events

- Develop molecular screening tool for the detection of Foot and Mouth Disease (FMD) in bulk milk tanks in collaboration with key dairy state partners.
- Complete and demonstrate prototype capability for inter-state livestock transportation network models to support planning and response options for high priority diseases (e.g., Foot-and-Mouth Disease).
- Field Enhanced Passive Surveillance System in at least four states.

Budget Year Key Events

- Transition validated sensitive molecular screening tool for the detection of FMD in bulk milk tanks using the existing dairy industry milk transportation and quality control infrastructure in the NAHLN and key dairy states.
- Enhanced Passive Surveillance iOS app in Apple store/ Droid App available in Google Play. Store to promote and enable wider use of animal disease surveillance toolset.
- Report summarizing the occurrence of FADs in wildlife species in endemic regions, including a compilation of susceptible US species with data on ecological, behavioral and environmental factors that could influence disease severity and spread.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|-------|-------|-------|-------|------|
| 512 | 3,248 | 3,325 | 3,304 | 7,273 | 750 |

Bioassays

- *Problem:* First Responders and Public Health officials do not have well-validated detection assays to analyze potential bio-threat samples and inform appropriate actions to ensure public safety and public health actions and decision.
- *Solution:* Develop highly robust assays; that includes test, evaluation, and validation of nucleic acid detection assays (TaqMan PCR); antigen detection assays (immunoassays); and rapid antimicrobial susceptibility assays (based on micro-culture and PCR) for deployment and employment through the Centers for Disease Control and Prevention (CDC) Laboratory Response Network and other federally sponsored laboratory response networks to support rapid detection of an event, respond to an event, and recover from an event. These assays are intended to be dual-use assays that can be used for environmental sample analysis as well as clinical specimen analysis.
- *Impact:* Enables capabilities to rapidly screen and detect high-consequence biological pathogens and toxins to provide critical information to support actions and decisions regarding public safety. This project will also develop bioinformatics resources, reference strain and antibody repositories along with appropriate standards to recognize and identify traditional, emerging, advanced, and enhanced threat agents.

Prior Year Key Events

- Validated Public Health Actionable Assays (PHAA) for Ricin toxin and *Francisella tularensis* transitioned to the Centers for Disease Control and Prevention Laboratory Response Network (CDC LRN).

- Completed evaluation of Ricin and Abrin lateral flow assays for First Responder Use in the field for screening and to evaluate suspicious materials.
- Completed the Government Unique Standards for PHAA Antigen/Toxin based detection Assay with Inter Agency participation and agreement.

Current Year Key Events

- Transition validated laboratory detection assays for high consequence (*Y. pestis*, *Rickettsia* and *Variola*) pathogens and toxins (*C. botulinum* and Abrin) to the Centers for Disease Control and Prevention Laboratory Response Network (CDC LRN) for deployment and employment.
- Conduct test, evaluation and validation of Lateral Flow assays for *Bacillus anthracis*, *Yersinia pestis* and *Francisella tularensis* for First Responder use in support of public safety actions and screening of suspicious material in the field.
- Complete Rapid Antimicrobial Susceptibility tests for *Y. pestis*.

Budget Year Key Events

- Complete testing, evaluation and validation of *Bacillus anthracis*, *Burkholderia mallei* and *pseudomallei* PHAA assays.
- Complete testing, evaluation of *Bacillus anthracis*, *Yersinia pestis* and *Francisella tularensis* lateral flow assays for First Responder use in support of public safety actions and screening of suspicious materials in the field.
- Complete Rapid Antimicrobial Susceptibility tests for *Francisella tularensis*.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|--------|--------|-------|-------|-------|-------|
| 19,421 | 15,007 | 4,000 | 3,975 | 7,000 | 4,000 |

Biosurveillance Systems

- *Problem:* There is a lack of prompt recognition, coordination and early response action protocols within the Federal, State governments and industry’s in the event of a biological attack or disease outbreak.
- *Solution:* This project assembles and demonstrates biosurveillance technology advances and data fusion concepts to build CONOPS with strong coordination in the Federal interagency and local community arenas. It explores a variety of methods and systems to rapidly collect and exploit information useful for identifying outbreaks or unusual events using existing cloud-based computing architectures. To inform requirements and potential operational architectures, a demonstration will be conducted in partnership with Department of Defense (DOD), the U.S. Department of Agriculture, and Health and Human Services (HHS) and will be based on scenario(s) of interest to these stakeholders and selected local communities.
- *Impact:* Optimized collection and integration of relevant environmental, animal and public health data will promote prompt awareness of a bio-attack or disease outbreak, resulting in reduced casualties and the application of early mitigation steps.

Prior Year Key Events

- None

Current Year Key Events

- Initiate biosurveillance analysis of alternatives and market survey for applicable technologies

- Deliver conceptual architecture for national bio-surveillance system of systems and deliver pilot project to link data from clinical and diagnostic networks.
- Establish stakeholder group and hold workshops to begin evaluation of surveillance response SOPs/CONOPs and requirements.

Budget Year Key Events

- Conduct stakeholder workshops to refine requirements.
- Down select appropriate commercial and prototype technologies for future year demonstrations.
- EPS iOS app in Apple Store / Droid app available in Google Play Store.
- Initiate development of integrated biological, chemical, and radiological surveillance architectures.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|------|-------|-------|
| N/A | N/A | N/A | N/A | 1,046 | 6,900 |

Point-of-Care Diagnostics

- *Problem:* The need exists to enhance rapid bio-diagnostic capabilities to inform bio-surveillance systems on the scope and scale of a bio-event and to enable rapid and effective treatment and triage of individuals exposed or infected during an event.
- *Solution:* Develop and validate inexpensive, easy-to-use, high specificity and sensitivity diagnostics tests for point of care/need use during bioterrorism events and disease outbreaks.
- *Impact:* This project provides Health Care Providers with Rapid Point of Care/Need (POC/PON) diagnostic tests to dramatically enhance bio-diagnostic capabilities and to enable rapid response and clinical decisions to high-consequence pathogens, associated disease outbreaks, and/or terrorism events. These tests will be critical for rapid response and triage to optimize clinical interventions and to support public health action and decisions.

Prior Year Key Events

- Developed point of care/need diagnostic assays to differentiate viral vs bacterial infection to support therapeutic decisions and triage.
- Developed point of care/need Rapid Anthrax diagnostic test to support event response and mitigation after an anthrax event.

Current Year Key Events

- Complete Phase I testing and evaluation of bacterial vs. viral infection discriminator lateral flow assays from healthy populations.
- Complete Phase I testing and evaluation of rapid anthrax diagnostic test using appropriate clinical sample matrices from healthy populations.
Complete Phase I testing and evaluation of Random Peptide Array for clinical diagnostics application.

Budget Year Key Events

- Establish clinical specimen repository to support test, evaluation and validation of clinical diagnostic tests developed by DHS S&T.
- Evaluate appropriate clinical sample matrices to support Phase II evaluation of rapid anthrax diagnostic tests and validation of bacterial vs. viral infection discriminator lateral flow assays in disease-affected versus healthy populations.
- Develop rapid point of need test for Plague and Tularemia for POC and triage use.

- Complete Phase II Testing and Evaluation of Random Peptide Array technology to determine its potential use and application for Clinical diagnostic applications.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|--------|-------|-------|-------|-------|
| 6,154 | 12,829 | 9,800 | 4,889 | 9,273 | 9,300 |

Rapid Biodetection

- *Problem:* There is a need for Federal, State, and local responders to rapidly identify biological threat agents and toxins in the field through use of fixed installation sensors, person-portable sensors, and/or mobile laboratory systems, to rapidly provide advance warning of biological attacks.
- *Solution:* This project will develop affordable and effective environmental biological detection and collection systems that are suitable for urban environments use for event detection and characterization purposes following an attack. The detection system outputs will feed into the emerging local, state, or national-level cloud processing architecture for rapid awareness and response in the event of a biological event/attack.
- *Impact:* The resulting advanced warning system will support indoor, outdoor, national security, and other biosurveillance monitoring in order to reduce the time it takes to identify biological threat agents in the field and increase effective response efforts.

Prior Year Key Events

- Completed Analysis of Alternatives for detection architectures and technology solutions. Completed Environmental Surveillance requirements to document decision points and information needs in response to a biological incident.

Current Year Key Events

- Prototype testing of improved laboratory modules for bio-threat agent sample preparation techniques.
- Analysis of alternatives for new assay concepts to detect emerging, advanced, or engineered threats.
- Finalize Environmental Monitoring requirements, issue broad agency announcement, and competitively select performers.

Budget Year Key Events

- Evaluate and down select feasible system solutions for continuous environmental monitoring.
- Feasibility of creating a model to predict virus function (i.e. pathogenicity) from genetic sequence information.
- Define requirements for distributed sensor architecture data integration networks.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|--------|--------|-------|--------|-------|--------|
| 10,426 | 11,708 | 4,163 | 12,488 | 8,191 | 14,726 |

Chemical Detection – FY 2014: \$0.000 million. FY 2015 Request: \$3.000 million. This program seeks to develop more reliable chemical detectors, which will promote their use and reduce vulnerabilities of the population and critical infrastructure in a wide array of operational applications.

Integrated Chemical Detection System

- *Problem:* Currently available chemical detectors experience significant false positive responses in varying backgrounds, undermining the confidence of response assets in their value in responder and infrastructure protection scenarios. This problem results in delay in improving the defensive posture to chemical attack or major accident scenarios.
- *Solution:* This project will consider evolving technologies that offer “orthogonal” approaches (examining data on different physical features of chemicals) to increase the probability of correct identification and explore the application of these technologies in operational scenarios.
- *Impact:* The development of more reliable chemical detectors will promote their use and reduce vulnerabilities of the population and critical infrastructure in a wide array of operational applications. The outcome of this project will affect operational capabilities of multiple DHS components (e.g. USSS, USCG, TSA, CBP, OHA), critical infrastructure owners and first responders.

Prior Year Key Events

- None

Current Year Key Events

- None

Budget Year Key Events

- Develop and document requirements in cooperation with user community.
- Initiate concept exploration with market survey and analysis of alternatives of applicable technologies guided by lessons learned from prior year pilot demonstrations.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|------|------|-------|
| N/A | N/A | N/A | N/A | N/A | 3,000 |

Explosives Detection – FY 2014: \$102.278 million. FY 2015 Request: \$86.750 million. This program researches, develops, and/or identifies tools to detect and locate explosives intended to be used as terrorist weapons and strengthens aviation security by bolstering the international aviation security system, processes, and technologies, and by encouraging partnerships with industry. It defines concepts, requirements, and procedures for improved techniques for early detection and warning of potential explosive threats, including explosive threats to the Nation’s transportation systems and large public gatherings.

Advanced Imaging Displays

- *Problem:* Current training for Transportation Security Officers (TSOs) does not use the latest methods, tools, technologies, or data and require dramatic improvement to increase both operational performance and efficiency.
- *Solution:* S&T will develop a prototype hardware and software adaptive training system that provides an improved x-ray image analysis training capability. The system will maximize screener operational performance by utilizing new training methods, data, and technological capabilities, such as eye tracking and cognitive state assessment. The program will then expand beyond x-ray image analysis training to also provide an improved training capability for ticket and document checking.

- *Impact:* Implementing the new training system, methods and materials will make screening operations more effective and efficient, and will save TSA money by reducing training time up to 2 hours per TSO resulting in almost \$3 million in annual cost savings/avoidance and will correspondingly free up the trainer/mentor for same amount of time resulting in a force multiplier.

Prior Year Key Events

- Integrated the Exceptional Performing (EP) Screener methods and materials into a next generation hardware and software adaptive training platform to maximize screener operational performance by utilizing new technological capabilities, such as eye tracking and cognitive state assessment.

Current Year Key Events

- Expand existing imagery, revise, and enhance existing image based training solutions.
- Conduct a task analysis to identify critical cues and techniques required for Ticket and Document Checker (TDC) job functions, develop methods to quantify evaluation of performance utilizing performance and eye gaze data.

Budget Year Key Events

- Conduct software-based training enhancement.
- Develop and execute field validation of image based training solutions.
- Deliver Technical Report.
- Transition training materials and train trainers.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|------|-------|-------|
| N/A | N/A | N/A | N/A | 1,000 | 1,200 |

Canine Explosives Detection

- *Problem:* The screening community needs enhanced tools, techniques and knowledge to better understand, train, and employ dogs utilized for explosive detection. *Solution:* The project has two primary goals. The first is to develop non-hazardous canine training aids for homemade explosives (HME) that will provide for more frequent training of canine explosives detection teams to improve the teams’ proficiency and to evaluate and improve upon detection techniques. The second goal is to provide scientifically rigorous independent test and evaluation of canine teams in their operational environment in order to validate training methodologies and assess the strengths and weaknesses of canine employment techniques.
- *Solution:* This project will develop and test non-hazardous HME canine training aids which will provide performance results equivalent to or better than the actual explosive. Also, create and execute a rigorous independent test and evaluation capability which will provide the TSA National Explosive Detection Canine Team Program (NEDCTP) and any other DHS and HSE explosive canine team users with operational performance data to make decisions on improved concept of operations, techniques, and training.
- *Impact:* The project will deliver field tested non-hazardous canine training aids for peroxide-based HMEs to allow explosive detection canine teams to improve overall detection proficiency by allowing for more frequent training in the operational environment. The project will provide a scientifically rigorous independent test and evaluation of canine teams in their operational environment: Ensuring canine teams are effective in the operational environment is paramount to protecting the public from explosive threats. Statistically significant data on the operational performance of the explosive detection canine team will allow canine end users to validate training

methodologies and provide for an independent assessment of the strengths and weaknesses of the operational deployment strategies.

Prior Year Key Events

- Delivered improved prototype canine training aids for peroxide-based HMEs for operational field assessment.
- Evaluated advanced off-leash canine screening methods for stadium search operations.
- Conducted operational assessment of the TSA person-search canine teams support airport operations.

Current Year Key Events

- Deliver two field validated low-cost non-hazardous canine training aids for peroxide-based HMEs.
- Deliver results of person search canine testing at mass transit rail environments.
- Deliver canine nuisance alarm laboratory analysis protocols.
- Test and deliver results to TSA on the operational performance of the Remote Explosive Sensing Techniques (REST) systems used by UK, FR, and NL to screen air cargo.

Budget Year Key Events

- Deliver results of testing person-search canines in support of final TSA RBS-MI.
- Deliver explosive odor generalization study to support reducing the current number of trained odors.
- Determine operational performance parameters of person-search canine in high throughput subway rail environment.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|-------|-------|-------|-------|
| 2,000 | 2,489 | 2,513 | 2,497 | 4,200 | 4,500 |

Checked Baggage

- *Problem:* TSA has a limited capability to detect the array of improvised explosives threats, while managing operating costs and CONOPS to meet budget constraints.
- *Solution:* In collaboration with Defense Advanced Research Projects Agency (DARPA) and TSA, Science and Technology Directorate (S&T) is developing next generation X-ray systems that incorporate advanced measurement methods (compressive sensing) from DARPA’s Knowledge Enhanced Compressive Measurement (KECoM) program along with integration of coherent X-ray scattering material discrimination and advanced X-ray component technology.
- *Impact:* These next generation X-ray systems are anticipated to provide TSA with enhanced threat detection capabilities and reduced false alarm rates (below 10%) for checked baggage screening operations allowing the TSA to be more efficient and effective.

Prior Year Key Events

- Delivered prototype 5th generation X-ray CT imaging systems with novel electron beam source for laboratory assessment.
- Delivered initial assessment of X-ray diffraction based liquid explosive identification capabilities to TSA.

Current Year Key Events

- Delivery of Phase 2 X-ray diffraction (XRD) proof of product design.

- Complete DPC/PeXsa System Concept Review.

Budget Year Key Events

- Delivery of X-ray diffraction based (XRD) hold baggage screening system prototype.
- Complete Adaptive X-ray explosives detection system (EDS) preliminary design review (PDR).

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|--------|--------|--------|--------|--------|--------|
| 16,954 | 19,698 | 16,697 | 21,701 | 21,700 | 20,700 |

Dynamic X-Ray Imaging

- *Problem:* Screeners do not have the ability to adjust internal equipment screening parameters rapidly during screening operations to increase efficiency in baggage screening.
- *Solution:* Integrate advanced measurement algorithms, and adaptive X-ray components, into X-ray screening systems to provide real-time dynamic X-ray imaging. This will provide an agile response to improvised explosive threat detection with false alarm rate reduction and increased system throughput.
- *Impact:* The ability to dynamically adjust X-ray system parameters during baggage screening will allow enhanced threat material detection, real-time reduction of false alarm rates, and increased screening throughput. TSA operations will be able to respond to security levels by adjusting X-ray screening system parameters and throughput during baggage screening to increase overall security system efficiency.

Prior Year Key Events

- Initial work on the collection of a broad range of threat signatures and initial baggage data for vendor evaluation has begun within the framework of other existing EXD and TSA project areas. It is expected that in 2014, initial capability review will be completed.

Current Year Key Events

- Develop a new start pitch to drive a targeted BAA. For the development of this BAA, this effort may be combined with other algorithm development target areas to become a more comprehensive algorithm development solicitation.

Budget Year Key Events

- None

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|------|-------|-------|
| N/A | N/A | N/A | N/A | 6,600 | 3,500 |

High Resolution Explosives Trace Detectors

- *Problem:* Current bench-top Explosive Trace Detectors (ETDs) have a limited ability to expand their threat detection capability, or decrease processing time without substantial performance penalties. Current Ion Mobility based systems lack the inherent sensitivity to expand the library of trace explosives, and detect lower concentrations of explosives.
- *Solution:* Develop next generation ETDs with improved threat detection capabilities to enhance detection capability and screening throughput.

- *Impact:* This project will provide TSA and other DHS Components with the ability to broaden their threat detection capabilities and increase screening throughput for primary and secondary screening operations.

Prior Year Key Events

- None

Current Year Key Events

- Release of BAA 13-03 to begin multiple 1-3 year projects for the development of next generations desktop and portable ETDs.

Budget Year Key Events

- Completion and delivery of Retrofit ETD prototype.
- Develop next generation desktop ETDs through CDR.
- Develop next generation desktop ETDs through critical design review (CDR).
- Develop next generation portable ETDs through CDR.
- Completion and delivery of next generation desktop ETDs prototypes.
- Completion and delivery of next generation portable ETDs prototypes.
- Completion of advanced detection tools and methods Government testing and evaluation.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|------|------|--------|--------|
| 2,872 | 5,612 | N/A | 587 | 12,100 | 16,300 |

Integrated Passenger Screening Systems

- *Problem:* Current Advanced Imaging Technology (AIT) for personnel screening have limited throughput and deployment options due to the mode of operation and the physical system size and cost. Current AIT systems require full divestiture of shoes and personal items due to their creating high-false alarms, therefore screening time is slowed and passengers are inconvenienced. The AIT system’s large size and lack of modularity prohibits efficient deployment at highly congested tier 1 airports in floor space that could be repurposed for additional checkpoint screening lanes.
- *Solution:* Modular, flat panel AIT solutions provide a less expensive, more flexible solution for screening of personnel and potentially reduce the need for divestiture by allowing some passengers to keep their shoes on during screening. Application of innovative compressive measurement techniques and advanced antenna components along with agile multi-band imaging will provide higher imaging resolution and screening throughput while reducing system architecture complexity and product cost.
- *Impact:* Flat panel AIT solutions provide higher throughput screening of personnel at reduced cost. Inexpensive, modular flat panel AIT systems will enable widespread deployment and improved threat detection capability at lower false alarm rates thereby reducing airport operational costs. Reduced divestiture will lessen passenger inconvenience and speed throughput.

Prior Year Key Events

- Duke University meta-materials program develops fundamental experimental and theoretical principals to enable technology.

Current Year Key Events

- New start brief with HSARPA Front Office.

Budget Year Key Events

- Development of flat panel AIT systems with integrated shoe screeners through critical design phase as part of Duke University metamaterials program.
- Broad Area Announcement solicitation release. BAA funds vendor based system development teams and will build on current EXD project activities with PNNL and Duke University building technical capability to support the solicitation.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|------|-------|--------|--------|
| 4,308 | 1,117 | N/A | 1,202 | 15,533 | 19,250 |

Mass Transit

- *Problem:* Current security capabilities for screening of people, vehicles, and baggage in mass transit environments are extremely limited. The mass transit end-user community has unique requirements for an open system with no fixed checkpoints, extremely high throughput, and an unalterable existing infrastructure within which technologies for explosives detection must fit necessitates a dedicated program to address this significant vulnerability to terrorist attack.
- *Solution:* Develop intelligent video capabilities to automatically detect and rapidly assess leave behind packages, continue the evaluation of advanced security technologies for mass transit applications, provide the mass transit end-user community with a layered and integrated capability to detect and mitigate the explosive threat, and develop a system capable of detecting Person-borne and Leave-behind Improvised Explosive Devices (IED) in a mass transit environment during rush hour without impeding passenger throughput.
- *Impact:* Program will develop next generation security technology requirements for mass transit systems, assessments of security technology for mass transit applications, development of low cost security solutions for mass transit. The result will address a critical vulnerability for which there is currently no viable, affordable solution for the mass transit end-user community.

Prior Year Key Events

- Developed enhanced video camera software for leave behind detection on mass transit rail platforms to the preliminary design phase.
- Performed assessment of sources of false alarms in commercial off of the shelf (COTS) handheld detection systems in operational mass transit environments.

Current Year Key Events

- Delivery of Sensor Integration Analysis field test report.
- Demonstrate advanced leave-behind detection software in operational mass transit environment.

Budget Year Key Events

- Delivery of Intelligent Video Analytics final report.
- Delivery of integrated sensor suites final report.
- Test stand-alone sub-millimeter wave (MMW) system in TSA sponsored mass transit test beds.
- Initial demo of leave behind package detection software in operational environment.
- Assess emerging technologies for potential application within integrated layered detection system architecture for subway rail passenger screening operations.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|--------|--------|--------|--------|-------|-------|
| 25,011 | 23,400 | 15,750 | 14,261 | 9,400 | 5,600 |

Next Generation Passenger Checkpoint Technologies

- *Problem:* Current aviation checkpoints lack technologies with enhanced threat detection performance that will reduce false alarm rates due to an increased volume of travelers, as well as screen for an expanding number of threats. Technology advances are required to meet TSA increased detection requirements as well as the changing TSA checkpoint functional and operational requirements.
- *Solution:* Develop new personnel and carry-on baggage screening technologies to improve detection capability, minimize checkpoint footprint, increase passenger throughput while maintaining or improving life cycle costs.
- *Impact:* The checkpoint will be an interoperable system that allows Transportation Security Officers (TSOs) to screen passengers for threats concealed on the passenger, and/or in carry-on items in a faster and more efficient method while increasing operational effectiveness, increasing passenger throughput from 180 to 210 passengers per hour, and decreasing traveler stress at the checkpoint by allowing passengers to retain outer wear and shoes.

Prior Year Key Events

- Delivered prototype handheld trace detection system.
- Developed next generation X-ray screening systems for the detection novel explosives in carry-on baggage through the preliminary design phase.
- Evaluated prototype portable personnel screening systems.
- Completed development of walk through AIT to preliminary design phase.

Current Year Key Events

- AT screening demonstration.
- Deliver the Department of Homeland Security (DHS) Explosives Detection Images Database Final Report.
- Deliver AT remote screening ConOps Final Report.

Budget Year Key Events

- K-band field prototype demonstration.
- Deliver sensor test bed hardware, documentation, software, and test reports.
- Hold W-band metrics review.
- Deliver low rate initial production (LRIP) metamaterials units.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|--------|--------|--------|-------|
| 4,615 | 4,038 | 15,732 | 18,080 | 19,045 | 8,000 |

Screener Training and Selection

- *Problem:* Current methods, tools, and technologies used by Transportation Security Officers (TSOs) at operational screening checkpoints result in more than 84,876,000 searched items taking more than 3,536,500 man hours annually. There is a need to provide new screener training and selection methods and tools to increase operational security and efficiently. Current training evaluation methods are unable to identify root causes of performance errors and do not leverage the latest research developments and technology innovations.

- *Solution:* A protocol analysis on high performing TSOs was conducted to identify cues, techniques, methods, and strategies related to X-ray imagery analysis that were consistently used by the highest of these top performers. In this effort, the resultant training material developed for Improvised Explosive Devices (IEDs) and IED components will be evaluated to determine the impact of the new training system/procedures/methods through a Training Effectiveness Evaluation (TEE) in the field with current TSOs.
- *Impact:* Implementing the training materials from the best practices of TSA’s best screeners will make screening operations more effective and efficient by lowering secondary screening rates at checkpoints and increasing checkpoint throughput, thereby saving TSA money and lowering wait times for the traveling public.

Prior Year Key Events

- Draft Training Material on Improvised Explosive Devices (IEDs) and IED components were piloted.

Current Year Key Events

- Enhance X-ray skills threat detection instructional framework.
- Develop comprehensive test plan outlining experimental design, procedures, and planned analyses.

