

Statement for the Record

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INTRODUCTION

Good afternoon, Chairman Wu, Congressman Smith, and distinguished Members of the Subcommittee. I am honored to appear before you today to report on the progress of the Department of Homeland Security's (DHS) Science and Technology Directorate (S&T Directorate) in advancing technological solutions to protect the American people and the critical infrastructures our society depends upon.

The S&T Directorate is charged with providing technical support and tools to the major DHS operating components and to our nation's first responders—the brave men and women who routinely face risk on the front lines of homeland security. I appreciate the Subcommittee's support of the S&T Directorate as it continues to mature and grow in areas critical to our mission of enabling technology applications to address critical gaps in homeland security. Toward this end, the Directorate provides technical support and tools to the major DHS operating components, and to our Nation's first responders — the brave men and women who routinely face risk on the front lines of homeland security.

I am very grateful for the strong leadership of Secretary Napolitano, who not only has emphasized the importance of science and technology in securing our nation, but has also repeatedly underscored the importance of strengthening relationships with state, local, tribal and territorial agencies—an area where the S&T Directorate continues to make significant inroads.

I greatly appreciate the Subcommittee's support of the S&T Directorate as it pursues its mission. I appreciate the leadership Congress has shown in supporting the S&T Directorate's endeavors. I am thankful for the engaged and non-partisan nature of our relationship. Our collaboration with both Congressional members and their staffs has been invaluable to the Department's efforts to position the S&T Directorate for accountability, tangible results, and success.

The Subcommittee is familiar with the S&T Directorate's efforts over the past three years to realign its structure, research portfolio, and business operations in an effort to expedite the delivery of advanced technological solutions to our customers. I am pleased to report that the restructuring plan has been fully and successfully implemented. The S&T Directorate is now wholly engaged in responding to the near- and long-term technological capability needs of the DHS components and their customers.

This testimony will primarily address three areas of interest expressed by the Subcommittee: the S&T Directorate's research and development (R&D) priorities and planning; the role of Capstone Integrated Product Teams (IPTs) in determining research priorities; and the role of basic research, both in the overall S&T research portfolio and specifically at the Homeland Security Centers of Excellence. I will also discuss some of the S&T Directorate's recent accomplishments and ongoing activities in these and other significant areas.

S&T DIRECTORATE RESEARCH AND DEVELOPMENT PRIORITIES AND PLANNING

The research and development priorities of the S&T Directorate are primarily customer-driven through our Capstone IPTs, a process described in detail later in this testimony. The customers and stakeholders in this iterative process play an important role in the informing the S&T Directorate's decisions about its research and development investments.

The S&T Directorate's Basic Research projects are initiated in one of two ways. First, DHS components can express a technological need for which we have no near term solutions with existing or near-existing technologies. Second, Basic Research projects may also originate from what science has to offer. With a small investment, DHS can help cultivate a promising technology that could ultimately yield a significant life-saving capability.

The S&T Directorate last published a Strategic Plan in June 2007. This plan focused on establishing the business practices by which the S&T Directorate would address the research and development needs of the homeland security enterprise. Based upon the forthcoming Quadrennial Homeland Security Review, we will be updating our strategic plan to support the strategic goals and objectives determined by the Review. This update will be in accordance with the guidance outlined in the OMB Circular A-11, Part 6.

The S&T Strategic Plan is a separate document from the *National Homeland Security Science and Technology Strategy* that the S&T Directorate is developing as directed by the *Homeland Security Act of 2002*, Section 302(2), which states that the Secretary of Homeland Security, through the Under Secretary for Science and Technology, shall develop "in consultation with other appropriate executive agencies, a national policy and strategic plan for, identifying priorities, goals, objectives and policies for, and coordinating the Federal Government's civilian efforts to identify and develop countermeasures to chemical, biological, radiological, nuclear, and other emerging terrorist threats, including the development of comprehensive, research-based definable goals for such efforts and development of annual measurable objectives and specific targets to accomplish and evaluate the goals for such efforts."

The S&T Directorate's 2008 report, "Coordination of Homeland Security Science and Technology," was an important step toward establishing a national strategy. The report laid out the role and responsibilities of federal agencies as well as the initiatives underway to counter threats to homeland security. The S&T Directorate is currently revising this 2008 effort in conjunction with the QHSR.

