

Department of Homeland Security Science & Technology

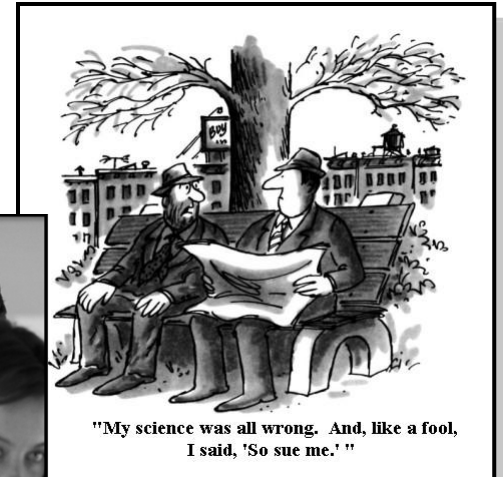
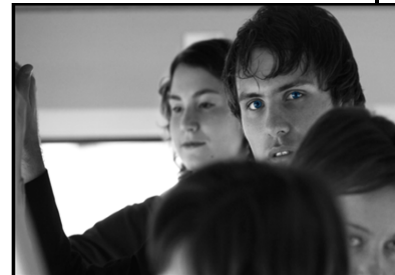
Presentation to the Government Technology and Services Coalition

Dr. Daniel Gerstein
Deputy Under Secretary
Science & Technology Directorate

May 10, 2013



Homeland Security



"My science was all wrong. And, like a fool,
I said, 'So sue me.' "

Did you **SEE** something suspicious
commuting to work or
grabbing some lunch?
Then **SAY** something to local
authorities to make it right.

Report suspicious activity.
Call 911.

if you
SEE
something
SAY
something™

Homeland Security

S&T At A Glance

One of 10 DHS Components

- Provides key technical & analytical capacity for DHS
- Operationally focused
- Supports DHS, Component and HSE requirements with innovation

S&T statistics:

- ~1.2% of DHS Budget
- ~1,200 personnel
 - Federal, contractor, IPAs
 - Highly technical staff

Six primary commodity areas

- First responders, borders & maritime, cyber, chem-bio defense, explosives, resilience

Highly collaborative

- Components & HSE
- State & Local
- Interagency & International
- Industry & Private sector

Laboratories

- 5 Internal Labs
 - Explosives, biodefense, chemical, urban environment
 - Adding new agricultural biodefense lab
- Responsible for usage of DOE Labs & FFRDCs

DHS S&T Mission: Strengthen America's security and resiliency by providing knowledge products and innovative technology solutions for the Homeland Security Enterprise (HSE)

DHS Mission Guidance

Complex & Dynamic Environment



Globalization & Transportation

Border Security & Immigration

Violent Extremism

Cyber Domain

Nature of Innovation

Natural Disasters



More Threats, Less Resources

White House Guidance (Examples)



HSPD-5
National Incident Management System (2003)

HSPD-7
Critical Infrastructure Identification & Protection (2003)

PPD-8
National Preparedness (2011)

Cyber Executive Order (EO) and PPD-21 Critical Infrastructure EO (2013)

Strategic Guidance (Examples)



U.S Law & Interagency



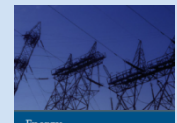
Homeland Security Act 2002



National Response Framework (2008)



QHSR (Feb 2010)



Energy Sector Plan (2010)

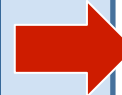
Quadrennial Homeland Security Review (QHSR) 2010

Threats

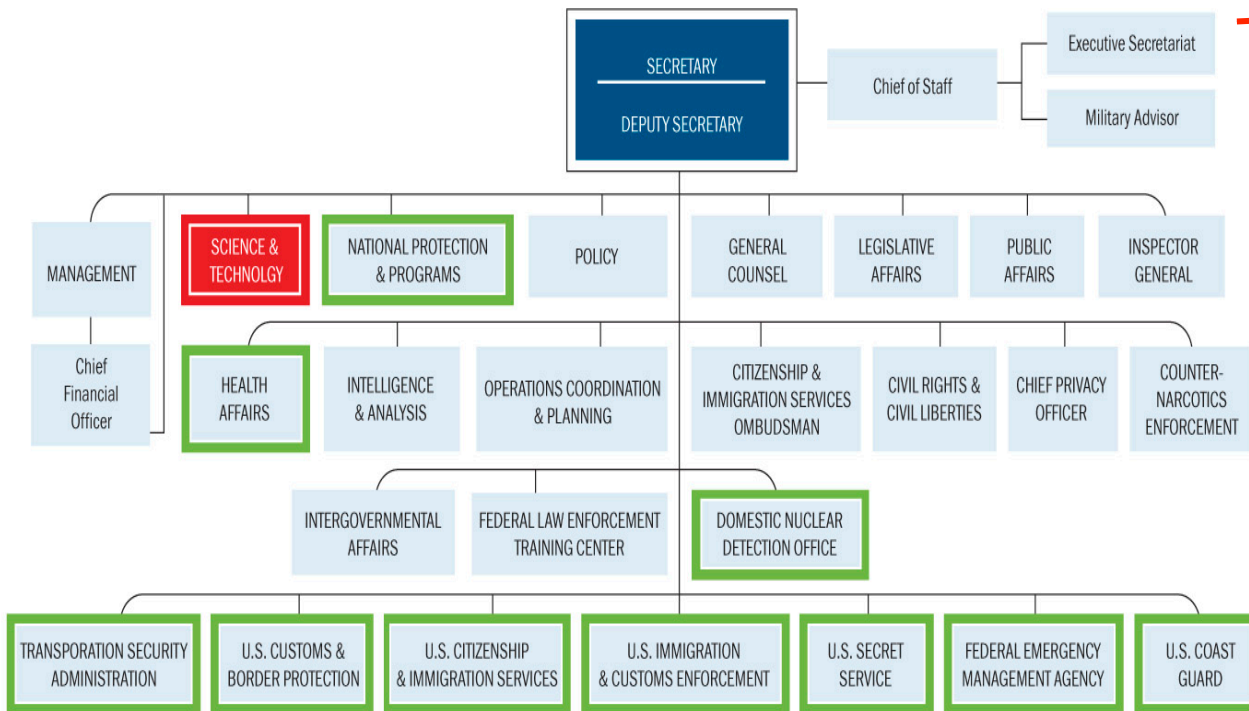
- Smaller Scale Terrorism
- Trafficking & Crime
- Pandemics, Accidents, Natural Hazards
- Violent Extremism
- High Consequence WMD

