# Introduction to DHS S&T

## Homeland Security Science & Technology Advisory Committee

**Tara O'Toole, M.D., M.P.H.**
**Under Secretary for Science and Technology**
**U.S. Department of Homeland Security**

**September 27, 2012**

Homeland Security

# Department of Homeland Security

## The Core Missions

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

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# Thinking Enemies: Evolution of Terrorist Attacks in Aviation

| Time | Event/Threat | Vulnerability | Response |
|---|---|---|---|
| 1970s | Hostage/Hijacking | Guns, weapons | Magnetometers |
| 1988 | Pan Am 103, Lockerbie | Bomb in baggage | Baggage scans |
| Sept. 2001 | WTC, PA, Pentagon | Box cutters, etc | TSA |
| Dec. 2001 | Richard Reid | Shoe bomb | Shoes removed |
| 2004 | Chechen suicide attacks | Vests | Pat downs, backscatter |
| 2006 | Heathrow liquids plot | Novel liquid bomb | Liquids ban |
| 2009 | Non-metallic body bomb | Body bomb in sensitive area | ETD, WBI, pat down |
| 2010 | Printer cartridge bombs | Explosives packed in cargo | Trace detection for cargo |

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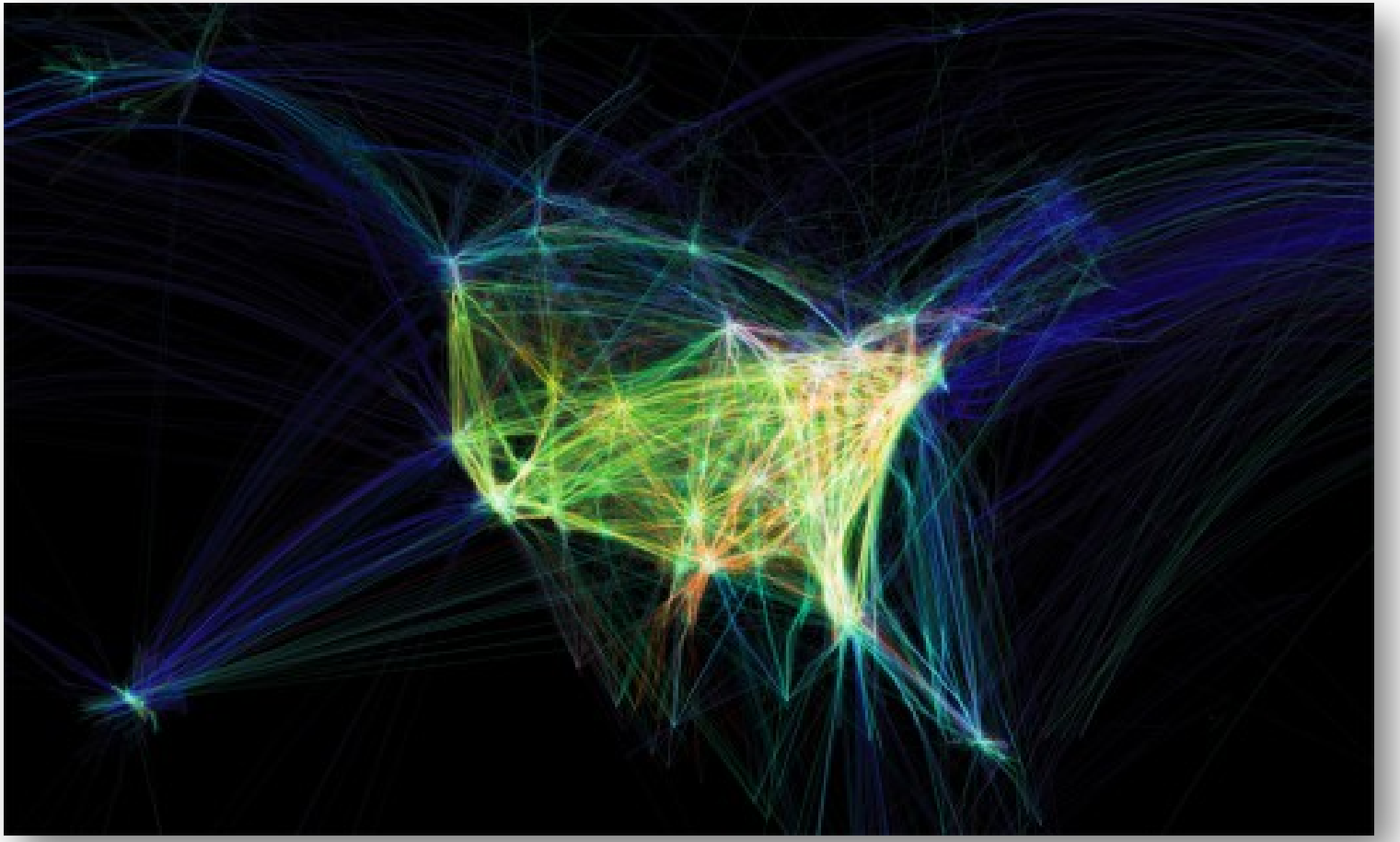
# U.S. Airline Flight Density



Source: Koblin

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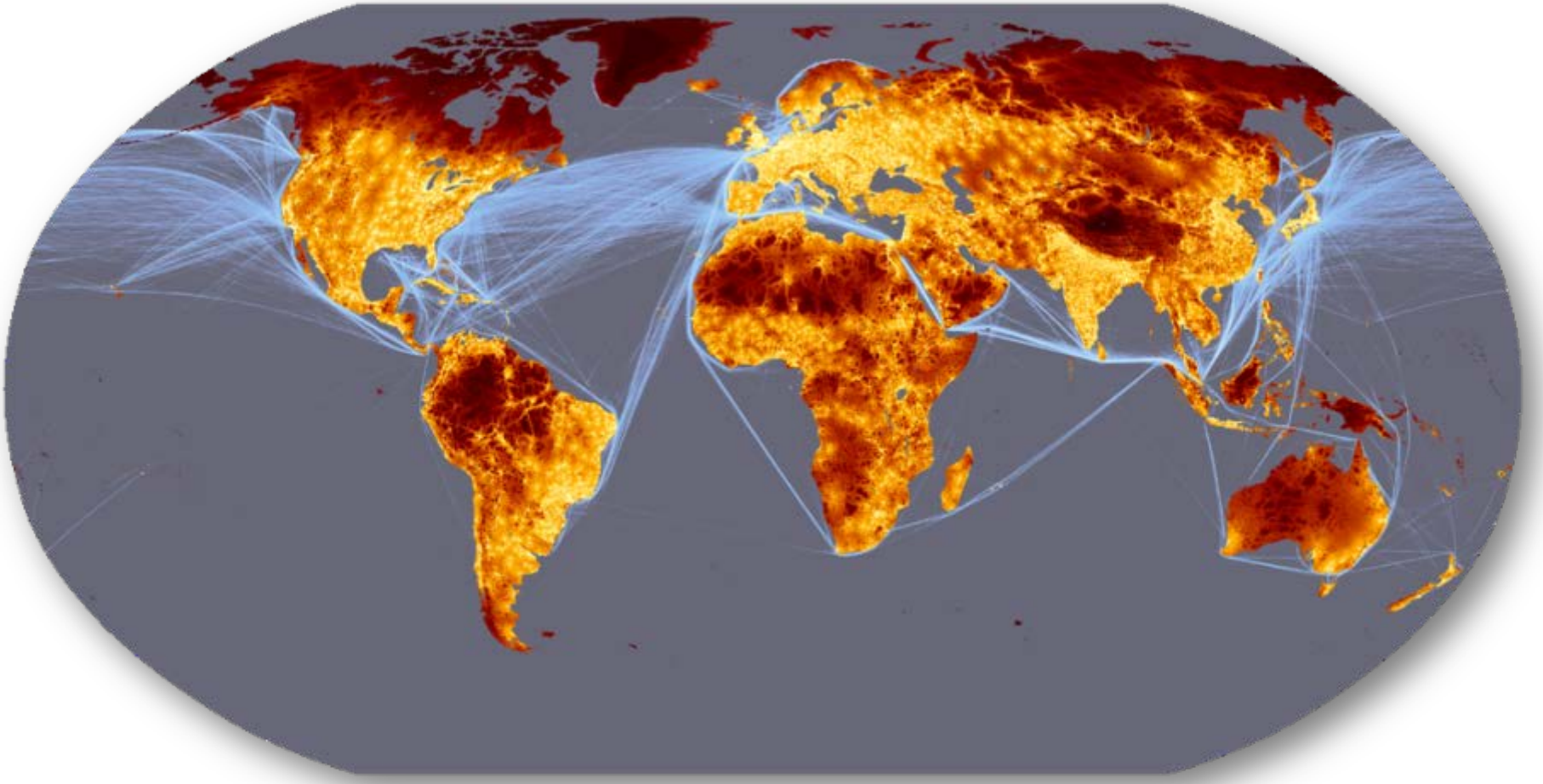
# Worldwide Land and Sea Shipping Density



Sources: Uchida, Nelson

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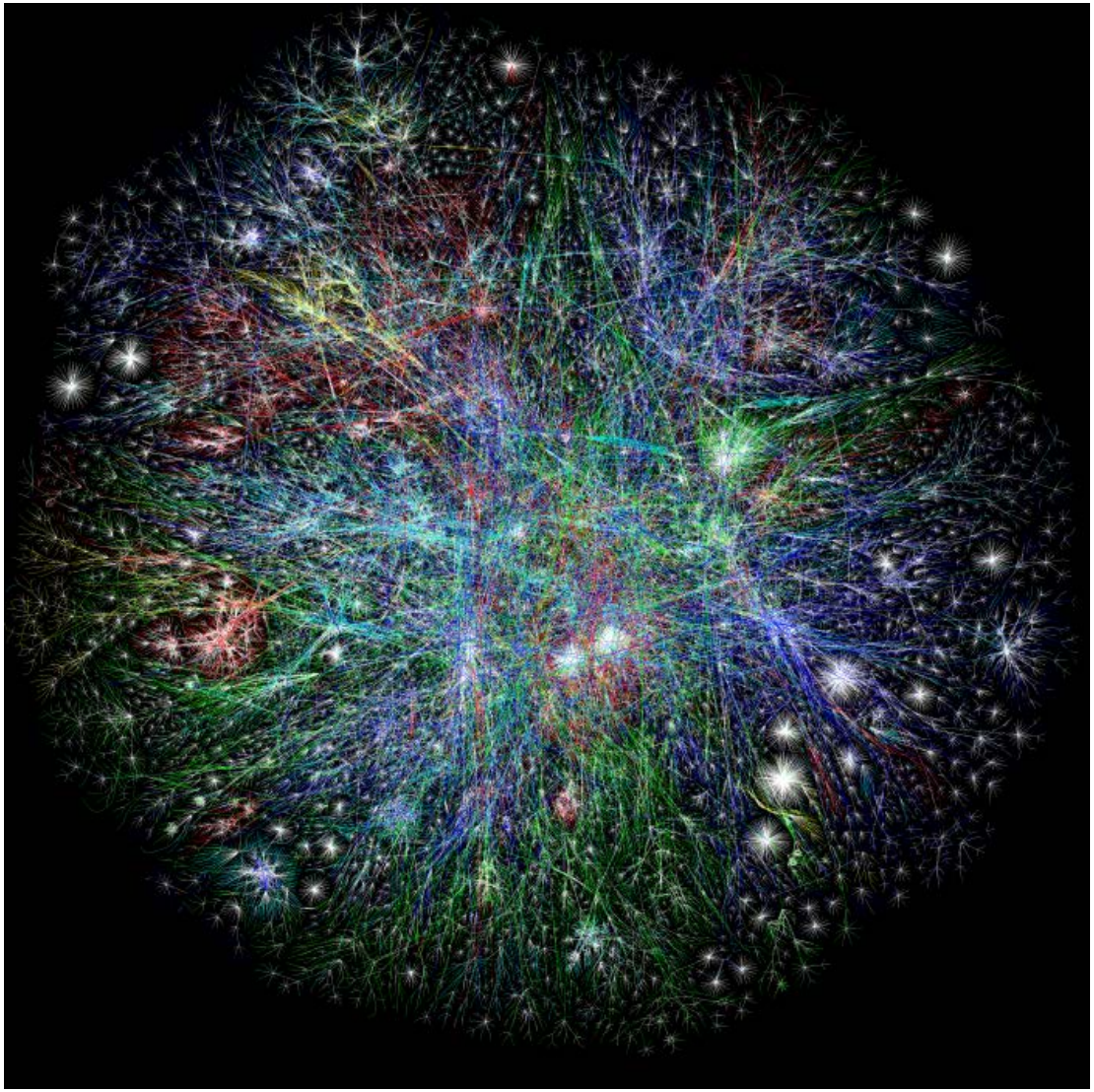
# Visualization of the Internet



Source: OPTE Project

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# Deepwater Horizon

Sources: Reuters, Wikimedia Commons

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# Three Near-Simultaneous Disasters

Magnitude 9.0


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# Complex Systems Fail Complexly

**"In complex industrial, space, and military systems, the normal accident generally (not always) means that the interactions are not only unexpected, but are *incomprehensible* for some critical period of time."**

**–Charles Perrow, *Normal Accidents*, 1984**

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# Bioweapons are a Strategic Threat

- Massively lethal, proven to work – with 1960s technology
- Essential materials, know-how cheap, widely available, dual-use: hard to track, easily hidden
- Attribution issue – Difficult for states to respond to attacks
- Reload potential: self-replicating organisms; risk multiple attacks
- Mitigation requires specific countermeasures quickly and in quantity
- Contagious disease introduces new dynamic
- Potency, diversity, and accessibility of biothreats will increase as bioscience advances