Strategic Coordination: External and Internal

The S&T Directorate's Strategic Plan provides the business framework that S&T uses to carry out its mission. A key aspect of the plan involves formal efforts to coordinate homeland security research and development with other federal agencies and the private sector. This coordination is extensive—for example, the S&T Directorate has 30 chairs and members of relevant National Science and Technology Council committees, subcommittees, and working groups.

Through the use of formal processes, the S&T Directorate limits unnecessary duplication of effort and leverages the valuable skills, experience and resources of other government agencies and the private sector. These formal processes include participation in interagency groups that

work to coordinate research and development across federal, state, local and tribal governments and in the private sector.

Inputs from the S&T Directorate’s interagency and private sector coordination efforts are reflected in the Directorate’s 2008-2013 Five Year Research and Development Plan, which lays out the blueprint for its investment portfolio and outlines the S&T Directorate’s research emphasis, programs, and key milestones.

The following table provides examples of participation by S&T Directorate divisions and offices in formal interagency coordination groups.

S&T Participation by Division/Office
Chemical/Biological Division
Federal
Public Health Emergency Medical Countermeasures (PHEMCE) Biological Working Group
Public Health Emergency Medical Countermeasures (PHEMCE) Enterprise Executive Committee
Public Health Emergency Medical Countermeasures (PHEMCE) Executive Governance Board
CB Defense Technical Coordination Work Group (DoD, EPA, DHS)
Chemical Security Analysis Center Interagency Steering Committee
Diagnostics Working Group
Domestic Chemical Defense Sub Interagency Policy Committee
Environmental Anthracis Validated Sampling Plan Technology Working Group
Environmental Chemical Laboratory Response Technical Working Group
First Responder-Anthrax Vaccine Policy Group
Integrated Consortium of Laboratory Networks
Joint Biological Point Detection System Working Group
Joint Science and Technology Office Proposal Review Panel
Non-Proliferation Arms Control Technical Working Group
NSTC Subcommittee on Decontamination Standards and Technology
NSTC Subcommittee on Foreign Animal Disease Threats
NSTC Task Force on Non-Traditional Chemical Agents
Response and Restoration Sub Policy Coordination Committee
Other
Laboratory Response Network-American Public Health Laboratories Advisory Group
Command, Control & Interoperability Division
Federal
Comprehensive National Cyber Initiative Senior Steering Group
Communications and Outreach Committee
Cyber Security and Information Assurance Working Group
Cyber Security Principal Investigators
Cyber Security Quarterly Agency Review
Domain Name System Security Working Group
Emergency Communications Preparedness Center Clearinghouse Working Group
Emergency Response Council
Health Information Technology Standards Panel Technical Committee
Information Security Research Council
Interagency Board for Equipment Standardization and Interoperability
Policy and Plans Steering Group

Project 25 Compliance Assessment Governing Board
Secure Protocols Working Group
Spectrum Working Group
Technical Support Working Group (project coordination)
Technology Policy Council
Wireless Working Group
State and Local
All Hazards Consortium
Emergency Response Council
International Association of Chiefs of Police Regional Information Sharing and Collaboration Working Group
Practitioner Steering Group
Strategic Resource Group
Human Factors/Behavioral Sciences Division
Analytic Methods and Technologies (AMT) Working Group
Behavioral Influence Analysis Working Group (Co-chair)
Biometrics and Identity Management Working Group
Biometrics Consortium
Center for Identification Technology Research (CITeR)
Countering Violent Extremism Interagency Coordination Group
DOD Human Factors Engineering Technical Advisory Group (Executive Board)
DOD Strategic Multilayer Assessment Group, Joint Integration and Preparation of the Operational Environment
Federal Alliance for Interdisciplinary Research
NSTC Subcommittee on Biometrics and Identity Management (Co-chair and DHS Lead)
NSTC Subcommittee on Domestic Improvised Explosive Devices
NSTC Subcommittee on Forensic Science
NSTC Subcommittee on Human Factors (Co-chair)
NSTC Subcommittee on Social, Behavioral, and Economic (SBE) Research (Co-chair)
Radicalization and Violent Extremism Working Group (Co-Chair)
Inter-Agency and First Responder Programs Division (IAD)
Federal
Army Counter-IED Task Force
Capabilities Development Working Group
Capabilities Development Working Group Senior Steering Committee
Transportation Sector R&D Working Group
U.S. Joint Forces Command S&T Committee
U.S. Northern Command S&T Committee
U.S. Southern Command S&T Committee
State and Local
FEMA Region I Regional Advisory Committee
FEMA Region I Regional Interagency Steering Committee
FEMA Region II Managers' Meeting
FEMA Region II Regional Advisory Committee
FEMA Region II Regional Interagency Steering Committee
FEMA Region III Regional Advisory Committee
FEMA Region III Regional Interagency Steering Committee
FEMA Region IV Regional Interagency Steering Committee
FEMA Region V Regional Advisory Committee
FEMA Region V Regional Interagency Steering Committee