Budget Year Key Events

- Develop and execute field validation of image based training solutions.
- Deliver Final Technical Report.
- Transition training materials and train trainers.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|------|------|------|
| N/A | N/A | N/A | N/A | 501 | 500 |

Stand-off Trace Detection

- *Problem:* Federal Protective Service (FPS) has an operational requirement to detect explosives on vehicles and people prior to entry into Federal facilities. Portable ETDs are expensive, labor intensive, and require too much time to screen each vehicle and individual without impacting throughput. Therefore, a layered, high-throughput, screening capability for vehicles, people, and personal items is needed to provide more time for security response in buildings and other public venues.
- *Solution:* Develop an effective stand-off explosives trace detection system that will allow the implementation of a more efficient, layered stand-off security system.
- *Impact:* A stand-off explosives trace detection system would enable 100% screening of vehicles and people for the detection of potential explosives threats and weapons which would significantly improve security response effectiveness.

Prior Year Key Events

- Completed initial capabilities assessment for existing standoff trace explosives detection equipment.
- Developed standalone prototype standoff explosives trace detections systems for personnel screening to preliminary design review.

Current Year Key Events

- Complete EOS Photonics Widely Tunable Infrared Source (WTIRS) preliminary design review (PDR).
- Complete Maxion WTIRS PDR.
- Complete EOS Photonics WTIRS critical design review (CDR).
- Complete Northwestern University WTIRS PDR.
- Complete Maxion WTIRS CDR.
- Delivery of standoff quantum cascade laser final report.
- Develop new start” pitch for Vehicle Eye-Safe Trace (VEST).

Budget Year Key Events

- Complete Corning WTIRS PDR.
- Complete Northwestern University WTIRS CDR.
- Complete Corning WTIRS CDR.
- Delivery of EOS Photonics WTIRS Prototypes.
- Delivery of Maxion WTIRS Prototypes.
- Complete Vehicle Eye-safe Trace (VEST) concept readiness review.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|------|-------|-------|
| N/A | N/A | N/A | 571 | 6,300 | 7,200 |

Counter Terrorist – FY 2014: \$76.631 million. FY 2015 Request: \$64.650 million. The S&T Directorate invests in the R&D technologies, methods, and procedures to counter terrorists. Efforts include R&D to identify individuals or groups that intend to conduct terrorist attacks or to illicitly move weapons, dangerous goods, and contraband. It also includes providing threat assessments of the high-consequence attack methods such as CBE that terrorists may use to attack the Nation.

Bioagent Threat Assessment – FY 2014: \$31.600 million. FY 2015 Request: \$26.000 million. This program addresses biological and agricultural knowledge gaps and develops defensive strategies to counter potential threats. It also supports a full spectrum of knowledge products (e.g. reports/studies) to better inform policy makers on the attributes, risks, and consequences associated with the intentional release of a biological or agricultural (livestock) agent.

Biodefense Knowledge Center (BKC)

- *Problem:* Customers from around the Homeland Security Enterprise require vetted information, knowledge and expertise to help them make decisions that involve biological sciences and bio-threats. HSE customers’ information and decision needs vary considerably across DHS Components, multiple Federal agencies, and State/local agencies.
- *Solution:* The BKC is an enduring DHS center of expertise and products that bridge science, technology, intelligence, health threats, and law enforcement. BKC provides customer requested bio-threat and science assessments as well as in-depth analyses of biodefense issues and biotechnologies. Its key assessments and analytical products include: biological threat agent Fact books; material threat assessments; a Biodefense Knowledge Management System which extracts and develops information for multiple Federal, state, and local users.
- *Impact:* The Biodefense Knowledge Center increases the awareness and understanding of biological threats across the Homeland Security Enterprise at multiple levels of classification. This project increases the probability of preventing and minimizing the impact of biological threat attacks.

Prior Year Key Events

- Updated Biothreat Agent Fact book (to include plant pathogens as well as a classified version).
- Increased scientific and sensitive holdings for Biodefense Knowledge Management System.
- Delivered BKMS to a subset of State/Local Fusion Centers.

Current Year Key Events

- Deliver upgraded Biodefense Knowledge Management System with user community data and finalize hosting of historical biological data for community access.
- Roll-out BKMS to intelligence analysts at fusion centers from two Homeland Security Intelligence Network regions (comprising 15 states total).
- Publication of classified BioAgent Fact book (electronic publication only).

Budget Year Key Events

- Deliver three Material Threat Assessments v2 requested by customers within Integrated Product Team.
- Deploy BKMS to intelligence analysts at fusion centers at remainder of Homeland Security Intelligence Network regions (all 50 states plus 22 metropolitan areas).

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|--------|-------|-------|-------|-------|-------|
| 10,799 | 4,800 | 1,600 | 5,433 | 6,000 | 6,000 |

Biodefense Net Assessments

- *Problem:* The United States requires a periodic, senior-level policy net assessment that evaluates progress in implementing biodefense policy (as outlined in Homeland Security Presidential Directive [HSPD]-10). This project works with the Homeland Security Enterprise (HSE) to identify continuing gaps or vulnerabilities in our Nation’s biodefense posture, and makes recommendations for re-balancing and refining investments among the pillars of our overall biodefense architecture.
- *Solution:* On an annual basis, strategic and topical assessments are conducted using subject matter experts (SME) from government, academia, and private industry to support ongoing and future biodefense programs, policies, and operational activities across the HSE. A panel of SMEs and senior government officials from the HSE propose and prioritize a set of timely, actionable topics for analysis.
- *Impact:* A group of vetted experts in the field develops the assessments, which are then provided to HSE stakeholders to input into their annual program planning process to strengthen the overall biodefense posture of DHS.

Prior Year Key Events

- Examined alternative approaches to assess the risk posed by bioterrorism and determined that the currently used probabilistic risk assessment (PRA) approach is the most appropriate for continued use in prioritizing biodefense programs and policies.
- Assessed unclassified aspects of the historical offensive biological weapons program to determine if there were any key threats or vulnerabilities available to the public that should be incorporated into the bio-risk picture.

- Examined classified reports from the historical offensive weapons programs to determine if any data gaps could be addressed by information not yet incorporated into the bioterrorism risk assessment.

Current Year Key Events

- Deliver three studies pertinent to chemical and biological defense strategy, customer/stakeholder engagement and future investment planning.
- Deliver final proceedings resulting from BNA senior expert panel meetings to stakeholders for integration into the respective strategic biodefense program plans.

Budget Year Key Events

- Deliver four targeted analytical studies specific to biodefense concern areas defined by BNA senior subject matter expert panel and released to key stakeholders.
- Deliver updated chemical and biological defense strategic documentation for internal program planning.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|------|------|------|------|-------|
| 1,851 | 500 | N/A | 993 | 727 | 1,000 |

Biothreat Characterization (BTC)

- *Problem:* There is a need to improve the Homeland Security Enterprise’s (HSE) estimation of the impacts of a bioterrorism attack on the U.S. through experimental research and analysis to understand the critical physical, chemical, and physiological parameters associated with potential bioterrorism agents.
- *Solution:* The BTC projects provides knowledge products (technical reports) generated through laboratory experiments to understand the critical physical, chemical, and physiological parameters associated with potential bioterrorism agents that are made available to the BTRA modeling community as a source of input in their assessment of risk uncertainty.
- *Impact:* The Biothreat Characterization project establishes and leverages innovative science-based capabilities to provide the HSE with data and knowledge products which improve pre-event planning and event-specific operational decisions. BTCP provides the knowledge products and capabilities required for effective preparedness & response to current and future biological threats.

Prior Year Key Events

- Fully registered ABSL/BSL-3 & ABSL/BSL-4 laboratories.
- Expanding set of capabilities including aerobiology, comparative medicine, synthetic genetics, and production/formulation capabilities.
- Published reports addressing key knowledge gaps related to differential yields, losses and stability of in-vivo and culture-produced agents; the relative stability of toxin serotypes; the feasibility of using improvised dissemination devices with traditional agents; and the stability of rickettsia, including the development of a unique assay to test for viability.

Current Year Key Events

- Lead development of Interagency and International requirements for biological threat characterization.
- Develop plans and experimentation to address top five traditional biological key threat-related knowledge gaps identified by stakeholders to provide actionable information on agent

characteristics such as the environmental decay of aerosolized spores and viruses; the differential virulence and pathogenesis of vegetative-contaminated spore preps; the survival of deposited agents on operationally-relevant surfaces; and the development of a BSL-3 rotating drum for long-duration environmental decay studies.

- Develop aerosol operational capability to characterize vulnerabilities associated with identified threats capable of analyzing from BSL-3 and BSL-4 agents.

Budget Year Key Events

- Develop plans and establish experimentation to address top ten traditional biological threat-related knowledge gap requirements identified by stakeholders to provide actionable information.
- Develop bacteriology capability to characterize vulnerabilities associated with newly identified threats.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|--------|--------|-------|--------|--------|--------|
| 27,726 | 17,500 | 8,000 | 12,247 | 14,000 | 11,400 |

Bioterrorism Risk Assessment (BTRA)

- *Problem:* Homeland Security Presidential Directive 10 directs the need for the comprehensive computational analysis program to help inform investments for national strategic biodefense planning, while identifying key knowledge and capability gaps and also evaluating critical vulnerability mitigation strategies.
- *Solution:* This project is responding to the needs of interagency partners by enhancing reliance on national strategic guidance to frame the problem space; redesigning the analytic process to ensure maximal partner input; and refining, updating, and validating BTRA models. An important evolution in this process is the development of a Countermeasure Assessment and Planning Tool, which will inform assessment of the relative importance and value of various defensive options (e.g., detectors, medical countermeasures, etc.) to reduce risk associated with bioattack scenarios. A variety of rapid analysis tools are being developed to allow users to explore a variety of CONOPS and make judgments regarding which scenarios merit further investment.
- *Impact:* This project informs decision-making and shapes resource allocations across Federal agencies through the development and execution of a probabilistic risk assessment and alternative methodologies for comparison and verification. These risk assessments integrate the judgments of the intelligence and law enforcement communities (threat) with input from the scientific, medical, and public health communities to estimate the probability of an attack occurring and the consequences of an attack.

Prior Year Key Events

- Revised project execution in response to stakeholder input (yielding a project with enhanced ability to provide analysis impactful to stakeholders’ missions and strategic objectives), and initiated process to collect stakeholder requirements for the next assessment.
- Incorporated stakeholder suggestions for changes to models (e.g. development of new tools, including b-CAPT, the Countermeasure Assessment and Planning Tool) and initiated model and data vetting (approval) effort with stakeholders.
- Developed model that allows one to ground truth outdoor aerosol casualties proposed by other models.

Current Year Key Events

- Gather, incorporate, and vet suggested changes for alternative data and models (including Bioterrorism Countermeasure Assessment and Planning Tool) with stakeholders.
- Gather requirements from external and internal stakeholders for next generation BTRA.
- Conduct SME elicitation of law enforcement, intelligence, and operational communities to obtain data that is current of the current threat picture.

Budget Year Key Events

- Release beta-version of b-CAPT (the Countermeasure Assessment and Planning Tool) for pilot testing with three to four Federal Agency partners.
- Develop tailored interim assessments (to be published 2014-2016, as completed) that address stakeholder requests. The interim assessments will be subcomponents of the more comprehensive Bioterrorism Risk Assessment (BTRA) report (BTRA 5.0).
- Gather requirements from external and internal stakeholders for next generation BTRA, by taking an agent agnostic approach to capture risks associated with unknown and emerging threats, and to develop a robust adaptive adversary model.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|-------|-------|-------|-------|
| N/A | N/A | 2,500 | 2,485 | 4,073 | 3,800 |

Integrated Terrorism Risk Assessment (ITRA)

- *Problem:* HSPD-18, requires the Secretary of Homeland Security to “develop a strategic, integrated all-CBRN risk assessment that integrates the findings of the intelligence and law enforcement communities with input from the scientific, medical, and public health communities.”
- *Solution:* This project supports national preparedness initiatives by providing a systematic, scientifically-defensible integrated CBRN terrorism risk assessment product that provides insights into likelihoods, consequences, and relative risks of terrorism, which complements the individual class-specific terrorism risk assessments.
- *Impact:* The Integrated Terrorism Risk Assessment informs resource allocation for medical countermeasures and will be used by a broader range of Federal decision makers to support development of risk management strategies that have tangible operational impact on cross-CBRN terrorism risk such as prevention, protection, mitigation, surveillance and detection, and response and recovery activities.

Prior Year Key Events

- Developed risk informed planning scenarios for FEMA and state and local first responders to aid them in establishing CONOPS for specific emergency situations.
- Verified 2011 Integrated CBRN Terrorism Risk Assessment software code in response to external review and to build stakeholder confidence in the models.
- Presented Risk Informed Resource Allocation Study for the Strategic National Stockpile (SNS) to inform priorities for Medical Countermeasures procurement.

Current Year Key Events

- Finalize risk informed study for Strategic National Stockpile (SNS) for use in establishing resource allocation priorities in determining the Stockpile’s makeup .
- Complete draft of the ITRA 3.0 for release to key stakeholders with harmonized event tree across CBRN probabilities. Implement adaptive adversary in TRA risk model in response to external review and to build stakeholder confidence in the models.

Budget Year Key Events

- Finalize comprehensive model updates to include public health response model, economic impact, food, water, indoor and outdoor release, and initiate building an integrated Countermeasure Assessment and Planning Tool (i-CAPT).
- Gather requirements from external and internal stakeholders for next generation ITRA to target analysis with outputs that comprise greater relevance to stakeholder mission objectives.
- Deliver comprehensive 2015 Integrated Terrorism Risk Assessment, in addition to including the above updates along will feature an enhanced Intel elicitation.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|-------|-------|-------|-------|
| N/A | N/A | 2,500 | 2,489 | 3,800 | 3,800 |

Chemical Threat Assessment – FY 2014: \$7.000 million. FY 2015 Request: \$7.000 million. This program researches and identifies current and potential chemical threats to understand the risk posed to the United States by their illicit use. This program encompasses risk-based, chemical threat agent characterization programs, domestic defense strategic planning, and analytical technologies, strategies, and procedures.

Chemical Security Analysis Center (CSAC)

- *Problem:* The need exists for a single centralized repository of chemical threat information (hazard and characterization data) for analysis of the Nation’s vulnerabilities to such chemical events to serve key customers.
- *Solution:* The Chemical Security Analysis Center (CSAC) conducts key analytical assessments, including hazard assessments and Material Threat Assessments (MTAs), and the Chemical Terrorism Risk Assessment. In addition, CSAC is funded to develop knowledge management capabilities such as the chemical knowledge management system, the CARD (chemical agent reactions database), and several other user-specific electronic libraries. This project will also identify, finalize, and secure the selection of a test site for a robust analysis of chlorine tank release (known as Jack Rabbit II).
- *Impact:* CSAC serves key customers such as NPPD, Office of Health Affairs (OHA), TSA, and I&A within DHS, as well as several Interagency partners. CSAC is the Nation’s first and only Federal studies, analysis, and knowledge management center for assessing the threat or hazard associated with an accidental or intentional large-scale chemical event in the American homeland.

Prior Year Key Events

- Transition of chemical threat knowledge information and products to the operational and policy community by addressing 75 Reach back queries to 13 Government organizations and maintaining the CSAC website, making available 195 DHS reports and over 1500 reports from the Interagency library.
- Implemented a detailed reaction pathway search algorithm for the CARD (or Chemical Agent Reactions Database), specifically requested by and relevant for FBI/IC “attribution” searches.
- Completed development of the CTRA Desktop Tool.

Current Year Key Events

- Deliver v2.0 of the CTRA Desktop Tool.

- Conduct three detailed risk analyses using the Chemical Terrorism Risk Assessment: 1) Mitigation techniques; 2) Application of Detectors for various scenarios; and 3) Food Sensitivity.
- Develop the Test Execution Plan for the Jack Rabbit II Field Trials.
- Complete market survey and analysis of computational toxicology software, methodologies, and the use of in vitro studies to support this approach.

Budget Year Key Events

- Deliver v2.0 of the CARD (Chemical Agent Reactions Database) system, incorporating requirements from the FBI chemical forensics program.
- Conduct 1-2 detailed risk analyses identified by stakeholders, using the Chemical Terrorism Risk Assessment.
- Conduct Phase I of Jack Rabbit II Field Trials.
- Develop Computational Toxicology Methodology for key toxidromes.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|-------|-------|-------|-------|
| 4,762 | 4,638 | 4,000 | 5,250 | 7,000 | 7,000 |

Explosives Threat Assessment – FY 2014: \$16.000 million. FY 2015 Request: \$14.100 million. This program researches and identifies current and potential explosive threats to understand the risk posed to the United States, strengthens aviation security by bolstering the international aviation security system, improves security processes and technologies, and encourages partnerships with industry. It encompasses risk-based threat characterization, attribution, strategic planning, prediction of magnitude of explosive disasters, and analytical technologies, strategies, and procedures.

Aircraft Vulnerability

- *Problem:* Vulnerability of the wide variety of commercial aircraft types (e.g., wide body, narrow body, regional jet) to the broad range of conventional and emerging Improvised Explosive Device (IED) threat configurations is not thoroughly understood and/or characterized, including blast effects vulnerability of new composite aircraft structures currently entering the civil transport fleet (e.g. Airbus A380, A350, Boeing B787).
- *Solution:* Identify the minimum size of the explosive threat that would result in catastrophic aircraft loss if undetected, and develop commercial aircraft blast mitigation technology that will provide protection to commercial aircraft from explosive threats that fall outside the range of current Explosive Detection Systems (EDS) capabilities.
- *Impact:* Commercial aircraft vulnerability data collected under this project will be used by TSA to validate and refine explosives detection standards for checkpoints, checked luggage and air cargo. TSA will ensure that EDS threat mass detection thresholds are sufficient to prevent introduction of explosive threats onboard the aircraft, that would otherwise result in catastrophic aircraft loss if detonated during operational flight

Prior Year Key Events

- Commenced cost benefit analysis of Hardened Unit Load Device technology for TSA.
- Evaluated blast protection capability of reduced threat composite Hardened Unit Load Device (HULD-R) prototype for explosive threats in air cargo contents.
- Conducted initial live fire testing to evaluate effectiveness of Modified Least Risk Bomb Location (M-LRBL) procedure for TSA.

- Completed evaluation of Tail Cone Exit Aircraft (e.g., DC9, MD80/88, B717) Least Risk Bomb Location (LRBL) procedures for TSA

Current Year Key Events

- Deliver Hardened Unit Load Device-R (HULD-R) prototypes.
- Deliver Commercial Aircraft Vulnerability Report, Boeing 737 Explosive Vulnerability Testing.
- Deliver HULD-A prototype.
- Evaluate blast mitigation capability of composite Hardened Unit Load Device prototypes (HULD-R and HULD-A variants) to IED threats in checked passenger luggage and air cargo contents.
- Deliver Hardened Unit Load Device (HULD) cost benefit analysis report and analysis tool to TSA.

Budget Year Key Events

- Deliver updated DHS SharePoint-based Explosive Testing Database (ETDB) to TSA.
- Conduct explosive testing on primary structure composites used in new commercial aircraft designs (e.g. B787, A380, A350) and deliver initial report on improvised explosive device (IED) blast effects on commercial aircraft composite design vulnerability.
- Deliver Wide Body Commercial Aircraft Vulnerability Report, Boeing 767 Explosive Vulnerability Testing.
- Conduct testing of Modified Least Risk Bomb Location (M-LRBL) procedure on Wide Body Commercial Aircraft and deliver report.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|------|-------|-------|-------|
| 2,256 | 1,219 | 700 | 1,242 | 1,750 | 1,750 |

Home Made Explosives Characterization

- *Problem:* Lack of explosives chemical signature data will hinder the success of proposed or future DHS explosives detection technology due to the millions of chemical combinations to create explosives.
- *Solution:* Provide Home Made Explosives (HME) signature data to TSA for checked baggage systems to support vendor development of HME detection capabilities in commercial screening systems for X-ray based baggage inspection, trace detection systems, and personnel screening systems.
- *Impact:* Direct support for deployment of enhanced improvised explosive threat detection capabilities.

Prior Year Key Events

- Delivered explosives characterization data on improvised nitrate-based explosives to TSA.
- Delivered X-ray detection signatures on four additional HMEs threats and eight precursor materials to TSA.
- Delivered trace detection signatures on four additional HME threats to TSA.

Current Year Key Events

- Delivery of PETN explosive characterization report.
- Delivery of chlorates/fuel explosive characterization report.
- Delivery of hydrogen peroxide/foodstuffs explosive characterization report.
- Characterized the chemical, physical, and explosive properties of HME's and reported the findings to TSA and other interagency partners.

- Terrorist Explosive Device Analytical Center's (TEDAC) Improvised Explosives Detection and Synthesis (TIEDS) Laboratory Built.
- Delivered new HME detection windows to TSA for incorporation into existing and future bulk and trace explosives screening systems.

Budget Year Key Events

- Characterize the chemical, physical and explosive properties of HMEs and report findings to TSA and interagency partners to support requirements development.
- Deliver new HME detection windows to TSA for incorporation into existing and future bulk and trace explosives screening systems.
- Delivery of nitrated sugars characterization report.
- Delivery of select Liquid, Military, and HME explosive data to the TSA Rapid Algorithm Development program.
- Start of explosive performance signature collection effort in conjunction with the DOJ.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|-------|--------|--------|--------|
| 3,385 | 8,077 | 9,000 | 13,787 | 10,850 | 10,350 |

Risk Prediction

- *Problem:* Approximately 400 million people, 123 million land vehicles, and 9 million sea containers entering the United States annually. The challenge is to identify threats prior to United States entry without negatively impacting travel and commerce.
- *Solution:* S&T is developing technologies to increase the accuracy of Customs Border Protection's automated passenger and container targeting processes and to decrease the time required for analysts to adjudicate the risk.
- *Impact:* Increased effectiveness through higher targeting accuracy and increased efficiency through reduced time to adjudicate passenger and container risk.

Prior Year Key Events

- Transitioned automated threat detection software to CBP to reduce the time required for CBP analysts to adjudicate Automated Targeting System (ATS) risk scores for air passenger by a factor of ten.

Current Year Key Events

- Transition threat characterization report.

Budget Year Key Events

- Transition automated threat detection software to CBP to reduce the time required for CBP analysts to adjudicate Automated Targeting System (ATS) risk scores for land passenger and sea cargo by a factor of ten.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|------|-------|-------|-------|
| 6,051 | 4,631 | N/A | 2,344 | 3,400 | 2,000 |

Hostile Behavior Predict and Detect - FY 2014: \$11.531 million. FY 2015 Request: \$9.200 million. This program leverages social and behavioral science research, data, and theory to understand the

determinants and timing of group conversions to terrorism and the intent to engage in violence. Knowledge from this program informs analytical, operational, and policy concerns related to terrorists and terrorist activities. This program also develops and builds the capability to noninvasively detect suspicious behavior that indicates the intent to cause harm.

Actionable Indicators and Countermeasures

- *Problem:* The United States has been attacked by violent extremists over 2500 times since 1970. Analyses of extremist violence based on a limited number of case studies, and the effectiveness of programs developed to counter violent extremism is often not clear.
- *Solution:* S&T will collect and analyze data on extremist violence in the U.S., measure the impact of Countering Violent Extremism (CVE) programs, and develop tools to support policymakers and practitioners in their efforts to counter violent extremism.
- *Impact:* New capabilities will support more efficient and accurate analysis of the threats posed by violent extremists and evidence-based CVE policies and programs.

Prior Year Key Events

- Delivered reports on surveys of public attitudes towards violent extremism and support for efforts to counter it.

Current Year Key Events

- Deliver reports on factors that influence terrorist disengagement, re-engagement, and recidivism.

Budget Year Key Events

- Deliver integrated database to support analysis of violent extremism in the United States at the incident, perpetrator, and geospatial levels.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|------|-------|-------|-------|
| 1,846 | 3,708 | N/A | 1,277 | 1,001 | 1,000 |

Hostile Intent Detection and Surveillance

- *Problem:* Approximately 1.2 million passengers fly within the United States daily with a projected increase of approximately four percent per year. With passenger volumes increasing, the challenge is to increase the scale and accuracy of the existing screening processes while continuing to secure aviation and ground transportation portals without an attendant increase in the number of screening personnel.
- *Solution:* S&T will develop technologies to increase the scale of the operational components’ screening process to accommodate higher passenger volumes, extend observation/screening area to include the entire portal, and increase screening accuracy.
- *Impact:* Increased efficiency and effectiveness through screening higher passenger volumes with fewer operational personnel (force multiplier) and increased screening accuracies.

Prior Year Key Events

- Identify potential video test bed.
- Conduct pilot experiment to assess the viability of replicating suspicious behaviors to support Go/No Go experimental milestones.

Current Year Key Events

- Risk reduction demonstration/pilot to be conducted at the Transportation Security Administration’s Systems Integration Facility (TSIF).
- Deliver market survey of video tracking software.
- Establish video test bed operational partner.
- Release competitive Broad Agency Announcement (BAA).