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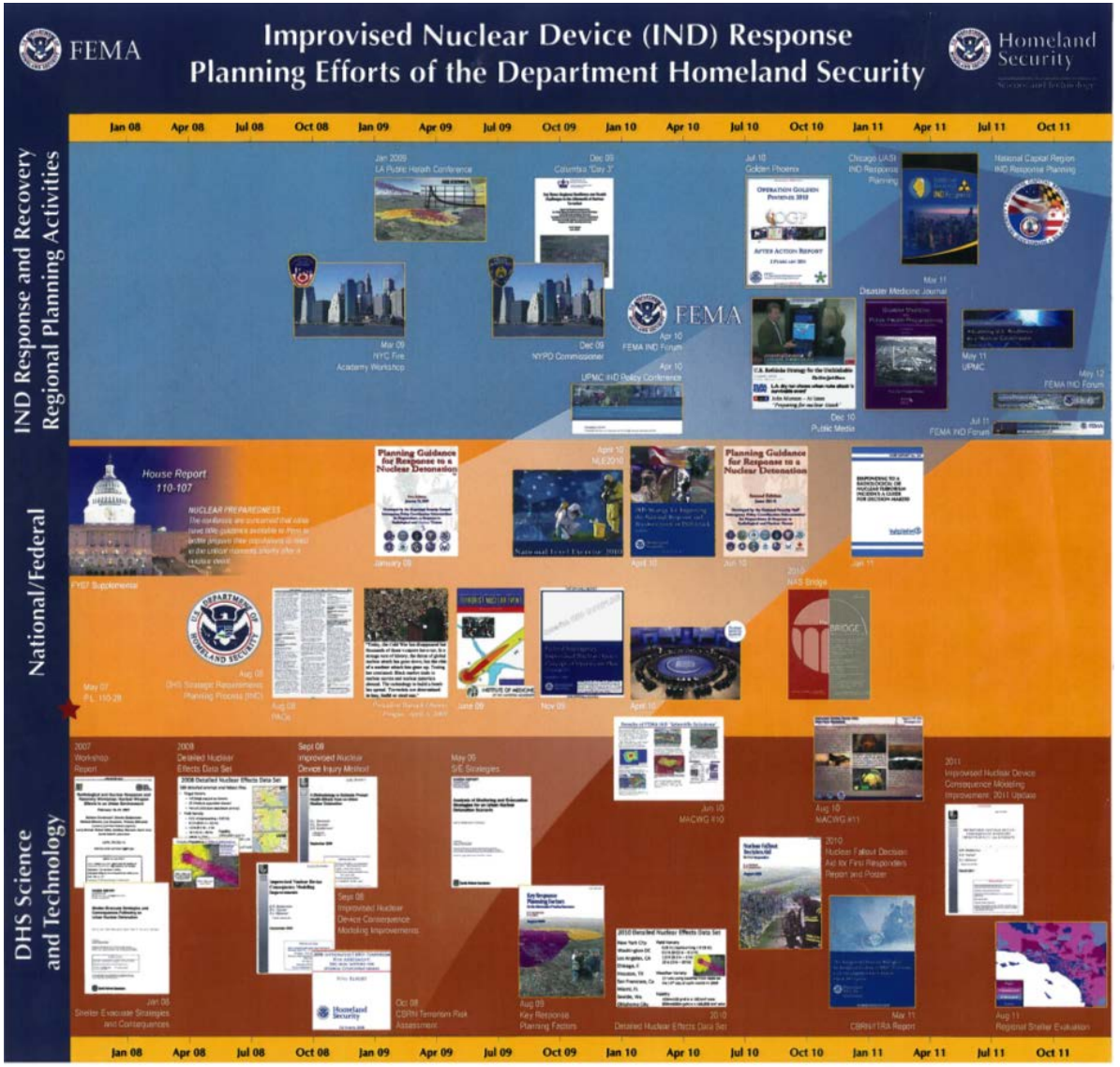
# The Long Road to Preparedness



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# DHS S&T Mission

**Strengthen America's security and resiliency by providing knowledge products and innovative technology solutions for the Homeland Security Enterprise**

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# S&T Value Proposition

- **S&T's contributions to the Homeland Security Enterprise will come from:**
  - **Creation, of new technological capabilities and process enhancements**
  - **Cost savings due to technological innovation and analytics**
  - **Leveraging scientific and engineering expertise to achieve improvements in operational analysis, project management and acquisition management**
  - **Progressively deeper, broader understanding of homeland security technology priorities and capability gaps**

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# What We've Done So Far

- Realigned
- Portfolio review
- Strategic emphases
  - Priority on transition to use – r&D
  - Partnerships with Components, leadership buy-in to problem to be addressed
  - Deep understanding of problem's operational context
  - System approaches and solutions
  - High ROI – collaboration with others, tech foraging
  - Multidisciplinary team-based culture, more time in the field
  - Display successes – publications, industry days, congressional demos, improve oral presentation skills

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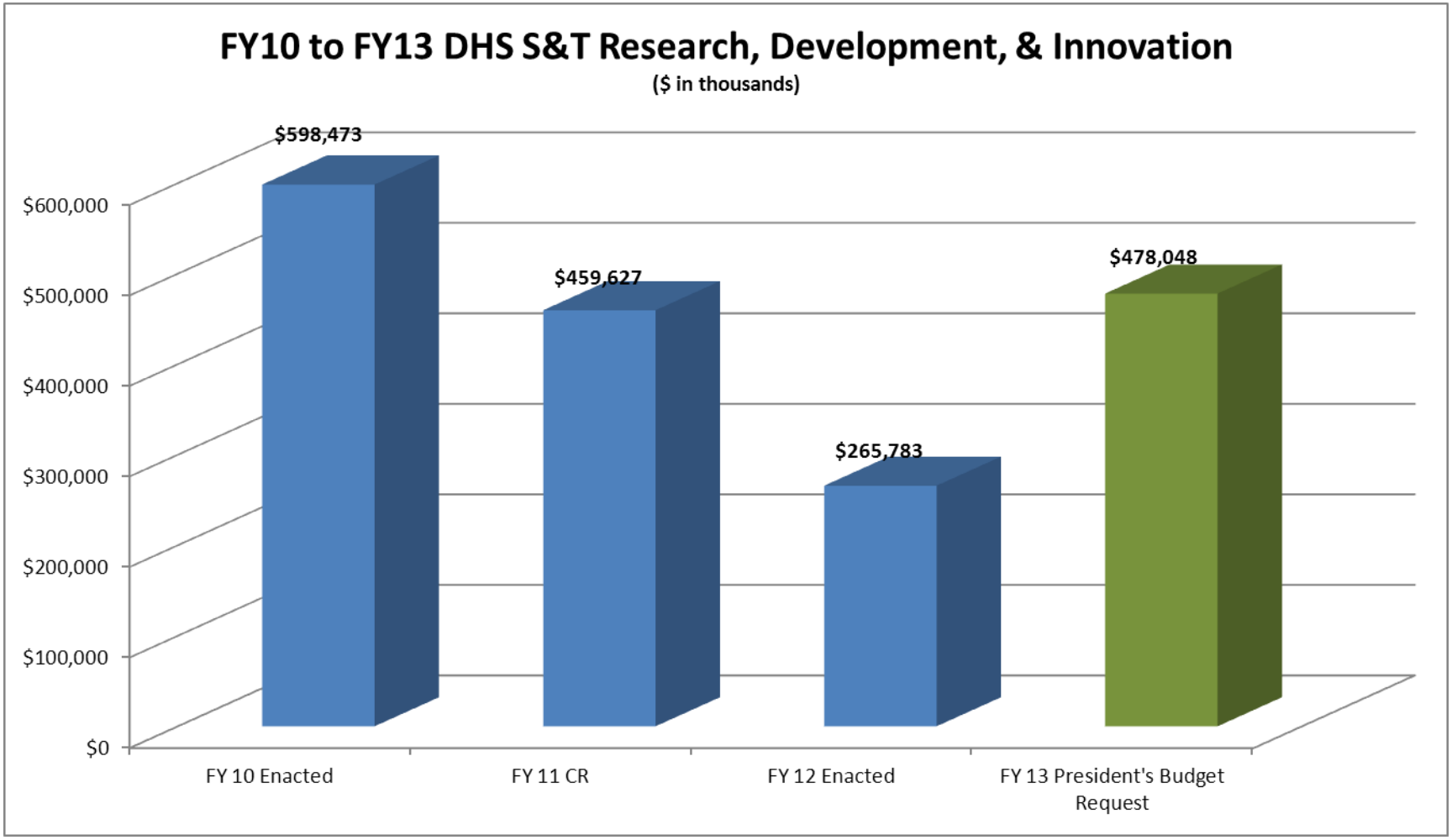
# DHS S&T R&D Budgets



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# Building S&T's Future

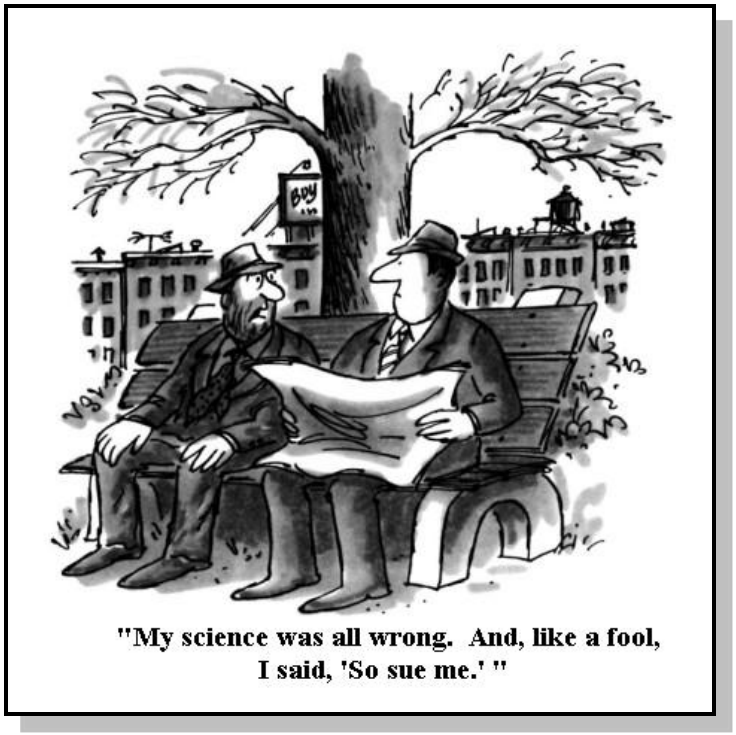
- How to anticipate and assess emerging threats and build resilience
- How to help DHS become more analytically driven, systems oriented
- How to operate and have impact in setting of Continuing Resolutions, budget cuts
- How to best take advantage of talent and investments of private sector, universities
- How can we build vibrant "ecosystem of innovation" with budget less than a sixth of DARPA's, in a federal agency that is deeply operational?
- How does S&T prepare and position products for markets originating from catastrophic events?
- How should/could first responders manage, validate and use the vast amount of social media data they receive?
- How to address privacy concerns associated with RDT&E efforts (e.g., unmanned aerial aircraft, high-resolution surveillance cameras, data sharing systems)

# Department of Homeland Security
# Science & Technology

## Presentation to the Homeland Security Science & Technology Advisory Committee

**Dr. Daniel Gerstein**
**Deputy Under Secretary**
**Science & Technology Directorate**

**September 27, 2012**

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# Agenda – Discussion Roadmap

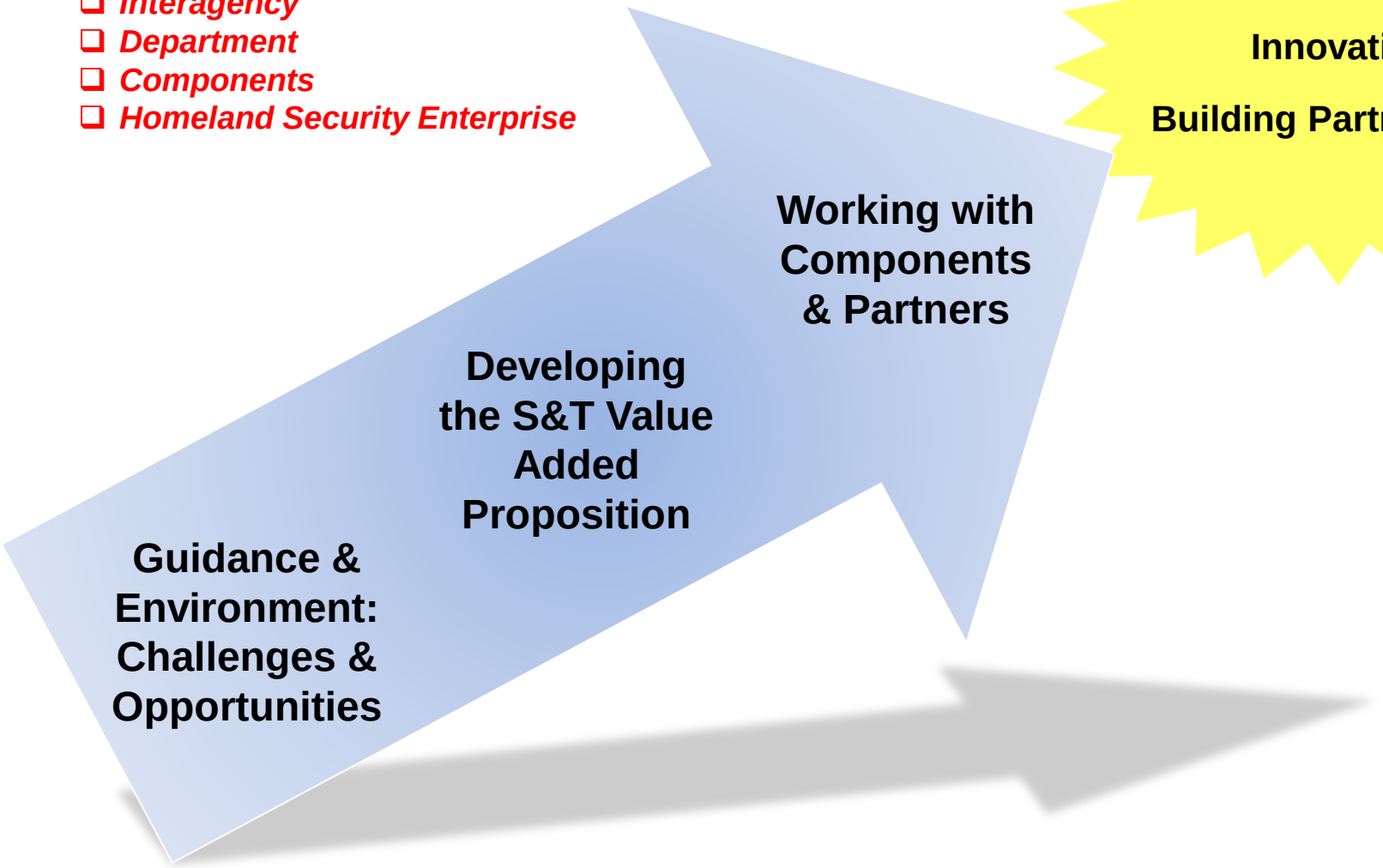
***S&T's roles as part of…***

- ***Interagency***
- ***Department***
- ***Components***
- ***Homeland Security Enterprise***