FEMA Region VI Regional Interagency Steering Committee
FEMA Region VII Radiological Assistance Meeting
FEMA Region VII Regional Interagency Steering Committee
First Responder RDT&E Working Group
Interagency Board for Equipment Standardization and Interoperability
New Jersey Center for Public Health Preparedness Advisory Council
New Jersey Regional Homeland Security Technology Committee
Urban Area Security Initiative Working Group (New York City metropolitan area, Sacramento, CA)
Urban Area Security Initiative Working Group (Northern New Jersey, Sacramento, CA)
Other
Adjutants General Association of the United States Homeland Security Committee
National Guard Association
Test & Evaluation/Standards Division
NSTC Subcommittee on Decontamination Standards and Technology
NSTC Subcommittee on Standards
Tri-Agency Working Group on Chemical and Biological Equipment Testing

In addition, the S&T Directorate facilitates coordination with customers and technology providers across its divisions and offices. For example:

- The S&T Directorate’s Transition Office coordinates with all S&T divisions to minimize duplication and ensure that the S&T Directorate is leveraging technology available in both the government and private sectors. The Transition Office facilitates 13 customer-led Capstone Integrated Product Teams (IPTs) to ensure visibility into customers’ capability gaps and technology needs. Two formal Capstone IPT reviews are conducted each year to provide customer visibility into the S&T Directorate’s cross-functional programs and facilitate discussion on available DHS-external technologies/capabilities.
- S&T has an Interagency and First Responder Program Division (IAD) to leverage other government research and development efforts. IAD coordinates closely with the Transition Office and participates in the Capstone IPT reviews. With knowledge of customer technology needs identified through the Capstone IPT process, IAD coordinates with other government entities to explore and/or leverage alternative technologies available through other government entities.
- S&T’s Commercialization Office is responsible for the identification, evaluation and rapid commercialization of technology directly from the private sector to meet the operational requirements of our customers. Since the Commercialization Office is part of the Transition effort, they have firsthand knowledge of customer technology needs identified through the Capstone IPT process and the supporting S&T Directorate efforts. The Commercialization Office works closely with S&T divisions to ensure there is no duplication of effort and that S&T Directorate efforts are focused only in areas where no rapid commercialization solution exists.
- The 1401 Technology Transfer Program, which is also housed in the Transition Office, identifies and transfers DoD technology, items and equipment of use to the federal, state, tribal, territorial and local first responder community. This program strengthens coordination

International Research Coordination

In accordance with Title 6, United States Code, Section 195c (“Promoting antiterrorism through international cooperation program”), the S&T Directorate’s International Cooperative Programs Office facilitates and supports international cooperative activity through mechanisms such as formal agreements with nine partner nations: Canada, the United Kingdom, Australia, Singapore, Sweden, Mexico, Israel, France, and Germany. Under these agreements, the S&T Directorate is conducting coordinated and joint research projects, technical demonstrations, scientific workshops, and exchanges of scientific and technological information.

Through its academic grant program for International Research in Homeland Security Mission Areas, the S&T Directorate has sponsored 22 international research efforts since 2007. These efforts involve cooperation between U.S. academic institutions and those in each of the S&T Directorate’s nine formal partners as well as Italy, Kenya, and Peru.