Budget Year Key Events

- Deliver report on the feasibility of video-based versus direct-based suspicious behavior detection.
- Conduct analysis and provide a report on the outcomes of the risk reduction demonstration/pilot at the TSIF.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|--------|--------|------|-------|-------|-------|
| 16,026 | 12,280 | N/A | 2,644 | 4,950 | 5,700 |

Insider Threat Detection

- *Problem:* There is limited understanding of the current research base which could be used to recognize the most feasible approaches to identify potential insider threats; conduct comparative analyses of existing and emerging technological approaches to detecting potential insider threats; and developing a fully-informed research agenda to develop and evaluate insider threat detection software.
- *Solution:* Identify and evaluate the feasibility and growth potential of existing and emerging research approaches; establish the performance baseline of threat detection software; draft an experimental plan leveraging the results of the literature review and market survey to establish a feasible research, development, and evaluation plan to support the speed and accuracy requirements of DHS’s operational screening environment.
- *Impact:* A relatively modest investment directly and simultaneously addressing several priority and focus areas articulated in the three R&D strategies signed to date for four key DHS constituencies: U.S. Secret Service; Transportation Security Administration; Federal Protective Service; and the General Services Administration.

Prior Year Key Events

- None

Current Year Key Events

- None

Budget Year Key Events

- Identify and evaluate the feasibility and growth potential of existing and emerging research approaches; establish the performance baseline of threat detection software; and develop one or more research and experimental plans to develop and evaluate insider threat detection software.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|------|------|------|------|------|
| 1,185 | N/A | N/A | N/A | N/A | 500 |

Risk-based Resource Deployment Decision-aid (R2D2)

- *Problem:* The Transportation Security Administration employs risk-based, intelligence-driven operations to prevent terrorist attacks and to reduce the vulnerability of the Nation’s transportation system to terrorism. TSA's security resources require proper allocation to create a multi-layered system of transportation security that mitigates risk and, the Federal Air Marshal Service (FAMS) requires that system to allocate its limited resources to the highest risks as the last line of defense for air, rail, subway, and water security transportation modes.
- *Solution:* R2D2 integrates multi-modal threat forecast algorithms that combine infrastructure vulnerability and consequence to the Nation into a single, interactive, visually intuitive risk assessment tool that dynamically communicates the highest, current transportation risk for TSA operations to allocate resources to counter the risk.
- *Impact:* R2D2 provides the needed risk assessment in an operationally timely fashion to enable TSA/FAMS operations personnel to assign Federal Air Marshals, and other TSA resources, to the highest transportation risk. The R2D2 solution addresses and aligns with TSA’s policy to continue employing risk-based, intelligence-driven operations to prevent terrorist attacks.

Prior Year Key Events

- Conduct an inventory of risk analysis tools that are in use by FAMS for resource allocation.
- Engaged FAMS to develop Concept of Operations for R2D2.

Current Year Key Events

- Finalize ConOps of the FAMS current resource deployment.
- Develop R2D2 technical architecture.
- Implement R2D2 Version 1.

Budget Year Key Events

- Develop integration architecture to combine selected analytic technologies with data sharing middleware.
- Incorporate requirements collected from end-users to design an end-user interface.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|------|-------|------|
| N/A | N/A | N/A | 277 | 1,200 | 500 |

Wide Area Surveillance

- *Problem:* During emergency operations, useful information to guide emergency managers and to inform forensic investigators usually exists in some form in the imagery records of multiple cameras but its value is perishable. To be useful, imagery is collected, compiled, and analyzed in a readily accessible form that enables timely action to save lives, care for the afflicted, and prevent further damage. Currently, efficient collection, sharing and analysis of video data is impeded by many factors such as resolution, standards, format, camera hardware, software limitations, video management system incompatibilities, and limited video analytic capabilities.
- *Solution:* This project will leverage advances in video analytic technologies to develop an overall architecture that will integrate disparate pictures and video to enable the local users to sort through a myriad of elements in the integrated imagery to isolate key indicators of events, for example post event tracking of suspects and the damage. S&T will develop the open video management system architecture and standards to support integration of third-party video analysis tools, easy system adaptability, and built-in mechanisms for sharing and analyzing city-scale data.

- *Impact:* This project will result in significantly improved large-scale video data integration, access, and analysis for major incidents. It also allows for routine use to help first responders approach disaster scenes and forensic investigators collect physical evidence to identify the scale of the event and, in the case of a terrorist event, the sophistication and type of the attack vector.

Prior Year Key Events

- Conducted Imaging System for Immersive Surveillance (ISIS) demonstration for the Boston Police Department at July 4th celebration.

Current Year Key Events

- Identification of commercial partner for ISIS transition.
- Acquire data for concept validation.

Budget Year Key Events

- Production of ISIS prototype units.
- Initial concept demonstration of large scale video data analysis.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|------|------|-------|-------|
| 3,500 | 2,500 | N/A | 90 | 2,000 | 1,500 |

Identity Management Program FY 2014: \$10.500 million. FY 2015 Request: \$8.350 million. This program researches and develops biometrics-based technologies, procedures, CONOPS, and information to identify known terrorists and criminals and prevent their movement into and out of the U.S. through effective, interoperable multi-biometrics in diverse areas, including border crossings, ports of entry, and visa application sites.

Biometric Database Interoperability

- *Problem:* Increases in international travel have strained CBP resources, resulting in increased wait times and delays for passengers to clear some Federal Inspection Service areas. In addition, it is a DHS legal requirement to implement a cost-effective biometric exit process to increase CBP’s ability to confirm the identity of persons departing the U.S.
- *Solution:* Analyze current entry operations, and implement technologies and enhancements to existing airport operations to increase CBP’s capability to expedite screening of travelers entering the U.S. In addition, S&T will develop recommended approaches, including technology, for cost-effective and integrated biometric exit capabilities to meet the Congressional mandate for biometric exit. Throughout the project, industry stakeholders will be engaged to understand the challenges and impacts of current operations and proposed changes.
- *Impact:* With S&T’s assistance, CBP will increase its ability to confirm the identity of persons entering and departing the U.S., fulfill its obligation to implement a biometric air exit solution, and ensure that processes are efficient and keep pace with growth in international air travel.

Prior Year Key Events

- Engaged industry stakeholders to discuss project goals, gather operational requirements, and address potential concerns.
- Delivered Survey Methodology for OFO POE Operations Data Collection.
- Completed Test Bed Facility architecture design and engineering drawings.

- Completed eight Airport Operational Surveys and documented findings in an As-Is Operational Survey Report.
- Drafted entry and exit capability gap assessment, and included targeted areas for potential solutions.

Current Year Key Events

- Conduct joint working session with key industry stakeholders to discuss pros and cons of notional biometric exit CONOPs.
- Conduct a biometric technology market survey of initial device capabilities and maturity report.
- Establish Test Bed Capability and Facility.
- Complete iris, fingerprint, and face biometric device laboratory qualification testing.
- Validate biometric air entry/exit CONOPs and technologies with scenario based testing.
- Conduct performance and cost-benefit analysis of biographic and biometric exit.
- Complete airport entry/exit analytical tools and document for transition to CBP.

Budget Year Key Events

- Select biometric technology candidates for field evaluation.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|-------|-------|------|
| N/A | N/A | N/A | 1,458 | 1,200 | 900 |

Cooperative Biometrics

- *Problem:* Biometric collection systems are not intuitive and rely on trained operators to ensure successful collection of usable biometric data.
- *Solution:* Focus on developing biometric collection system interfaces that (1) are more intuitive; (2) accommodate users with disabilities; and (3) reduce reliance on operators to obtain usable biometric information and lower operational costs. Further, enhance signal collection and processing to produce higher quality data will support the achievement of increased matching performance and improve detection of false biometric presentations.
- *Impact:* Reduced operator labor requirements; increased quality of biometric samples; i.e., iris or fingerprint; matching error rates reduced by as much as 50%; and the development of automated signal processing techniques without requiring additional manpower.

Prior Year Key Events

- None

Current Year Key Events

- RSD Office of Border Patrol / Tactical Awareness and Biometrics Build (OBP TABB) Activity Charter signed.

Budget Year Key Events

- Final Technical Specification Document delivered to Customs and Border Protection, US Border Patrol (CBP USBP) for acquisition.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|------|-------|-------|-------|
| 6,282 | 4,658 | N/A | 4,475 | 4,150 | 2,250 |

Non-Cooperative Biometrics

- *Problem:* Due to increasing travel and evolving border threats, there is an identified capability need to assist operations with screening technology to increase efficiency and agent safety by developing technologies to identify non-cooperative individuals.
- *Solution:* S&T will develop technical specifications for biometric systems that identify persons encountered by operational end users. In addition, S&T will evaluate face recognition systems and report on their capabilities in operationally realistic environments.
- *Impact:* Provide component end-users with technical specifications for biometric systems designed to identify persons prior to being processed, increasing security, and promoting agent safety.

Prior Year Key Events

- Privacy Threshold Assessment and Institutional Review Board approval was received for face video collection.

Current Year Key Events

- Collect and ground truth face video data.
- Analyze face video data using vendor algorithms.

Budget Year Key Events

- Video face data collections.
- Report on vendor face recognition algorithm performance.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|-------|-------|-------|
| N/A | N/A | N/A | 1,100 | 2,000 | 3,900 |

Rapid DNA

- *Problem:* DHS Components such as ICE, CBP, USCG, and USCIS require a rapid and low-cost method to verify family relationships is required in the field due to refugee applicants lacking sufficient documentation as well as fraud reduction in other immigration applications.
- *Solution:* Integrate and automate 10 hours of laboratory Deoxyribonucleic Acid (DNA) processes, currently requiring five instruments and a trained technician, into a single field instrument operated by immigration officers that returns results in one hour.
- *Impact:* Refugee applicants can volunteer to be tested on-site proving their family relationships and informing officer responses to interview questions. Rapid-DNA assists legitimate immigration applicants while deterring fraudulent ones while improving officer efficiency and immigration processes.

Prior Year Key Events

- Technology Transition Agreement signed with USCIS Refugee Affairs Division.
- Jointly-funded Rapid DNA prototypes delivered to NIST for laboratory evaluations.

Current Year Key Events

- Extended kinship system ready for commercial product delivery.
- IRB approval for pilot field testing.

Budget Year Key Events

- Pilot field tests with USCIS.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|-------|-------|-------|-------|-------|
| N/A | 3,352 | 1,000 | 2,077 | 2,300 | 1,300 |

Cyber Security/Information Analytics – FY 2014: \$80.254 million. FY 2015 Request: \$77.010 million. Conducts and supports RDT&E and transition for advanced cybersecurity and information assurance technologies to secure the Nations current and future cyber and critical infrastructures. These solutions include user identity and data privacy technologies, end system security, research infrastructure, law enforcement forensic capabilities, secure protocols, software assurance, and cybersecurity education.

Cyber Security Research Infrastructure – FY 2014: \$11.800 million. FY 2015 Request: \$13.200 million. This program provides the infrastructure necessary to support the cyber R&D that is critical for matching the growing and adapting threat. Much like testing for CBE R&D, special testbeds and data sets must be made available to the cyber research community, and unlike CBE, there is not a large selection of facilities or capabilities like missile ranges or BSL-4 labs that can be used to safely test malicious code somewhere other than on the live Internet or on real data.

Experimental Research Testbed

- *Problem:* Due to the increasing sophistication of cybersecurity attacks, it is necessary to test new cybersecurity defenses and research in a repeatable manner at a realistic scale in order to determine the best approach. Furthermore, such research and experimentation must be conducted in a secure environment to allow for testing against “live” threats, without endangering the larger Internet.
- *Solution:* Provide the Defense Technology Experimental Research (DETER) Testbed, which provides a contained “virtual Internet” environment to conduct large scale, repeatable cybersecurity research experiments.
- *Impact:* As the only freely available testbed of this scale, DETER improves attack mitigation and confinement strategies and the quality of new cybersecurity technologies as it is used by hundreds of organizations, including other government agencies, for test and evaluation purposes. Furthermore, DETER is also used as a tool for academia to enhance the educational experience of cybersecurity students, providing a realistic “hands-on” experimentation platform for thousands of university students.

Prior Year Key Events

- Upgraded testbed hardware for “Cloud” like virtualization to dramatically expand experiments conducted in the testbed.

Current Year Key Events

- Extend federation of testbed facilities to support Process Control System focused experiments.

Budget Year Key Events

- Expand experiment and test tools to allow for quicker experimentation cycles and greater insight.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|-------|-------|-------|-------|
| 2,872 | 3,962 | 2,962 | 4,795 | 3,940 | 4,000 |

Research Data Repository

- *Problem:* Without access to large scale, real-world data, cybersecurity technology developers and evaluators often have to determine the value of their technical solutions based on anecdotal evidence or small-scale test experiments.
- *Solution:* Develop and maintain the Protected Repository for the Defense of Infrastructure Against Cyber Threats (PREDICT), the only freely-available, legally and ethically collected, repository of large-scale datasets containing real network traffic and system logs for use by cybersecurity researchers.
- *Impact:* PREDICT is helping users accelerate the design, production, and evaluation of next-generation cybersecurity solutions, including commercial products by allowing solutions to be based on more comprehensive real-world data. Further, PREDICT is improving the ethics of cybersecurity research on a larger scale through the development of an ethics framework and disclosure control principles available to the broader community.

Prior Year Key Events

- New customers and partners were added to the project, including 17 from academia, 21 commercial, 3 foreign, 8 government, and 2 non-profit organizations.
- 97 new datasets were added to the repository.

Current Year Key Events

- Create a program structure to support the cataloging, hosting and/or mirroring of publicly available research grade datasets.
- Develop draft agreement supporting limited trials with several international partner countries.

Budget Year Key Events

- Development of several analytical/policy papers that address fostering Information and Communication Technology Research (ICTR) ethics from principles to practice in the form of IEEE and other community working groups.
- Creation of a legal framework and infrastructure to facilitate live streaming of data sets.
- Expand mobile data availability to support context aware computing paradigms.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|-------|-------|-------|-------|
| 3,150 | 3,556 | 3,500 | 3,846 | 3,515 | 4,000 |

Software Assurance Marketplace

- *Problem:* There is a need to develop more secure and resilient software code as defects in code cost billions of dollars to fix each year, particularly when these defects are not identified until late in the software development process, and introduce vulnerabilities into the systems in which the code is deployed.
- *Solution:* Initiate the Software Assurance Marketplace (SWAMP), to improve development activities by offering a collection of software quality assurance tools and assurance services for developers to test and evaluate code for weaknesses and vulnerabilities; and provide tool developers an environment where they can test, calibrate, and improve the coverage area in their tools.

- *Impact:* SWAMP will reduce the number of vulnerabilities found in software, by applying the principle of continuous assurance throughout the software development process, affording developers the opportunity to detect bugs and defects in their code before it leaves their desktops.

Prior Year Key Events

- Developed test infrastructure capable of supporting software accreditation/certification for security.

Current Year Key Events

- Deliver the initial operating capability of SWAMP.

Budget Year Key Events

- Conduct 2nd SWAMP Community User Meeting to improve the community’s understanding of the SWAMP capability.
- Transition Code Pulse (developed as part of the Software Quality Assurance activity in the Improving Foundational Elements of Cybersecurity project) into the SWAMP.
- Transition Code Hawk (developed as part of the Software Quality Assurance activity in the Improving Foundational Elements of Cybersecurity project) into the SWAMP to measure and provide benchmark for C Source Code static analysis tools.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|-------|-------|-------|-------|-------|
| N/A | 5,078 | 2,925 | 4,216 | 4,345 | 5,200 |

Cyber Transition and Outreach – FY 2014: \$13.588 million. FY 2015 Request: \$8.960 million. This program provides outreach to the next generation of the cybersecurity workforce.

Cybersecurity Outreach

- *Problem:* As cybersecurity becomes significantly more important each year, there is an increasingly growing need to improve awareness, training, and education in this area.
- *Solution:* Improve cybersecurity training and education of the cybersecurity workforce. In particular, S&T sponsors cybersecurity competitions for high school and college students and runs activities to identify and address educational needs of those individuals working on Computer Security Incident Response Teams (CSIRTs).
- *Impact:* S&T’s sponsored cybersecurity competitions improve the quality and skill set of the next generation of cybersecurity professionals by providing an opportunity for students in a competitive environment exposing them to the latest defense technologies and solutions, including those developed by S&T. S&T’s work with CSIRTs will improve the performance of these groups by identifying needed knowledge, skills, and abilities for key CSIRT roles, providing recommendations for optimal performance, and developing and transitioning decision aids into commercial use.

Prior Year Key Events

- Conducted a Panoply competition at the Australia Security in Government (SIG) Conference.
- Over 160 colleges and universities participated in the S&T supported Collegiate Cyber Defense Competition in 2013.

Current Year Key Events

- Deliver initial research results of dynamics and effectiveness development of Cyber Security Incident Response Teams (CSIRT).
- Engage with internal DHS customers and relevant Government wide organizations to develop a strategy to identify emerging cyber security threats and develop a methodology for scenario development for use in innovation competitions.
- Pilot and deploy S&T funded visualization, network analysis and open source technologies within customer network infrastructures.

Budget Year Key Events

- Deliver a series of tools and capabilities for transition to on-going DHS supported competitions.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|-------|-------|-------|-------|
| N/A | N/A | 1,000 | 1,748 | 2,481 | 1,500 |

Transition to Practice

- *Problem:* Each year the Federal Government spends a significant amount of money on cybersecurity research. However, only a minimal amount of that research transitions into operational and commercial products.
- *Solution:* Transition research that addresses imminent needs in cybersecurity systems that impact national security. These activities include test and evaluation of technologies, setting up forums to introduce technologies to potential transition partners, and funding pilots of technologies in a variety of operational environments.
- *Impact:* By creating a heightened focus around transition, technology that could have otherwise “sat on the shelf” is now introduced to partners and end users who can take advantage of solutions to enhance the cybersecurity of the systems the nation relies on. S&T is leveraging millions of dollars of research investment while ensuring that technologies and solutions developed with federal research dollars meet operational needs to protect the nation’s critical infrastructure and systems.

Prior Year Key Events

- CSD reviewed 60 federally funded cybersecurity technologies at seven Department of Energy (DOE) National Laboratories and three Department of Defense (DOD)-affiliated Labs and selected nine promising technologies to transition.
- Conducted red-teaming and assessments of priority project areas, including experimental research testbeds, open source project technologies and select outside technologies.
- Conducted 3 industry specific technology demonstrations with the public and private sectors.

Current Year Key Events

- Design and conduct the first phase of a cybersecurity net technical assessment.
- Conduct four to six cybersecurity collaboration events.
- Conduct 5 industry specific technology demonstrations with the public and private sectors to include the Finance and Energy sections.

Budget Year Key Events

- Identify and test/pilot/deploy at least two S&T Cyber Security Division funded technologies based on customer requirements.
- Pilot three to six technologies in production environments in the Homeland Security Enterprise.

- Provide three to five red-teaming reports and vulnerabilities assessments.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|-------|--------|--------|-------|
| 6,251 | 2,794 | 5,338 | 10,706 | 11,108 | 7,460 |

Information Analysis – FY 2014: \$10.000 million. FY 2015 Request: \$5.000 million. This program researches, analyzes, and develops technologies to strengthen interoperable communications and improve effective information sharing at all levels of government.

Predictive Analytics and Informatics

- *Problem:* DHS component organizations have identified numerous gaps in information analytics that would vastly improve operational efficiencies and homeland security missions.
- *Solution:* S&T is leveraging academic, government and commercial solutions as well as investing in national laboratory research to solve some of the more difficult challenges identified by the components. HSARPA has developed an analytics center where operational problems identified by the components can be defined and potential solutions examined. The analytics center utilizes authorities to conduct experiments to expose key information regarding future potential architectures, system performance, as well as potential security and privacy issues.
- *Impact:* Delivery of technical and information services that assist the components with key information architecture strategy, provide data for alternatives analysis, and validate vendor claims with respect to information analytics in far less time and with much greater accuracy than DHS components.

Prior Year Key Events

- Collaborated with National Labs to address key computing issues in storage, processing and analytic support to Big Data needs of 43 component requirements.
- Initiated evaluation of new entity scoring methods, machine learning, and methods for transitioning machine learning into operations.
- Initiated partnerships with TSA to evaluate third party risk computations.

Current Year Key Events

- Complete assessment of 43 Big Data requirements for DHS components.
- Evaluate distributed storage systems, graph processing and big data analytics capabilities.
- Complete third party risk computation study for TSA, initiate independent risk modeling, support operational evaluation for third party risk computation services.
- Introduce leading edge information ingestion capabilities, NoSQL data bases, and analytic services models for DHS Components.
- Establish general purpose laboratory environment for in-house evaluations of DHS and vendor algorithm performance.

Budget Year Key Events

- Develop and deliver cross cutting solutions for application to DHS component missions: cross domain information analytics, entity resolution techniques, secure data access evaluations, and fraud detection algorithms.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|------|------|------|
|------|------|------|------|------|------|

| | | | | | |
|-----|-----|-----|-------|--------|-------|
| N/A | N/A | N/A | 5,469 | 10,000 | 5,000 |
|-----|-----|-----|-------|--------|-------|

Network and System Security and Investigations – FY 2014: \$35.766 million. FY 2015 Request: \$43.350 million. This program produces technologies needed to secure information and software that resides on the networks and systems that make up the Internet and provide analytic tools for the law enforcement community to investigate crimes committed in cyberspace.

Cybersecurity for Law Enforcement

- *Problem:* A significant barrier for law enforcement is keeping abreast of technology changes. New technology, both hardware and software, is released into the market at a very rapid pace and used in criminal and terrorist activity almost immediately.
- *Solution:* Develop new technologies, capabilities, and standards to assist law enforcement in investigations and the forensic analysis of technologies used in criminal activity, and to aid organizations in mitigating the potential impact and damage posed by insider threat activity.
- *Impact:* These technologies, capabilities, and standards will reduce the amount of time needed to analyze technology used in illicit activity, reduce the cost of acquisition for law enforcement agencies whose budgets are stretched thin, and narrow the technology capability gap between criminals and law enforcement.

Prior Year Key Events

- Delivered final reports regarding the testing and validation of various cyber forensic tools through the Cyber Forensic Tool Testing (CFTT) effort.
- Developed tools that analyze gaming systems that are increasingly used for criminal activity.
- Briefed *Insider Threat Study: Illicit Cyber Activity Involving Fraud in the U.S. Financial Services Sector* to United States Secret Service (USSS) sponsored Electronic Crimes Task Forces.

Current Year Key Events

- Commence development of, and deliver, link analysis tools for mobile device forensics.
- Conduct testing on a Database Monitoring System algorithm prototype.

Budget Year Key Events

- Deliver tool capable of performing a forensic comparison of individual storage profiles across an organization to detect anomalous behavior.
- Test and evaluate deployable cloud forensics solutions and new capabilities in partnership with law enforcement customers.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|-------|-------|-------|-------|
| 6,657 | 6,088 | 4,100 | 6,126 | 9,704 | 9,800 |

Data Privacy and Identity Management

- *Problem:* Agencies and organizations are experiencing a lack of processes and tools to share and coordinate information effectively because of an inadequate amount of security, trust, usable tools, policies, and procedures.
- *Solution:* Enhance the security of information sharing environments and the protection of users by improving authentication for persons, hardware devices, and software applications across all levels of government.

- *Impact:* This project provides interoperable access control technologies that provide a cost effective solution to all levels of government, including State and local levels. Additionally, this work enables information sharing without compromising the privacy of individuals (i.e. Personally Identifiable Information) or organizations.

Prior Year Key Events

- Developed a prototype policy-based engine and automated tools for complying with privacy policies to enable secure information sharing environments for State fusion centers.
- Developed knowledge products and tools to prevent privacy-related data breaches for agencies, states, and other private organizations.
- Transitioned open source middleware to industry to allow physical access control commercial vendors to interoperate with the cyber systems for a more secure, cost-efficient, effective access management system.

Current Year Key Events

- Identify and prioritize privacy research and development projects through continued collaboration with DHS component and Headquarters Privacy Offices.
- Conduct proof-of-concept demonstrations to validate the use of open standards based on federal, state, local, public, private sector logical and physical access control use-case and capability needs.

Budget Year Key Events

- Issue Broad Agency Announcement for specific topic areas with a focus on data privacy technologies.
- Conduct system integration and interoperability tests and evaluations for capability needs provided by local, tribal, State, and DHS operational components through the Identity Management Testbed.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|-------|-------|-------|-------|
| 2,568 | 2,599 | 2,597 | 4,994 | 4,837 | 8,500 |

Disrupting Cyber Threats and Inducing Change

- *Problem:* As cyber threats and crime have become more persistent and sophisticated, there is a need to invest in research, technologies, and solutions that address the root cause of known threats.
- *Solution:* Develop fundamentally different approaches to improving the cybersecurity of critical infrastructure with activities focused on areas such as understanding cyber economic incentives and the development of dynamic new system defenses.
- *Impact:* By disrupting the status quo through radically different techniques, S&T will be able to address some of the most difficult cybersecurity issues.