**Operational Focus …**

**Innovative …**

**Building Partnerships …**



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# DHS S&T Mission Guidance

**Strategic Guidance**

Homeland Security Act 2002


QHSR (Feb 2010)


BUR (July 2010)


S&T Strategic Plan (2011)

## QHSR

**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

**Operational Directives**

| HSPD-5 National | HSPD-9 Defense of | HSPD-10 Biodefense | HSPD-22 Domestic | PPD-8 National |
|---|---|---|---|---|
| System (2003) | & Food (2004) | (2004) | (2007) | |

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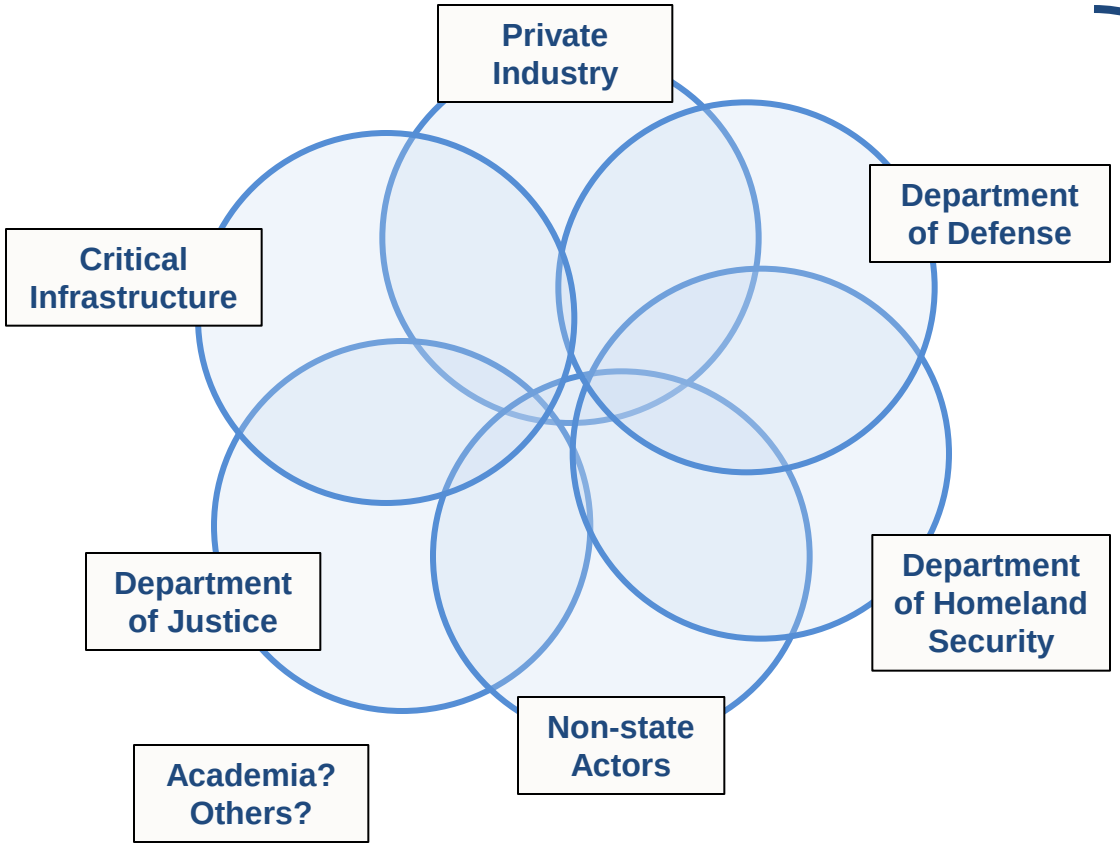
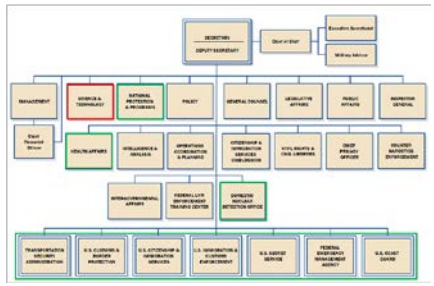
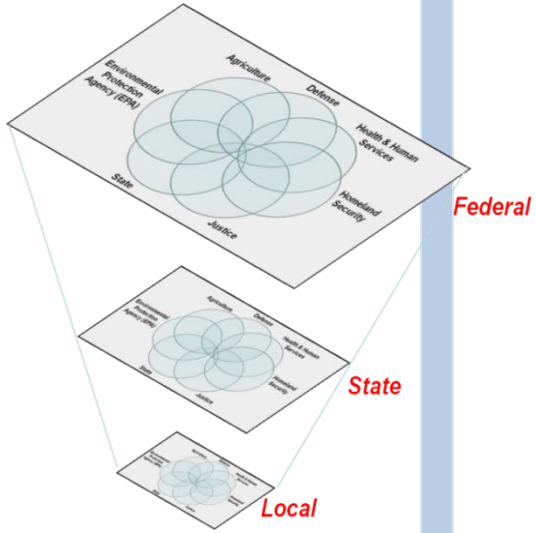
# Complicating Factor #1: Dealing with the Number & Diversity of Key Actors




***Must develop common understanding of the threat, lexicon, plans, procedures, communications, etc.***

***International***





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# Complicating Factor #2: DoD Versus DHS

| DoD | | DHS |
|---|---|---|
| Homeland Defense mission | ⟺ | Homeland Security mission |
| Military/warfighting culture | ⟺ | Law enforcement culture |
| Rules of Engagement | ⟺ | Domestic Civil Rights & Liberties |
| Culture of training | ⟺ | Little opportunity for training |
| Lethal force | ⟺ | Non-lethal force |
| $$$ | ⟺ | $ |

**Differences can result in difficulty infusing military technology and equipment into the operational work of DHS Components and first responders …**

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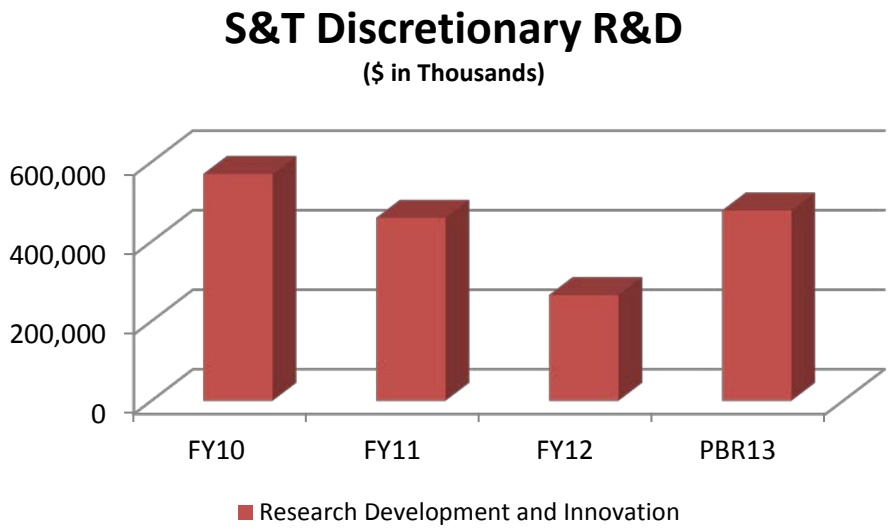
# Complicating Factor #3: S&T Budget




- 53% reduction in R&D
- Uncertainty in infrastructure funding
- Reduced flexibility to invest in leap-ahead technologies
- Limited ability to award grants

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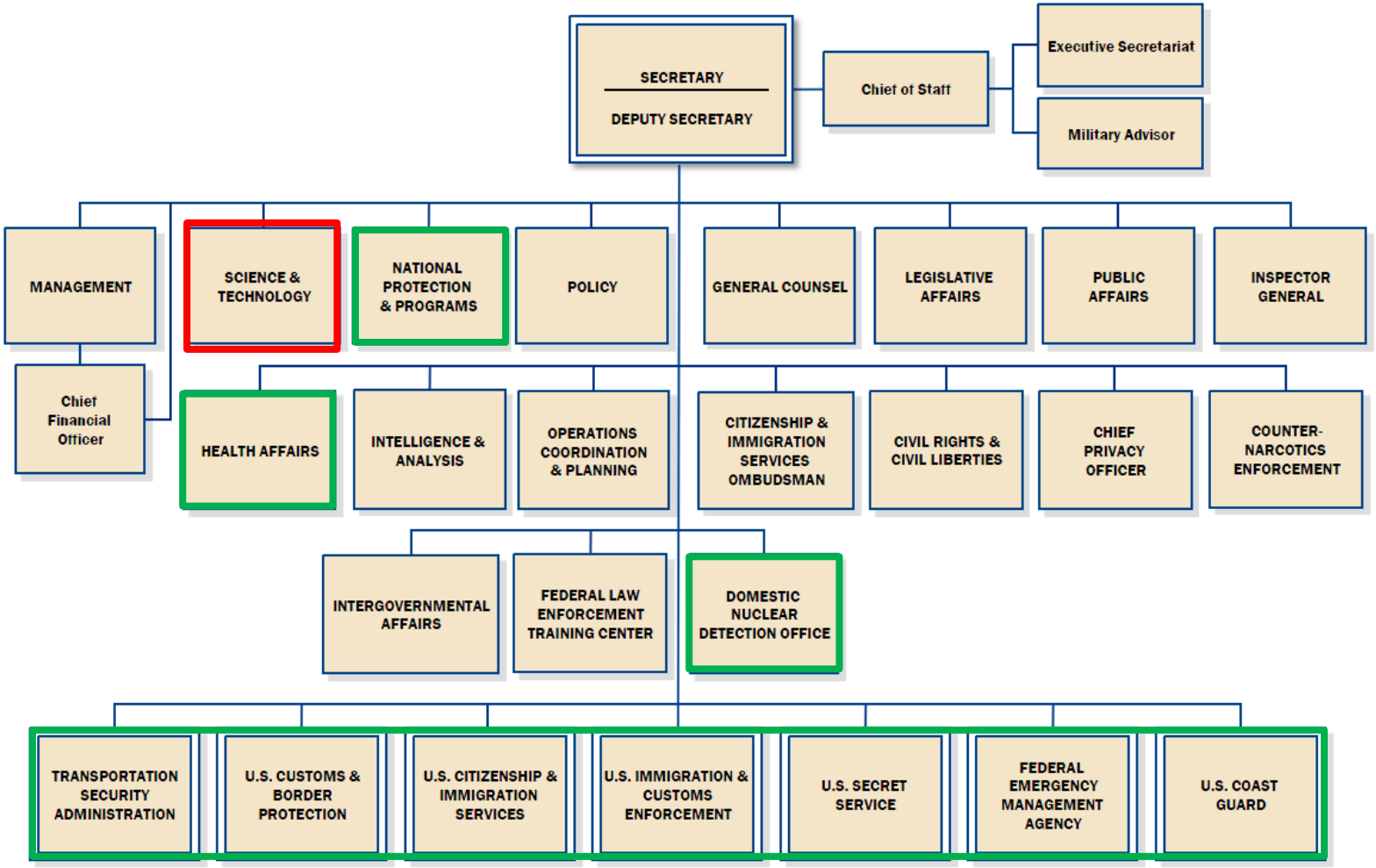
# Department of Homeland Security




Others …

- ❑ Homeland Security Enterprise (HSE)
- ❑ First Responder Community

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# How to Achieve the S&T Mission in this Challenging Environment?