Each of these projects requires the participation of at least one U.S. and one foreign institution. To ensure relevance to DHS and S&T Directorate requirements, these institutions coordinate directly with S&T’s technical divisions and, as appropriate, with customers. Customers include U.S. Customs and Border Protection (for tunnel detection), the Transportation Security Administration (for protection of mass transit infrastructure), and the U.S. Coast Guard (for improved maritime surveillance using teams of unmanned aerial vehicles).

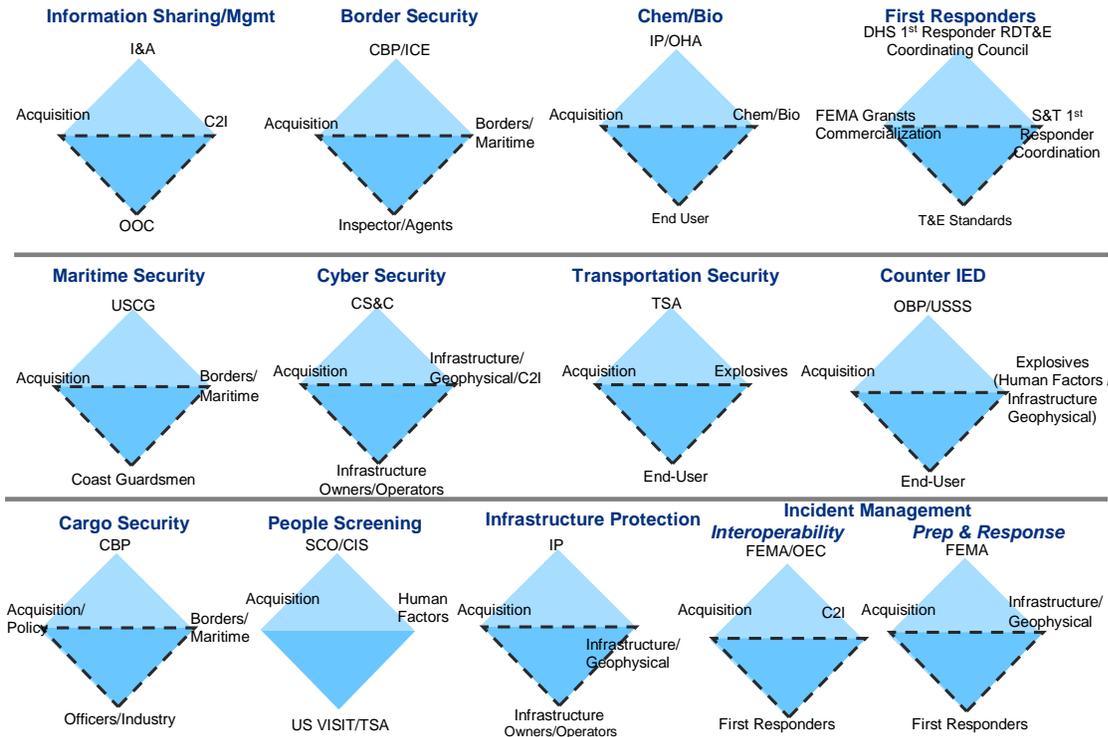
During the past year, the S&T Directorate conducted numerous successful proofs-of-concept. One proof-of-concept, in cooperation with Australia, involved an entirely new form of blast-resistant glass. With Mexico, the S&T Directorate developed novel approaches to determine hurricane intensity using underwater acoustic sensors. The S&T Directorate also worked with Canada on a proof-of-concept for detection of clandestine tunnels using seismic waves.

ROLE OF INTEGRATED PRODUCT TEAMS IN DETERMINING PRIORITIES

The Capstone Integrated Product Teams (IPTs) are designed to, and have proven to fulfill, their intended purpose of providing direct stakeholder input into S&T Directorate research investments. The customer-driven Capstone IPT process informs research across the entire S&T Directorate and directly guides approximately 50 percent of our investment. DHS customers chair the Capstone IPTs and establish their desired capability priorities based on their assessment of risk in the mission areas for which they are responsible.