Core Missions

1. Preventing terrorism & enhancing security
2. Securing and managing our borders
3. Enforcing & administering immigration laws
4. Safeguarding and securing cyberspace
5. Ensuring resilience to disasters



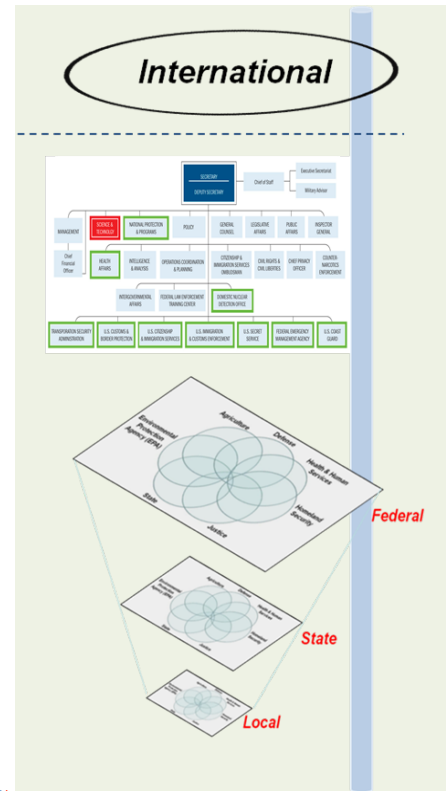
Department of Homeland Security



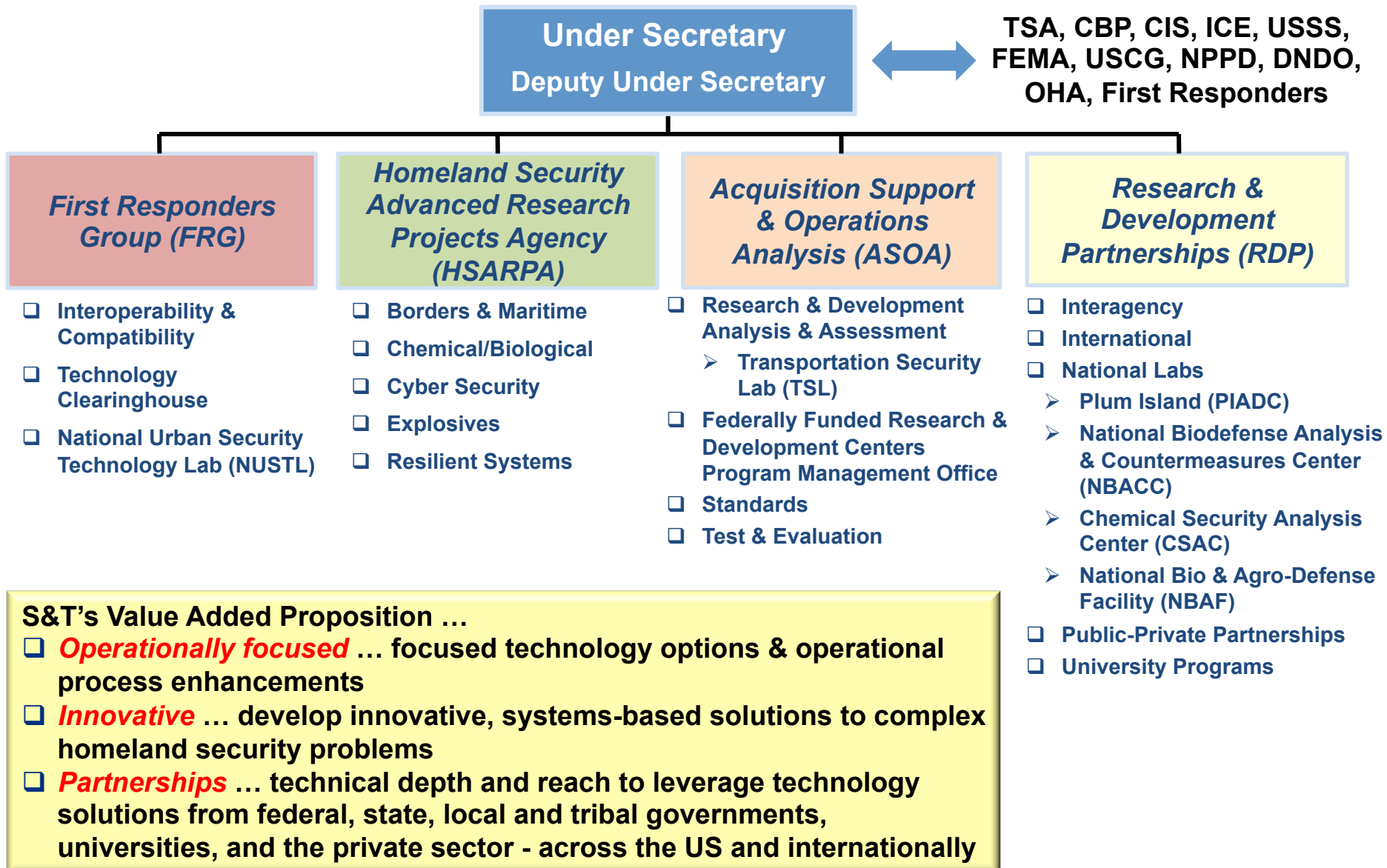
Homeland Security Enterprise (HSE)

- First Responders across the Nation
- Critical Infrastructure

- Personnel: DHS is about 230K ... HSE is about 3.5M
- Culture of law enforcement
- Focus on borders, customs enforcement & maritime
- Requires threat, lexicon, plans, procedures, communications, etc.