- **S&T Mission**
  - **Strengthen America's security and resilience by providing knowledge products and innovative technology solutions for the Homeland Security Enterprise (HSE)**
- **Achieving the S&T Mission in this Challenging Environment**
  - ***Operationally focused*** **… S&T provides the HSE with strategic and focused technology options and operational process enhancements**
  - ***Innovative*** **… S&T seeks innovative, systems-based solutions to complex homeland security problems**
  - ***Partnerships*** **… S&T has the technical depth and reach to discover, adapt and leverage technology solutions developed by federal agencies and laboratories, state, local and tribal governments, universities, and the private sector - across the US and internationally**

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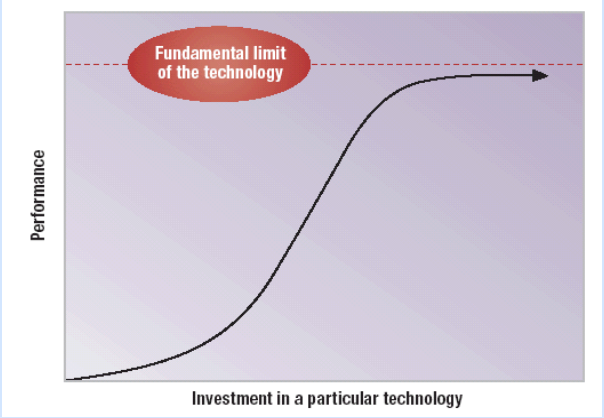
# Maximizing Technology Returns in Challenging Fiscal Times

***New Approach to Delivering Operationally Relevant Support***

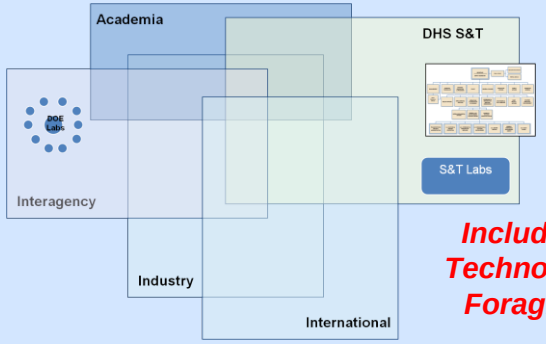
## From R&D to r&D




## DHS S&T Current Priorities

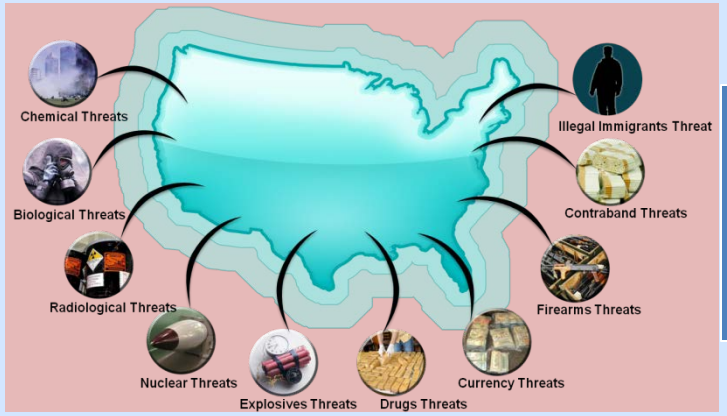
- ❑ Cybersecurity
- ❑ Biodefense
- ❑ Home Made Explosives (HME)
- ❑ First Responders

## Leverage Others' Investments




***Including Technology Foraging***

## Systems Analysis




**Threats & Environment to identifying shortfalls**

- Deter
- Detect & Track
- Classify
- Interdict
- Resolve

## Deliverables

- Technological Capabilities & Knowledge Products
- Acquisition Support & Operational Analysis
- Process Enhancements & Gain Efficiencies
- Understanding of Homeland Security Risks & Opportunities

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# Science & Technology's Resource Allocation Strategy (STRAS)

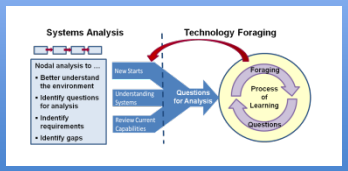
## Gain Component Head & USST Support

- Agree upon Mutual Goals
- Agree upon Co-Ownership
- Commit organizations to solution development and transition

GO / NO-GO DECISION

## Work with Component to validate:

- Mission, priorities and gaps
- Assist in developing requirements
- S&T investment in the correct solutions




Systems Analysis & Technology Foraging

GO / NO-GO DECISION

## Write Formal S&T/Component Support Strategy

- Document understanding
- Document expectations
- Document approach

## Write Formal S&T/DHS Support Strategy

- Document understanding
- Document expectations
- Document approach

## Current Portfolio

DHS/S&T ⟷ Component

# Science & Technology's Resource Allocation Strategy (STRAS) -- S&T View

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**Lead by:**

**ASOA**

## Systems Analysis

**Systems analysis to …**

- Better understand the environment
- Identify questions for analysis
- Indentify requirements
- Identify gaps

## Technology Foraging

New Starts

Understanding Systems

Review Current Capabilities

Questions for Analysis

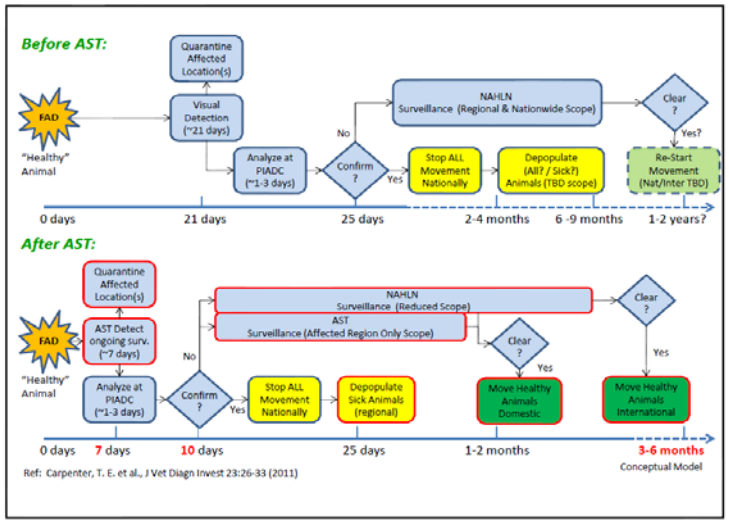
Foraging

Process of Learning

Questions

Gap

**HSARPA / FRG**




Ops Context Chart (OCC)

**Lead by:**

- ❑ RDP to Assist PMs
- ❑ All participate
- ❑ Benefits:
  - ➢ "System" definition
  - ➢ Situational Awareness
  - ➢ Speed of Execution
  - ➢ Strategic Partnerships
  - ➢ Portfolio refinement
  - ➢ Resource Management
  - ➢ Points of Contact

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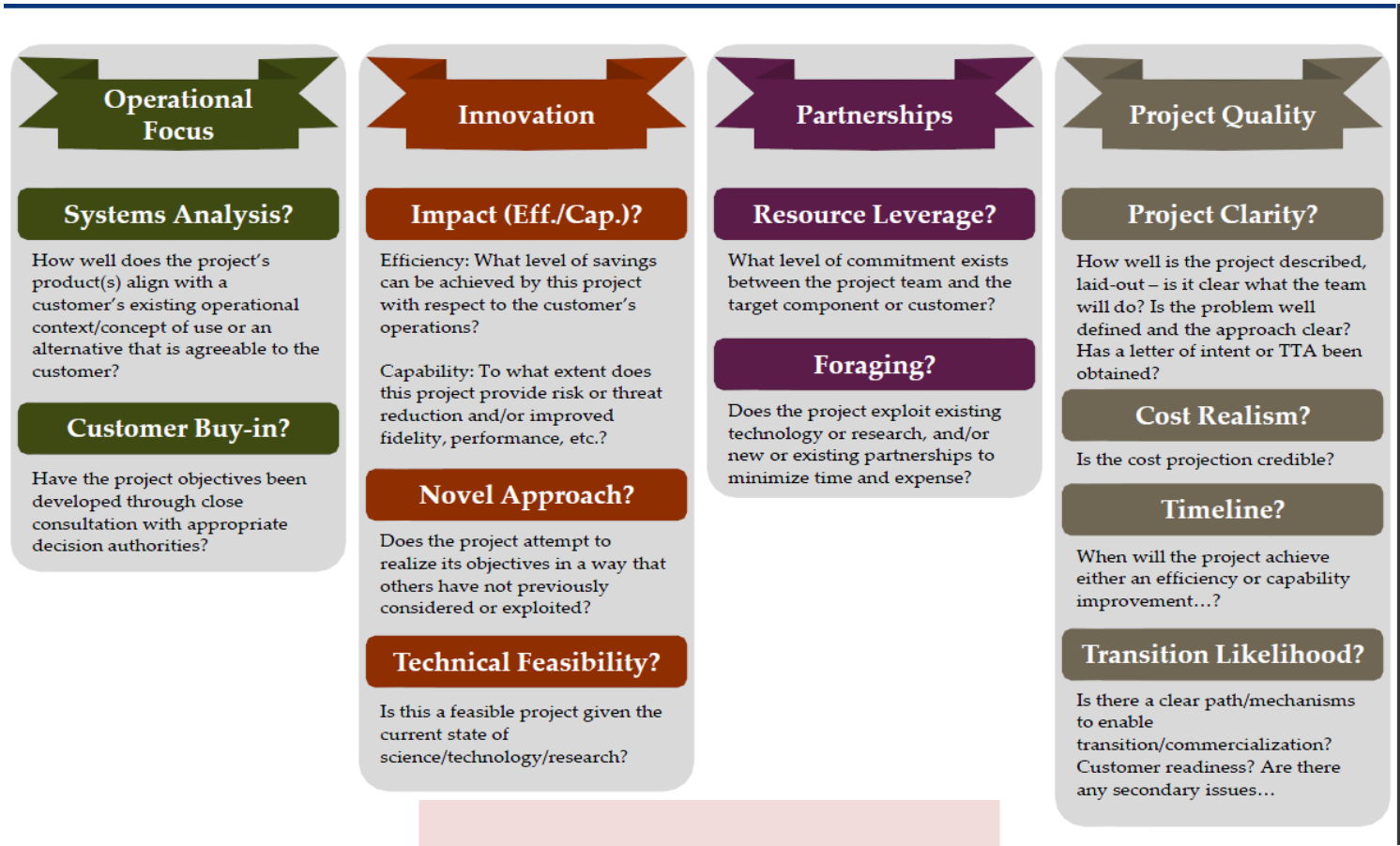
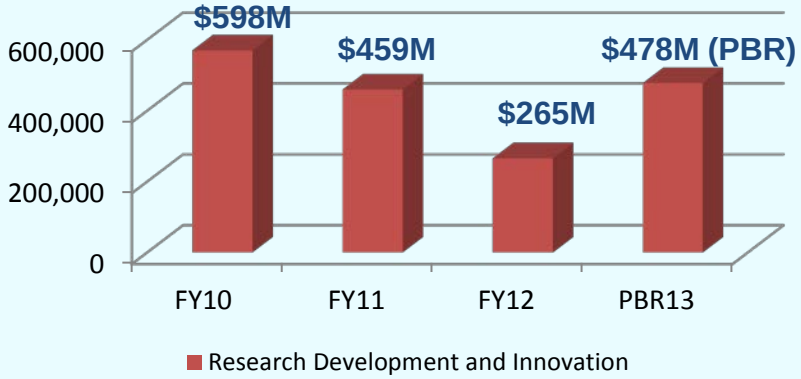
# S&T Portfolio Review Analysis




**Assess:**

- ❑ **Health of the individual projects …**
- ❑ **Potential for transition to operational use …**
- ❑ **Balance of the portfolio …**

# Maximizing Technology Returns in Challenging Fiscal Times

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## DHS S&T Current Priorities

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

Examples

| Divested (FY12) & Resumed (FY13) | Increases | New Starts |
|---|---|---|
| Small Dark Aircrafts | Border Security | Security in Cloud-Based Systems (sCBS) |
| Tunnel Detection | Bio-Security | Rad/Nuc Response/Recovery |
| Joint Agro Defense Office (JADO) | Chem-Security | Biometric Data Interoperability |
| System Studies | Cyber Security | Social Media Disaster Resilience |
| Passive Methods for Precision Behavioral Screening | Explosives | Integrated Passenger Screening |
| Biometrics | First Responders | PB Threat Imaging Sensor Development |
| Chem-Bio Event Characterization | Identity Management | Portable Detection |
| Community Resilience | Info Sharing & Interoperability | Safe Bulk Detection |
| IP Communications Test & Eval | Natural Disaster Resiliency | |

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# QHSR -- Bottom Line Up Front

- **in QHSR 2010**
  - **Major question: What is homeland security?**
  - **S&T was under-represented**
  - **Major Findings:**


| | Threats | | | | |
|---|---|---|---|---|---|
| | Smaller Scale Terrorism | Trafficking, Crime | Pandemics, Accidents, Natural Hazards | Violent Extremism | High Consequence WMD |
| Core Missions | 1. Preventing terrorism & enhancing security<br>2. Securing and managing our borders<br>3. Enforcing & administering immigration laws | | | 4. Safeguarding and securing cyberspace<br>5. Ensuring resilience to disasters | |

- **QHSR 2013**
  - **Major question: How do we approach the most important things?**
  - **Need to shape the 2013 QHSR**
    - **S&T must be part of the "how"**
    - **Promote S&T in strategic thinking in DHS**
  - **Most trends of interest to DHS Executive Steering Committee are tech related**
  - **S&T must ensure understanding of the challenges/risks/ opportunities associated with this technically rich environment**

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# DHS S&T In Review

## Technological Capabilities & Knowledge Products

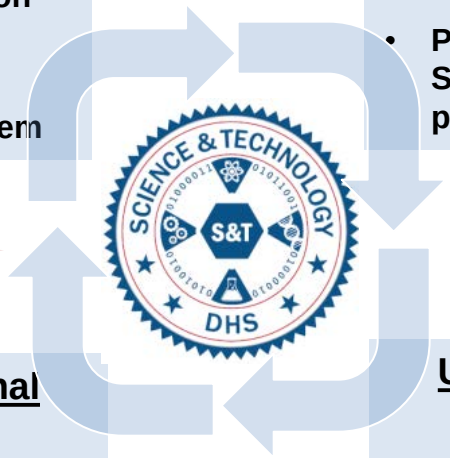
- Foot & Mouth Disease vaccine
- Major cyber security protocol adoption
- Concrete breach tool for urban search and rescue
- Homemade explosives characterization
- 3D geo-location for emergency responders
- Backboard cover and neck brace system

Homeland Security Enterprise

## Process Enhancements & Efficiencies

- Technology Foraging for situational awareness of key technologies & systems
- Power grid reconstitution (RecX transformer project)
- Saved TSA $2.1 million USD in training costs
- Portfolio balancing reviews
- Partnering with International, Interagency, State and Local, Industry to incorporate best practices

Interagency




International

## Acquisition Support & Operational Analysis

- S&T Operational Research Enhancement (STORE) for the U.S. Secret Service
- SBInet Analysis of Alternatives
- Vulnerability assessments for underwater mass transit tunnels

Industry

## Understanding of Homeland Security Risks & Opportunities

- Bioterror Risk Assessment
- Chemical Threat Risk Assessment
- Signed 12 international agreements
- Manages laboratories that conduct key R&D activities on behalf of HSE
- Certification to operate National Biological Analysis & Countermeasures Center (NBACC)

# Department of Homeland Security
# Science & Technology

## HSARPA Overview

**September 28, 2012**

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# HSARPA Evolution

- HSARPA evolving
  - Technology development and integration
  - Less focus on basic research
- Understand and define Operational Context
  - Develop systems analysis for requirements
  - Identify technology opportunities
- Develop empirical metrics for programs
  - Efficiency Impact
  - Capability Impact
  - Return on Investment
- Transition products to the field – transition = operational use + ownership
- Operational Pilots – S&T will fund through deployment