DHS S&T Capstone IPTs

Gathering Mechanism for Customer Requirements:



Within the S&T Directorate’s Transition portfolio, the stakeholders directly drive investment based upon their needs and solutions recommended by the S&T Directorate. In addition, what we learn from our stakeholders about their operations and future capability gaps helps influence our own investment decisions in our longer-range Basic Research and Innovation/Homeland Security Advanced Research Projects Agency (HSARPA) portfolios. The more insight we gain regarding current and future threats and the capability gaps of our stakeholders, the better positioned we are to identify promising areas of research and explore innovative solutions that are outside the development timeframe for the nearer term-focused Transition portfolio.

Within the S&T Directorate, we need to continue our efforts to put stakeholders at the head of the table—they are the experts on their operations and capability gap priorities. We also need to continue to mature our internal processes for delivering the technology to our stakeholders. This includes developing program manager tools, the execution of Technology Transition Agreements to ensure we are synchronized with the end users, and continued dialogue with stakeholders to ensure that the S&T Directorate’s effort remains aligned to their needs.

Externally, the S&T Directorate needs to work with the stakeholders to develop a more uniform methodology across DHS for identifying and prioritizing capability gaps. We will work with stakeholders to arrive at a consistent, analytic approach to identifying capability gaps and developing operational requirements documents. This will help further ensure that our scientists and technologists develop solutions that meet the highest-priority needs of the stakeholders.

All three S&T portfolios participate in the IPT process. While the IPT members drive the selection of Transition projects, the needs expressed at the IPTs also inform the selection of projects in our Basic Research portfolio and similarly inform the higher-risk/high pay-off initiatives undertaken by our Innovation/HSARPA portfolio.

IPT Example: Working Group Deliberations Inform First Responder IPT

The First Responder Research, Development, Testing, and Evaluation (RDT&E) Working Group is composed of 38 voting positions that encompass major first responder associations and practitioners that include firefighters, emergency managers, law enforcement officers and emergency medical services providers. The Working Group practitioners represent state, local and tribal first responders from across the country. The S&T Directorate is seeking a territorial representative to ensure the full complement of governmental voices is represented.

The First Responder RDT&E Working Group convened most recently at the S&T Directorate offices on September 22, 2009. Members of the DHS First Responder Integrated Product Team were invited to observe and contribute to the Working Group deliberations.

During the meeting, the Working Group identified four major cross-cutting capability gaps that were deemed to affect all first responder disciplines while Working Group subgroups identified sector-specific capability gaps. For example, major cross-cutting capability gaps were identified as the lack of a standard common operating platform to link communication and data systems across the country; improved respiratory safety/protection; and the need for better tools for end-to-end incident management.

The Working Group has completed its initial task of identifying current capability gaps. Next, its members will develop detailed operational requirements to ensure the gaps are clearly defined. The First Responder IPT will meet as well to prioritize the capability gaps and begin to review potential RDT&E programs designed to solve existing problems and field solutions.

The overarching goal of the First Responder IPT is to use the process to close the capability gaps that exist in this community by putting viable solutions into the hands of our responders. S&T's IPT process is new to the first responder community. Members of the First Responder RDT&E Working Group have expressed support for the process and a willingness to help the S&T Directorate develop it in the first responder community. The process will mature as the IPT, the S&T Directorate and the Working Group continue our collaboration to refine identified capability gaps and develop concrete operational requirements to drive new science and technology development or applications.

ROLE OF BASIC RESEARCH: CENTERS OF EXCELLENCE AND DHS S&T

In September 2009, the S&T Directorate issued its Basic Research Strategy to guide long-term homeland security research investments. This will inform the development of the next iteration of the S&T Directorate Strategic Plan.

The overall basic research vision for the S&T Directorate is:

Developing and accessing an internationally recognized scientific workforce creating new knowledge and scientific understanding in focus areas of enduring relevance to the homeland security enterprise.