Prior Year Key Events

- Conducted cybersecurity investment case studies.
- Developed and demonstrated a model for data provenance to examine trustworthiness and reliability of data that has been manipulated by multiple entities.
- Developed prototype framework architecture to reduce predictability of a system’s attack surface.

Current Year Key Events

- Develop initial draft models of cyber economic incentives, and the coupling of cyber economics and cyber/user behaviors.
- Deliver analytic models for cybersecurity investment (private sector focus).
- Develop and conduct initial testing of a commercially viable and operational ready network appliance for enterprise-level implementation.
- Deliver nature inspired algorithms for testing malware detection in computer networks.

Budget Year Key Events

- Complete testing and large scale experimentation of Bio-Inspired Distributed Decision Algorithms based on social insect behavior.
- Complete transition of network traffic monitoring capability to at least one Information Sharing and Analysis Center (ISAC) member group.
- Complete development of software to tag, track, and block access to digital objects.
- Initial development of a research community oriented on the different areas of cyber economic incentives.
- Provide recommendations for policies, procedures, (and regulations) that incentivize the appropriate level of private sector cybersecurity investment.
- Development of economic models that can be transferred for use by different users and organizations.
- Complete and publish for collaboration draft Moving Target Defense (MTD) architectures.
- Prototype hardware/software system elements to expand MTD capabilities.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|-------|-------|-------|-------|
| N/A | N/A | 9,300 | 6,151 | 5,562 | 4,450 |

Improving Foundational Elements of Cybersecurity

- *Problem:* Many of today’s networking and information technologies contain inherent vulnerabilities, a legacy of a time when systems were designed without security in mind.
- *Solution:* To focus R&D activities on the characteristics essential to the desired end states of trustworthy systems with activities that include securing cloud based systems, improving the quality of software assurance tools, and developing metrics that aid organizations in measuring the security of their cyber systems.
- *Impact:* This project will develop new cybersecurity technologies and solutions that are designed with security built in from the ground up rather than needing to secure a technology’s vulnerabilities once it is already in operational use.

Prior Year Key Events

- Developed tools to measure change in enterprise security posture based on changing threats, tools to assess impact of not deploying security solutions, and tools to determine balance of security and performance within an enterprise.
- Produced tools for identifying, analyzing, and rectifying latent vulnerabilities in software.

Current Year Key Events

- Study the feasibility of applying new metrics to existing security processes.
- Transition software quality assurance technologies to commercial products.

Budget Year Key Events

- Develop test and evaluation facilities to investigate new and existing capabilities of software analysis.
- Develop a systematic method to map natural language security controls to Common Weakness Enumerations (CWE).
- Develop software/Tools to enhance usability and security of identity and user authentication.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|-------|-------|-------|-------|
| 8,190 | 6,603 | 1,875 | 8,938 | 7,159 | 7,800 |

Leap Ahead Technologies

- *Problem:* As cyber attacks and crime are constantly evolving, government and industry face a continuing need to respond to emerging cyber threats.
- *Solution:* Identify, incubate, and execute early research projects that may significantly advance current capabilities through moderate risk and high-payoff outcomes in areas such as Open Source technology development and mobile device security.
- *Impact:* These activities give organizations the ability to quickly shift to and respond to new and potential threats by focusing attention on cutting edge issues that are not currently being addressed. For example, efforts in the area of mobile device security focus attention on the vulnerabilities this computing platform presents to an organization as their use becomes more prevalent.

Prior Year Key Events

- Developed a resource for open source acquisition and accreditation in the Government.
- Updated the inventory of open source software being used across the Government.
- Developed technologies that will improve the survivability and resiliency of cyber systems while experiencing attacks, failures and other accidents.

Current Year Key Events

- Develop a portal and repository for security research of open source products.

Budget Year Key Events

- Complete transition of mobile security solutions initiated in FY13.
- Complete evaluation of existing mobile security solutions being used in the Homeland Security Enterprise.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|-------|-------|-------|-------|--------|
| N/A | 3,155 | 2,100 | 7,735 | 7,092 | 12,800 |

Trustworthy Cyber Infrastructure – FY 2014: \$9.100 million. FY 2015 Request: \$6.500 million. This program provides security for the building blocks that comprise the infrastructure of the Internet such as routers and routing protocols.

Internet Measurement and Attack Modeling

- *Problem:* As the Internet has grown organically and exponentially since its original conception, the protection of cyber infrastructure depends on the ability to identify critical Internet resources that are subject to attack.

- *Solution:* To measure the infrastructure as it exists today, then make periodic or continuous measurements to identify changes, recognize attacks, and provide analysis.
- *Impact:* The development and application of modeling and analysis capabilities affords the ability to predict the effects of cyber-attacks on federal government installations and other critical infrastructure through the detection of malware and botnets, situational understanding, and attack attribution.

Prior Year Key Events

- Deliver tools to US-CERT providing better capabilities in visualization as well as identification of cyber attacks.

Current Year Key Events

- Apply modeling capabilities and results to customers’ operational infrastructures and representative environments to improve the understanding and situational awareness of potential impact of cyber attacks.

Budget Year Key Events

- Transition technologies to the customer and/or end user as appropriate, examples include router traffic monitors, route tracing tools, internet traffic visualization tools, etc.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|-------|-------|-------|-------|
| 5,585 | 3,556 | 3,772 | 5,435 | 5,000 | 6,500 |

First Responder/Disaster Resilience – FY 2014: \$104.397 million. FY 2015 Request: \$100.588 million. Work includes reduction of vulnerability of critical infrastructure, key leadership, and events to terrorist attacks and other hazards; working with state, local, tribal, and territorial governments to secure their information systems; working with local and regional partners to identify hazards, assess vulnerabilities, and develop strategies to manage risks associated with all hazards; increasing the state of preparedness of state, local, regional, tribal, and territorial partners, as well as nongovernmental organizations, the private sector, and the general public; advancing and improving disaster emergency and interoperable communications capabilities; and, improving the capabilities of DHS to lead in emergency management.

Bioagent Attack Resiliency – FY 2014: \$33.776 million. FY 2015 Request: \$35.300 million. This program provides advanced planning; develops CONOPS; develops and provides capabilities to support forensics, laboratory response, personnel protection, and decontamination; and utilizes exercises and training for responding to and recovering from a biological disaster. This program includes actions to limit the spread of disease among animal species to protect the United States economy.

Adaptive Facility Protection (Bio and Chem)

- *Problem:* There is a need to improve the ability of facility operators to protect buildings and transit systems from a chemical release by using a comprehensive, rapid-detection architecture for infrastructure, and developing response networks to effect low-regret protective action for the occupants of nearby buildings.
- *Solution:* This project will develop key elements for a complete architecture that incorporates existing chemical detection technologies with both active and passive facility response systems.

The project will allow for detection of chemical agents via chemical detection systems developed by S&T.

- *Impact:* The outcome of the project will be improved facility and transit system protection from chemical threats. The project will also evaluate expanding the architecture to include biological protection by incorporating biological detection systems developed by S&T.

Prior Year Key Events

- Conduct needs analysis and develop initial CONOPs for building responsive measures for building protection.

Current Year Key Events

- Support GSA efforts to establish a standardized Physical Access Control configuration.
- Conduct Analysis of Alternatives Study for advanced Video Analytics capability to recognize anomalies associated with the ISC Design Basis Threat list of 31 undesirable events.
- Conduct market survey of candidate COTS/GOTS chemical detectors for customer-selected analytes.
- Chemical detector prototypes fabricated and integrated.

Budget Year Key Events

- Conduct Pilot to demonstrate methods to improve FPS Protective Security Officers (PSOs) security mission resource utilization.
- Conduct Pilot to demonstrate performance of selected advanced Video Analytics engines integrated with GSA’s Physical Security Information Management system.
- Conduct Analysis of Alternatives Study for exterior-based standoff Chemical detection capability.
- End-User Field testing of Chemical detector prototypes.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|------|-------|-------|
| N/A | N/A | N/A | N/A | 3,500 | 4,000 |

Bio Event Recovery

- *Problem:* The Emergency Responder community needs operational tools to respond to and recover from biological events. Currently there are only limited and time-consuming means of cleaning up large areas after a biological event.
- *Solution:* This project will assess requirements and potential technology solutions for biological agent clean-up, including the feasibility of modifying COTS technologies, developing methods for rapid recovery, and developing protocols for rapidly determining the extent of contamination to inform risk-based clearance goals.
- *Impact:* This project will provide public health officials environmental cleanup managers, and emergency management at the Federal, State, and local levels a system of tools and methods for decontamination of many facility types, to conduct emergency response and recovery actions. It will enable building and system owners and operators the tools to decontaminate facilities, as well as large vehicles, such as aircraft, train cars, buses, and emergency vehicles, among others, following a chemical or biological incident and enable the vehicles and system to return to service after remediation.

Prior Year Key Events

- Establish requirements and assess technology solutions for rapid recovery of an underground transit system following biological agent contamination.

Current Year Key Events

- Initiate Field Demonstrations to establish efficacy and operational parameters of current decontamination technologies for recovery of subway system rolling stock.
- Initiate fate and transport field tests in a subway system to update capability of existing dispersion and airflow models to predict extent of contamination and enable faster start of remediation actions.

Budget Year Key Events

- Validate ability of updated dispersion and airflow models, combined with targeted environmental sampling, to rapidly map extent of contamination following a biological agent event in the subway.
- Initiate evaluation of decontamination technologies and area isolation methods in limited locations of a partner subway.
- Demonstrate ability of composite sampling and an improved rapid viability PCR technique to speed a clearance process through reduction and better prioritization of environmental samples requiring traditional laboratory analysis (i.e., culturing).

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|-------|-------|-------|-------|
| 7,025 | 9,375 | 7,147 | 6,261 | 5,000 | 5,000 |

Bio-Forensics

- *Problem:* Bio-Forensics research and development (R&D) is required to improve the ability to identify and characterize source material collected from a bio-crime in order to pursue legal prosecution against the responsible party (or parties). This research provides investigators such as FBI and USSS with critical tools that provide investigative leads for attribution.
- *Solution:* This Project develops advanced forensic capabilities to determine the source and production method of biological threat agents (BTAs) collected from crime scenes. Specifically, the project develops protocols for characterization and identification of BTAs, and utilizes a robust sample management, molecular signatures, and physical/chemical analysis research program. Bio-Forensics R&D is currently focused on establishing a methods-based approach to BTA characterization, which does not depend on prior knowledge of the organism and can detect novel and/or emerging organisms. Establishment of this approach includes development of orthogonal approaches to agent characterization initiation of an effort to build a national sequence database for whole genome comparison and development of computational algorithms for data analysis.
- *Impact:* The Bio-Forensics R&D project leads national research efforts in microbial forensics and transitions analytical techniques to the National Bio-forensics Analysis Center (NBFAC) and other government stakeholders.

Prior Year Key Events

- Delivered 100 unique *Burkholderia pseudomallei* isolates to NBFAC repository through collaboration with Australia.
- Established genomic signatures for select agent viruses.
- Established database of mobile genetic element signatures for select agent bacteria.

Current Year Key Events

- Transition improved vacuum sampling technology and test criteria to the FBI and other first responders for validation.
- Transition ultraclean reagents to support whole genome comparative analysis in bioforensics operations.
- Validate end-to-end sample processing pipeline.

Budget Year Key Events

- Develop and populate databases for comparative whole genome analysis of select agents for forensics characterization.
- Transition mass spectrometer-based methods of determining production methods (production deduction) of organisms used in a biocrime to bioforensics operations.
- Develop computational methods for analyzing metagenomic data.
- Identify gaps in toxin detection and characterization technologies.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|--------|--------|-------|-------|-------|-------|
| 11,847 | 11,049 | 4,000 | 4,870 | 4,000 | 6,500 |

National Bioforensics Analysis Center (NBFAC)

- *Problem:* There is a need to ensure unimpeachable technical data for use by law enforcement authorities, particularly the FBI, in the investigation and prosecution of crimes involving biological agents.
- *Solution:* The NBFAC, located at the NBACC, is the Nation’s lead facility for technical analysis of samples from biocrime and bioterror investigations. NBFAC validates protocols for the identification and characterization of the biological, chemical, and physical “fingerprints” that those samples may contain, rigorous chain-of-custody and quality-control procedures to ensure the integrity of the sample and its analysis, and maintains 24/7 continuous hub-and-spoke laboratories to provide casework support and additional specialized capabilities.
- *Impact:* NBFAC provides Federal law enforcement agencies with centrally coordinated and validated capabilities for sample handling, sample processing, and bioforensic analyses of evidentiary material derived from biocrime and bioterror investigations or from the actual use of a biological agent.

Prior Year Key Events

- Conducted casework analysis in support of 45 law enforcement investigations from 17 individual cases.
- Established first ISO 17025 sequencing and bioinformatics capability.
- Demonstrated application of genomics for casework.

Current Year Key Events

- Enhance metagenomic analysis capabilities by enabling identification of rare variants through the bioinformatic subtraction of host nucleic acids.
- Establish next generation sequencing capability at BSL-4.
- Establish statistical confidence for whole genome SNP genotyping.

Budget Year Key Events

- Provide 24/7 bioforensic casework support.

- Develop/demonstrate an operational capability to characterize individual components of a sample to support the analysis of: limited sample, non-cultureable agents, rare variants, and metagenomic.
- Transition mass spectrometer-based toxin identification and production deduction capability from Bioforensics R&D project.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|--------|--------|-------|-------|-------|-------|
| 17,228 | 13,639 | 8,333 | 8,483 | 5,875 | 6,500 |

Foreign Animal Disease Vaccines, Diagnostics, and Countermeasures

- *Problem:* This project directly addresses HSPD-5 and HSPD-9 by ensuring that USDA and other first responders in the animal agriculture community have the countermeasure tools needed to safely and effectively respond to and recover from foreign animal and zoonotic disease outbreaks.
- *Solution:* New and next-generation countermeasures are developed and transitioned directly to USDA response labs or through veterinary biologic industry partners for commercialization and access by USDA. This project plans to complete the regulatory requirements (master-seed, pre-licensing serials, clinical trials) for additional Foot and Mouth Disease (FMD) serotypes/subtype molecular vaccine candidates. It also coordinates with animal health industry partners on regulatory development programs for vaccine candidates for African Swine Fever (ASF), Classical Swine Fever (CSF), and zoonotic diseases including Rift Valley fever and Henipavirus.
- *Impact:* This project strengthens the defense of the U.S. agricultural infrastructure by developing new and next-generation countermeasures (vaccines and diagnostics) to protect the livestock industry against FMD and other high-consequence FADs. Efforts from this project will provide data to support the regulatory licensing and/or use of new countermeasures by USDA in the event of a high-consequence FAD outbreak in the U.S.

Prior Year Key Events

- Complete proof of concept immunogenicity studies for African swine fever vaccine candidates.
- Produce master seeds for FMD molecular vaccine candidates for two additional serotypes.

Current Year Key Events

- Transition additional licensable FMD master seed virus to industry to produce vaccine pre-licensing serials.
- Produce master seeds for four additional (4th – 7th) serotypes.
- Transition 3ABC cELISA diagnostic assay compatible with FMD DIVA vaccines to industry and initiate assay development regulatory program.

Budget Year Key Events

- Transition the production of 2nd serotype for the Ad-5 FMD vaccine to industry partners for development and regulatory processes.
- Produce master seeds for three additional (8th – 10th) serotypes.
- Conclude assessment of broad spectrum countermeasure alternatives to address emerging disease threats.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|--------|--------|--------|--------|--------|--------|
| 13,450 | 13,846 | 11,000 | 10,932 | 14,125 | 12,300 |

Livestock Decontamination, Disposal, and Depopulation (3D)

- *Problem:* There is a need to improve Federal, State, and local animal health officials' emergency response capabilities to control the spread of Foreign Animal Diseases (FADs) and mitigate the impact on the livestock industry by using validated data to develop new and improved response tools.
- *Solution:* This project will develop, in coordination with USDA, EPA, and other Federal agencies, new and/or enhanced animal health emergency response tools, technologies, and associated CONOPS to increase response capacity and to ensure that 3D activities are performed rapidly, humanely, and in an environmentally protective manner.
- *Impact:* Products from this Project will not only help preserve the safety and availability of a plentiful food supply, they will also minimize economic losses and speed recovery after an outbreak. This project plans to transition new technologies such as transportable, high-speed disposal units and portable nonfreezing vehicle decontamination units; validate depopulation equipment; publish research data and science-based protocols to improve capabilities; and develop tools to facilitate responder decision-making.

Prior Year Key Events

- Validated and published conceptual design of humane swine CO₂ depopulation protocol for emergency use.
- Validated and published findings and best practices for humane livestock mass depopulation using captive bolt.
- Published study on use of rendering plants for disposal of infectious carcasses during an animal disease outbreak and efficacy of mitigation strategies.

Current Year Key Events

- Deliver comprehensive report on Logistical Infrastructure for Animal Disease Outbreak Emergency Response.
- Launch website of online agricultural emergency response tools.
- Test and evaluate full-scale transportable gasifier at full capacity over a 72-hour period.
- Complete evaluation of foot-and-mouth disease surrogates when subjected to vaporous hydrogen peroxide and chlorine dioxide fumigation methods.

Budget Year Key Events

- Validate and commercialize non-freezing portable vehicle wash tunnels for decontaminating vehicles during an animal health emergency response.
- Publish ASTM standard for validating efficacy of antimicrobials on porous surfaces.
- Publish quantitative carcass disposal risk assessment for all hazards.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|-------|-------|-------|
| N/A | N/A | N/A | 1,842 | 2,000 | 3,000 |

Chemical Attack Resiliency – FY 2014: \$7.500 million. FY 2015 Request: \$5.000 million. Provides advanced planning; develops CONOPS; develops and provides capabilities in forensics, laboratory response, personnel protection, and decontamination; and utilizes exercises and training for responding to and recovering from a chemical disaster.

Chemical Forensics

- *Problem:* There is a need to provide timely and comprehensive forensic support to investigations of chemical terrorist and criminal acts by collecting, preserving, analyzing and matching chemical samples collected at scenes with samples obtained from people, places, and other events, as well as production sources.
- *Solution:* The Chemical Forensics project develops and maintains a robust and enduring national capability for the collection, preservation, and processing of chemical threat agents and associated evidence to provide comprehensive and timely forensic analysis and attribution. This project will develop and transition additional collection and preservation methods and devices, as well as expanded laboratory analytical methods to provide the capability to address the numerous chemical threat agents of interest in a prioritized manner.
- *Impact:* This project will provide law enforcement official with the capability to promptly conduct chemical forensics analysis and attribute terrorist acts to their source to provide highly valuable investigative leads that can identify perpetrators and prevent follow-on and copycat attacks.

Prior Year Key Events

- Published two Chemical Forensics articles in relevant scientific journals.
- Presentation of second biennial Chemical Forensics Symposium at annual American Chemical Society National meeting, Indianapolis, IN, 9/9-10/2013.

Current Year Key Events

- Publishing and transition to customers of at least four Chemical Forensics Standard Methods for the collection or analysis of Chemical Threat Agents of interest.
- Publishing at least two Chemical Forensics articles in relevant scientific journals.
- Development of comprehensive standard chemical forensic samples (chemical cocktails and substrates) for standardized testing of chemical sampling and analysis methods.

Budget Year Key Events

- Publishing and transition to customers of at least four Chemical Forensics Standard Methods for the collection or analysis of Chemical Threat Agents of interest.
- Publishing of at least two Chemical Forensics articles in relevant scientific journals.
- Provide a Chemical Sampling Guidebook for use of law enforcement and first responders both in hard copy and an application useable on handheld device.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|-------|-------|-------|-------|
| 4,762 | 4,718 | 2,643 | 3,478 | 3,500 | 2,000 |

Integrated Consortium of Laboratory Networks

- *Problem:* Recovery from large-scale chemical, biological, or radiological (CBR) contamination and/or disease events can require the collection and analysis of very large numbers of samples. The laboratory capacity available in the US to accommodate this load of samples limits the rate of resolution of these samples and inhibits the return of contaminated spaces to normal condition.
- *Solution:* The project develops operational procedures and information technology systems to enable joint action of the several Federally-sponsored laboratory response networks for both intentional and naturally evolving events of sufficient scale to over-run the resources of any one network.
- *Impact:* Effective laboratory capacity is increased through the organized sharing of resources rather than investment of new funding. The optimized action of six laboratory response networks

comprising some 450 laboratories across the US will greatly decrease the time to return to normal state after a CBR event.

Prior Year Key Events

- Completed and demonstrated capability to share lab data across networks via a data exchange utility on ICLN web portal.
- Conducted planning in concert with FEMA National Exercise Division to conduct an ICLN Validation Exercise to demonstrate ICLN interface with an incident command responding to bio contamination in urban area.

Current Year Key Events

- Initiate lab response-focused risk assessment for emerging threats.
- Complete conduct of ICLN Validation Exercise.
- Conduct test measuring capacity across multiple networks for priority chemical agent, following methodology used for *B. anthracis* analytical capacity measurement.

Budget Year Key Events

- Complete assessment of existing capabilities against emerging biological and chemical threats.
- Transition operational ICLN to DHS Office of Health Affairs.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|-------|-------|-------|-------|
| 1,447 | 1,826 | 2,000 | 2,485 | 2,500 | 1,000 |

Explosives & Rad/Nuc Attack Resiliency – FY 2014: \$5.000 million. FY 2015 Request: \$3.250 million. This program provides advanced planning, develops CONOPS, develops advanced materials, and funds exercises and training for responding to and recovering from a disaster employing explosives.

Radiological/Nuclear Response and Recovery (RNRR)

- *Problem:* The detonation of a Radiological Dispersal Device or Improvised Nuclear Device would be high consequence incidents and pose tremendous challenges to the first responder community and homeland security enterprise.
- *Solution:* Improve responder preparedness for the complexity of a radiological incident response and recovery operations by working with partner agencies, Federal interagency working groups, and first responders to identify impactful opportunities that address technology and research needs in the areas of radiological response management, incident characterization, initial response capabilities, medical care/triage, casualty/evacuee care, impacted area stabilization/control, and site cleanup/decontamination.
- *Impact:* Improved radiological response capabilities at both the local and national level through strategic investment in projects focused on increasing agency preparedness, improving government understanding of impacts and risks, and finding technological solutions to radiological capability gaps and mission needs.

Prior Year Key Events

- Initiated the project, including establishing seats on and providing briefings to relevant radiological response interagency committees, guiding and coordinating the future work of this project.

- Initiated the development of a Radiological/Nuclear Response and Recovery Investment Plan for Fiscal Years 2015-2019 that correlates prioritized responder needs with emerging and next generation technology solutions.

Current Year Key Events

- Complete first responder prioritization of existing radiological/nuclear response mission requirements, and work with technologists and subject matter experts to identify current/emerging solutions.
- Finalize the Rad/Nuc Response and Recovery Investment Plan for Fiscal Years 2015-2019, and initiate priority efforts.

Budget Year Key Events

- Fund top priority portfolio from the Rad/Nuc Response and Recovery Investment Plan with available budget and initiate the development of program/project management document for future fiscal years based on unfunded responder priorities.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|-------|-------|-------|
| N/A | N/A | N/A | 4,928 | 5,000 | 3,250 |

First Responder Capability – FY 2014: \$20.028 million. FY 2015 Request: \$17.900 million. This program develops technologies, information, procedures, and CONOPS to aid first responders, emergency managers, and incident commanders as they respond to hazardous situations. It assists the emergency response communities to establish requirements and tests technologies and assesses them for usability to help make the technologies available across all first responder communities.

First Responder Technologies

- *Problem:* The response environment that our Nation’s first responders operate in on a day to day basis is constantly changing and requires an ongoing evaluation of needs, required capabilities, and potential investments and/or innovations, to allow them to conduct their missions more safely, effectively, and efficiently. Due to the lengthy process it normally takes to commercialize technology that fully meet these challenges, there is a need to rapidly develop technologies that address high priority capability gaps identified by local, tribal, state, and Federal first responders.
- *Solution:* Identify high priority needs, develop prototype solutions, and conduct operational field assessments of next generation technologies to address gaps, with the goal of rapidly fielding technologies that meet at least 80% of the operational requirement in a 12 to 18 month timeframe.
- *Impact:* This will strengthen the response community’s ability to protect the homeland, respond to disasters, and to save lives through the increased availability and reliability of technology for first responders.

Prior Year Key Events

- Transitioned a virtual training capability, based on an active shooter scenario, to first responders in Sacramento, CA. The simulation tool was designed so that it could be used by first responders from any jurisdiction.
- Developed a prototype wireless patient vital signs monitor, to improve the safety, and efficiency of emergency services personnel while transporting ambulatory patients. The performer plans to submit the device for Federal Drug Administration approval and commercialize the product in 2014.