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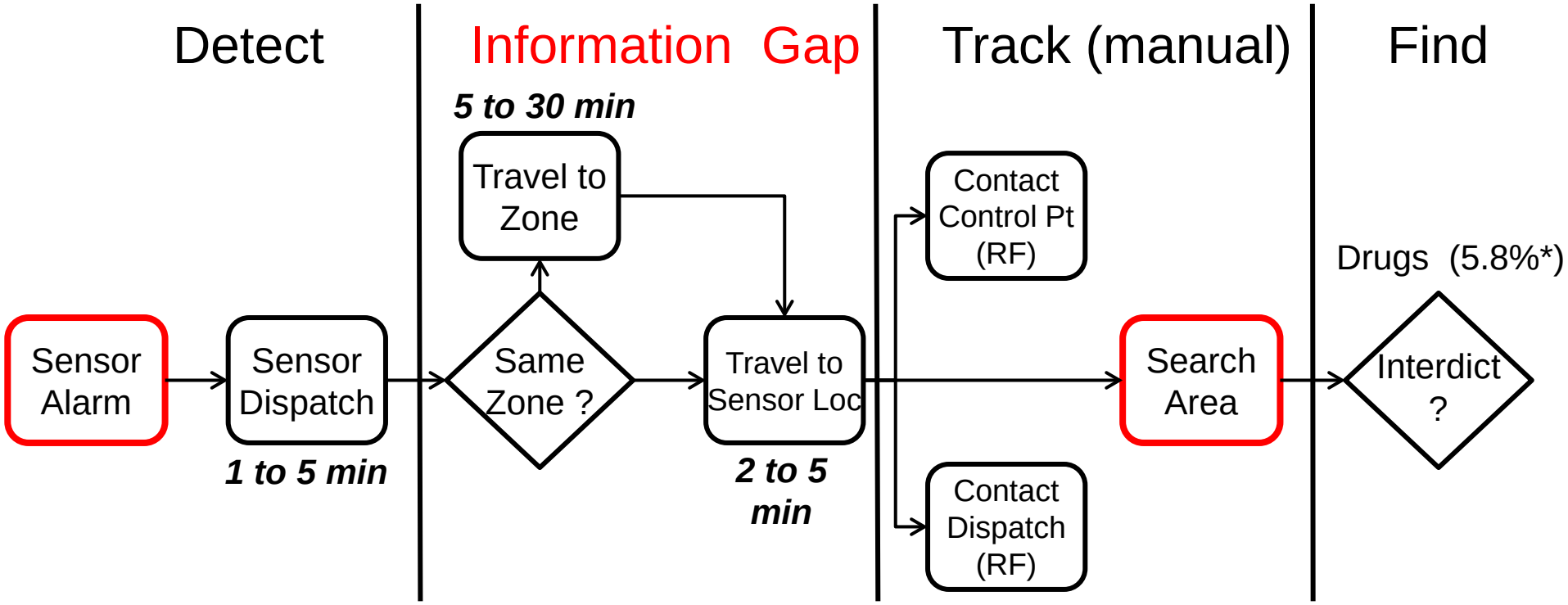
# Ops Context Model – Sensor Dispatch

(BPMN symbology, Static representation)




1. Process nodes bounded in red denote “Pivot Points” where applying S&T technologies (capabilities) can have a measureable impact on performance and interdiction rates (efficiency).
2. During Travel to Zone, there is an information gap about the target that caused the sensor alarm.

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# HSARPA Mission and Functions

- Protect America - save money
- Be a science & technology information clearinghouse for homeland security enterprise
  - Best practices
  - Technologies
- Impact operations across the homeland security enterprise
- Fund research versus perform research
- Majority of funds go to private industry, National Labs, and other Federally Funded Research and Development Centers

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# HSARPA Technical Divisions






- **Borders and Maritime Security Division - Prevent contraband, criminals and terrorists from entering the U.S. while permitting the lawful flow of commerce and visitors**
- **Chemical/Biological Defense Division - Detect, protect against, respond to, and recover from potential biological or chemical events**
- **Cyber Security Division - Create a safe, secure and resilient cyber environment**
- **Explosives Division - Detect, prevent and mitigate explosives attacks against people and infrastructure**
- **Human Factors/Behavioral Sciences Division - Identify and analyze threats, enhance societal resilience, and integrate human capabilities in technology development**
- **Infrastructure Protection & Disaster Management Division - Strengthen situational awareness, emergency response capabilities and critical infrastructure protection**

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# Border and Maritime Security

- **Mission:**

  **Develop, integrate, and evaluate technologies to detect, track, and classify threats crossing air/land/water borders in between Ports of Entry**

- **Research Areas:**
  - **Buried tripwires**
  - **Mobile surveillance systems**
  - **Tunnel detection and monitoring**
  - **Air-based sensor technologies**
  - **Maritime security of surface and underwater contraband threats**

# Chemical and Biological Defense Division

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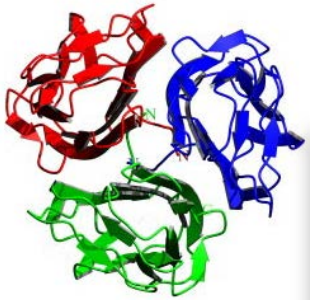
## ❑ Mission:

**Save lives and protect Nation's infrastructure against chemical, biological and agricultural threats and disasters**

## ❑ Research Areas:

- **Comprehensive understanding and analyses of chem-bio threats**
- **Develop pre-event assessment, discovery, and interdiction capabilities**
- **Develop capability for warning, notification, and timely analysis**
- **Optimize recovery processes**
- **Enhance the capability to inform attribution of attacks**
- **Develop medical countermeasures against foreign animal diseases**

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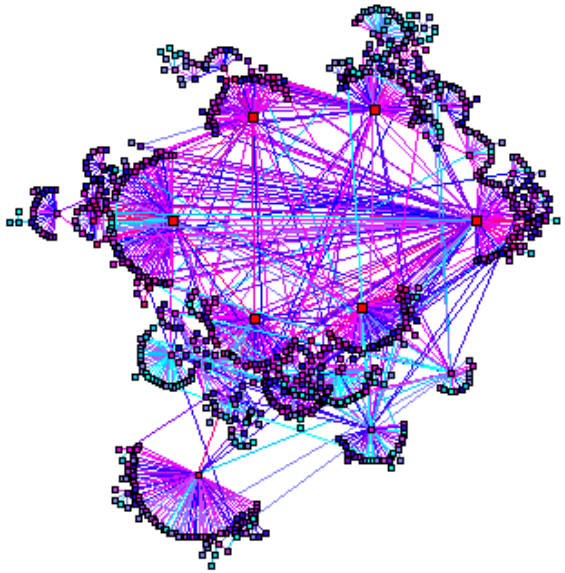
# Cyber Security Division


## ❑ Mission:

**Secure cyber systems and networks, resilient to cyber threats. Protect users, infrastructure, and the Internet**

## ❑ Research Areas:

- **Ensure infrastructure and the Internet are secure and less vulnerable to malicious and natural events**
- **Develop protocols essential to trustworthy cyber systems**
- **Provide safe cyber arenas to enable research on discovery, testing, and analysis of tools, technologies and software**
- **Provide R&D activities for users to attract next generation cyber security warriors, provide tools cyber criminal and terrorist investigations**



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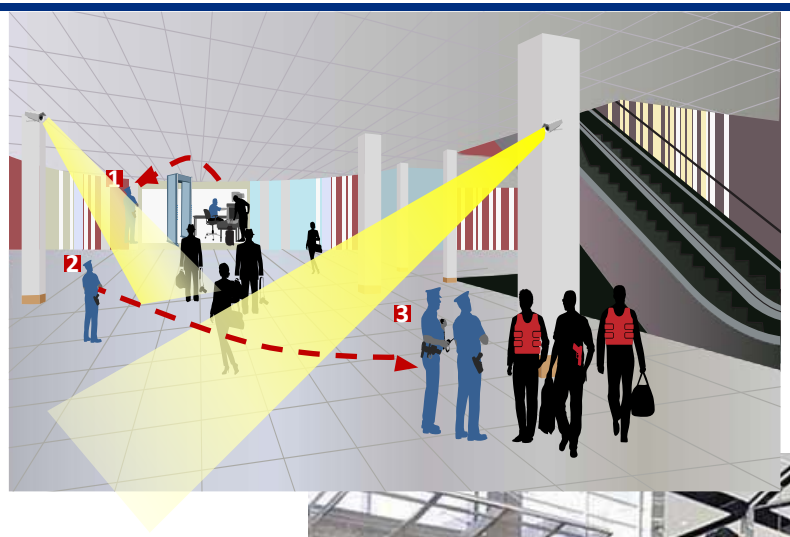
# Explosives Division

## ❑ Mission:

Develop technical capabilities to detect, respond, defeat, and mitigate non-nuclear explosives terrorism

## ❑ Research Areas:

- ➢ Secure passenger and cargo safety at airports and checkpoints
- ➢ Protect national infrastructure and treasures from explosive threats
- ➢ Protect people and facilities in high volume, fast-paced environments like trains and subways
- ➢ Support TSA, US Secret Service, first responders, Customs and Border Protection

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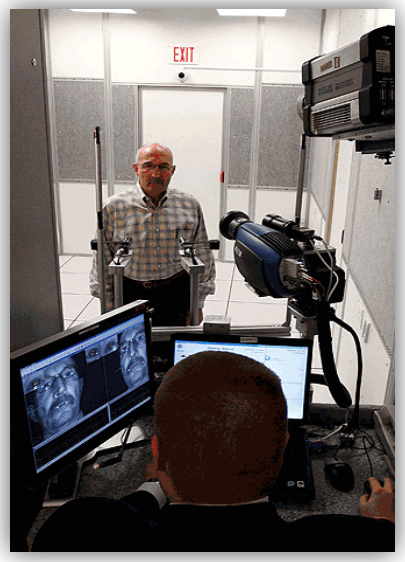
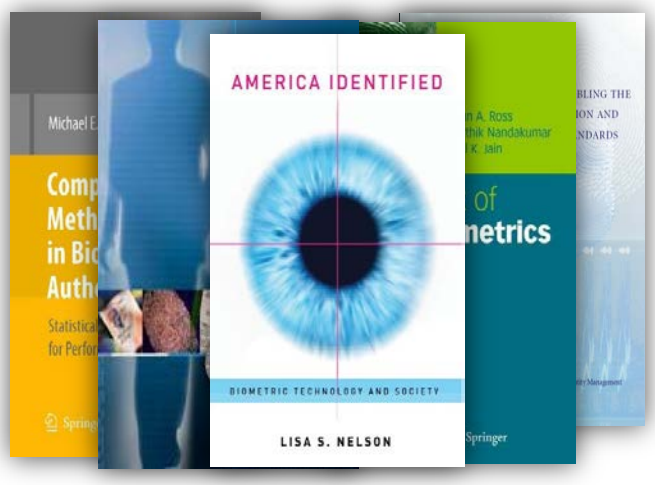
# Human Factors and Behavioral Sciences Division








- **Mission:**

  **Develop people-centric technologies, knowledge products, and enhanced human performance to ensure homeland security**

- **Research Areas:**
  - **Target and screen people, land vehicles, and sea containers entering the U.S.**
  - **Biometric Identity management**
  - **Verify identities, assess intent, and authenticate documentation**
  - **Understand operational threats, improve operator performance, improve sensor technologies, perform technology testing and evaluation**

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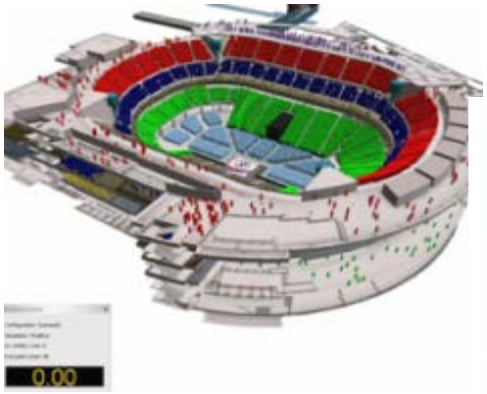
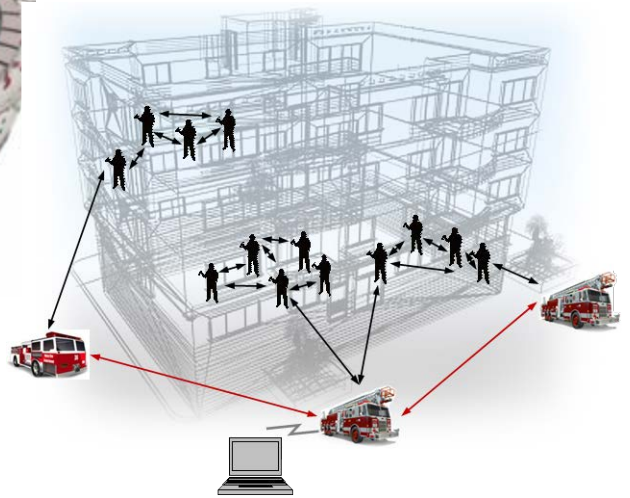
# Infrastructure Protection and Disaster Management Division

## ❑ Mission:

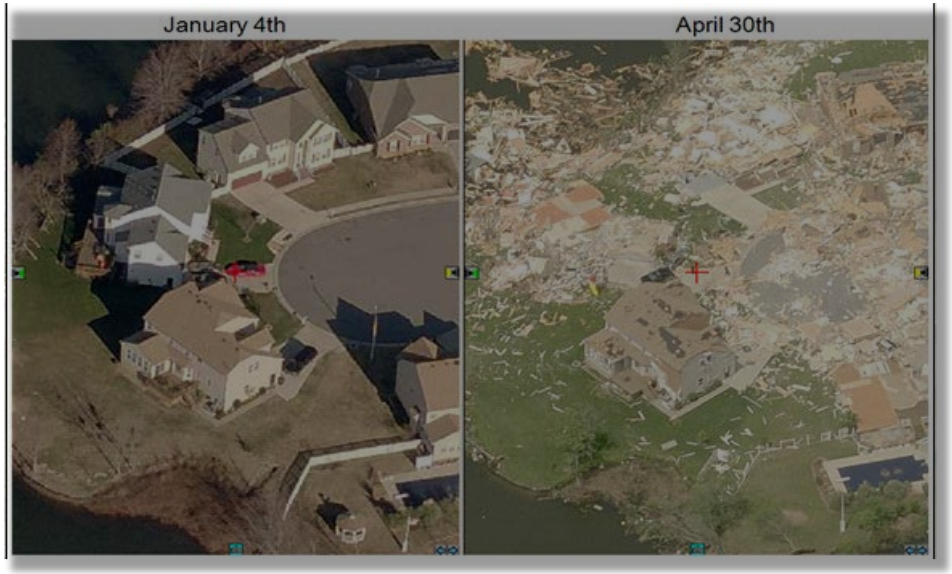
**Provide physical and virtual technologies and solutions to protect national infrastructure and manage disaster impact and response**