Given the broad spectrum of science and technology requirements associated with the homeland security mission, the Department of Energy (DOE) National Laboratories provide unique, renowned interdisciplinary capabilities, as well as world-class research facilities. In FY 2009, eight DHS components and offices, including S&T, utilized the DOE National Laboratories and the in-house S&T labs for homeland security-related research and development as well as technology transition. This R&D includes developing advanced screening and detection technologies; designing multi-scale and simulation capabilities in the event of a biological attack or a disease outbreak; and designing resilient electrical grid technologies to ensure better protection of our nation's critical infrastructures. We anticipate the continued use of the DOE laboratories to address the cross-cutting, long-term basic research challenges of the S&T mission.

In addition to our laboratories, the S&T Directorate sponsors 11 university Centers of Excellence (COE). While these COEs are managed by our Office of University Programs, the key to their success has been the close involvement with each of the S&T Directorate's six divisions. Through their active engagement in the selection and management of the COEs, divisions are well positioned to ensure that their research initiatives are closely aligned with the S&T Directorate's overall research strategy.

DHS S&T-Sponsored Research at the COEs: From Research to Reality

The DHS COEs, with over 350 current projects, deliver results along the entire research and development spectrum, from basic research results published in prestigious scientific journals to practical research-driven tools that DHS components and local and state first responders are already using. Even looking at a single COE program proves the benefit of this cost-effective model. For example, a single project at the National Center for Food Protection and Defense identified the source of a Salmonella St. Paul outbreak as jalapeno peppers from Mexico, and may have saved Florida tomato growers up to the equivalent of six years of S&T's COE budget.

Now five years old, the COEs are increasingly producing usable results for S&T Directorate customers. As evidence, the COEs have generated over \$50 million in additional funds for customer-directed research. As planned by the S&T Directorate, the COEs are well on their way to being self-sufficient within a decade. The COE customer base has grown rapidly over the last couple of years—so rapidly, in fact, that we have had to develop more efficient financial mechanisms for our customers to access the COEs expertise, facilities and products. Additionally, now that some of the COE projects are ready, we are piloting “research-to-reality” university research transition approaches in several law enforcement venues. These approaches will disseminate applicable research results to many law enforcement agencies. Below is a sampling of the S&T Directorate's successful transition of COE results to our federal, state and local partners.

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

- START developed the Global Terrorism Database (GTD), the most comprehensive unclassified database on terrorist events in the world. The GTD includes more than 80,000 events stretching from 1970 through 2007 and is continuously being updated. START has provided GTD data and access on request to several different offices within DHS alone (e.g. S&T Human Factors/Behavioral Sciences Division, Office of Intelligence and Analysis and the Transportation Security Administration).
- START is studying how communities can enhance their resilience to a potential terrorist threat in the United States through two additional products: (1) the Community Assessment of Resilience Tool (CART), which is a tool for communities to conduct self-assessments on core components of community resilience; and (2) the Social Vulnerability Index (SoVI)--a county-level mapping of the United States and its infrastructure and potential vulnerabilities to all types of catastrophic events. Local planners throughout the country are using CART and SoVI to set priorities for enhancing resilience.

Command, Control and Interoperability (CCI) COE (Rutgers and Purdue universities)

- The CCI COE has transitioned several visual and data analytics technologies to end users in partnership with the Pacific Northwest National Laboratory, START and a vendor partner. This COE-led team developed and deployed law enforcement information analysis tools to the Port Authority of New York and New Jersey Police Department, enabling analysis of crime incident data in conjunction with other sources, including START's GTD. A similar visual and data analytics system is being deployed to the New Jersey State Police.
- The Command, Control and Interoperability Division's "Research to Reality" technology transition model, which engages directly with industry partners to commercialize research results, is bringing visual and data analytics technologies to a wider group of law enforcement agencies. The specific technologies involved are known as LEIF (Law Enforcement Information Framework) and FADE (Fused Analytic Desktop Environment). Both involve upgraded features first made available in the ComStat II application developed specifically for the Port Authority and described directly above. The agencies include the Port Authority of New York and New Jersey, San Diego's Automated Regional Justice Information System, the Seattle area police departments, the New Jersey State Police, and the Lehigh Valley (PA) Police. New efforts are being initiated with in the Baltimore-Washington area including the Maryland State Police, Baltimore County Police, Baltimore City Police and several other agencies in the region.