- Developed a strategic plan to guide the implementation of the Next Generation Personal Protective Equipment (PPE) Program for first responders. The key objective of the Program is development of a multi-hazard, multi-discipline ensemble that will focus on 1) hazard protection and 2) hazard perception and detection.

Current Year Key Events

- Develop readily accessible, high-fidelity simulation tools to support training and exercises in incident management and response for an active school shooting scenario.
- Begin development of technology to provide the ability to remotely monitor the tactical actions and progress of all responders involved in the incident in real time.
- Use the PPE Strategic Plan to begin development of protective clothing and equipment for all first responders that protects against multiple hazards.

Budget Year Key Events

- Complete development of an improved structural firefighter glove, to provide improved dexterity and don/doff ability.
- Complete development of a low light covert camera for law enforcement, to provide ICE and other law enforcement agencies with a non-existent capability.
- Complete development of an internet protocol encoder, which provides the ability to stream data from the low light camera in real time, at a low cost.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|--------|-------|-------|--------|-------|--------|
| 11,173 | 8,669 | 4,798 | 10,947 | 7,978 | 11,400 |

Response and Defeat Operations Support (REDOPS)

- *Problem:* Improvised Explosive Devices (IED) are generally easy to develop, difficult to combat, and cause damage to life and/or property.
- *Solution:* Establish a systems analysis approach involving explosives countermeasures experts from all levels of government and direct Research, Development, Testing & Evaluation (RDT&E) of technologies needed by state and local bomb squads (SLBS).
- *Impact:* The new capabilities developed as well as the performance and training standards will help protect and save the lives of State and Local Bomb Techs and the public. In addition, the outputs associated with this project will provide SLBS the confidence and authority to perform activities associated with response and defeat operations.

Prior Year Key Events

- None

Current Year Key Events

- None

Budget Year Key Events

- Convene C-IED Requirements Review Panel.
- Perform RDT&E on Camera Boom for robots.
- Update VBIED Tool Kit.

Funding History

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|------|------|-------|
| N/A | N/A | N/A | N/A | N/A | 1,500 |

Tech Clearinghouse

- *Problem:* S&T must maintain effective communication with the first responder and emergency preparedness and response communities in order to gather necessary information for its program and to keep those communities informed about the technologies and knowledge products the Directorate is developing on their behalf.
- *Solution:* A three-pronged communications effort that includes:
 1. FirstResponder.gov: S&T's premiere online portal for sharing information about its own projects and initiatives as well as outside technology-related programs and events of interest to first responders
 2. First Responder Communities of Practice: a vetted online forum that enables first responders to collaborate and share best practices while also providing: 1) developers with operational requirements and information needed to design and manufacture increasingly useful tools and technologies, as well as 2) users with information related to procuring, deploying, and maintaining technologies and training for their proper use
 3. Outreach and Engagement: an ongoing suite of communications activities that enables S&T to gain a fuller understanding of the capability gaps, needs and requirements of first responders and thus strengthen its focus on essential technologies with the greatest potential for transition to use.
- *Impact:* Tech Clearinghouse increases first responder awareness of the Directorate's work, facilitates the flow of important information throughout the emergency response community, and enables the Directorate to design and manage projects that truly meet its mission. It is a cost-effective, multi-channel communications effort that steadily expands the S&T's reach into stakeholder communities.

Prior Year Key Events

- Conducted First Responder Resource Group (FRRG) meeting which resulted in the development of twelve operational requirements documents.
- Increased membership of Communities of Practice by 10%.
- Created a Community of Practice to specifically support the Quadrennial Homeland Security Review.

Current Year Key Events

- Develop a prototype social media aggregator tool and demonstrate it through a pilot program.
- Refreshed FirstResponders.gov website that included an improved search capability, added a document library, and included links to key resources (eg. Grants and Training information, SAVER, etc.) for first responders.
- Launched a social media experiment with Facebook to increase traffic to firstresponder.gov

Budget Year Key Events

- Develop and publish the ORDs for each of the FRRG identified capability gaps following FRG's Solution Development Process
- Implement and refine the development of partnerships with the public and private sectors to facilitate and create efficiencies to collect feedback and reviews on responder safety and knowledge products that could evolve into requirements

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|-------|-------|-------|-------|
| 5,026 | 3,284 | 5,616 | 2,273 | 2,000 | 5,000 |

Information Sharing and Interoperability – FY 2014: \$15.500 million. FY 2015 Request: \$14.638 million. This program creates an integrated information sharing architecture and links that architecture to interagency efforts to prevent terrorism while protecting privacy, civil rights, and civil liberties.

Cross Border Communications

- *Problem:* Coordinating responses and sharing information for situational awareness and decision making during critical incidents involving multiple agencies on both sides of the United States border is a challenge.
- *Solution:* Conduct carefully designed, robust experiments to identify how best to address issues that make it difficult to share essential capabilities across the border when bi-national responses are essential.
- *Impact:* Nations will better handle cross-border technology and policy issues and will leave behind trusted relationships, collaborative processes, and international technology solutions. Binational coordination is extended to public safety issues that simultaneously affect both nations, regardless of where incidents occur.

Prior Year Key Events

- Conducted planning sessions of the Communications Interoperability Working Group (CIWG), which was established by the BTB Action Plan.
- The Canada-US Resiliency Experiment II (CAUSE II), which occurred March 4-6, 2013, demonstrated the ability to exchange information between local, state, provincial and national agencies using various systems and software applications, including Canada’s Multi Agency Situational Awareness System (MASAS), and the U.S.’s Integrated Public Alert and Warning System (IPAWS) and Virtual USA (vUSA). CAUSE II also involved the use of Virtual Maine and the Mutual Aid Support System and Mission Ready Package Tools (MASS MRP).

Current Year Key Events

- The Canada-US Resiliency Experiment III (Cause III) is scheduled to occur in the September-October timeframe of 2014, spanning FY 14/15. CAUSE III is to build on the lessons learned from CAUSE I and II, and seeks to address improving interoperable communications (Land-Mobile Radio, Data, GIS), resource management/sharing protocols, and to develop a cross-border Concept of Operations (CONOPS). The intended outcomes include:
 - Conduct planning sessions of the Communications Interoperability Working Group (CIWG),
 - Building upon CAUSE II, the Canada-US Resiliency Experiment III (CAUSE III), will involve different agencies and systems/software applications to continue to demonstrate the ability to exchange information;
 - CAUSE III will also demonstrate enhanced resilience through improved interoperable shared situational awareness during major events;
 - Enhance resilience in a border region by leaving behind working operational interfaces that will improve shared situational awareness;
 - Execute CAUSE III as a catalyst to build trust relationships in support of the Beyond the Border Action Plan; and
 - Build enhanced cross border trust relationships.

Budget Year Key Events

- Much of the outcome from CAUSE III will inform the activities of CAUSE IV in FY15. For example, while CAUSE I and II focused primarily on the interoperability of data, CAUSE III and IV will focus on data with the introduction of voice communications interoperability. CAUSE IV will include data and a stronger focus on voice communications interoperability.
- The development of a CONOPS will result from the efforts of CAUSE III. This CONOPS will be further refined and validated for the CAUSE IV activities.
- With CAUSE “experiments” occurring in CAUSE I through III, it is anticipated that CAUSE IV will culminate in an actual exercise, perhaps with all previous CAUSE participants.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|------|------|------|
| N/A | N/A | N/A | N/A | N/A | 300 |

Emergency Response and Management Tools for First Responders

- *Problem:* First responders often lack timely access to the information they need to operate safely and enhance their ability to save lives and protect property. Whether they are not sharing due to unfamiliarity with their response partners or because their systems are not interoperable, decisions are not made in the most effective and timely manner.
- *Solution:* Develops and transitions to operational use the technologies required so that emergency managers and first responders will have the incident information they require when and how they need it. In addition, this project will provide the standard operating procedures, training, and governance needed to effectively and efficiently conduct response and recovery efforts from day-to-day incidents to large-scale emergencies, including visualization, geospatial and analytics technologies.
- *Impact:* Increased safety of US citizens and first responders, more effective incident response and recovery leading to fewer lives lost, decreased property damages, and increased national resilience from incidents of all types and scales.

Prior Year Key Events

- Deployed the National Capital Region-Geospatial Data Exchange (NCR-GDX), the operational instance of the Virtual USA Library (used by 22 jurisdictions and 500+ users, used in daily operations for Police/Fire computer aided dispatch (CAD) situational awareness, and used for major events such as Hurricane Sandy and 2013 Presidential Inauguration).
- Installed and utilized the Next-Generation Incident Command System (NICS) in California for 1000+ users at over 161 events (including: the Yosemite Rim Fire, other vegetation fires and prescribed burns, planned events, and exercises) by participating Federal, state and local jurisdictions for situational awareness, collaboration and resource deployment.
- Provided 13 web-based educational presentations, known as the Capacity Building Webinar Series, to 2,300 first responders at all levels of government (primarily state and local practitioners), to educate the first responders community for augmenting their abilities and capabilities to share information during critical incidents.
- Activated the National Information Sharing Consortium (NISC) that strives to bring together data owners, custodians, and users involved in the fields of homeland security, public safety, and emergency management. NISC responds to leveraged efforts related to governance, standards, and development. It also encourages sharing of technology, data processes, and best practices. The NISC currently has 92 members comprised of the first responder domain (police, fire, emergency

management) that represent 64 member organizations from state, local and regional governments, the private sector, and academia.

Current Year Key Events

- Capstone 2014 Demonstration in 8 Central US Earthquake Consortium (CUSEC) states using the Mutual Aid Support System (MASS) resource identification and sharing solution as well as demonstrating the enhanced Virtual USA Library tools.
- Full transition of the Virtual USA Library to 1) have the “Refresh” be deployed to the NCR-GDX; and 2) the NISC whereby the existing Virtual USA Library will retire and the NISC will work with ESRI to deploy information-sharing tools via ESRI’s cloud-based, geospatial solution.
- Present 10+ Capacity Building Webinars to educate the first responders community for augmenting their abilities and capabilities to share information during critical incidents.
- Develop an Incident Management Information Sharing Capability Maturity Model (IMIS-CMM) for jurisdictions to objectively assess their maturity to share information during critical incidents.

Budget Year Key Events

- Refine and validate the IMIS-CMM with practitioners and publish a guide for its application within a jurisdiction to assess and augment their information sharing capabilities.
- Assist in publishing grant funding guidance for jurisdictional recipients to augment their capabilities to conform to FRG’s IMIS-CMM.
- Finalize and validate the Public Safety Cloud strategy that addresses identity management issues and computer aided dispatch (CAD to CAD) jurisdictional interoperability for information sharing.
- Via the IMIS Committee, provide recommendations to the PM-ISE detailing the standards needed to meet requirements and fill gaps from the first responders community at all levels of government.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|-------|-------|-------|-------|
| N/A | N/A | 2,673 | 6,953 | 2,000 | 4,000 |

Interoperability and Compatibility Standards

- *Problem:* The proliferation of new technologies makes it difficult for first responders to communicate with each other during emergencies.
- *Solution:* Identify and develop standards essential to ensuring that all the new technologies are interoperable so first responder agencies can make good decisions about new technologies.
- *Impact:* These new and strengthened standards will help first responders to make smart choices of new technologies so they will be interoperable and can migrate successfully to the new nationwide public safety broadband network without putting that \$7 billion national investment at risk.

Prior Year Key Events

- Developed draft direct mode and Push to Talk (PTT) requirements through the National Public Safety Telecommunications Council (NPSTC). These requirements were shared with the First Responder Network Authority (FirstNet) in support of the creation of the nationwide public safety broadband network.
- Obtained Expressions of Interest from International Laboratory Accreditation Corporation (ILAC) accreditation organizations, through the Federal Register, to become a part of P25 Compliance Assessment Program (P25 CAP).

Current Year Key Events

- Work with Accreditation Bodies and P25 CAP Laboratories to develop the DHS OIC – P25 CAP Laboratory Policy Document.
- Develop Quantitative Broadband Launch Requirements and submit to FirstNet for consideration.
- Develop public safety console requirements for Long Term Evolution (LTE).

Budget Year Key Events

- Develop and publish Public Safety 1-2 Year Qualitative Broadband Communications Requirements.
- Develop and publish Public Safety Location Requirements.
- Add P25 Common Air Interface (CAI) Conventional Interoperability Tests to the program.
- Add P25 CAI Conventional Conformance Tests to the program.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|-------|-------|-------|
| N/A | N/A | N/A | 4,112 | 2,000 | 2,000 |

Operational Assessment Tools to Strengthen Agency Acquisition

- *Problem:* New infrastructure installations are extremely expensive but neither public safety nor the new nationwide public safety broadband network have reliable ways to assess the best solutions before they make major investments in new infrastructure.
- *Solution:* Leverage existing modeling and simulation tools to make more informed procurement decisions for everything from user equipment to applications and services and make them available to first responders before they make major investments.
- *Impact:* These tools will make it possible for first responder agencies to determine whether a given investment is the best possible and thus avoid wasting significant resources.

Prior Year Key Events

- None

Current Year Key Events

- None

Budget Year Key Events

- Publish results of subjective video tests for new/advanced video codecs.
- Study the performance of LTE in the presence of device to device interference and characterize the effects of out-of-coverage device to device transmissions on an infrastructure uplink. Publish results in a conference/journal article.
- Investigate extensions to mobility state estimation and mobility based inter-subchannel interface (ICIC) to mitigate interference resulting from handovers to small-cells and improve the overall network performance. Document findings in a conference/journal article.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|------|------|-------|
| 743 | 745 | N/A | N/A | N/A | 3,000 |

Wireless Communications

- *Problem:* Technologies capable of bridging disparate but essential communications systems are not currently available, making it difficult for first responders to communicate with each other during emergencies.
- *Solution:* Develop a viable testing and evaluation capability to ensure that new technologies that claim to be interoperable with existing public safety systems actually are.
- *Impact:* This project provides a critical testing and evaluation capability for first responders to gain knowledge on how communications devices work on broadband networks and determine how the systems will meet user needs. This project brings together public safety practitioners, Federal partners, manufacturers, and representatives of standards making bodies to improve the way in which video and other technologies serve the public safety community.

Prior Year Key Events

- Developed a software tool that allows users to specify the following: speed of a mobile device, cell density, coverage radius for an arbitrary number of heterogeneous network tiers, the number of handover events to simulate, and statistics for reselections involving all possible combinations of cell types.
- Extended and executed new Cooperative Research and Development Agreements (CRADA) with industry to build a more robust 700MHz broadband demonstration network which currently has over 60 industry partners through CRADAs.

Current Year Key Events

- Engage LTE, P25 land mobile radio (LMR), and technology bridging device manufacturers to help create and define a test suite.
- Develop an initial test suite that can be used to exercise mobile application testing tools abilities to identify software weaknesses of concern to public safety.
- Complete a draft use case containing public safety requirements for securing interfaces between network equipment and data traversing the network, which is suitable for developing test cases for the 700MHz broadband Demonstration Network.

Budget Year Key Events

- Investigate PTT LTE interface possibilities to other than P25 LMR technologies.
- Investigate viability of a single, ubiquitous public safety broadband LTE to multi-LMR-technology.
- Develop draft document(s) suitable for publication on public safety security requirements for mobile applications and conformity assessment strategies for the requirements.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|-------|-------|-------|-------|
| 1,867 | 1,163 | 2,676 | 5,587 | 8,500 | 5,338 |

Natural Disaster Resiliency – FY 2014: \$22.592 million. FY 2015 Request: \$24.500 million. This program develops and provides advanced planning, CONOPS, disaster management tools, and training aids for responding to and recovering from a large-scale natural disaster. This includes providing assistance to the private sector to “design-in” greater resilience for critical infrastructure and providing DHS with more robust tools for disaster response, disaster logistics, individual and public assistance programs, and national continuity programs.

Community Resilience and Communications

- *Problem:* There is insufficient social and behavioral science research to support the development of effective communication strategies to successfully promote resilience to disasters in U.S. communities and that focus on helping disaster survivors, enhancing communities’ robustness, adaptability, and recovery capabilities.
- *Solution:* Develop more targeted and effective risk and crisis communications in order to produce evidence-based guidance to promote resilience in communities.
- *Impact:* Communities that are more resilient will support dramatically improved response efforts and significantly reduce the time and resources required for recovery from natural and manmade disasters.

Prior Year Key Events

- Completion of research projects in:
 - Building Resilience with Diverse Communities: Faith-Based and Community Organizations in Emergency Preparedness; and
 - Enhancing the Effectiveness of State 2-1-1 Call Systems.
- Delivery of Knowledge Products and Training:
 - Executive Summary: Understanding Risk Communication Best Practices and Theory.
 - Training in Risk and Crisis Communication (TRACC).
 - Social Media Use During Disasters: A Nationally Representative Field Experiment.

Current Year Key Events

- Begin evidence-based analysis in support of whole community implementation. As part of this activity, the program will begin the conduct of social and behavioral science research to develop communication strategies to successfully promote resilient to disasters in U.S. communities focusing on helping disaster survivors, enhancing communities’ robustness, adaptability, and recovery capabilities.

Budget Year Key Events

- Deliver a knowledge product that provides the result of the evidence-based analysis completed to date with a goal of developing more targeted and effective risk and crisis communications in order to provide evidence-based guidance that can be used by communities to promote resilience.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|--------|-------|------|------|-------|------|
| 12,468 | 1,433 | N/A | 583 | 1,000 | 700 |

Cyber Physical Security (CPS)

- *Problem:* The increased integration of cyber systems into many critical physical infrastructure and systems including, electric, water, transportation, and more, has introduced new and unknown possible vulnerabilities within single and potentially across multiple systems. As the systems are relatively new and growing in complexity and number, an understanding of the new challenges and information and decision support tools for owners and operators are needed for continued safe and secure operation and avoidance or limitation of disruptions or destruction from natural or manmade hazards.
- *Solution:* Focusing on high priority sectors such as energy (electrical grid) and water, this project will leverage past and current assessments and research efforts to provide decision support tools and mitigation solutions to address critical infrastructure vulnerabilities and the associated risks. Partnerships in government; Federal, State, local, and the private key critical sectors will be

developed to ensure resilience will be implemented into the systems such as the electrical grid and water.

- *Impact:* This program will enhance resilience of the Nation’s many critical infrastructure systems that are controlled by cyber systems in an interconnected environment. This increased level of resilience from all hazards allows the owners and operators to have an increased ability to assess and militate against potential threats and vulnerabilities from manmade and natural hazards. There will be an increase in overall understanding and security development for cyber-physical systems which will benefit security of future systems ensuring security is included from design.

Prior Year Key Events

- Built on findings from earlier project studies and workshops on the CPS vulnerabilities in several of the CI Sectors.

Current Year Key Events

- In collaboration with NPPD, engage the critical infrastructure sectors, owners, and operators to identify key requirements, gaps, and capture vulnerabilities.

Budget Year Key Events

- Develop initial overarching architecture for CPS analysis and experimentation with high priority sectors.
- Develop pilot plans for engaging the energy and water sector.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|-------|-------|-------|-------|
| 1,333 | 1,524 | 1,638 | 1,788 | 8,242 | 5,750 |

Drinking Water Resilience

- *Problem:* The drinking (potable) water infrastructure is aging and experiencing serious failures. The water infrastructure supports commerce and a major dependency for emergency response, healthcare, and community resilience.
- *Solution:* Develop a bottom-up risk assessment approach that works by enabling utility owners to self-assess risk with the aid of advanced scientific input from the national labs. Feed the outcome of those assessments into regional and national-scale risk models. Develop guidance for decisions on investing in the water infrastructure for maximum resilience improvements based on risk.
- *Impact:* Water utilities will save 50 % over the current cost of manual risk assessment with a web-based interactive tool. Safe, reliable, and resilient drinking water systems planned for anticipated risks over the next few decades will meet the dependencies of the health, emergency response, community preparedness, electronics, communications, power generation, industrial and many other vital sectors of the nation’s economy and well-being.

Prior Year Key Events

- Developed an investigative framework for the risk assessment model and identified knowledge support for the integrated utility self-assessment methodology.

Current Year Key Events

- Prototype utility self-assessment methodology, web-based and interactive, utilizing the existing RAMCAP ANSI-certified J100-10 risk assessment method endorsed by the American Water Works Association.

- Framework interface for national model with identified data interlinks for FY15 upgrade to the J100 tool.
- Prototype testing with one or more volunteer water utility companies.

Budget Year Key Events

- Upgrade J100 Web tool to enable interactive risk scenario development & consequence assessments.
- Implement framework interface between the national labs, J100 tool and data links to provide scientific support for J100.
- Implement secure data sharing from J100 to national labs.
- Implement national/regional risk assessment.
- Plan/socialize national risk-based prioritization for water infrastructure investment

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|------|-------|-------|
| N/A | N/A | N/A | 394 | 1,200 | 2,500 |

Incident Logistics and Resource Tracking

- *Problem:* Currently, the entire logistics supply chain when activated during disasters is inefficient and lacks agility to support national resilience. System-to-system data interfaces exist in various forms and standards. Transportation processes do not handle resource management automation for planning, selecting, and delivery at the local and vendors levels, and distribution centers receipts, shipments, and inventory technology processes are not fully automated to ensure fully automated just-in-time reporting and resource typing.
- *Solution:* Development of Incident Logistics and Resource Tracking injects a set of integrated technologies to enhance the current FEMA Logistics system to better support local responders and EOCs by improving asset visibility in the areas of status, tracking, and correct fulfillment. The automated connectivity relies upon the National Information Exchange Model standards to enable resource data exchange at the local, States, and Federal levels. The system provides a standardized resource management at the state, local, and Federal level and eliminates duplicate systems, requests, shipments, while enhancing visibility throughout the entire logistics supply chain through the secured cloud/web.
- *Impact:* This system provides increased end-to-end situational awareness, enhances just-in-time status and progress reports, improves real-time resource typing and inventory information thus improves better sourcing decisions, reduces operational costs, and increases resource/inventory accuracy. The improved cycle times help to deliver resources to the local and states easier and faster thereby making the entire logistical supply chain resilient and effective.

Prior Year Key Events

- None

Current Year Key Events

- Conduct an investigation of current (stove-piped) systems; perform a systems analysis; and identify a framework for system(s) integration.

Budget Year Key Events

- Based on the inventory of current state-of-the-art systems; gap analysis; results of technology foraging; and requirements definition, a go/no go decision will be made as to the feasibility of proceeding with the program.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|------|------|------|-------|
| 2,244 | 3,047 | N/A | N/A | 500 | 1,000 |

Overhead Imagery Data

- *Problem:* Improvements are required in the delivery of disaster relief programs using damage assessment products derived from remote sensing system in aircraft and satellites.
- *Solution:* A set of projects that bring together academia, industry, research laboratories, and government partners to develop a more effective and efficient process for the tasking of satellite and aircraft assets, the acquisition of remote sensing data, the analysis of these data, and the delivery of the derived product.
- *Impact:* The rapid provision of accurate post-disaster imagery will speed up the determination of damage, reduce the time to deliver disaster assistance to victims and reduce the cost of existing damage assessment procedures. These projects will improve the utility of existing satellite and airborne remote sensing assets through advanced analytical techniques designed to address specific hazard-related issues. This will include the leverage of basic and applied research by DOD, NASA, NOAA, and other Federal partners.

Prior Year Key Events

- Refined the satellite model and developed an initial aircraft asset planning module within the Remote Sensing Planning Tool (RESPT) for improved tasking of remote sensing assets.
- Tested and evaluated the Real time Airborne Management System (RAMS) for real time acquisition of imagery and downlink to response teams in the field with the Civil Air Patrol (CAP). CAP is a primary provider of imagery to FEMA for disaster assessment.
- Initiated the definition of technical specifications with FEMA for the construction of an advanced image analysis tool to improve FEMA’s post-disaster debris volume estimation process.

Current Year Key Events

- Complete development of the satellite modeling capability, enhance the aircraft asset location tool, and improve the collaborative sharing of imagery request within RESPT.
- Install a two-camera RAMS system in a CAP aircraft and test and evaluate acquisition and data transfer from the CAP infrastructure to FEMA Geo-portal.
- Complete a requirements definition study to determine the opportunity for remote sensing technologies to improve the FEMA post-disaster debris volume estimation process.

Budget Year Key Events

- Install a two-camera RAMS system in a CAP aircraft and test and evaluate acquisition and data transfer from the CAP infrastructure to FEMA Geo-portal.
- Initiate remote sensing based tools to improve the FEMA post-disaster debris volume estimation process.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|-------|-------|-------|-------|-------|
| N/A | 1,429 | 1,900 | 2,309 | 2,950 | 2,000 |

Resilient Structures

- *Problem:* Critical infrastructures are vulnerable to manmade and natural hazards, resulting in crippling effects on mass transportation, buildings, and other critical infrastructure.
- *Solution:* This project will design, fabricate, and test protective measures for tunnels, subway systems, bridges, buildings, and other critical transportation infrastructure. S&T will also develop software analysis tools to aid in analysis of vulnerabilities and improved design. Includes development of tunnel plugs under the Resilient Tunnel Project.
- *Impact:* The project will minimize and/or prevent the disruption to transportation services associated with terrorist attacks and natural disasters, to include Sandy-like storm surge flooding. Other solutions will increase structural resilience of high-risk critical infrastructure, to include tunnels, bridges, and buildings, such as commercial establishments, government buildings, and schools.