## ❑ Research Areas:

- **Modeling and simulation for evacuation**
- **Incident management**
- **Overhead imagery for disaster response**
- **Location of first responders in GPS challenged environments**
- **Electric grid resilience**
- **Levee and tunnel breach mitigation**



| Operational Focus | Scoring Guidelines | | | |
|---|---|---|---|---|
| | 1 | 4 | 7 | 10 |
| **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? | **Many Questions –** Solution seems decoupled from the operational context or concept of use | **Some Concerns –** Solution clearly could play a role in the operational context or concept of use, but questions remain about exactly how it will enable operations | **Good Fit** – Solution is an integral part of the operational context/concept of use | **Key Enabler** – Solution is a central component of the operational context/concept of use – without this effort it is unlikely the concept of use can be achieved |
| **Customer Buy-in:** Have the project objectives been developed through close consultation with appropriate decision authorities? | **Many Unknowns –** Project objectives remain in flux | **Some Uncertainty** – Customer representative and S&T have agreed to and documented project objectives | **Mostly Clear** – Customer representative with decision authority and S&T have agreed to and documented project objectives | **Solid** – Decision authority involvement and formal transition agreement in place |

| Innovation | | | | |
|---|---|---|---|---|
| **Efficiency:** What level of savings can be achieved by this project with respect to the customer's operations? | **Unknown/None** – Too many factors to assess accurately; no confidence in savings estimate(s); no cost savings anticipated | **Limited** – Savings may be possible, but they are of limited scope or the path to their achievement is unclear | **Meaningful** – Savings will definitely result from this effort and their magnitude will be meaningful within the context of the customer's operations | **Significant Impact** – The projected savings are such that the nature of the customer's operations will be dramatically streamlined (changed) |
| **Capability:** To what extent does this project provide risk or threat reduction and/or improved fidelity, performance, etc.? | **Unknown/None –** Does not meaningfully or measurably improve the existing operations | **Incremental Improvement** – Measurable and meaningful improvement to operations | **Moderate Improvement** – The nature of the improvement significantly enhances operations | **"Game Changer" –** The capability fielded is so advanced it effectively eliminates the need for further work in this area (for the immediate future) |
| **Novel Approach:** Does the project attempt to realize its objectives in a way that others have not previously considered or exploited? | **No –** Follows a similar pattern of thinking used in the past; tried and true technologies/methods | **Next Logical Step –** Uses an existing approach, but with new technologies/methods or uses existing technologies/methods in a new application | **Fresh Perspective** – Incorporates significant novel thinking in the utilization and exploitation of technology/methods or integrates existing technologies/methods to create a new capability | **Revolutionary** – Significant departure from prior utilization of technology/methods; has the potential to revolutionize the field |
| **Technical Feasibility:** Is this a feasible project given the current state of science/technology/research? | **Very Difficult** – Many unknowns | **Difficult** – Some significant questions exist | **Achievable** – Modest technical uncertainty | **Sure Thing** – Very high probability of technical success |

**Note:** Values can be assigned between descriptor numerical scores, i.e., 2,3,5,6,8,9

v051512

| Partnerships | Scoring Guidelines | | | |
|---|---|---|---|---|
| | 1 | 4 | 7 | 10 |
| **Resource Leverage:** What level of commitment exists between the project team and the target component or customer? (Resource leverage may also be through interagency, international, academia and/or industry relationships) | **None/Minimal** – Component/customer is aware of the project, but is uninvolved | **Modest Commitment** – Component/customer is in active discussions with the project team, but not currently providing resource support | **Strong Commitment** – Component/customer is actively working with S&T to plan for transition and is providing significant in-kind(1) and/or monetary support | **Joint Effort** – Over half of the project funds are provided by the component/customer |
| **Foraging:** Does the project exploit existing technology or research, and/or new or existing partnerships (interagency, international, academia, industry) to minimize time and expense? | **Questions Exist**– No indication requisite due diligence has been performed | **No Opportunity** – Due diligence complete, but no opportunities identified | **Verified Opportunity** – Project team has identified existing technology , research, and/or partnerships that can be used or re-purposed to directly facilitate a cost and time effective solution | **Exploitation Underway** – Project team has obtained access to existing technology research, and/or partnerships that will directly facilitate a cost and time effective solution |
| **Project Quality** | | | | |
| **Project Clarity:** How well is the project described, laid-out – is it clear what the team will do? Is the problem well defined and the approach clear? Has a letter of intent or TTA been obtained? | **Lacks Clarity** – Difficult to know what will result | **Some Confusion** – Documentation is incomplete or poorly detailed; many uncertainties | **Straightforward** – Well documented project, most aspects can be easily understood | **Transparent** – Project documentation is clear and easily understood – effort "makes sense" |
| **Cost Realism:** Is the cost projection credible? | **Insufficient Information** – Insufficient information provided to make an assessment | **Ballpark** – Projection is probably in the "ballpark", but could benefit from greater detail | **Substantiated** – Project team has made an obvious attempt to build a detailed cost analysis | **On the Mark** – Very high credibility, robust analysis, projection makes sense |
| **Timeline:** When will the project achieve either an efficiency or capability improvement, as defined on the previous page, as part of normal operations? (Ex: hand over of prototype for operational use would qualify) **or** When will the 1st demonstration of the capability/efficiency be observed in an operational context? (2) | **Far-term** (Five or more years) | **Mid-term** ( 3-4 years) | **Near-term** (1-2 years) | **Imminent** (Less than a year) |
| **Transition Likelihood:** Is there a clear path/mechanisms to enable transition/commercialization? Customer readiness? Are there any secondary issues related to the concept of use, proponency, budgeting, affordability, regulatory or statutory realities, or business value? | **Unlikely** – Transition and use of results is unlikely | **Somewhat Likely** – Much more has to happen to enable transition and use of results | **Likely** – Most obstacles to transition and use of results have been overcome and/or project is in pilot | **Very Likely** – Customer has budgeted for technology and commercialization plan is in place and being executed |

**Notes: 1)** In-kind support defined as commitment of personnel, facilities, and/or funding for demonstrations that are representative of at least 10% of project cost; 2) The Timeline criteria is scored based on the categories provided; numerical scores are not provided for this criteria. All other criteria are assessed with numerical scores and can be assigned between descriptor numerical scores, i.e., 2,3,5,6,8,9

# First Responders Group

**Briefing to Homeland Security Science and Technology Advisory Committee**

**September 27-28, 2012**

**Robert P. Griffin, Ph.D.**
**Director, First Responders Group**
**DHS Science and Technology Directorate**

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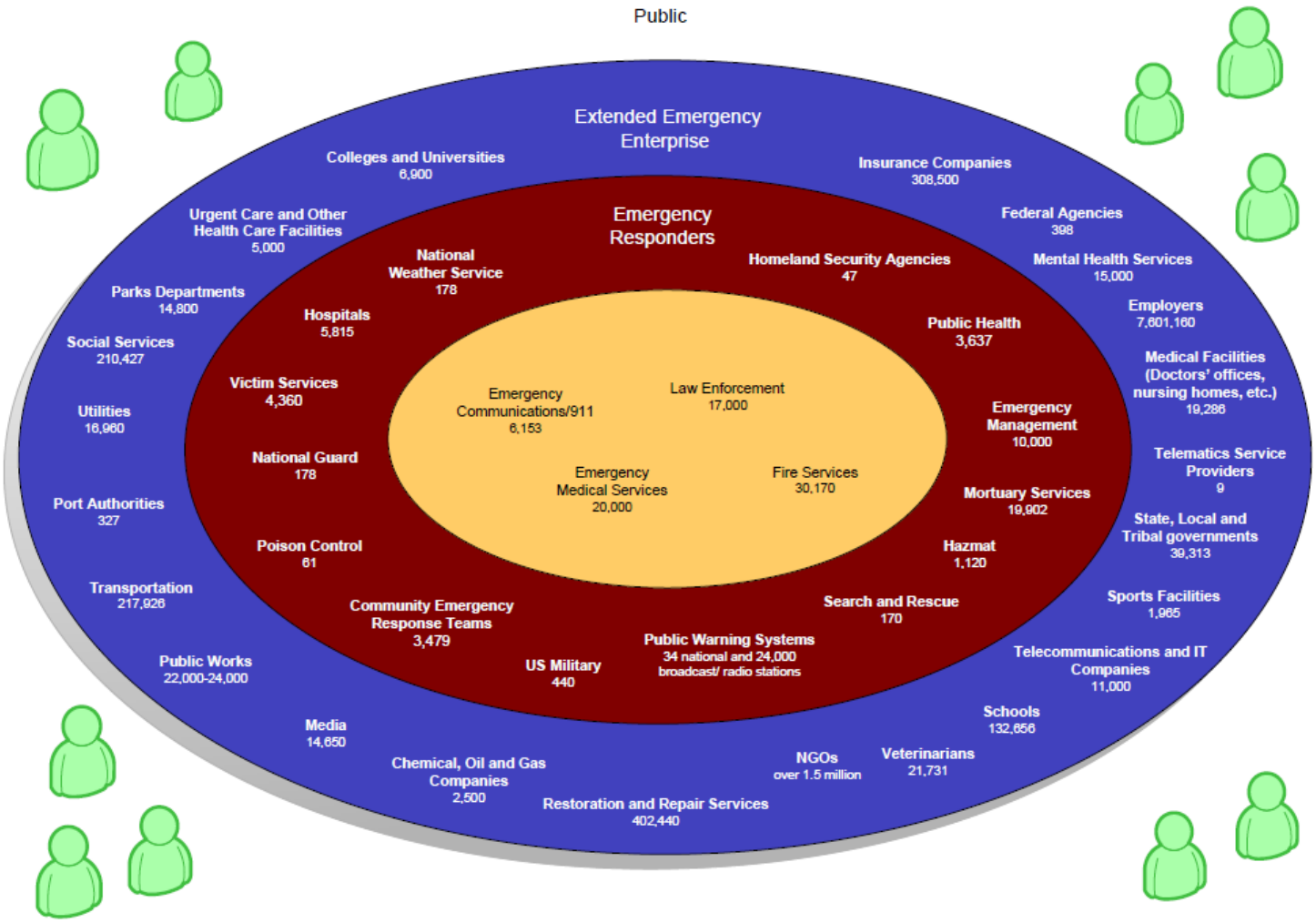
# Stakeholder Community

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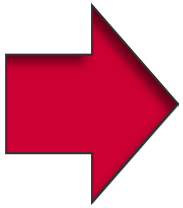
# FRG Vision and Key Outcomes

**FRG Vision: Our work save lives**

- First responders communicate seamlessly before, during, and after an emergency event
- First responders get needed and timely technologies and information that saves lives
- First responders feel deeply supported by DHS S&T

**FRG**



***Key Outcomes***

***Enable Communications***

***Increase Data Sharing***

***Increase Responder Safety***

***Enhance First Responder Effectiveness***

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# Guiding Principles

- **Mission: Strengthen responders' ability to protect the homeland**
- **Guiding Principles**
  - **Our Collaboration Saves Lives**
  - **The Operational Needs of First Responders Drive Our Projects**
  - **We Build on Existing Investments**
  - **We Support Easy to Use Solutions**
  - **We Transition Technologies to the Field**

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# How FRG Achieves Its Outcomes

**Communications, Outreach, and Responder Engagement**

- CORE supports communications and outreach activities between the first responder community, FRG, and S&T

**Responder Technologies**

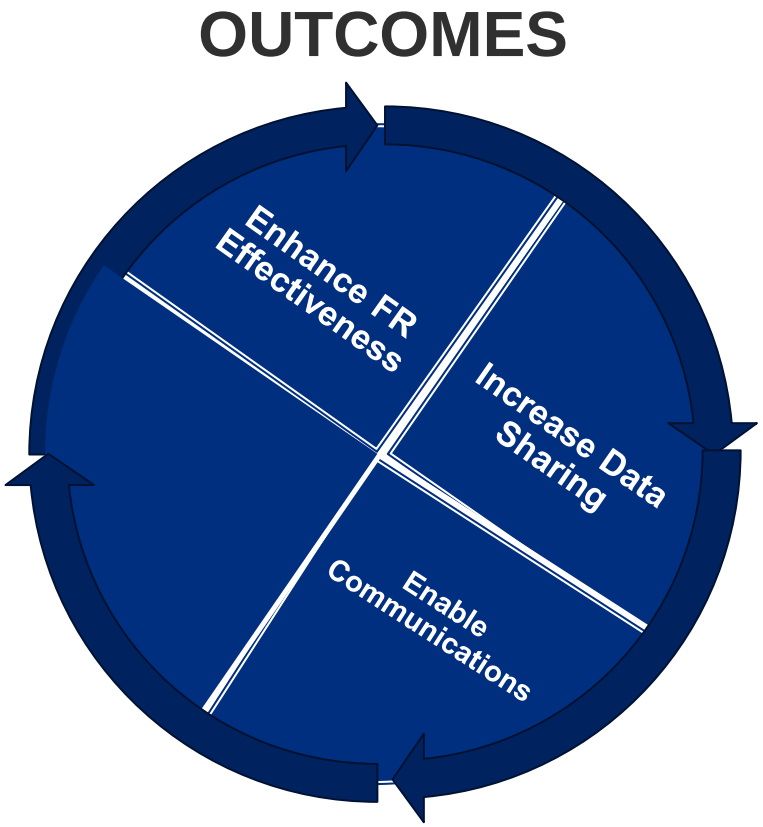
- R-Tech manages the development of technologies that first responders need