Foreign Animal and Zoonotic Disease (FAZD) COE (Texas A&M University) and the National Center for Food Protection and Defense (NCFPD) (University of Southern Mississippi)

These two COEs develop, advance and share customizable technologies with DHS and customers working to protect our food and agriculture lifelines.

- FAZD worked with the CCI COE to develop the Dynamic Preparedness System (DPS) and Biosurveillance Common Operating Picture (BCOP) technologies that will serve as decision support tools for incident commanders for health emergencies across the country. DPS and BCOP also act as customizable training programs for users. Following rigorous testing, the DHS National Biological Information Center is transitioning BCOP into an operational environment where it will provide critical and up-to-date health emergency information to thousands of DHS' federal, state and local partners, hospitals and medical and veterinary practitioners.
- FAZD's Rift Valley Fever candidate vaccine, derived from the MP12 antigen developed for human use, is currently moving to commercial production trials in sheep. This product is being enhanced in further research with a genetic marker that allows the immunity resulting from vaccination to be distinguished from that associated with active disease, thereby allowing immunized animals to safely move through interstate commerce.
- NCFPD has established itself as a nationally and internationally renowned R&D center for food protection and defense. The Center is developing expertise and tools to identify and reduce vulnerabilities to the nation's food system from terrorist or natural causes.
- NCFPD has provided over 25 congressional testimonies, responded to over 700 requests for assistance or advice from DHS, federal, state and local government agencies, and matriculated over 100 students in relevant disciplines.
- NCFPD's FoodShield is a research-based communication-sharing portal for use by DHS, FDA, and USDA during food related incidents. FoodShield is linking agencies to improve communication during food events, and enabling all levels of government to share resources during food recall and response events.
- NCFPD's and BT Safety's Consequence Management System (CMS) serves as an integrative tool across the breadth of NCFPD projects to provide an advanced visual model for predicting, tracking, and assessing the public health and economic impact of a catastrophic food system incident.
- NCFPD has provided expert advice to both food importing and exporting nations in order to keep commerce moving and food supplies safe. The Center is working with Chinese officials to restructure the country's food export system and with Chilean officials to obtain data on production chain models. NCFPD hosted an exercise on food supply protection for G8 nation participants from Japan, Canada, France Germany, the United Kingdom and the United States. The exercise aimed to strengthen coordination, cooperation, and communication between G8 nations in the event of an intentional contamination of the food supply.

Center for Risk and Economic Analysis of Terrorism Events (CREATE) COE (University of Southern California)

- The HS-ANALISER (Homeland Security-Analytical, Modeling, Integrated and Secured Environment and Repository) is a software tool for policy decision-makers and risk analysts

- Assistant for Randomized Monitoring Over Routes (ARMOR) software provides a methodology and tool for creating randomized plans and schedules for monitoring, inspecting, and patrolling, so that even if an attacker observes the plans, they cannot predict its progression, thus providing risk reduction via deterrence while guaranteeing a specified level of protection quality. ARMOR was deployed at the Los Angeles International Airport (LAX) in August 2007 to randomize checkpoint deployment and canine unit allocation. Police officers attending the six month evaluation of ARMOR declared it a success, leading to its permanent deployment at LAX.
- In coordination with the S&T Command, Control and Interoperability Division and the Federal Air Marshal Service (FAMS), CREATE developed the Intelligent Randomization in Scheduling (IRIS) software which builds upon the ARMOR concept and was adapted for use in the FAMS operational domain. Drawing upon the principles of game theory, which analyzes behavioral decisions, IRIS will systematically prevent observers from recognizing patterns in FAMS security procedures – with a goal of interrupting terrorist planning cycles. IRIS allows for randomization of international flight coverage while limiting or eliminating predictability and will place FAMS in locations where they will prove most effective. IRIS was transitioned to the FAMS in September 2009 and is being operationally tested on a select subset of international flights. An additional adaptation of the ARMOR program, called GUARDS, is being piloted by TSA in the coming weeks.

CONCLUSION

I am pleased to report that the Science and Technology Directorate has made significant strides during the past year in establishing our research priorities and enabling technological capabilities for those on the front lines of homeland security.

Members of the Subcommittee, thank you for all you do in support of our mission. I thank you for the opportunity to meet with you today, and I look forward to answering your questions.