Prior Year Key Events

- Completed full-scale tunnel plug container testing.

Current Year Key Events

- Integrated system and subsystem designs for tunnel plug.
- Reconfiguration of tunnel plug testing facilities.
- Production of tunnel plug prototype.

Budget Year Key Events

- Full-scale tunnel plug pressure testing.
- Full system testing of tunnel plug prototype.
- Small-scale blast testing for unmitigated masonry tunnels.
- Small-scale blast testing of protective schemes for masonry tunnels.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|------|-------|-------|-------|
| 8,026 | 3,309 | N/A | 2,375 | 3,050 | 7,050 |

Solar Storm Mitigation

- *Problem:* Extreme solar storm activity produces ground induced currents (GIC) that can impact the electric grid performance and significantly damage critical components of the grid. There is very limited capability to accurately forecast a GIC-related event that would impact critical infrastructure in a timely manner.
- *Solution:* Develop the capability to forecast and model GICs and their impacts at specific nodes in the US power grid.
- *Impact:* Provide the utility owners and operators with timely and accurate GIC forecast information, allowing them to make key operational decisions, such as shutting down, reducing load, or rerouting load to minimize the impact of a GIC event.

Prior Year Key Events

- None

Current Year Key Events

- Development of user-defined requirements.

- Development and coupling of key models as inputs into the GIC forecasting system.

Budget Year Key Events

- Develop the GIC forecasting model.
- GIC forecasting model validation and verification.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------|------|------|------|------|-------|
| N/A | N/A | N/A | N/A | 500 | 2,000 |

Standard Unified Modeling Mapping Integrated Toolkit (SUMMIT)

- *Problem:* Planning and conducting exercises are costly as they require significant resources to develop objectives, analyze and design scenarios, and support the conduct phase by providing reach back subject matter expertise, data needs, and injects. This cycle of activities, from pre-event planning, to training and exercise, to evaluation and improvement, is often repeated for every exercise and is inefficient.
- *Solution:* SUMMIT is a modeling and simulation toolkit/platform that enables the emergency management community to access and connect suites of modeling tools and data sources for planning, exercises, or operational response on the web. SUMMIT improves the preparedness effectiveness by providing a collaborative environment that makes the linking of models and underlying data reusable so as to decrease the time and cost needed to train for, analyze, and respond to real or potential incidents.
- *Impact:* SUMMIT is available to Federal, State, and Local agencies at no cost and used at various F/S/L exercises and operational planning efforts including: NLE11, NLE12, FEMA Region 2 Blue Surge 2013 Exercise and Anaheim/Santa Ana Urban Area Threat and Hazard Identification and Risk Assessment (THIRA) planning process. FEMA adopted this tool and saved approximately \$2M per National Level Exercise. Sweden’s Civil Contingencies Agency (MSB) adopted it internationally for regional exercises.

Prior Year Key Events

- Transitioned SUMMIT reporting capability to FEMA operational environment at National Exercise Division.
- SUMMIT was used by FEMA personnel to support the design and execution of FEMA Region II Blue Surge and FEMA Region IV Ardent Sentry exercises, which were both part of FEMA’s National Exercise Program.

Current Year Key Events

- Deploy SUMMIT at FEMA Region II Wildcat exercise and planning efforts in preparation for 2014 NFL Super Bowl.
- Deploy SUMMIT at the state of Georgia to generate scenarios and preparedness considerations for regional hospital need planning.
- Complete DHS-Sweden, Swedish Civil Contingencies Agency (MSB) 3-year pilot of SUMMIT for country preparedness.
- Integrate SUMMIT into Homeland Security Exercise and Evaluation Program Enterprise Platform (HSEEP-EP).
- Upgrade SUMMIT capabilities to handle FEMA Region II Threat and Hazard Identification and Risk Assessment (THIRA) process to enhance effectiveness of FEMA preparedness grant dispersal.

Budget Year Key Events

- Develop SUMMIT analytical capabilities to support FEMA Threat and Hazard Identification and Risk Assessment (THIRA) process to enhance effectiveness of FEMA preparedness grant dispersal.
- Complete pilot deployment of SUMMIT in FEMA response environment to enhance effectiveness of emergency response during declared national disasters.

Funding History (thousands)

| FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|-------|-------|------|-------|-------|-------|
| 2,146 | 3,047 | N/A | 4,500 | 3,650 | 3,500 |

Note: Amounts may not add to total due to rounding.

S&T Framework for Prioritizing R&D Projects

DHS has a mission to strengthen America’s security and resiliency by providing knowledge products and innovative technology solutions for the HSE. To achieve this mission, S&T has outlined three critical areas of strategic focus. Firstly, S&T will pursue technology options and process enhancements that are focused on DHS Component operational priorities. Secondly, S&T will seek innovative, systems-based solutions to operationally complex problems. Thirdly, S&T will foster robust partnerships across the USG; State, local, and tribal governments; and universities, the private sector, and internationally in order to leverage expertise and solutions and share resources. S&T priorities for areas of research, development, and analysis are derived from an understanding of near- and long-term threats, national needs, and DHS mission needs and operational vulnerabilities, as articulated in the Administration’s National Security Strategy, the QHSR, and the capability gaps and operational requirements of DHS Components and first responder communities.

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

- **Systems Analysis:** How well does the project’s product(s) align with a customer’s existing operational context/concept of use or an alternative that is agreeable to the customer?
- **Customer Buy-in:** Have the project objectives been developed through close consultation with appropriate decision authorities?
- **Efficiency:** What level of savings can be achieved by this project with respect to the customer’s operations?
- **Capability:** To what extent does this project provide risk or threat reduction and/or improved fidelity, performance, etc.?

- Technical/Research Feasibility: How likely is it that the team will overcome the technical and/or research challenges facing this technology and/or knowledge product?
- Transition Likelihood: Is there a clear path/mechanism to enable transition/commercialization?
- Customer readiness: Are there any secondary issues related to the concept of use, prepotency, budgeting, affordability, regulatory or statutory realities, or business value?
- Timeline: When will the project achieve either an efficiency or capability improvement, as part of normal operations? Or, when will the first demonstration of the capability/efficiency be observed in an operational context?
- Innovation: Does the project attempt to realize its objectives in a way that others have not previously considered or exploited?
- Resource Leverage: What level of interaction exists between the project team and the target Component or customer?
- Foraging: Does the project exploit existing technology or research, and/or new or existing partnerships to minimize time and expense?
- Cost Realism: Is the cost projection credible?
- Project Clarity: How well is the project described, laid-out – is it clear what the team will do? Are the problems well defined and the approach clear? Has a letter of intent or technology transition agreement been obtained?

In addition, S&T established the following methods to ensure that S&T projects support the Component's highest priorities in supporting DHS QHSR missions:

- S&T Component Liaisons: Component liaisons are a primary coordination mechanism for both S&T and the Components to ensure strong communication throughout the R&D process. Liaisons from TSA, CBP, ICE, NPPD, USSS, and USCG are detailed to S&T and S&T has provided liaisons to CBP, USSS, DHS's Office of Policy, DHS Tactical Communications Program Office, DNDO, TSA, and FEMA.
- Component R&D Agreements: R&D agreements with Components strengthen cooperation, coordination, and investment in projects. S&T's APEX projects begin with a memorandum of understanding signed by the Undersecretary of Science and Technology and Component leadership. This process solidifies the agreement that both entities will provide resources and oversight for the length of the project. S&T has agreements with CBP and USSS regarding ongoing R&D efforts in various stages of completion, and plans to expand partnerships with other DHS Components.
- Component R&D Strategies: S&T and TSA issued a joint R&D strategy for aviation security that identified TSA's R&D priorities. That plan was a result of an internal planning process that prioritized capability gaps and focused on the work between TSA's and S&T's Explosives and Human Factors/Behavioral Sciences Divisions. S&T also is planning to work with USSS,

CBP, ICE, and FEMA to build component-specific R&D strategies that are linked to component acquisition programs.

R&D Coordination Teams: S&T plans to replace the current Integrated Product Team process with two new coordination teams—a cross-functional team comprised of S&T personnel focusing on strategic priorities and an integral partner team—led by S&T’s newly created ASOA division to focus on components’ operational needs.

**Department of Homeland Security
Science & Technology
Research, Development, Acquisitions, and Operations
University Programs
Program Performance Justification**
(Dollars in Thousands)

PPA: University Programs

| | Perm. Pos | FTE | Amount |
|------------------------------|------------------|------------|---------------|
| 2013 Revised Enacted | - | - | 38,339 |
| 2014 Enacted | - | - | 39,724 |
| 2015 Current Services | - | - | 39,724 |
| 2015 Program Change | - | - | (8,724) |
| 2015 Total Request | - | - | 31,000 |
| Total Change 2014 to 2015 | - | - | (8,724) |

The S&T Directorate requests \$31.000 million for University Programs in FY 2015. The \$8.724 million decrease in FY 2015 will reduce operational support to current COEs and will impact the number of future competitions for COEs.

CURRENT SERVICES PROGRAM DESCRIPTION:

University Programs PPA – FY 2014: \$39.724 million. FY 2015 Request: \$31.000 million. The Office of University Programs (OUP) supports critical homeland security-related research and education at U.S. colleges and universities to address high-priority DHS-related issues and to enhance homeland security capabilities over the long term. The program brings together scientists, mathematicians, and engineers from many academic disciplines and institutions. These researchers are investigating research questions important to DHS as well as developing new technologies and approaches to solve complex and challenging homeland security problems. The program focuses on building homeland security expertise in the academic community, creating strategic partnerships among universities and public agencies, and developing a new science and engineering workforce dedicated to homeland security. The primary customers for OUP are the S&T Directorate’s divisions, the DHS Component agencies, and Federal, State, and local government agencies.

Investments in university research and support for students in relevant fields are critical to preserving the United States’ strategic/economic security and carrying out activities in two program areas: the S&T Directorate University COEs and MSI program.

Centers of Excellence

The COEs work with the S&T Directorate, the DHS Component agencies, and State, local, and tribal first responders. COE research complements existing DHS R&D programs including those of Federal laboratories and FFRDCs. They take advantage of other relevant Federal agency-sponsored research and provide outcomes useful to Federal, State, and local governments, the private sector, and international partners. The selection process for the COEs is highly competitive, rigorously peer-reviewed, and merit-based.

In 2015, OUP will continue to focus on transition-related activities. The COEs have recently participated in a series of highly successful technology demonstrations to DHS Components and first responders. The demonstrations increase exposure of new and existing COE tools, technologies, and knowledge products to end-users. In 2015, the COEs will increase resources dedicated to their flagship End-to-End projects – larger research efforts with particular emphasis on end-user engagement from inception to product use.

The COEs are funded through research cooperative agreements, grants, and contracts, depending on the nature of the projects. The COEs are building expertise and reachback capabilities in multi-disciplinary fields of study important to homeland security.

Research will be focused on:

1. Areas identified as priorities in the QHSR
2. Research that is clearly within DHS's purview and closely related to DHS missions
3. Research that is not being done elsewhere
4. Research that can make a difference in operations or intelligence-gathering

The current COEs include:

- The National Center for Border Security and Immigration (NCBSI), co-led by the University of Arizona at Tucson and the University of Texas at El Paso (<http://www.borders.arizona.edu/> <http://osi.utep.edu/NCBSI/index.html>)
- Center of Excellence for Visualization and Data Analytics (CVADA), co-led by Rutgers and Purdue Universities, (<http://ccicada.rutgers.edu/>, <http://www.purdue.edu/discoverypark/vaccine/>)
- The Center for Awareness and Location of Explosives-Related Threats (ALERT), (formerly Center of Excellence for Explosives Detection, Mitigation, and Response), co-led by Northeastern University and the University of Rhode Island (<http://www.northeastern.edu/alert/>, <http://energetics.chm.uri.edu/?q=node/6>)
- The National Center for Food Protection and Defense (NCFPD), led by the University of Minnesota (www.ncfpd.umn.edu)
- The Center of Excellence for Maritime, Island and Remote and Extreme Environment Security (MIREES), co-led by the University of Hawaii and Stevens Institute of Technology (<http://www.cimes.hawaii.edu/>, <http://www.stevens.edu/csr/>)
- The National Center for Zoonotic and Animal Disease Defense, (formerly National Center for Foreign Animal and Zoonotic Disease Defense (FAZD)), co-located at Texas A&M University and Kansas State University (<http://fazd.tamu.edu/>, <http://www.ceeazd.org>)
- The Consortium for the Study of Terrorism and Responses to Terrorism (START), led by the University of Maryland (www.start.umd.edu)

- The National Center for Risk and Economic Analysis of Terrorism Events (CREATE) led by the University of Southern California (<http://create.usc.edu>)
- The Coastal Hazards Center of Excellence (formerly the Center of Excellence for Natural Disasters, Coastal Infrastructure, and Emergency Management (NDCIEM)), co-led by the University of North Carolina at Chapel Hill and Jackson State University (<http://hazardscenter.unc.edu/diem/>, <http://www.jsums.edu/cset/or/centers/centndciem.htm>)

The following section describes specific activities conducted by COEs managed by OUP.

The National Center for Border Security and Immigration (NCBSI)

This Center improves the capabilities of the U.S. Customs and Border Protection (CBP), U.S. Immigration and Customs Enforcement (ICE), U.S. Citizenship and Immigration Services (USCIS), U.S. Coast Guard (USCG), and other federal, state and local agencies to detect people and goods moving across U.S. borders (legally or illegally), using a fully integrated, system-of-systems approach. NCBSI provides fundamental research in support of DHS's goals of strengthening border security, immigration enforcement, and immigration services.

Center for Visualization and Data Analytics (CVADA)

This Center's tools and analyses improve the data analysis abilities of the Federal Emergency Management Agency (FEMA), CBP, ICE, USCG, Intelligence and Analysis (I&A), and more than 25 regional, state and local public safety and emergency response agencies. CVADA develops new methods, algorithms, and technologies that enable federal, state, and local homeland security agencies to efficiently manage, analyze, visualize, and understand vast amounts of diverse, ever-changing, and distributed data. Such capabilities help to identify vulnerabilities, detect threats, improve information analysis techniques, improve resource management and operational analysis capabilities, mitigate catastrophic events, and plan post-event analysis for remediation activities.

The Center for Awareness and Localization of Explosives-Related Threats (ALERT)

This Center supports the National Protection and Programs Directorate (NPPD) Office of Infrastructure Protection (OIP) and Office for Bombing Prevention (OBP), DHS Office of Policy, Transportation Security Administration (TSA), ICE, state homeland security agencies, and state and local police bomb squads by providing research and training to prepare for, prevent, mitigate, respond to, and recover from terrorist attacks involving explosives. ALERT provides basic explosives-related research to advance the technical tools and information that the Science and Technology (S&T) Directorate's customers will need in the future.

The National Center for Food Protection & Defense (NCFPD)

This Center improves the ability of the S&T Directorate, NPPD Office of Infrastructure Protection (OIP), Office of Health Affairs (OHA) Food, Agriculture, Veterinary Defense, CBP, U.S. Department of Agriculture (USDA), the Food and Drug Administration, Centers for Disease Control (CDC), U.S. Environmental Protection Agency (EPA), state and local agencies, and the food and agriculture private sector to respond to catastrophic food system events by minimizing or eliminating food/agriculture system vulnerabilities. NCFPD conducts research and education aimed at reducing the potential for contamination at any point along the food supply chain and at mitigating the potentially catastrophic public health and economic effects of such attacks.

National Center for Zoonotic & Animal Disease Defense (ZADD)

This Center conducts research and develops products that improve the ability of the S&T Chemical and Biological Division, OHA, NPPD, Plum Island Animal Disease Center (PIADC), National Biodefense Analysis and Countermeasures Center (NBACC), USDA, CDC, state and local governments, and the agricultural industry to protect the Nation's agriculture and public health sectors against high-consequence foreign, emerging, and/or zoonotic animal disease threats in the United States.

Center of Excellence for Maritime, Island & Remote, and Extreme Environmental Security (MIREES)

This Center enhances USCG, CBP, FEMA and state homeland security agencies' ability to detect, prevent and respond to catastrophic events, particularly for U.S. ports, coasts, islands, and extreme environments. The Center develops both fundamental and applied research to support DHS's and other agencies' maritime security mission goals, including improved detection and interdiction capabilities, and a more resilient marine transportation system.

The National Consortium for the Study of Terrorism and Responses to Terrorism (START)

This Center provides DHS Components, other federal, state, and local agencies, private security agencies, and academia with data-driven research and capability strategies to disrupt terrorist networks, reduce the incidence of terrorism, and enhance the preparedness of American society. The Center uses advanced behavioral and social science theories, methods, and data analysis to better understand the origins, dynamics, and impacts of terrorism and counterterrorism strategies. START is used by agencies throughout federal, state, and local governments, industry, academia and the news media as a source of objective data and analysis regarding terrorism and trans-national criminal activities.

Coastal Hazards Center of Excellence (CHC)

This Center provides FEMA, USCG, National Oceanic and Atmospheric Administration (NOAA), U.S. Army Corps of Engineers (USACE), state and local emergency managers, and infrastructure managers with improved coastal hazards planning, response, and recovery capabilities such as providing more accurate storm surge estimates within minutes instead of hours. CHC conducts basic and transformational research in coastal hazards modeling, coastal engineering, disaster response, and resiliency planning, and also develops expertise in related disciplines through education.

National Center for Risk & Economic Analysis of Terrorism Events (CREATE)

This Center's models and analyses improve the ability of DHS Components, federal, state, and local agencies, private sector security/operators, and academia to predict, evaluate and counter terrorist attacks, and allocate limited resources more efficiently. CREATE develops advanced models and tools to evaluate the risks, costs, and consequences of terrorism and security operations, and to identify economically efficient investments to improve security and resilience.

New Center of Excellence

S&T anticipates competing a new Center of Excellence based on funding received in the 2014 appropriations bill.

Minority Serving Institutions

Minority Serving Institutions Program

The MSI programs enhance the capabilities of MSIs to conduct HS-STEM related research and move MSI students into successful HSE careers. Current MSI programs, including the Scientific Leadership Award program and the Summer Research Team program, are developing course content and training in areas critical to homeland security, while they also build enduring partnerships with the COEs. With small investments, S&T will realize significant returns in the development of a new generation of scientists and engineers focused on homeland security. In addition, the programs can increase diversity and representation within the future homeland security science and engineering workforce.

IV. Program Justification Changes

**Department of Homeland Security
Science & Technology
Research, Development, Acquisitions, and Operations
Justification of Program Changes
(Dollars in Thousands)**

Program Increase 1: Laboratory Operations
PPA: Laboratory Facilities
Program Increase: Positions 0, FTE 0, Dollars \$5,048

Funding Profile

| | FY 2013 Revised Enacted | | | FY 2014 Enacted | | | FY 2015 Request | | |
|------------------------|-------------------------|------------|-----------------|-----------------|------------|-----------------|-----------------|------------|-----------------|
| | Pos | FTE | Dollars (\$000) | Pos | FTE | Dollars (\$000) | Pos | FTE | Dollars (\$000) |
| Current Services Level | | | | | | | 130 | 130 | 114,902 |
| Program Increase | | | | | | | - | - | 5,048 |
| Total Request | 128 | 128 | 112,432 | 130 | 130 | 114,535 | 130 | 130 | 119,950 |

Description of Item

The increase provides funding for laboratory operations.

Justification

ONL manages the Laboratory Facilities Programs. ONL provides the Nation with a coordinated, enduring core of productive science, technology and engineering laboratories, organizations, and institutions, which can provide the knowledge and technology required to secure our homeland.

Laboratory Operations – The Directorate requests \$119.950 million to manage the operations, core capabilities, maintenance, and personnel requirements of the DHS S&T Laboratories and infrastructure. This program also oversees the continued operations of facilities to meet the mission requirements while maintaining safe, secure, compliant, and efficient operations. The increase in funding to Laboratory Operations will support the operations and maintenance of laboratories.

Impact on Performance (Relationship of Decrease to Strategic Goals)

The FY 2015 funding will increase Laboratory Facilities' ability to establish additional direct relationships between its researchers and customers across DHS and expand future funding mechanisms for its wide range of programs.

Department of Homeland Security
Science & Technology
Research, Development, Acquisitions, and Operations
Justification of Program Changes
(Dollars in Thousands)

Program Increase 2: Laboratory Construction
PPA: Laboratory Facilities
Program Increase: Positions 0, FTE 0, Dollars \$315,230

Funding Profile

| | FY 2013 Revised Enacted | | | FY 2014 Enacted | | | FY 2015 Request | | |
|------------------------|-------------------------|-----|-----------------|-----------------|-----|-----------------|-----------------|-----|-----------------|
| | Pos | FTE | Dollars (\$000) | Pos | FTE | Dollars (\$000) | Pos | FTE | Dollars (\$000) |
| Current Services Level | | | | | | | - | - | - |
| Program Increase | | | | | | | - | - | 315,230 |
| Total Request | - | - | 45,651 | - | - | 433,250 | - | - | 315,230 |

Description of Item

The increase provides funding for NBAF, which will replace PIADC as the Nation’s first line of defense against Foreign Animal Diseases (FADs), as well as for critical infrastructure upgrades for PIADC.

Justification

ONL manages the Laboratory Facilities Programs. ONL provides the Nation with a coordinated, enduring core of productive science, technology and engineering laboratories, organizations, and institutions, which can provide the knowledge and technology required to secure our homeland.

Construction and Upgrades – The Directorate requests \$315.230 million to oversee the planning, budgeting, and management of laboratory infrastructure construction and upgrade projects. Construction projects provide and maintain R&D capabilities to support the missions of the S&T Directorate, the Department, and other government agencies that have interrelated homeland security missions. The investments include the construction of future laboratories, where a current capability does not exist, and upgrades to extend the life and capabilities of present laboratory facilities. The increase in funding to Construction will fully fund the construction of the NBAF main laboratory and provide funding for the construction of the new wastewater thermal decontamination facility at PIADC.

NBAF Construction

The Directorate requests \$300 million for NBAF construction. NBAF will be a state-of-the-art bio-containment facility for the study of foreign animal, emerging and zoonotic (transmitted from animals to humans) diseases that threaten the U.S. animal agriculture and public health. It will provide and strengthen our Nation with critical capabilities to conduct research, develop vaccines and other

countermeasures, and train veterinarians in preparedness and response against these diseases. For the past 50 years, PIADC has served our Nation as the primary facility to conduct this research. However, PIADC is at the end of its lifecycle and needs to be replaced in order to meet U.S. research requirements and ensure the timely development of countermeasures in the event of an outbreak. NBAF meets that need and will serve as a replacement for the PIADC facility. Strategically, NBAF will boast of new and expanded capabilities, specifically, BSL-4 containment for the study of high-consequence diseases affecting large livestock and a biotechnology development module to expedite the licensure of vaccines.

PIADC Infrastructure Upgrades

The Directorate requests \$15.230 million for critical life and safety infrastructure upgrades at PIADC. Specifically, the construction of the new wastewater thermal decontamination facility is a high-priority project necessary to maintain capacity and safety at PIADC. The Directorate recently completed an engineering assessment to refine the estimate of PIADC infrastructure costs for FY 2014 and beyond. The assessment was risk-based to provide reliable and safe operations for at least 10 years while NBAF is constructed and certified.

Additionally, S&T has established a partnership with USDA to explore possible opportunities to transition non-FMD research from PIADC to other facilities, including Kansas State, before NBAF is opened, with the intent to minimize the load on the PIADC infrastructure and reduce the cost of out-year upgrades and operations.

Impact on Performance (Relationship of Increase to Strategic Goals)

The FY 2015 funding will increase Laboratory Facilities' ability to establish additional direct relationships between its researchers and customers across DHS and expand future funding mechanisms for its wide range of programs.

**Department of Homeland Security
Science & Technology
Research, Development, Acquisitions, and Operations
Justification of Program Changes
(Dollars in Thousands)**

Program Decrease 1: University Programs
 PPA: University Programs
 Program Decrease: Positions 0, FTE 0, Dollars \$(8,724)

Funding Profile

| | FY 2013 Revised Enacted | | | FY 2014 Enacted | | | FY 2015 Request | | |
|------------------------|-------------------------|-----|-----------------|-----------------|-----|-----------------|-----------------|-----|-----------------|
| | Pos | FTE | Dollars (\$000) | Pos | FTE | Dollars (\$000) | Pos | FTE | Dollars (\$000) |
| Current Services Level | | | | | | | - | - | 39,724 |
| Program Decrease | | | | | | | - | - | (8,724) |
| Total Request | - | - | 38,339 | - | - | 39,724 | - | - | 31,000 |

Description of Item:

Reduction of the Office of University Programs budget from \$39,724,000 to \$31,000,000, or a net decrease of \$8,724,000 would have several impacts on FY 2015 activities for the COEs. OUP does not anticipate any changes in its Minority Servings Institutions programs. Effects on the COEs would include:

1. S&T will re-compete COEs at a lower proposed funding level.
2. The decrease would reduce the number of research opportunities per year available through this program .