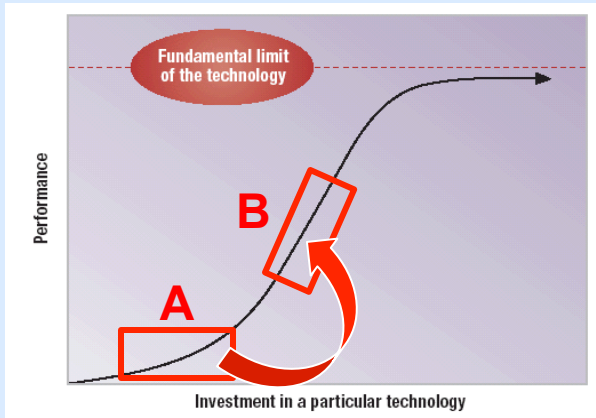


Organization of DHS Science & Technology (S&T) Aligned with Mission



Maximizing Operational & Technology Returns in Challenging Fiscal Times

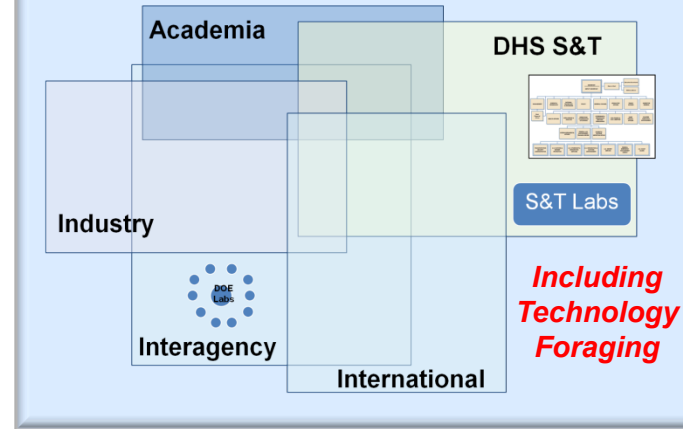
From R&D to r&D



DHS S&T Current Priorities

- Cybersecurity
- Biodefense
- Home Made Explosives (HME)
- First Responders
- Resilience

Collaboration



Deliverables

Technological Capabilities & Knowledge Products

Acquisition Support & Operational Analysis

Process Enhancements & Gain Efficiencies

Understanding of Homeland Security Risks & Opportunities

Cyber Systems Analysis

Identifying Threats, Risks & Opportunities

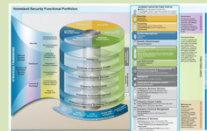
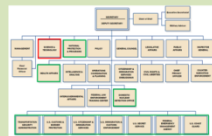
Developing Objectives & Priorities

Filling Requirements & Gaps

Governance

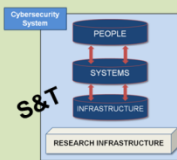
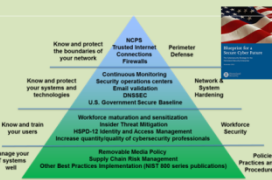


CYBER STORM IV NATIONAL CYBER EXERCISE



Doctrine

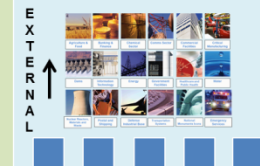
Comprehensive National Cybersecurity Initiative (CNCSI)