**Office for Interoperability and Compatibility**

- OIC manages the development of communications technologies and standards

**National Urban Security Technology Laboratory**

- NUSTL tests and evaluates equipment in the field



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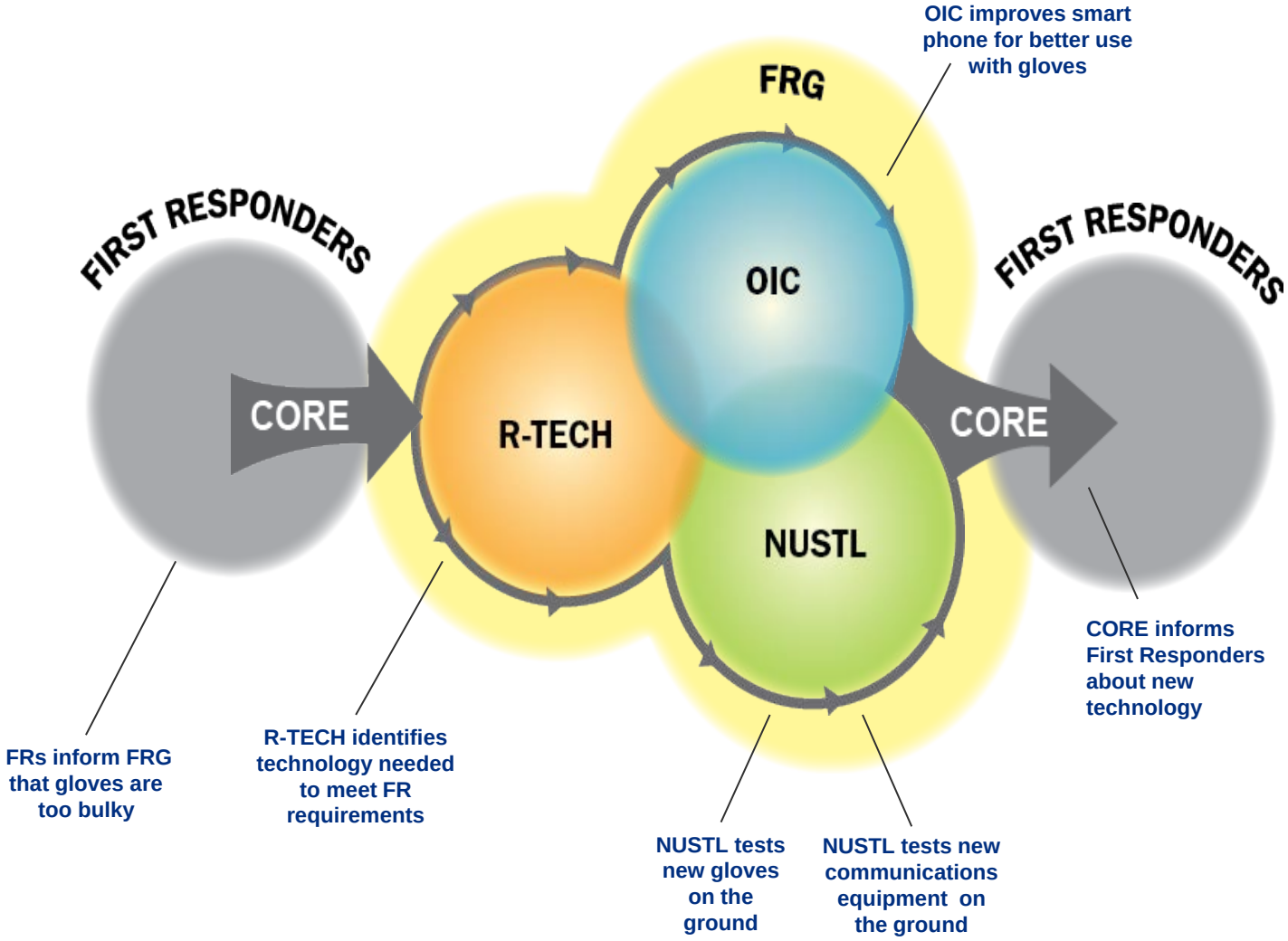
# Roles in Solution Development Process
# Development of Firefighter Glove



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# Capability Gaps Tier 1

- Readily accessible, high-fidelity simulation tools to support training in incident management and response.
- The ability to remotely monitor the tactical actions and progress of all responders involved in the incident in real time.
- The ability to know the location of responders and their proximity to risks and hazards in real time.
- The ability to communicate with responders in any environmental conditions (including through barriers, inside buildings, and underground).
- Protective clothing and equipment for all first responders that protects against multiple hazards.

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# The Path Forward

## Three main focus areas:

- *Communications*
  - Conventional Fixed Station Interface
  - Wireless Broadband Technology Demonstrator
  - Next-Generation Communication Interoperability
- *Data Sharing*
  - Virtual USA®
  - National Information-Sharing Consortium
- *First Responder Safety and Effectiveness*
  - Virtual Training
  - Wildland Firefighters Advanced Personal Protection System
  - Operational Field Assessment of Prototype Technologies

# DHS S&T Acquisition Support and Operations Analysis Group

## Briefing to Homeland Security Science and Technology Advisory Committee
## September 27, 2012

**Debra Durham, Director**
**Acquisition Support & Operations Analysis**
**DHS Science & Technology Directorate**


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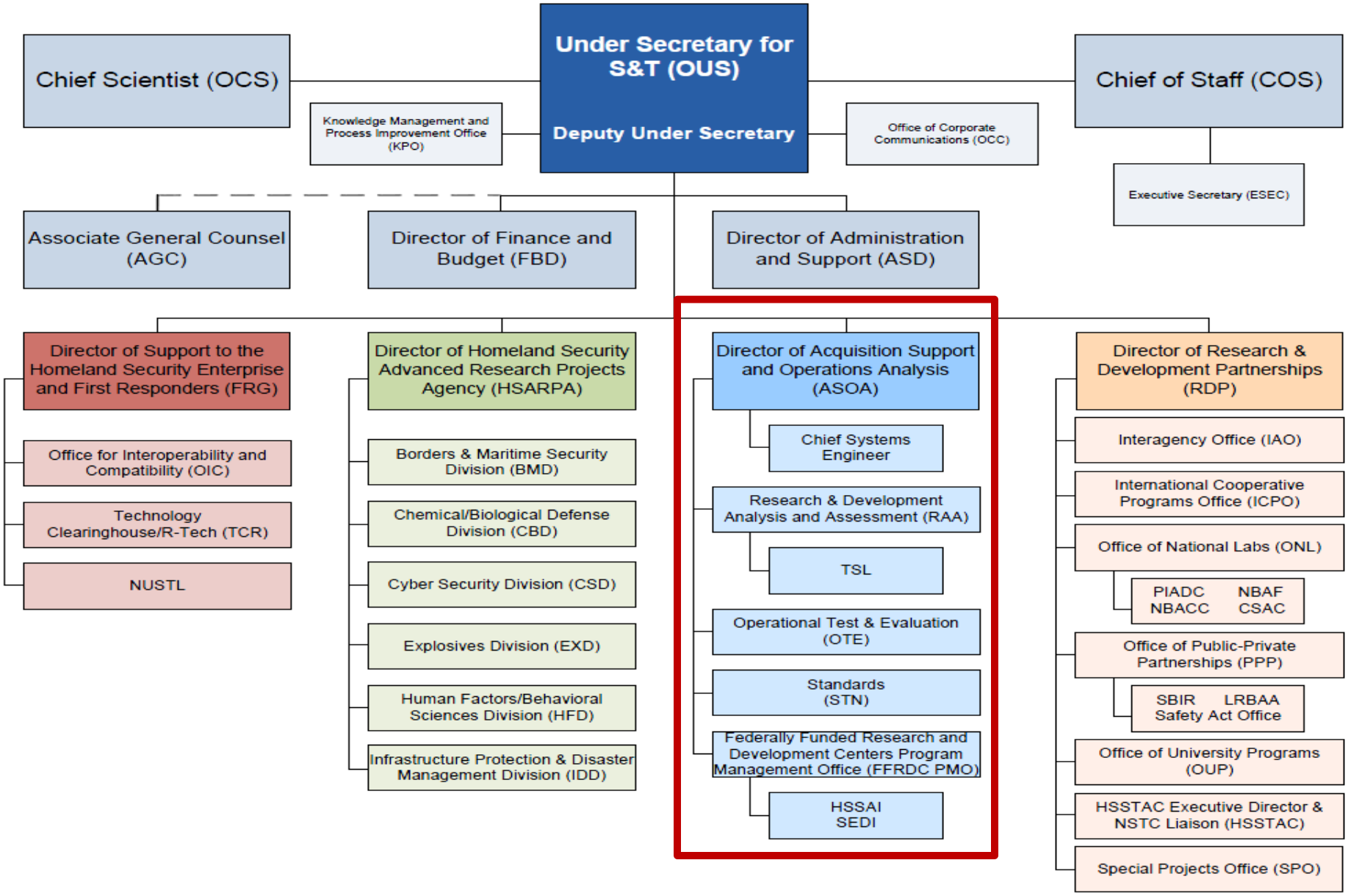
# Science & Technology Directorate



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# ASOA Mission

***ASOA strengthens the Homeland Security Enterprise mission to secure the nation by providing analyses, engineering, and test expertise and products connecting Research, Development, and Acquisition to the operational end-user.***

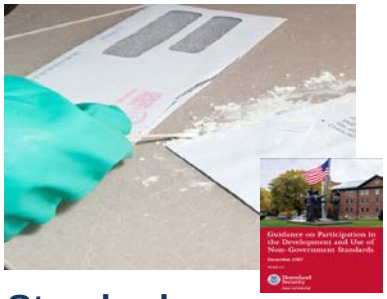

# ASOA's Value Add to the Homeland Security Enterprise (HSE)

## Systems Analysis

- Operational Context / Visualization
- Mission Analysis
- Predictive analytics
- Alternatives

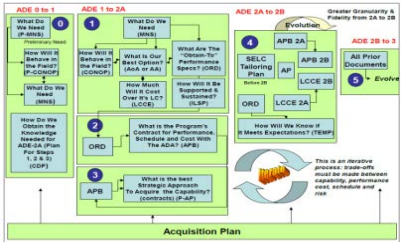

## Systems Engineering

- Requirements Engineering
- Technology Optimization
- Technical Process Integration



## Standards

- Performance Specifications
- Test Methods
- Conformity Assessment
- Training




## Acquisition Planning

- Acquisition Strategy
- Transition Planning
- Cost Analysis
- Technology Insertion

## Test & Evaluation

- Technology Assessment
- Operational Test
- Screening Detection
- Field Experimentation

## Federally Funded Research & Development Centers

- Strategic Planning
- Policy Studies
- Threat and Risk Analysis
- Trade-off Studies

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# ASOA Stakeholders

**Homeland Security Enterprise**

- First Responders
- State, Local, Tribal, Territories

**Department of Homeland Security**

- Operational Components
- Headquarters

**Science & Technology Directorate**

- Groups
- Partnerships
- Industry

***Analyze*** + ***Evaluate*** + ***Transition*** = **Capability**

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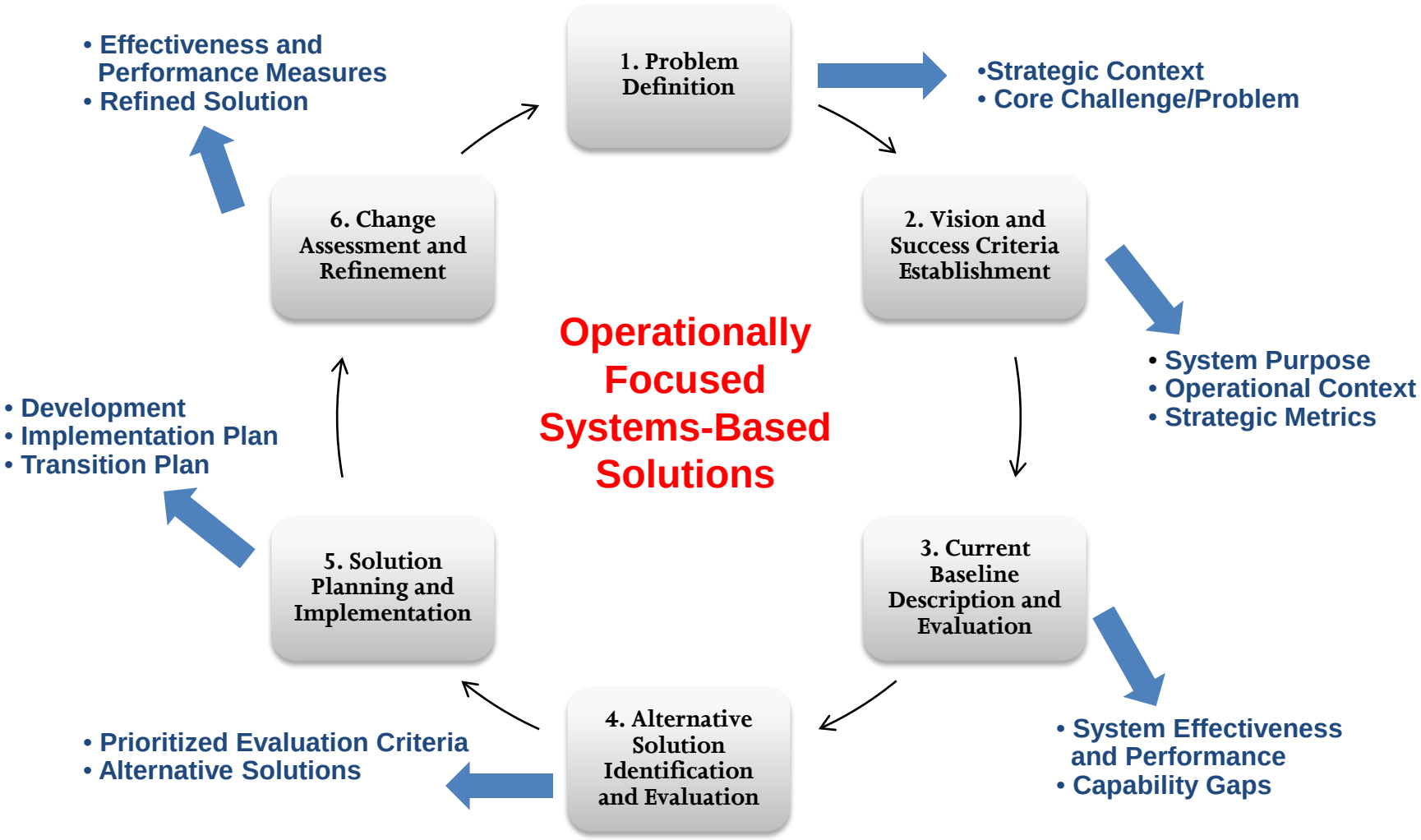
# ASOA Systems-Based Approach