Justification:

Funding was realigned to support other R&D and capital needs within S&T.

Impact on Performance (Relationship to Strategic Goals):

This decrease will reduce the number of COEs that can be maintained at current operational levels and will impact the number of future competitions for COEs. This will also decrease OUP's ability to establish additional direct relationships between its researchers and customers across DHS .

Department of Homeland Security
Science & Technology
Research, Development, Acquisitions, and Operations
Justification of Program Changes
(Dollars in Thousands)

Program Decrease 2: Research, Development and Innovation
PPA: Research Development and Innovation
Program Decrease: Positions 0, FTE 0, Dollars \$(28,212)

Funding Profile

| | FY 2013 Revised Enacted | | | FY 2014 Enacted | | | FY 2015 Request | | |
|------------------------|-------------------------|-----|-----------------|-----------------|-----|-----------------|-----------------|-----|-----------------|
| | Pos | FTE | Dollars (\$000) | Pos | FTE | Dollars (\$000) | Pos | FTE | Dollars (\$000) |
| Current Services Level | | | | | | | - | - | 462,000 |
| Program Decrease | | | | | | | - | - | (28,212) |
| Total Request | - | - | 425,295 | - | - | 462,000 | - | - | 433,788 |

Description of Item:

Reduction of the Research, Development, and Innovation budget from \$462,000,000 to \$433,788,000, or a net decrease of \$28,212,000 would have several impacts on FY 2015 activities for the CBE Defense, Counter Terrorist, Cyber Security/Information Analytics, and First Responder/Disaster Resilience thrust areas.

Border Security – Net increase of \$7.244 million. Enhances security at our nation’s borders and waterways without impeding the flow of commerce.

CBE Defense – Net decrease of \$16.422 million. Detects, protects against, responds to, and recovers from chemical and biological incidents, and protects citizens and infrastructure from the devastating effects of explosives.

Counter Terrorist – Net decrease of \$11.981 million. Identifies individuals or groups that intend to conduct terrorist attacks or to illicitly move weapons, dangerous goods, and contraband.

Cyber Security/Information Analytics – Net decrease of \$3.244 million. Contributes to a safe, secure, and resilient cyber environment.

First Responder/Disaster Resilience – Net decrease of \$3.809 million. Expands first responder capabilities and improves their effectiveness, efficiency, and safety. Improves the nation’s preparedness for natural and man-made catastrophes.

Justification:

RD&I provides state-of-the-art technology and/or solutions to meet the needs of the operational Components of the Department and the first responder community. It includes customer-focused and output-oriented RDT&E programs that balance risk, cost, impact, and time to delivery. The six thrust areas of RD&I include: APEX; Border Security; CBE Defense; Counter Terrorist; Cyber Security/Information Analytics; First Responder/Disaster Resilience. The S&T Directorate will use available funding to conduct R&D in a manner that drives investments towards clear priorities, aids transparency and accountability, eliminates unwanted project redundancies and fragmentation, and effectively leverages other organizations' R&D investments.

Impact on Performance (Relationship to Strategic Goals):

The reduction in funding will impact the S&T Directorate's ability to meet the operational needs of DHS Components and first responders. Reductions will be in the following areas: Explosives Detection, Bioagent Threat Assessment, Hostile Behavior Predict and Detect, Identity Management, and Information Analysis. S&T will focus available resources on the projects most critical to DHS operating components and first responders.

V. Exhibits and Other Supporting Material

A. Justification of Proposed Legislative Language

For necessary expenses for science and technology research, including advanced research projects, development, test and evaluation, acquisition, and operations as authorized by title III of the Homeland Security Act of 2002 (6 U.S.C. 181 et seq.), and the purchase or lease of not to exceed 5 vehicles [\$1,091,212,000] \$941,671,000, of which [\$543,427,000] \$506,491,000, to remain available until September 30, [2016] 2017; and of which [\$547,785,000] \$435,180,000, to remain available until September 30, [2018] 2019, solely for operation and construction of laboratory facilities.

| Language Provision | Explanation |
|--|--|
| ¹ ...[\$1,091,212,000] \$941,671,000... | Dollar change only. No substantial change proposed. |
| ² ...[\$543,427,000] \$506,491,000... | Dollar change only. No substantial change proposed. |
| ³ ... [2016] 2017... | Fiscal year change only. No substantial change proposed. |
| ⁴ ... to remain available until... | Provides S&T with 3-year authority for the \$506,491,000 available for advanced research projects, development, test and evaluation, acquisition, and operations |
| ⁵ ...[\$547,785,000] \$435,180,000... | Dollar change only. No substantial change proposed. |
| ⁶ ... [2018] 2019... | Fiscal year change only. No substantial change proposed. |
| ⁷ ... to remain available until... | Provides S&T with 5-year authority for the \$435,180,000 available solely for operation and construction of laboratory facilities |
| | |

B. FY 2014 to FY 2015 Budget Change

Department of Homeland Security Research, Development, Acquisitions, and Operations FY 2014 to FY 2015 Budget Change (Dollars in Thousands)

| | Pos. | FTE | Amount |
|--------------------------------------|------|-----|-------------|
| FY 2013 Revised Enacted | 128 | 128 | \$667,708 |
| FY 2014 Enacted | 130 | 130 | \$1,091,212 |
| Adjustments-to-Base | | | |
| Increases | | | |
| 2015 pay raise | - | - | \$144 |
| Annualization of 2014 pay raise | - | - | \$47 |
| Increased Retirement Contribution | - | - | \$176 |
| Total, Increases | - | - | \$367 |
| Decreases | | | |
| Non-Recur: Laboratory Construction | - | - | (\$433,250) |
| Total, Decreases | - | - | (\$433,250) |
| Total Other Adjustments | - | - | (\$432,883) |
| Total Adjustments-to-Base | - | - | (\$432,883) |
| FY 2015 Current Services | 130 | 130 | \$658,329 |
| Program Changes | | | |
| Increases | | | |
| Laboratory Construction | - | - | \$315,230 |
| Laboratory Operations | - | - | \$5,048 |
| Total, Increases | - | - | \$320,278 |
| Decreases | | | |
| Research, Development and Innovation | - | - | (\$28,212) |
| University Programs | - | - | (\$8,724) |
| Total, Decreases | - | - | (\$36,936) |
| Total Program Changes | - | - | \$283,342 |
| FY 2015 Request | 130 | 130 | \$941,671 |
| FY 2014 to FY 2015 Change | - | - | (\$149,541) |

C. Summary of Requirements

**Department of Homeland Security
Science & Technology
Research, Development, Acquisitions, and Operations
Summary of Requirements
(Dollars in Thousands)**

| | Pos. | FTE | Amount |
|--|------|-----|-------------|
| FY 2013 Revised Enacted | 128 | 128 | \$667,708 |
| FY 2014 Enacted | 130 | 130 | \$1,091,212 |
| Adjustments-to-Base | - | - | - |
| Increases | - | - | \$367 |
| Decreases | - | - | (\$433,250) |
| Total, Adjustments-to-Base | - | - | (\$432,883) |
| FY 2015 Current Services | 130 | 130 | \$658,329 |
| Program Changes | - | - | - |
| Increases | - | - | \$320,278 |
| Decreases | - | - | (\$36,936) |
| Total, Program Changes | - | - | \$283,342 |
| FY 2015 Request | 130 | 130 | \$941,671 |
| FY 2014 to FY 2015 Total Change | - | - | (\$149,541) |

| Estimates by Program Project Activity | FY 2014 | | | FY 2015 | | | FY 2015 | | | FY 2015 | | | FY 2014 to FY 2015 | | |
|---------------------------------------|---------|-----|-------------|---------------------|-----|-------------|----------------|-----|------------|---------|-----|-----------|--------------------|-----|-------------|
| | Enacted | | | Adjustments-to-Base | | | Program Change | | | Request | | | Total Change | | |
| | Pos | FTE | Amount | Pos | FTE | Amount | Pos | FTE | Amount | Pos | FTE | Amount | Pos | FTE | Amount |
| Acquisition and Operations Support | - | - | \$41,703 | - | - | - | - | - | - | - | - | \$41,703 | - | - | - |
| Research Development and Innovation | - | - | \$462,000 | - | - | - | - | - | (\$28,212) | - | - | \$433,788 | - | - | (\$28,212) |
| University Programs | - | - | \$39,724 | - | - | - | - | - | (\$8,724) | - | - | \$31,000 | - | - | (\$8,724) |
| Laboratory Facilities | 130 | 130 | \$547,785 | - | - | (\$432,883) | - | - | \$320,278 | 130 | 130 | \$435,180 | - | - | (\$112,605) |
| Total | 130 | 130 | \$1,091,212 | - | - | (\$432,883) | - | - | \$283,342 | 130 | 130 | \$941,671 | - | - | (\$149,541) |

D. Summary of Reimbursable Resources

Department of Homeland Security
Research, Development, Acquisitions, and Operations
Summary of Reimbursable Resources
(Dollars in Thousands)

| Collections by Source: | FY 2013 Revised Enacted | | | FY 2014 Enacted | | | FY 2015 Request | | | Increase/Decrease | | |
|--|-------------------------|-----|------------------|-----------------|-----|------------------|-----------------|-----|------------------|-------------------|-----|----------------|
| | Pos | FTE | Amount | Pos | FTE | Amount | Pos | FTE | Amount | Pos | FTE | Amount |
| Department of Agriculture | - | - | \$344 | - | - | \$350 | - | - | \$350 | - | - | - |
| Department of Justice | - | - | \$3,500 | - | - | \$90 | - | - | - | - | - | (\$90) |
| Department of Transportation | - | - | - | - | - | \$250 | - | - | - | - | - | (\$250) |
| Sweden | - | - | \$628 | - | - | - | - | - | - | - | - | - |
| Kansas | - | - | \$41,042 | - | - | - | - | - | - | - | - | - |
| United States Coast Guard | - | - | \$2,579 | - | - | \$2,680 | - | - | \$2,925 | - | - | \$245 |
| National Protection and Programs Directorate | - | - | \$33,093 | - | - | \$35,235 | - | - | \$38,850 | - | - | \$3,615 |
| Canada | - | - | \$510 | - | - | \$400 | - | - | \$400 | - | - | - |
| United Kingdom | - | - | \$2,802 | - | - | - | - | - | - | - | - | - |
| Headquarters Operations | - | - | \$15,134 | - | - | \$26,945 | - | - | \$27,945 | - | - | \$1,000 |
| Australia | - | - | \$178 | - | - | - | - | - | - | - | - | - |
| Citizen and Immigration Services | - | - | \$5,893 | - | - | \$13,850 | - | - | \$15,100 | - | - | \$1,250 |
| Chlorine Institute | - | - | \$25 | - | - | \$425 | - | - | \$425 | - | - | - |
| EuroChlor | - | - | - | - | - | \$300 | - | - | \$300 | - | - | - |
| Clorosur | - | - | - | - | - | \$300 | - | - | \$300 | - | - | - |
| Association of American Railroads | - | - | - | - | - | \$200 | - | - | \$200 | - | - | - |
| Transportation Research Board | - | - | - | - | - | \$200 | - | - | \$200 | - | - | - |
| Netherlands | - | - | \$275 | - | - | - | - | - | - | - | - | - |
| Department of Health & Human Services | - | - | \$747 | - | - | \$750 | - | - | \$750 | - | - | - |
| Department of Defense | - | - | \$1,948 | - | - | \$1,950 | - | - | \$2,350 | - | - | \$400 |
| Immigration and Customs Enforcement | - | - | - | - | - | \$2,330 | - | - | \$2,540 | - | - | \$210 |
| Customs and Border Protection | - | - | \$12,032 | - | - | \$19,695 | - | - | \$21,000 | - | - | \$1,305 |
| Federal Emergency Management Agency | - | - | \$2,295 | - | - | \$7,000 | - | - | \$7,350 | - | - | \$350 |
| Transportation Security Administration | - | - | \$9,286 | - | - | \$12,550 | - | - | \$13,400 | - | - | \$850 |
| United States Secret Service | - | - | \$1,195 | - | - | \$1,790 | - | - | \$1,950 | - | - | \$160 |
| Domestic Nuclear Detection Office | - | - | \$4,682 | - | - | \$4,488 | - | - | \$4,688 | - | - | \$200 |
| Office of Health Affairs | - | - | \$1,690 | - | - | \$215 | - | - | \$235 | - | - | \$20 |
| Department of State | - | - | \$232 | - | - | \$195 | - | - | \$215 | - | - | \$20 |
| Total Budgetary Resources | - | - | \$140,110 | - | - | \$132,188 | - | - | \$141,473 | - | - | \$9,285 |

| Obligations by Program/Project Activity: | FY 2013 Revised Enacted | | | FY 2014 Enacted | | | FY 2015 Request | | | Increase/Decrease | | |
|--|-------------------------|-----|------------------|-----------------|-----|------------------|-----------------|-----|------------------|-------------------|-----|----------------|
| | Pos | FTE | Amount | Pos | FTE | Amount | Pos | FTE | Amount | Pos | FTE | Amount |
| University Programs | - | - | \$1,448 | - | - | \$1,250 | - | - | \$1,250 | - | - | - |
| Acquisition and Operations Support | - | - | \$81,761 | - | - | \$115,213 | - | - | \$124,148 | - | - | \$8,935 |
| Research, Development, and Innovation | - | - | \$11,950 | - | - | \$12,000 | - | - | \$12,000 | - | - | - |
| Laboratory Facilities | - | - | \$44,951 | - | - | \$3,725 | - | - | \$4,075 | - | - | \$350 |
| Total Obligations | - | - | \$140,110 | - | - | \$132,188 | - | - | \$141,473 | - | - | \$9,285 |

E. Summary of Requirements By Object Class

Department of Homeland Security
Research, Development, Acquisitions, and Operations
 Summary of Requirements by Object Class
 (Dollars in Thousands)

| Object Classes | 2013 Revised Enacted | 2014 Enacted | 2015 Request | FY 2014 to FY 2015 Change |
|---|-------------------------|--------------------|------------------|------------------------------|
| Personnel and Other Compensation Benefits | | | | |
| 11.1 Full-time Permanent | \$13,512 | \$13,702 | \$13,893 | \$191 |
| 11.7 Military Personnel | \$1,561 | \$1,561 | \$1,561 | - |
| 12.1 Civilian Personnel Benefits | \$3,850 | \$3,850 | \$4,026 | \$176 |
| Total, Personnel and Other Compensation Benefits | \$18,923 | \$19,113 | \$19,480 | \$367 |
| Other Object Classes | | | | |
| 21.0 Travel and Transportation of Persons | \$4,183 | \$2,905 | \$2,905 | - |
| 23.1 Rental Payments to GSA | \$1,250 | \$1,250 | \$1,250 | - |
| 23.3 Communications, Utilities, and Misc. Charges | \$12,804 | \$12,804 | \$12,804 | - |
| 25.1 Advisory and Assistance Services | \$40,724 | \$40,468 | \$40,468 | - |
| 25.3 Other Goods and Services from Federal Sources | \$5,915 | \$5,915 | \$5,915 | - |
| 25.4 Operation and Maintenance of Facilities | \$48,457 | \$50,548 | \$55,596 | \$5,048 |
| 25.5 Research and Development Contracts | \$443,035 | \$476,745 | \$448,533 | (\$28,212) |
| 25.7 Operation and Maintenance of Equipment | \$649 | \$649 | \$649 | - |
| 26.0 Supplies and Materials | \$5,641 | \$5,641 | \$5,641 | - |
| 31.0 Equipment | \$1,871 | \$1,871 | \$1,871 | - |
| 32.0 Land and Structures | \$45,651 | \$433,250 | \$315,230 | (\$118,020) |
| 33.0 Investments and loans | \$1,966 | - | - | - |
| 41.0 Grants, Subsidies, and Contributions | \$36,639 | \$40,053 | \$31,329 | (\$8,724) |
| Total, Other Object Classes | \$648,785 | \$1,072,099 | \$922,191 | (\$149,908) |
| Total, Direct Obligations | \$667,708 | \$1,091,212 | \$941,671 | (\$149,541) |
| Adjustments | | | | |
| Net Offsetting Collections | - | - | - | - |
| Unobligated Balance, start of year | - | - | - | - |
| Unobligated Balance, end of year | - | - | - | - |
| Recoveries of Prior Year Obligations | - | - | - | - |
| Offsetting Collections | - | - | - | - |
| Total Requirements | \$667,708 | \$1,091,212 | \$941,671 | (\$149,541) |
| Full Time Equivalents | 128 | 130 | 130 | - |

F. Permanent Positions by Grade

Department of Homeland Security
Research, Development, Acquisitions, and Operations
 Permanent Positions by Grade

| Grades and Salary Range | FY 2013 | FY 2014 | FY 2015 | FY 2014 to |
|--|-----------------|------------|------------|----------------|
| | Revised Enacted | Enacted | Request | FY 2015 Change |
| | Pos. | Pos. | Pos. | Total |
| Total, SES | 1 | 1 | 1 | - |
| GS-15 | 23 | 24 | 23 | (1) |
| GS-14 | 40 | 40 | 41 | 1 |
| GS-13 | 20 | 20 | 21 | 1 |
| GS-12 | 18 | 19 | 17 | (2) |
| GS-11 | 4 | 4 | 5 | 1 |
| GS-9 | 9 | 9 | 10 | 1 |
| GS-7 | 1 | 1 | 1 | - |
| GS-6 | 10 | 10 | 11 | 1 |
| GS-5 | 1 | 1 | - | (1) |
| GS-4 | 1 | 1 | - | (1) |
| Total Permanent Positions | 128 | 130 | 130 | - |
| Unfilled Positions EOY | - | - | - | - |
| Total Permanent Employment EOY | - | - | - | - |
| U.S. Field | 128 | 130 | 130 | - |
| Total, Research, Development, Acquisitions, and Operations: | 128 | 130 | 130 | - |
| Full Time Equivalent | 128 | 130 | 130 | - |
| Average ES Salary | 179,700 | 181,497 | 183,312 | 1,815 |
| Average GS Salary | 109,158 | 110,249 | 111,352 | 1,103 |
| Average Grade | 14 | 14 | 14 | - |

G. Capital Investment and Construction Initiative Listing
Department of Homeland Security
Science and Technology Directorate

| INITIATIVE NAME | FY 2015 FUNDING REQUEST (\$300,000) | | | FUNDING FROM: | |
|--|-------------------------------------|------------------|------------------|-----------------|-----------------------|
| | Current Services Level | New Initiative | Total | Budget Activity | Program/s Name |
| National Bio- and Agro-Defense Facility (NBAF) Incremental funding of the NBAF Laboratory Building construction | \$0 | \$300,000 | \$300,000 | R&D | Laboratory Facilities |
| Total Non-IT investments \$5 million or more | \$0 | \$0 | \$0 | | |
| Total Non-IT initiatives under \$5 million | \$0 | \$0 | \$0 | | |
| Total Non-IT Investments | \$0 | \$0 | \$0 | | |
| Total of IT Investments | \$0 | \$0 | \$0 | | |
| Total all IT and Non-IT Investments | \$0 | \$300,000 | \$300,000 | | |

NATIONAL BIO-AND AGRO-DEFENSE FACILITY

1. Project Description, Justification, and Scope

The NBAF will be an integrated foreign animal and zoonotic disease research, development, and testing facility to support the complementary missions of DHS and the United States Department of Agriculture (USDA). Currently, some of this research occurs at Plum Island Animal Disease Center (PIADC), where researchers have contributed significantly to protecting against Foreign Animal Diseases (FAD) for the past 50 years. The Homeland Security Act of 2002 (Public Law 107-296) transferred the operation of the PIADC from USDA to DHS. DHS and USDA discussed a coordinated agricultural research strategy, as called for in the Homeland Security Act of 2002 and Homeland Security Presidential Directive 9 (HSPD-9), "Defense of United States Agriculture and Food (January 30, 2004)." These discussions revealed a capability gap that must be filled by an integrated research, development, test, and evaluation infrastructure for combating agricultural and public health threats

posed by FADs, emerging, and zoonotic diseases in livestock. The DHS Science and Technology (S&T) Directorate is responsible for addressing this gap.

Accordingly, DHS proposed building NBAF to bridge the capability gap and to comply with HSPD-9. Co-locating DHS with USDA’s Animal and Plant Health Inspection Service – Veterinary Services and Agricultural Research Service at NBAF would increase capabilities in research, diagnostics, and responses to outbreaks in agricultural animals (i.e., cattle, swine, and sheep). NBAF will provide a domestic, modern, integrated high-containment facility that includes Biosafety Level (BSL)-2, BSL-3E, BSL-3Ag, and BSL-4 laboratories for an estimated 350 scientists and support staff to safely and effectively prevent the accidental or intentional introduction of animal diseases of high consequence into the United States.

PIADC, the current facility built in the 1950s, is nearing the end of its lifecycle, and does not contain the necessary BSL facilities to meet research requirements. NBAF would fulfill the need for a secure U.S. facility to support collaborative efforts among researchers from Federal and state agencies, academia, and international partners to perform necessary research to protect the agricultural economy and public health. Additionally, the NBAF mission supports the recommendations of the *Report of the Commission on the Prevention of Weapons of Mass Destruction (WMD) Proliferation and Terrorism (December 2008)*, which advises the U.S. to undertake a series of mutually reinforcing domestic measures to prevent agro and bioterrorism.

NBAF Space Justification – NBAF will satisfy the requirements identified in HSPD-9 by providing an integrated facility for studying foreign animal and zoonotic diseases. The existing animal holding, laboratory, training, and support spaces at PIADC present challenges for scientists and building operators since they are inefficiently designed and not designed to modern bio-containment standards. Major limitations exist in the ability to conduct large-animal research trials necessary for assessing and countering emerging threats and developing necessary vaccines. NBAF will be designed to maximize laboratory space and research efficiencies while providing state-of-the-art technologies that meet modern bio-containment standards.

NBAF will have approximately 176,000 net square feet and 574,000 gross square feet, which includes the necessary support space to safely operate and maintain NBAF at the various biosafety levels. Foot and Mouth Disease research requires BSL-3Ag laboratory space while zoonotic disease research requires BSL-4 laboratory space. The overall space is broken out as follows:

| Space | NSF |
|-----------------|----------------|
| Office/Support | 63,500 |
| BSL-2 | 9,700 |
| BSL-3 | 81,100 |
| BSL-4 | 13,400 |
| Vaccine Prod. | 8,300 |
| | 176,000 |
| NBAF GSF | 574,000 |

2. Significant Changes

Description of Item

The FY 2015 program change reflects an increase of \$300.000 million for construction of the NBAF main laboratory building and associated support infrastructure. The State of Kansas will provide an additional \$202.000 million in gift funds that, when combined with the 2015 request and previously appropriated amounts, will fully fund the construction contract award.

Justification

The \$300.000 million will provide the funding for the construction of the NBAF main laboratory that will provide an integrated animal, foreign animal, and zoonotic disease research, development, and testing facility to support the complementary missions of DHS and USDA. NBAF will replace PIADC and provide additional capabilities in state-of-the-art research, development, testing, and evaluation infrastructure to conduct research on high-consequence zoonotic (i.e., transmitted from animals to humans) diseases that could be a threat to public health. Expanded capabilities from the existing PIADC mission will allow NBAF to address a broader and more complete spectrum of threats. Research and development at NBAF will additionally address multiple threats/vulnerabilities related to bio- and agro-attacks and improve our understanding of potential agro-terrorism such as employing foreign animal and zoonotic disease pathogens against U.S. targets.

FY 2013 Accomplishments

For FY 2013, the S&T Directorate took ownership of the NBAF land in the State of Kansas and awarded the construction of the central utility plant (CUP). The scope of the construction of the CUP includes mass site excavation, foundations, substructure, superstructure, utility rough-ins, and installation of mechanical equipment.

FY 2014 Accomplishments

In FY 2014, construction of the CUP continues and major construction milestones include installing major equipment (boilers, chillers, generators) and completing a weather-tight exterior.

FY 2015 Accomplishments

In FY 2015, the S&T Directorate will award the construction of the NBAF main laboratory. The construction activities will primarily include foundation and structural work for the laboratory facility and early procurement of major mechanical systems and equipment. The \$300.000 million will provide funding for the construction of the NBAF main laboratory facility as well as construction administration activities, site security, and procurement support. Once this award is made, the construction contractor will mobilize to the site and begin laboratory construction activities. The CUP construction will be 98% complete by the end of FY 2015.