S&T's Cyber BAA

Architecture & Operations

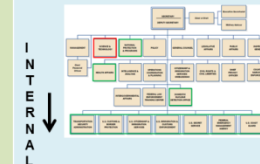
Einstein 3A



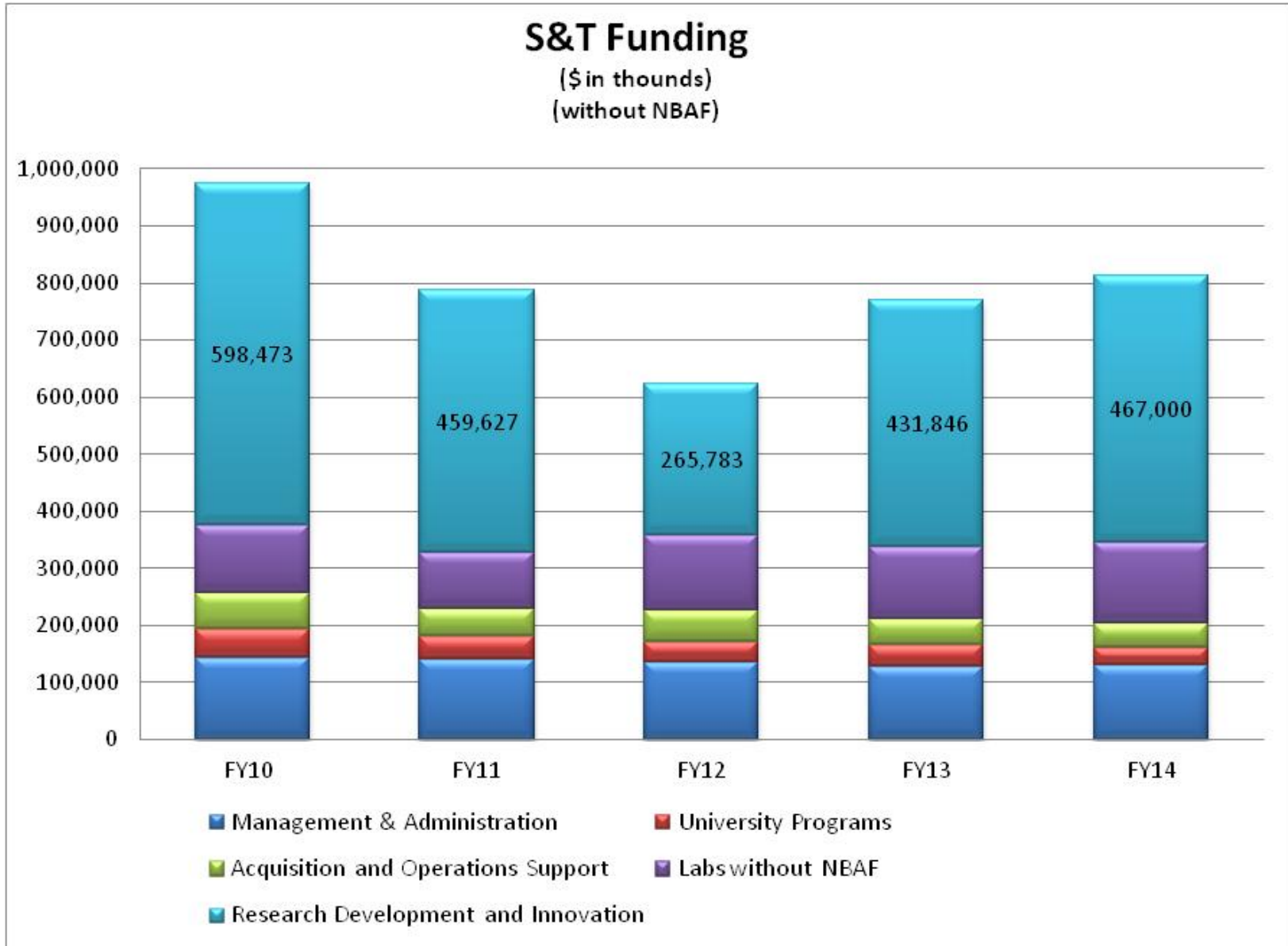
NCCIC

CERT

Continuous Monitoring



S&T Budget History



Changing Priorities and Increased Partner Alignment

- ❑ **FY 13 and projected FY14 demonstrates increased confidence in S&T role**
 - **Adherence to the value proposition ... operational focus, innovation & building partnerships**
 - **Increased leveraging of resources ... greater push for transition**

Cyber Security (CSD)



- SCADA System Security
- Cloud Security
- Mobile Device Security

Chem /Biological (CBD)



- FMD Vaccine
- Bio-Threat Risk Assessment

First Responders (FRG)



- Rad/Nuc Response & Recovery
- Wildland Firefighters Advanced PPE

Resilient Solutions (RSD)



- Sandy Lessons Learned
- Resilient Electric Grid

Borders & Maritime (BMD)



- Import Security
- Counterfeit Cargo

Explosives (EXD)



- Next-Generation Passenger Checkpoint
- HME Characterization

“Big Data”



- Data scraping
- Visualization
- Data Intensive Computing
- Data Qualities
- Pattern Recognition
- Decision Making
- Privacy
- Models & Simulation

DHS Challenges for Cyber Security

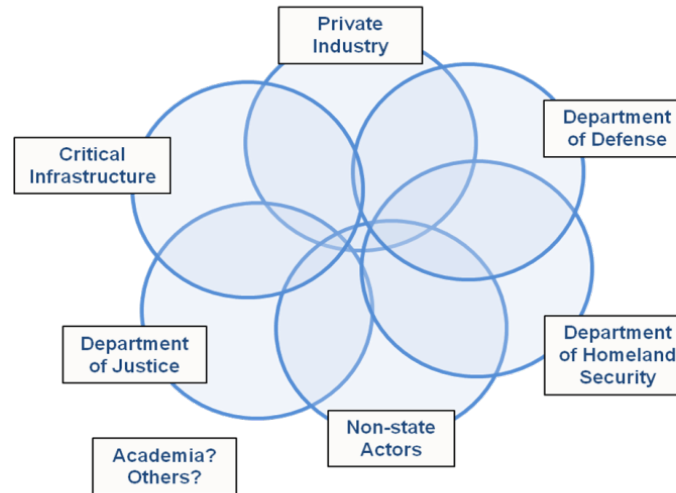
Countering Threats

Harmonizing Efforts

Building Capabilities

- Banking & Financial Fraud
- Sabotage & Attack
- Hacktivism
- Denial of Service
- Intellectual Property Theft
- Espionage
- Identity Theft
- Money Laundering
- Child Pornography & Exploitation
- Counterfeiting

U.S. Federal Cybersecurity Operations Team National Roles and Responsibilities



- Securing Federal Civilian Government Networks
- Protecting Critical Infrastructure
- Responding to Cyber Threats
- Combating Cybercrime
- Fostering Innovation
- Building Partnerships
- Growing & Strengthening the Cyber Workforce

Next Steps: Implementing Cyber Executive Order ... Potential Congressional Legislation?

DHS Big Data Way Forward

❑ Captured Component “big data” requirements

- Average 3-5 “big data” issues per component
- 43 issues identified across 10 components
- Currently consolidating & analyzing results

❑ Work governance issues within DHS

- NPPD/CIO/S&T
- Components
- Homeland Security Enterprise (HSE)

❑ Continue to catalogue ongoing efforts

❑ Identify common, long-term efforts for R&D

❑ Continue to work cultural issues that tend to plague big data

Survey on Big Data Challenges

1. Name of Challenge: [Please click to enter information](#)
2. Component/Organization/Point of Contact: [Please click to enter information](#)
3. Big Data Problem Areas: Please check all applicable problem areas.

Analytics		Data	
Situational Awareness	<input type="checkbox"/>	Storage	<input type="checkbox"/>
Geolocation	<input type="checkbox"/>	Retrieval	<input type="checkbox"/>
Modeling/Simulation	<input type="checkbox"/>	Searching	<input type="checkbox"/>
Visualization	<input type="checkbox"/>	Security	<input type="checkbox"/>
Algorithm Development	<input type="checkbox"/>	Correlation	<input type="checkbox"/>
Trending Over Time	<input type="checkbox"/>	Systems Reliability	<input type="checkbox"/>
Projecting/Anticipating	<input type="checkbox"/>	Privacy	<input type="checkbox"/>
		Veracity	<input type="checkbox"/>

4. Specific
[Please click](#)



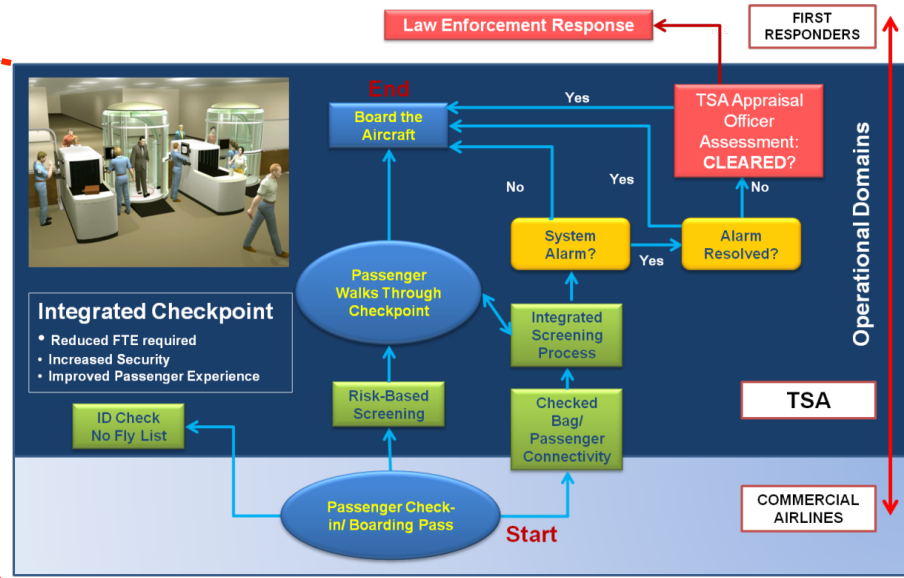
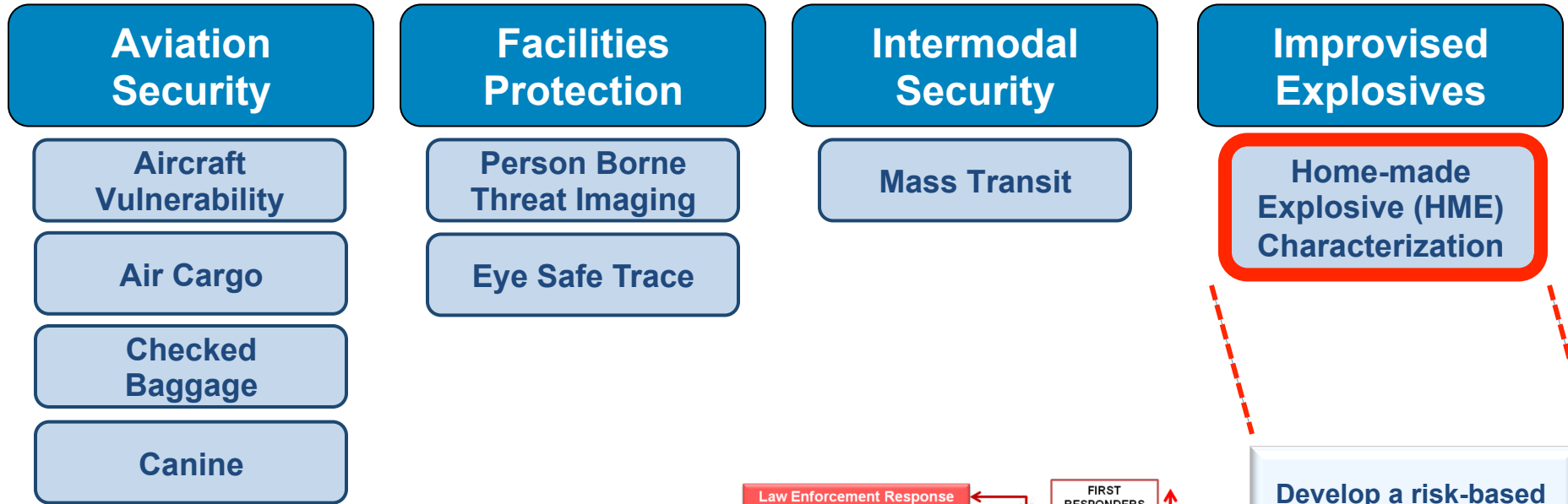
DHS S&T Technical Team Analysis

Dan Cotter, Stephen Dennis, Joe Kielman, Douglas Maughan

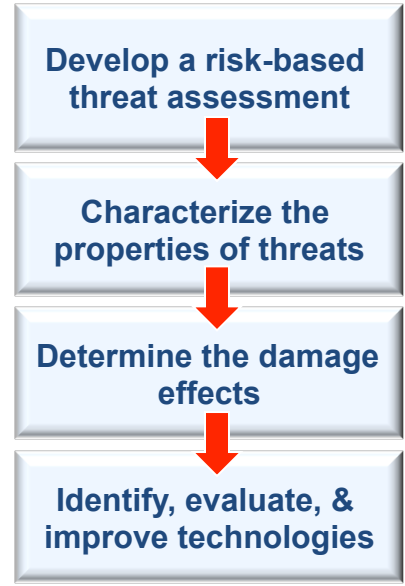
25 March 2013

Goal is to improve operational effectiveness and efficiency within the Department and HSE

Portfolio Structure for Explosives Division



Integrated Checkpoint Operations



S&T Bio Contributions

Chem-Bio Division ...

Save lives & protect Nation's infrastructure against chemical, biological & agricultural threats & disasters.



S&T Labs



Interagency

- DOE National Labs
- Defense Threat Reduction Agency (DTRA)
- Department of Agriculture
- Others ...

International

Federal

State

Local

Tribal

Territorial

International & Academic



Successes (Examples)

- Foot & Mouth Disease (FMD) Vaccine
- Rapid point of care diagnostics
- Biowatch fielding & analysis
- Medical Countermeasures Development (MCM) support
- DHS laboratory certification
- "White Powder" standard
- Assay development standards
- Threat characterization studies
- Bioterror Risk Assessment (BTRA)
- Bioforensics

Areas of Concern (Examples)

Crisis Management
Agricultural Vaccines
Supply Chain Security
Public Biothreat Education
Forecasting Future Threats

International BSAT Standards
Int'l/Domestic Response Training
Decon of CI/KR (Ag & Bio)
Resilience Communication
Local Response Capability
Integrated Consortium of Laboratory Networks (ICLN)

Superstorm Sandy, First Responders & Resilience

- ❑ **Largest Atlantic hurricane on record**
 - **At its peak, hurricane-force winds extended 175 miles (280km) from center**
 - **Tropical storm-force winds felt 520 miles (835km) away**
- ❑ **24 states affected ... entire U.S. eastern seaboard**
 - **131 fatalities in U.S.**
- ❑ **Massive flooding from storm surge in New York City, New Jersey**
 - **\$63 billion in estimated damage**
 - **8.5 million without power at peak**
 - **~1 million without power after one week**



What are the lessons learned in the aftermath of Superstorm Sandy? What does it mean for infrastructure? How do we build in resilience? What should we do to better prepare, prevent, mitigate, respond and recovery from future catastrophic events?