**3. Project Schedule and Current Cost Estimate
(Dollars in Thousands)**

| NBAF Project Milestones | Fiscal Quarter and Year | | | | Total Estimated Completion Cost (\$000) | Total Project Cost (\$000) |
|---|-------------------------|----------------|-----------------------------|--------------------------------|---|----------------------------|
| | Work Initiated | Work Completed | Physical Construction Start | Physical Construction Complete | | |
| Management and Procurement Support | 1Q FY 2005 | 3Q FY 2021 | | | 38,200 | 38,200 |
| Planning and Studies (including site selection, EIS, risk assessments, Mission Need Assessment) | 2Q FY 2006 | 4Q FY 2012 | | | 14,900 | 14,900 |
| Technical Services (including pre-design and pre-construction services, cost estimating, title services, site security) | 3Q FY 2009 | 3Q FY 2021 | | | 34,100 | 34,100 |
| Facility Detailed Design | 4Q FY 2009 | 4Q FY 2012 | | | 78,700 | 78,700 |
| Existing Infrastructure and Utility Improvements ⁽¹⁾ | 2Q FY 2010 | 3Q FY 2013 | | | 26,600 | 26,600 |
| Site Preparation | 4Q FY 2010 | 4Q FY 2012 | | | 15,000 | 15,000 |
| Construction Support Services (including construction administration and materials testing) | 4Q FY 2010 | 3Q FY 2021 | | | 41,600 | 41,600 |
| Physical Construction-CUP (Construction) | | | 2Q FY 2013 | 1Q FY 2016 | 80,200 | 80,200 |
| Physical Construction-Lab Facility (Construction) | | | 3Q FY 2015 | 1Q FY 2021 | 911,800 | 911,800 |
| Commissioning (for both CUP and Lab Facility) | | | 3Q FY 2015 | 3Q FY 2021 | 9,200 | 9,200 |
| Total | | | | | \$1,250,300 | \$1,250,300 |

| PIADC D&D Project Durations | Work Initiated | Work Completed | Physical Construction Start | Physical Construction Complete | Total Estimated Completion Cost (\$000) | Total Project Cost (\$000) |
|-----------------------------|----------------|----------------|-----------------------------|--------------------------------|---|----------------------------|
|-----------------------------|----------------|----------------|-----------------------------|--------------------------------|---|----------------------------|

| | | | | | | |
|---|------------|------------|--|--|--------------------|--------------------|
| Preliminary Planning & Development | 2Q FY 2009 | 4Q FY 2016 | | | 5,000 | 5,000 |
| Management | 3Q FY 2016 | 4Q FY 2023 | | | 25,000 | 25,000 |
| Transition ⁽²⁾ | 1Q FY 2017 | 4Q FY 2023 | | | 90,000 | 90,000 |
| Closure Activities ⁽³⁾ | 2Q FY 2021 | 4Q FY 2023 | | | 70,000 | 70,000 |
| Total | | | | | 190,000 | 190,000 |
| Grand Total NBAF Construction + PIADC Transition/D&D | | | | | \$1,440,300 | \$1,440,300 |

- (1) Funded through in-kind contributions that will be executed by Kansas State University.
- (2) PIADC Transition/D&D is based on preliminary estimates and is subject to change.
- (3) PIADC closure activities costs may be partially offset by the sale of Plum Island.

4. Schedule of Project Funding (Dollars in Thousands)

| | Prior | FY 2013 | FY 2014 | FY 2015 | FY 2016-2021 ⁽³⁾ | Total ⁽³⁾ |
|---|----------------|---------------|---------------|----------------|-----------------------------|----------------------|
| Fund Source | | | | | | |
| Appropriation | 203,600 | 30,700 | 404,000 | 300,000 | | 938,300 |
| Kansas In-Kind Contribution ⁽¹⁾ | 40,700 | 40,000 | | 231,300 | | 312,000 |
| Obligations (Planned) | | | | | | |
| S&T – Obligation | 163,500 | 11,800 | 4,200 | 707,800 | 51,000 | 938,300 |
| Kansas In-Kind – Obligation | 40,700 | 40,000 | | 231,300 | | 312,000 |
| Expenditures (Planned) | | | | | | |
| S&T – Expenditure | 119,900 | 7,800 | 35,000 | 73,000 | 702,600 | 938,300 |
| Kansas In-Kind – Expenditure | 30,800 | 5,200 | 5,000 | 50,000 | 221,000 | 312,000 |
| Total | 150,700 | 13,000 | 40,000 | 123,000 | 923,600 | 1,250,300 |
| NBAF Project Expenditures ⁽²⁾ | | | | | | |
| Management and Procurement Support | 12,700 | 200 | 3,000 | 2,800 | 19,500 | 38,200 |
| Planning and Studies (including site selection, EIS, risk assessments, Mission Need Assessment) | 14,400 | 500 | | | | 14,900 |
| Technical Services (including pre-design and pre-construction services, cost estimating, title services, site security) | 16,000 | 1,900 | 2,300 | 2,000 | 11,900 | 34,100 |
| Facility Detailed Design | 76,600 | 2,100 | | | | 78,700 |
| Existing Infrastructure and Utility | 15,000 | 4,400 | | 5,200 | 2,000 | 26,600 |

| | | | | | | |
|---|------------------|-----------------|-----------------|------------------|--------------------|--------------------|
| Improvements | | | | | | |
| Site Preparation | 14,500 | 500 | | | | 15,000 |
| Construction Support Services (including construction administration and materials testing) | 1,500 | 500 | 1,200 | 2,000 | 36,400 | 41,600 |
| Physical Construction-CUP (Construction) – Gift Funds | | 2,900 | 33,500 | 43,300 | 500 | 80,200 |
| Physical Construction-Lab Facility (Construction) | | | | 66,500 | 845,300 | 911,800 |
| Commissioning (for both CUP and Lab Facility) | | | | | 9,200 | 9,200 |
| Total NBAF Project Expenditures | 150,700 | 13,000 | 40,000 | 123,000 | 923,600 | 1,250,300 |
| PIADC Transition/D&D⁽³⁾ | | | | | 190,000 | 190,000 |
| Grand Total NBAF + PIADC Transition/D&D | \$150,700 | \$13,000 | \$40,000 | \$123,000 | \$1,113,600 | \$1,440,300 |

- (1) In addition to appropriations, the State of Kansas offered DHS gift funding of \$110.000 million to offset construction costs for the NBAF as part of its site offer package. To further support NBAF construction, the State of Kansas and DHS have formalized a Memorandum of Agreement which will provide up to \$202.000 million in additional gift funds. DHS will not receive the entire amount of gift funding directly, as portions are managed as in-kind contributions.
- (2) Expenditures include Kansas gift funds and in-kind contributions.
- (3) PIADC Transition/D&D is based on preliminary estimates and is subject to change.

5. Cost Estimate Detail and Changes

The FY 2014 Consolidated Appropriations Act provides \$404.000 million for NBAF construction without incremental funding authority. Therefore construction of the main laboratory will be delayed until FY 2015 when DHS will request an additional \$300.000 million to continue construction with the award of the laboratory construction contract.

6. Method of Performance

The NBAF project consists of three phases: design; site preparation and CUP construction; and NBAF building construction. For accountability and in accordance with sound project management principles, the program management team will track all of the project’s activities in an organizational work breakdown structure (WBS) to manage cost, scope, and schedule. The S&T Directorate’s Office of National Laboratories (ONL), DHS Federal Law Enforcement Training Center (FLETC) Bio-containment Branch, the Construction Contractor (known as the Construction Manager as Contractor (CMc)), and the Architecture and Engineering (A/E) team will form the integrated project team and will coordinate inputs into the WBS. The project execution plan includes the following components:

- Program Organizational Structure

- Contract Administration Oversight
- Quality Assurance
- Status and Cost Reporting
- Communications with Stakeholders
- Cross-Task Linkages
- Risk Management
- Cost Controls

A robust, well-integrated plan that includes a WBS is an essential ingredient in effective project management and will provide the source data for internal and external reporting requirements. Such a plan provides a detailed blueprint for project execution and facilitates project coordination, control, reporting, and communications between team components, and all stakeholders.

The FLETC Bio-containment Procurement Branch (FLETC-BPB) will provide day-to-day management and execution of the NBAF design and construction activities and will lead an experienced team of contracting officers, technical managers, and procurement specialists. The NBAF Project Management Office (PMO) will provide analytical and management support and maintain constant communication and coordination among the project team members, cooperating agencies, stakeholders, regulatory agencies, senior leaders, and other local and regional interests. Project communication will occur both internally and externally. Additionally, the ONL Director and NBAF Project Director may establish other critical interfaces throughout the development process.

The NBAF Project Director and the PMO will implement project controls, address reporting requirements, and produce documents to support this project. Project controls include an integrated project schedule, earned value management (EVM) system, and project communication portal. The EVM will effectively integrate the project’s scope, schedule, and cost elements to assess and optimize project planning and performance. The NBAF project will meet all reporting requirements.

The NBAF Steering Committee, consisting of individuals from the integrated project team, will execute the NBAF Risk Management Plan. The Committee will identify, manage, track, and control risks in order to minimize adverse impacts that would jeopardize mission success.

The Acquisition Strategy for NBAF includes the involvement of a CMc early in the design process, prior to actual construction. This approach improves the project decision-making framework, resulting in a blended perspective on the design and associated construction cost estimates. The CMc and A/E participated in cost reconciliation exercises to maximize the reliability of the construction cost estimates.

7. Related Annual Funding Requirements

Once operational, the estimated annual operating and support cost for NBAF is approximately \$68.000 million (beginning in FY 2024) and is based on the current program cost model. This figure includes research costs, operating and maintenance (O&M) costs, utilities, and DHS staffing costs. Annual operating costs will be refined as more information becomes available during

8. Budget Allocation to Programs

| Program | Allocated Budget (\$000) | |
|-----------------------|--------------------------|------------------|
| | FY 2014 | FY 2015 |
| Laboratory Facilities | \$404,000 | \$300,000 |
| Total | \$404,000 | \$300,000 |

9. Compliance with applicable Public Laws, Regulations, Standards and Executive Orders

Identify and certify compliance with all applicable laws, regulations, standards, and executive orders to this project.

- DHS, in coordination with USDA, is fulfilling requirements from HSPD-9: *Defense of the United States Agriculture and Food* (January 2004) by constructing the NBAF to replace the PIADC.
- The FY 2006 Appropriations House Report directed S&T to pursue NBAF:
 - The Committee recognized that the PIADC facility would need to be replaced in the near future and that other potential locations needed to be explored.
 - NBAF will provide safe, secure, and state-of-the-art agriculture biocontainment laboratories that research and develop diagnostic capabilities for foreign animal and zoonotic diseases. It will house BSL-3 and -4 laboratories. There is currently no BSL-4 lab for livestock in the United States.
- DHS completed a 3-year, multi-agency competitive site selection process including an EIS assessing the impacts of accidental release of foot-and-mouth disease on the mainland.
- DHS and USDA evaluated the existing Biosecurity Research Institute at Kansas State University during the design phase and found that the use of this facility may be appropriate to offset some transition costs.
- Final security requirements and design criteria may affect construction costs.
- The FY 2010 Appropriations language (H.R. 2892, Section 540) directs that should the DHS Secretary determine that Plum Island will not be the future site of NBAF, the Secretary will have the GSA Administrator sell Plum Island's real and related personal property along with transportation assets supporting PIADC operations through public sale. Gross proceeds from the sale will be available in an offsetting account of the S&T Directorate's RDA&O appropriation to offset site acquisition, NBAF construction, and related costs including due diligence requirements necessary to remediate Plum Island.
- The FY 2010 Appropriations directed DHS to complete a site-specific Bio Safety and Bio Security Risk Assessment followed by the National Academies of Science review prior to beginning construction. DHS completed this assessment in FY 2010.
- The FY 2011 Appropriations directed DHS to complete an updated site-specific Bio Safety and Bio Security Risk Assessment followed by the National Academies of Science review prior to beginning construction. DHS completed this assessment in FY 2012.
- The FY 2012 Appropriations direct DHS to complete a construction plan and schedule. DHS provided this plan, entitled NBAF Construction Plan Update," to Congress on August 16, 2013.

Prior to passage of the Food, Conservation, and Energy Act of 2008 (H.R. 6124 [2008 Farm Bill]) which became law on May 22, 2008, the United States Code (21 U.S.C. Section 113a) stipulated that live foot-and-mouth disease virus (FMDV) could not be studied on the U.S. mainland unless the Secretary of Agriculture made a determination that such study was necessary and in the public interest and issued a permit for such research to be conducted on the mainland. Section 7524 of the 2008 Farm Bill directs the Secretary of Agriculture to issue a permit to the Secretary of Homeland Security for work on the live FMDV at any facility that is a successor to PIADC and charged with researching high-consequence biological threats involving zoonotic and FADs. The permit is limited to a single successor facility. On December 18, 2008, Michael Chertoff, the Secretary of Homeland Security, sent a letter to Ed Schafer, the Secretary of Agriculture, requesting that USDA issue a permit if the evaluation process selects a mainland site. On January 9, 2009, DHS received a letter from Secretary Schafer that affirmed USDA's intention of complying with congressional direction to issue a permit for the movement and use of live FMDV at the NBAF.

H. PPA Budget Justifications

**Department of Homeland Security
Science & Technology
Research, Development, Acquisitions, and Operations
Acquisition and Operations Support
Summary of Requirements by Object Class
(Dollars in Thousands)**

| Object Classes | FY 2013 Revised Enacted | FY 2014 Enacted | FY 2015 Request | FY 2014 to FY 2015 Change |
|--|----------------------------|--------------------|--------------------|------------------------------|
| Personnel and Compensation Benefits | - | - | - | - |
| | | | | |
| Other Object Classes | - | - | - | - |
| | | | | |
| 21.0 Travel and Transportation of Persons | 455 | 711 | 711 | - |
| 25.1 Advisory and Assistance Services | 1,858 | 1,602 | 1,602 | - |
| 25.3 Other Goods and Services from Federal Sources | 170 | 170 | 170 | - |
| 25.4 Operation and Maintenance of Facilities | 10 | 10 | 10 | - |
| 25.5 Research and Development Contracts | 43,126 | 38,838 | 38,838 | - |
| 25.7 Operation and Maintenance of Equipment | 4 | 4 | 4 | - |
| 26.0 Supplies and Materials | 65 | 65 | 65 | - |
| 31.0 Equipment | 9 | 9 | 9 | - |
| 41.0 Grants, Subsidies, and Contributions | 294 | 294 | 294 | - |
| Total, Other Object Classes | 45,991 | 41,703 | 41,703 | - |
| | | | | |
| Adjustments | - | - | - | - |
| | | | | |
| Unobligated Balance, start of year | - | - | - | - |
| Unobligated Balance, end of year | - | - | - | - |
| Recoveries of Prior Year Obligations | - | - | - | - |
| | | | | |
| Total Requirements | 45,991 | 41,703 | 41,703 | - |
| Full Time Equivalents | - | - | - | - |

Acquisition and Operations Support Mission Statement

Provides expert assistance to entities across the Homeland Security Enterprise to ensure that the transition, acquisition and deployment of technologies, information, and procedures improve the efficiency and effectiveness of the operational capabilities across the Homeland Security mission. The five thrust areas of Acquisition and Operations Support are: Operations Research and Analysis; Safety Act; Standards; Technology Transition Support; and Testing and Evaluation.

Department of Homeland Security
Science & Technology
Research, Development, Acquisitions, and Operations
Research Development and Innovation
Summary of Requirements by Object Class
(Dollars in Thousands)

| Object Classes | FY 2013 Revised Enacted | FY 2014 Enacted | FY 2015 Request | FY 2014 to FY 2015 Change |
|--|----------------------------|--------------------|--------------------|------------------------------|
| Personnel and Compensation Benefits | - | - | - | - |
| Other Object Classes | - | - | - | - |
| 21.0 Travel and Transportation of Persons | 2,894 | 1,601 | 1,601 | - |
| 25.1 Advisory and Assistance Services | 26,094 | 26,094 | 26,094 | - |
| 25.3 Other Goods and Services from Federal Sources | 1,134 | 1,134 | 1,134 | - |
| 25.4 Operation and Maintenance of Facilities | 63 | 63 | 63 | - |
| 25.5 Research and Development Contracts | 392,640 | 430,638 | 402,426 | (28,212) |
| 25.7 Operation and Maintenance of Equipment | 29 | 29 | 29 | - |
| 26.0 Supplies and Materials | 413 | 413 | 413 | - |
| 31.0 Equipment | 62 | 62 | 62 | - |
| 33.0 Investments and loans | 1,966 | - | - | - |
| 41.0 Grants, Subsidies, and Contributions | - | 1,966 | 1,966 | - |
| Total, Other Object Classes | 425,295 | 462,000 | 433,788 | (28,212) |
| Adjustments | - | - | - | - |
| Unobligated Balance, start of year | - | - | - | - |
| Unobligated Balance, end of year | - | - | - | - |
| Recoveries of Prior Year Obligations | - | - | - | - |
| Total Requirements | 425,295 | 462,000 | 433,788 | (28,212) |
| Full Time Equivalents | - | - | - | - |

Research Development and Innovation Mission Statement

Provides state-of-the-art technology and/or solutions to meet the needs of the operational components of the Department and the first responder community. Includes customer-focused and output-oriented RDT&E programs that balance risk, cost, impact, and time to delivery. The six thrust areas of RD&I include: APEX Research and Development; Border Security; Chemical, Biological, and Explosives (CBE) Defense; Counter Terrorist; Cyber Security / Information Analysis; and First Responder / Disaster Resilience.

Summary Justification and Explanation of Changes

| | FY 2013 Revised Enacted | FY 2014 Enacted | FY 2015 Request | FY 2014 to FY 2015 Change |
|--|----------------------------|--------------------|--------------------|------------------------------|
| 25.5 Research and Development Contracts | \$392,640 | \$430,638 | \$402,426 | (\$28,212) |

Research and Development includes costs for contracts for basic and applied research and development. The program decrease includes R&D activities in CBE Defense, Counter Terrorist, Cyber Security / Information Analysis, and First Responder / Disaster Resilience.

**Department of Homeland Security
Science & Technology
Research, Development, Acquisitions, and Operations
University Programs
Summary of Requirements by Object Class
(Dollars in Thousands)**

| Object Classes | FY 2013 Revised Enacted | FY 2014 Enacted | FY 2015 Request | FY 2014 to FY 2015 Change |
|--|----------------------------|--------------------|--------------------|------------------------------|
| Personnel and Compensation Benefits | - | - | - | - |
| Other Object Classes | - | - | - | - |
| 21.0 Travel and Transportation of Persons | 199 | 136 | 136 | - |
| 25.1 Advisory and Assistance Services | 1,795 | 1,795 | 1,795 | - |
| 41.0 Grants, Subsidies, and Contributions | 36,345 | 37,793 | 29,069 | (8,724) |
| Total, Other Object Classes | 38,339 | 39,724 | 31,000 | (8,724) |
| Adjustments | - | - | - | - |
| Unobligated Balance, start of year | - | - | - | - |
| Unobligated Balance, end of year | - | - | - | - |
| Recoveries of Prior Year Obligations | - | - | - | - |
| Total Requirements | 38,339 | 39,724 | 31,000 | (8,724) |
| Full Time Equivalents | - | - | - | - |

University Programs Mission Statement

Supports critical homeland security-related research and education at U.S. colleges and universities to address high-priority DHS-related issues and to enhance homeland security capabilities over the long term. The three thrust areas of University Programs include: Centers of Excellence, Education, and Minority Serving Institutions.

Summary Justification and Explanation of Changes

| | FY 2013 Revised Enacted | FY 2014 Enacted | FY 2015 Request | FY 2014 to FY 2015 Change |
|--|----------------------------|--------------------|--------------------|------------------------------|
| 41.0 Grants, Subsidies, and Contributions | \$36,345 | \$37,793 | \$29,069 | (\$8,724) |

Grants/Subsidies/Contributions includes cash payments to States, other political subdivisions, corporations, associations, individuals, and contributions to foreign countries, international societies, commissions, proceedings, or projects. This includes funding provided to Centers of Excellence (COEs), homeland security related science, technology, engineering and mathematics (HS-STEM) Career Development Grants, and Minority Serving Institutions (MSI) Leadership Grants. The decreases in funding are for Centers of Excellence.

Department of Homeland Security
Science & Technology
Research, Development, Acquisitions, and Operations
Laboratory Facilities
Summary of Requirements by Object Class
(Dollars in Thousands)

| Object Classes | FY 2013 Revised Enacted | FY 2014 Enacted | FY 2015 Request | FY 2014 to FY 2015 Change |
|--|----------------------------|--------------------|--------------------|------------------------------|
| Personnel and Compensation Benefits | - | - | - | - |
| 11.1 Full-time Permanent | 13,512 | 13,702 | 13,893 | 191 |
| 11.7 Military Personnel | 1,561 | 1,561 | 1,561 | - |
| 12.1 Civilian Personnel Benefits | 3,850 | 3,850 | 4,026 | 176 |
| Total, Personnel and Compensation Benefits | 18,923 | 19,113 | 19,480 | 367 |
| Other Object Classes | - | - | - | - |
| 21.0 Travel and Transportation of Persons | 635 | 457 | 457 | - |
| 23.1 Rental Payments to GSA | 1,250 | 1,250 | 1,250 | - |
| 23.3 Communications, Utilities, and Misc. Charges | 12,804 | 12,804 | 12,804 | - |
| 25.1 Advisory and Assistance Services | 10,977 | 10,977 | 10,977 | - |
| 25.3 Other Goods and Services from Federal Sources | 4,611 | 4,611 | 4,611 | - |
| 25.4 Operation and Maintenance of Facilities | 48,384 | 50,475 | 55,523 | 5,048 |
| 25.5 Research and Development Contracts | 7,269 | 7,269 | 7,269 | - |
| 25.7 Operation and Maintenance of Equipment | 616 | 616 | 616 | - |
| 26.0 Supplies and Materials | 5,163 | 5,163 | 5,163 | - |
| 31.0 Equipment | 1,800 | 1,800 | 1,800 | - |
| 32.0 Land and Structures | 45,651 | 433,250 | 315,230 | (118,020) |
| Total, Other Object Classes | 139,160 | 528,672 | 415,700 | (112,972) |
| Adjustments | - | - | - | - |
| Unobligated Balance, start of year | - | - | - | - |
| Unobligated Balance, end of year | - | - | - | - |
| Recoveries of Prior Year Obligations | - | - | - | - |
| Total Requirements | 158,083 | 547,785 | 435,180 | (112,605) |
| Full Time Equivalents | 128 | 130 | 130 | - |

Laboratory Facilities Mission Statement

Manages the Laboratory Facilities programs. The Office of National Laboratories (ONL) provides the Nation with a coordinated, enduring core of productive science, technology and engineering laboratories, organizations and institutions, which can provide the knowledge and technology required to secure our homeland. ONL executes two programs: Construction and Laboratory Operations.

Summary Justification and Explanation of Changes

| | FY 2013 Revised Enacted | FY 2014 Enacted | FY 2015 Request | FY 2014 to FY 2015 Change |
|---------------------------------------|----------------------------|-----------------|-----------------|------------------------------|
| 11.1 Full-time Permanent | 13,512 | 13,702 | 13,893 | 191 |
| 11.7 Military Personnel | 1,561 | 1,561 | 1,561 | - |
| 12.1 Civilian Personnel Benefits | 3,850 | 3,850 | 4,026 | 176 |
| Total, Salaries & Benefits | 18,923 | 19,113 | 19,480 | 367 |

Salaries and Benefits includes costs for FTEs located at DHS S&T-operated laboratories. The 2015 pay increase of 1% and increased retirement contribution are also included.

| | FY 2013 Revised Enacted | FY 2014 Enacted | FY 2015 Request | FY 2014 to FY 2015 Change |
|--|----------------------------|--------------------|--------------------|------------------------------|
| 25.4 Operation and Maintenance of Facilities | \$48,384 | \$50,475 | \$55,523 | \$5,048 |

Operation and maintenance of facilities provides normal daily operations of PIADC, NUSTL, TSL, and NBACC. The costs include maintenance and repair of buildings and land.

| | FY 2013 Revised Enacted | FY 2014 Enacted | FY 2015 Request | FY 2014 to FY 2015 Change |
|--------------------------|----------------------------|--------------------|--------------------|------------------------------|
| 32.0 Land and Structures | \$45,651 | \$433,250 | \$315,230 | (\$118,020) |

Land and Structures provides costs for construction and capital improvement activities.

I. Changes In Full Time Employment

| | FY 2013 | FY 2014 | FY 2015 |
|---|------------|------------|------------|
| BASE: Year End Actual from Prior Year | 128 | 128 | 130 |
| Increases | | | |
| Adjustment for actual FTE | - | 2 | - |
| Subtotal, Increases | - | 2 | - |
| Decreases | | | |
| Year End Actuals/Estimated FTEs: | 128 | 130 | 130 |
| Net Change from prior year base to Budget Year Estimate: | - | 2 | - |

J. FY 2015 Schedule of Working Capital Fund by Program/Project Activity

N/A

K. DHS Balanced Workforce Strategy

N/A