DHS S&T Laboratory Network

DHS S&T operates 5 dedicated labs and has access to DOE National Labs' capabilities



Plum Island Animal Disease Center – Animal Vaccine R&D



Transportation Security Laboratory – Explosives Detection, Damage Mitigation



Chemical Security Analysis Center – Chemical Forensics

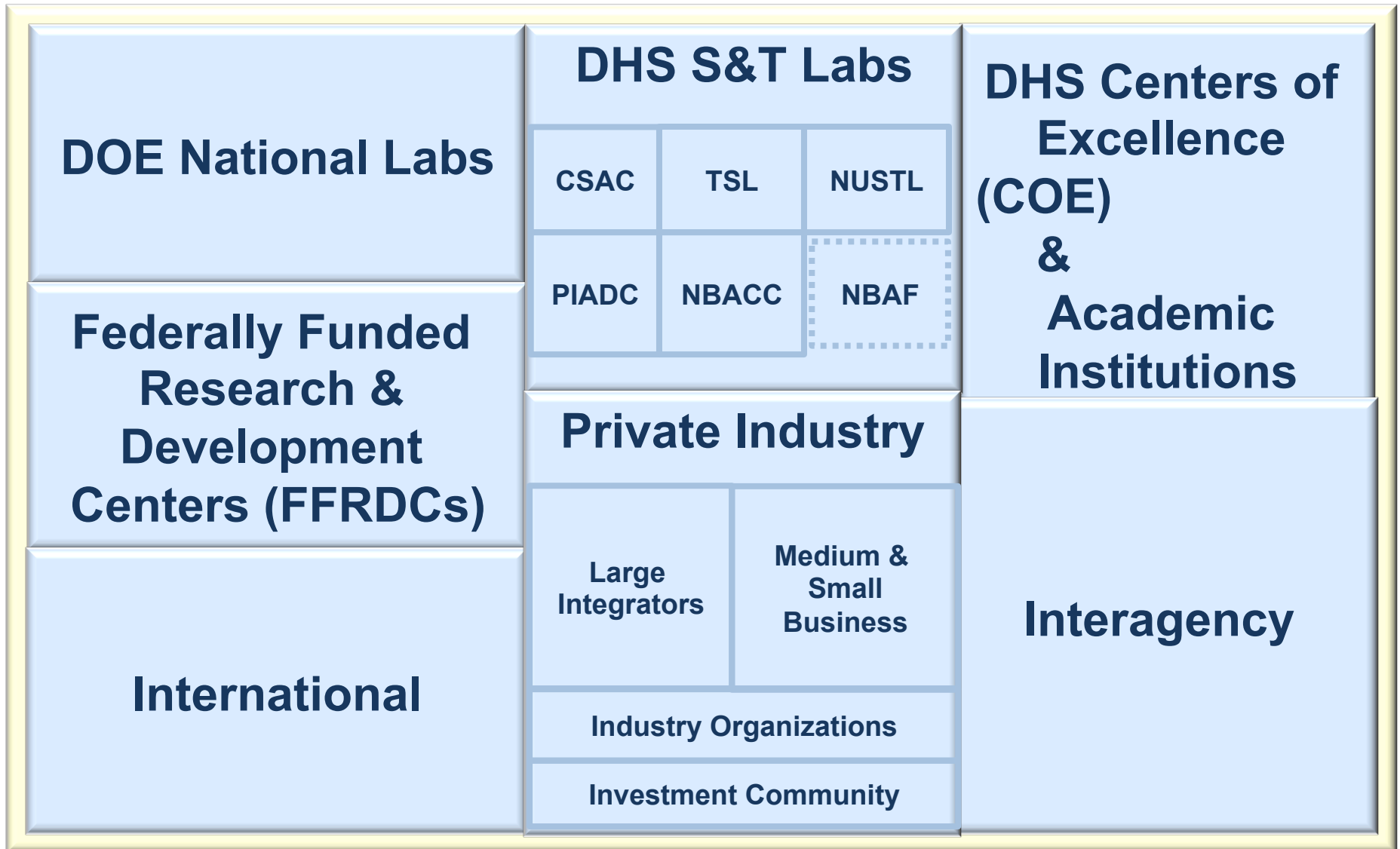


National Urban Security Technology Laboratory – Nuclear Detection and First Responder Focused



National Biodefense Analysis and Countermeasures Center – Biological Threat Assessment, Bioforensic Analysis

DHS S&T Performers



Business Partnership Initiatives

❑ S&T Webinar Series

- Variety of topics covering S&T areas
- Variety of desired outcomes:
 - Information sharing
 - RFI / RFP focused
 - Identification of S&T priorities
 - Identification of potential transition technologies

❑ Safety Act (Since 2003)

- From technologies to services
- A market differentiator
- Considered ~800
- Approved 572

❑ Cooperative R&D Agreement (CRADA)

- A good way to ensure transition
- 144 entered since 2008

❑ Broad Agency Announcement (BAA)

- New LRBA ~ Mid January 2013
 - Predict 90-100 topic areas for CY13 solicitation
 - Can be accessed at <https://baa2.st.dhs.gov>
- Also have a Cyber BAA
 - Can be accessed at <http://www.cyber.st.dhs.gov>

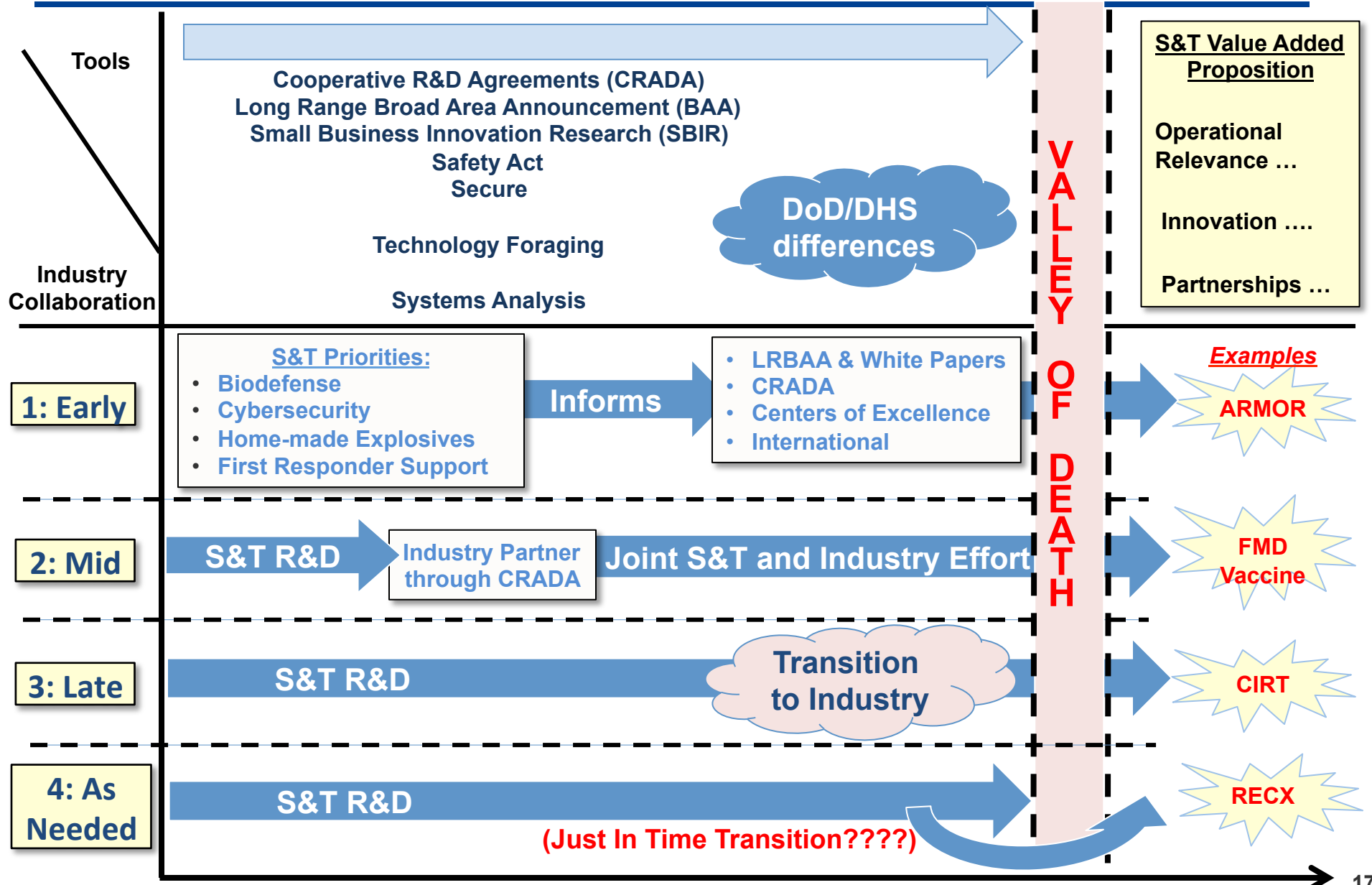
❑ Small Business Innovation Research (SBIR) ...

- Goal is to gain advantages of small business innovation
- Next SBIR ... 13.1 in mid-December
- ~500 of initiatives since 2004

❑ SECURE

- Links stakeholders to private sector to articulate requirements
- Promotes DHS solutions at market speed

Technology Transition to Operational Use



SBIR: Small Business Innovation Research Program

- ❑ **Statutory purpose:** To stimulate technological innovation by strengthening the role of innovative small businesses in Federally-funded R&D
- ❑ **FY13.2:** ~\$1.2M available in FY13 for 4 topics (~12 Phase I projects)
- ❑ **Not less than 2.7% of S&T's FY13 extramural budget will be provided for SBIR: ~\$14.0M**

- **Phase I:**
 - Radio Frequency Sensing of Persons in Woods
 - Hybrid Analysis Mapping
 - GPS Disruption Detection and Localization
 - Quick Disconnect Cables for Power Distribution
 - Burn-Saver Device
- **FY12.2: Funding 12 Phase I projects (w/FY12\$); ~\$1.9M needed in FY13 for 5 Phase II:**
 - Solid State Storage Investigative Tools for Police
 - Automated Threat Recognition Algorithms
 - Objective Measures for Screener Imaging Tech
 - Hardening Hand Held Devices for First Responders
 - Next Gen Textiles for PPE
- **FY12.1: 6 Phase II projects under negotiation; ~\$4.5M in FY13:**
 - Non-Freezing Portable Vehicle Wash Tunnels
 - Moving Target Defense
 - Safe Standoff Detection of Bulk Explosives
 - Tracking Person within a Security Perimeter
 - Swarm Robotic Sensing Platform for Search/Rescue
 - Firearms and Ammunition Test Equipment

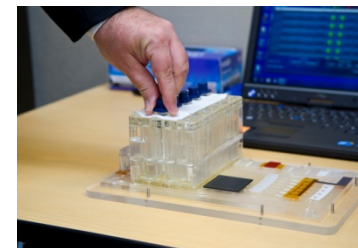
- **FY11.2: Funding 6 Phase II projects (1st increment w/FY12\$); ~\$1.7M needed in FY13:**
 - Low Power Tri-Axial Acoustic Sensor
 - Improved Wipe for Surface Chemical Agent Sampling
 - Mobile Device Forensics
 - Standoff Checkpoint Detection for Explosives
 - Iris Image Quality Tools for Biometric Recognition
 - Intelligent "Object" Symbology
- **FY11.1: Funding 5 Phase II projects (1st increment w/FY12\$); \$1.6M needed in FY13:**
 - Small Vessel Identification and Tracking Technologies
 - Environmental Samples for Biological Detection
 - Infrared Laser Sources
 - Mitigation of Challenges to Iris Recognition
 - Public Safety Broadband Mobile App for Voice
 - Improved Firefighter SCBA Face Piece Lenses

S&T Broad Agency Announcements

- ❑ **Long-Range BAA (LRBAA):** Solicitations with a broad range of topic areas come out of S&T
- ❑ **BAA:** Issue-specific solicitations come directly out of S&T's Divisions
 - Each is presented with numerous topic areas

Active S&T BAAs

- **BAA13-007 Chemical Attribution Signatures for Chemical Threat Agents**
 - Forensic Analysis
 - Sampling
- **BAA 13-008 Characterization of Biological Threat Agents**
 - Agent Production Rates & Stability/Decay Rates
 - Incubation Time for Disease Onset
 - Morbidity and Mortality Rates
 - ID50 and LD50
 - Biological Agent Characterization
- **BAA 13-05 Advanced X-ray Material Discrimination**
 - X-Ray Test Bed Prototype Design, Build and Test
 - Information Theoretic Analysis
 - Classification on Vendor Data Sets
 - Automated Decision Aids
 - Priors Library
 - Monte Carlo Model for X-ray Systems
 - Current EDS/AT platform detection assessment
 - Test Articles
 - Component Development
 - X-Ray System Architectural Design Concepts



S&T Long Range BAA

Active S&T Long Range Broad Agency Announcement : DHSS-TLRBAA12-07

▪ **Borders and Maritime Security**

- BMD.01 Land Border Security
- BMD.02 Maritime Border Security

▪ **Chemical and Biological**

- CBD.02 Improved Sampling
- CBD.03 Sample Preparation
- CBD.04 Instruments and Detection
- CBD.05 Facility Protection
- CBD.06 ICBRNE Program
- CBD.07 CBRN Threat Characterization Program
- CBD.08 FAD Countermeasures
- CBD.09 FAD Rapid Diagnostic Testing
- CBD. 10 FAD Modeling and Analysis
- CBD.11 Animal Disease Outbreak Response

▪ **First Responder**

- FRG.12 Training Simulation Tools
- FRG.13 Protective Clothing and Equipment
- FRG.14 Big Data Information Management
- FRG.15 Remote Monitoring of Responders
- FRG.16 Communications
- FRG.17 Video Sharing
- FRG.18 Video Transport Analysis
- FRG.19 Response to Alert and Warning Messaging
- FRG.20 Geo-Targeting

▪ **HSARPA/Innovation**

- HID.02 Apex Project Management
- HID.03 Apex Project Technologies
- HID.04 Information Resources
- HID.05 Communications, Surveillance, Recon
- HID.06 Individual Protection
- HID.07 Mobile Security
- HID.08 Big Data Architectures and Analytics

▪ **Resilient Systems**

- RSD 1.1 Behavior-Based Methods, Models, Tech
- RSD 1.2 Threat R&D
- RSD 1.3 Deceptive/Suspicious Behavior Detection
- RSD 1.4 Biometrics
- RSD 2.1 Surveillance Systems
- RSD 2.2 Resilient and Sustainable Infrastructure
- RSD 3.1 Agile Decision Aid Analytics
- RSD 3.2 Modeling, Simulation, Gaming Tech
- RSD 3.3 Geospatial and Remote Sensing
- RSD 3.4 Emergency Management
- RSD 3.5 Information Sharing

▪ **Cyber Security**

- CSD.02 Internet Infrastructure Security
- CSD.03 National Research Infrastructure
- CSD.04 Homeland Open Security Technology
- CSD.05 Forensics Support to Law Enforcement
- CSD.06 Identity Management
- CSD.07 Data Privacy Technologies
- CSD.08 Software Assurance
- CSD.09 Cyber Security Education
- CSD.10 Critical Infrastructure Systems and Security
- CSD.11 Internet Measurement and Attack Modeling
- CSD.12 Securing the Mobile Workforce
- CSD.13 Security in Cloud Based Systems
- CSD.14 Experiments and Pilots
- CSD.15 Research Data Repository
- CSD.16 Cybersecurity Economic Incentives
- CSD.17 Data Analytics
- CSD.18 Tailored Trustworthy Spaces

Doing Business with DHS S&T



- **Contact DHS S&T - Phone: 202-254-6006; email: SandT@dhs.gov**
- **www.fedbizopps.gov - Posts DHS S&T and all U.S. government business opportunities**
- **<https://baa2.st.dhs.gov> - Solicitations Portal for **Broad Agency Announcements** that address needs of DHS S&T technical divisions**
- **<https://sbir2.st.dhs.gov> - SBIR Program for Small Businesses posts two solicitations annually seeking technical capabilities that cut across DHS S&T divisions**
- **<https://www.safetyact.gov> - **SAFETY Act** helps facilitate development and use of qualified anti-terrorism technologies by providing limited liability protection to manufacturers**
- **www.firstresponder.gov – A collaborative environment for federal, state, local, and tribal first responders to access and leverage federal web services, information on resources, products, standards, testing and evaluation and best practices**
- **www.dhs.gov search “**SECURE**” - **SECURE** program leverages private sector resources and expertise to develop solutions aligned with DHS operational requirements**

DHS S&T In Review

Technological Capabilities & Knowledge Products

- Foot & Mouth Disease vaccine
- Major cybersecurity protocol adoption
- Firefighter protective gear
- Homemade explosives characterization
- 3D geo-location for responders
- Backboard cover and neck brace system
- Multi-band Radio for first responders
- Tunnel Plug
- Resilient Electric Grid

Homeland Security Enterprise

Process Enhancements & Efficiencies

- Technology foraging for situational awareness of key technologies & systems
- Power grid reconstitution (RecX transformer)
- ARMOR randomization algorithm
- Adapting DoD equipment for Homeland Security
- White Powder Standard
- Partnering with international, interagency, state and local, industry
- S&T Webinar series

Interagency



International

Acquisition Support & Operational Analysis

- S&T Operational Research Enhancement (STORE) for the U.S. Secret Service
- Incorporating systems analysis into DHS
- CBP Rio Grande Valley operational analysis
- SBInet Analysis of Alternatives
- Vulnerability assessments for underwater mass transit tunnels
- T&E oversight for all 135 DHS major acquisition programs

Industry

Understanding of Homeland Security Risks & Opportunities

- Leading DHS wide "Big Data" initiative
- Chemical & Bioterror Risk Assessment
- Have 12 bilateral international agreements
- Manage laboratories that conduct key R&D
- Coastal Hazards Center wave surge predictor
- Full operation of National Biological Analysis & Countermeasures Center (NBACC)
- Building state-of-the-art National Bio and Agro-Defense Facility



Homeland Security

Science and Technology