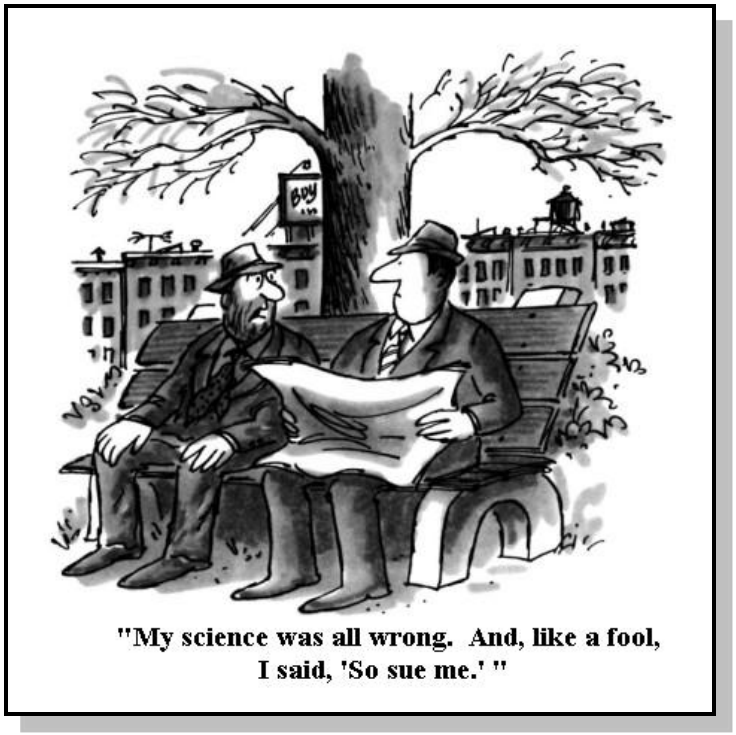


# Department of Homeland Security
# Science & Technology

## Presentation to the Homeland Security Science & Technology Advisory Committee

**Dr. Daniel Gerstein**
**Deputy Under Secretary**
**Science & Technology Directorate**

**September 27, 2012**




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

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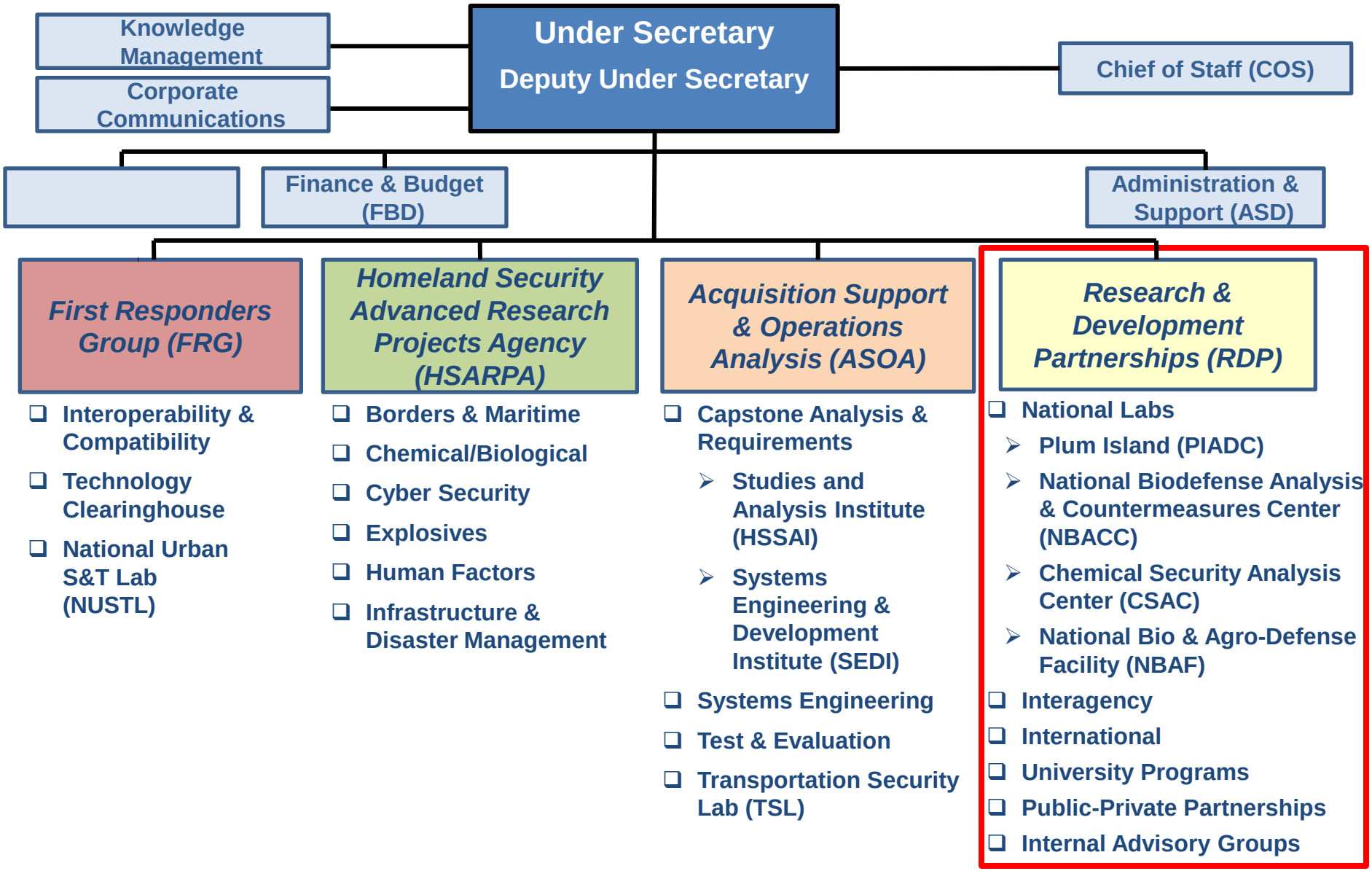
# Organization of DHS Science & Technology (S&T) Aligned with Mission



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# RDP Mission & Functions

- **Mission:**
  - Develop and foster partnerships and provide research resources that facilitate delivering solutions to the Homeland Security Enterprise
- **Function for RDP offices are to:**
  - Cultivate broad, in-depth, partnering opportunities that produce impactful results for the HSE
  - Advocate for S&T's "value added" and facilitate collaboration across government, industry, academia, and research and development institutions, both domestic and international
  - Foster relationships and open lines of communication that facilitate access to, and understanding of, others with the capabilities and/or resources to deliver science-based solutions for the HSE
  - Provide infrastructure and expertise in support of Homeland Security missions
  - Manage processes and/or programs that stimulate innovation, encourage involvement, investment and development of products and services that improve the nation's security
  - Assist in transitioning technologies and knowledge to use for the Homeland Security Enterprise

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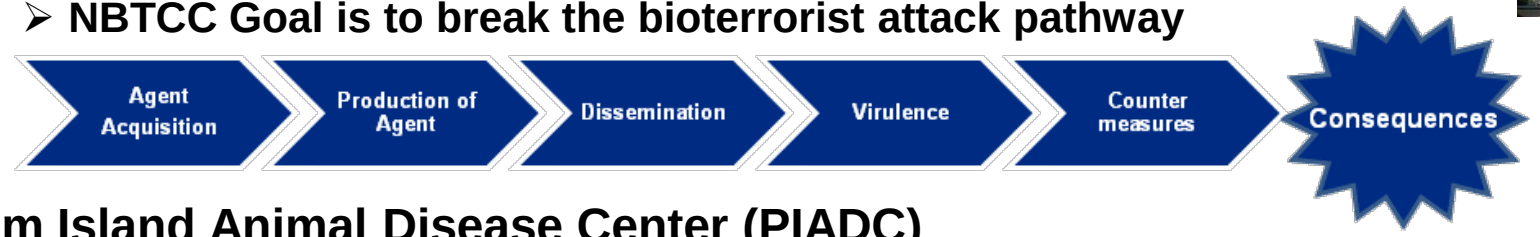
# S&T Chem-Bio Laboratories

- **National Biodefense Analysis and Countermeasures Center (NBACC)**
  - **National Bioforensics Analysis Center (NBFAC)**
    - Conduct forensics in containment
    - Laboratory Response Network qualified … CDC select agent registered
  - **National Biological Threat Characterization Center (NBTCC)**
    - Vulnerability characterization studies
    - NBTCC Goal is to break the bioterrorist attack pathway


- **Plum Island Animal Disease Center (PIADC)**
  - Protect U.S. livestock from the accidental or deliberate introduction of foreign animal diseases (FAD)
  - Built in 1954, PIADC is …
    - Undergoing upgrades to maintain safety and provide added near-term capacity
    - BSL-3 only … Limited capacity … Serves as a critical resource for FAD
    - Development of countermeasures … Vaccines, diagnostics, biotherapeutics
- **Chemical Security Analysis Center (CSAC)**
  - Identify and characterize the chemical threats against the American homeland and American public
  - Located at Aberdeen Proving Ground … Collocated with U.S. Army
  - Example programs:
    - Chemical Terrorism Risk Assessment (CTRA)
    - Project Jackrabbit

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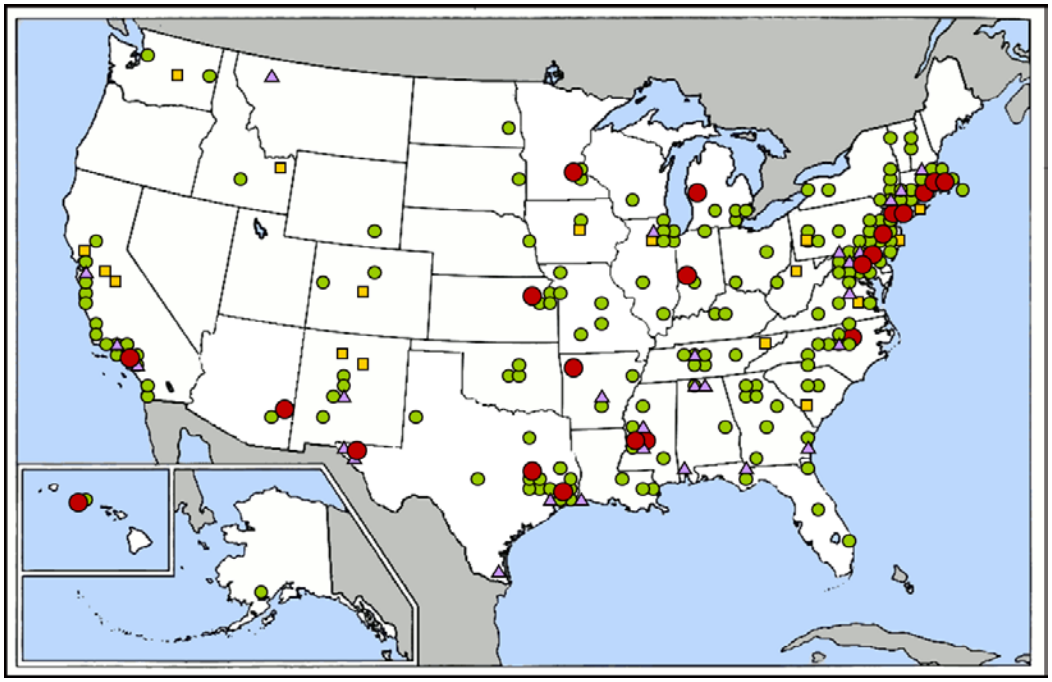
# The DHS S&T University Network



- COE Lead Universities
- COE Partner Universities
- National Lab Partners
- Minority Serving Institutions (SLA/COE)

- ❑ Center for Risk & Economic Analysis of Terrorism Events (**CREATE**)
- ❑ National Center for Zoonotic & Animal Disease Defense (**ZADD**)
- ❑ National Center for Food Protection & Defense (**NCFPD**)
- ❑ National Consortium for the Study of Terrorism & Responses to Terrorism (**START**)
- ❑ Center for Advancing Microbial Risk Assessment (**CAMRA**)
- ❑ National Center for the Study of Preparedness & Catastrophic Event Response (**PACER**)
- ❑ The Center for Awareness and Location of Explosives-Related Threats (**ALERT**)
- ❑ The National Center for Border Security and Immigration (**NCBSI**)
- ❑ The Center for Maritime, Island and Remote and Extreme Environment Security (**MIREES**)
- ❑ Coastal Hazards Center (**CHC**)
- ❑ National Transportation Security COE (**NTSCOE**)
- ❑ Center for Visual and Data Analytics (**CVADA**)

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# Tools for International Engagement

## ❑ International Bilateral Agreements

- ICPO facilitates and implements government-to-government cooperative activities under the auspices of 12 bilateral Agreements

| | | |
|---|---|---|
| • Canada (2004) | • Sweden (2007) | • Germany (2009) |
| • Australia (2004) | • Mexico (2008) | • New Zealand (2010) |
| • United Kingdom (2005) | • Israel (2008) | • European Commission (2010) |
| • Singapore (2007) | • France (2008) | • Spain (2011) |

## ❑ International Research Grants

- ICPO administers annual solicitation for international research proposals, aligned with the DHS Mission and S&T's Goals to:
  - Rapidly develop low-cost solutions
  - Leverage technical expertise
  - Promote discovery and innovation

## ❑ Other Mechanisms

- Other U.S. Government Agreements
  - Department of Defense Data Exchange Agreements
  - Department of State Umbrella S&T Agreements
- Contracts with Foreign Partners (i.e. Universities)
- Cooperative Research and Development Agreements (CRADAs)

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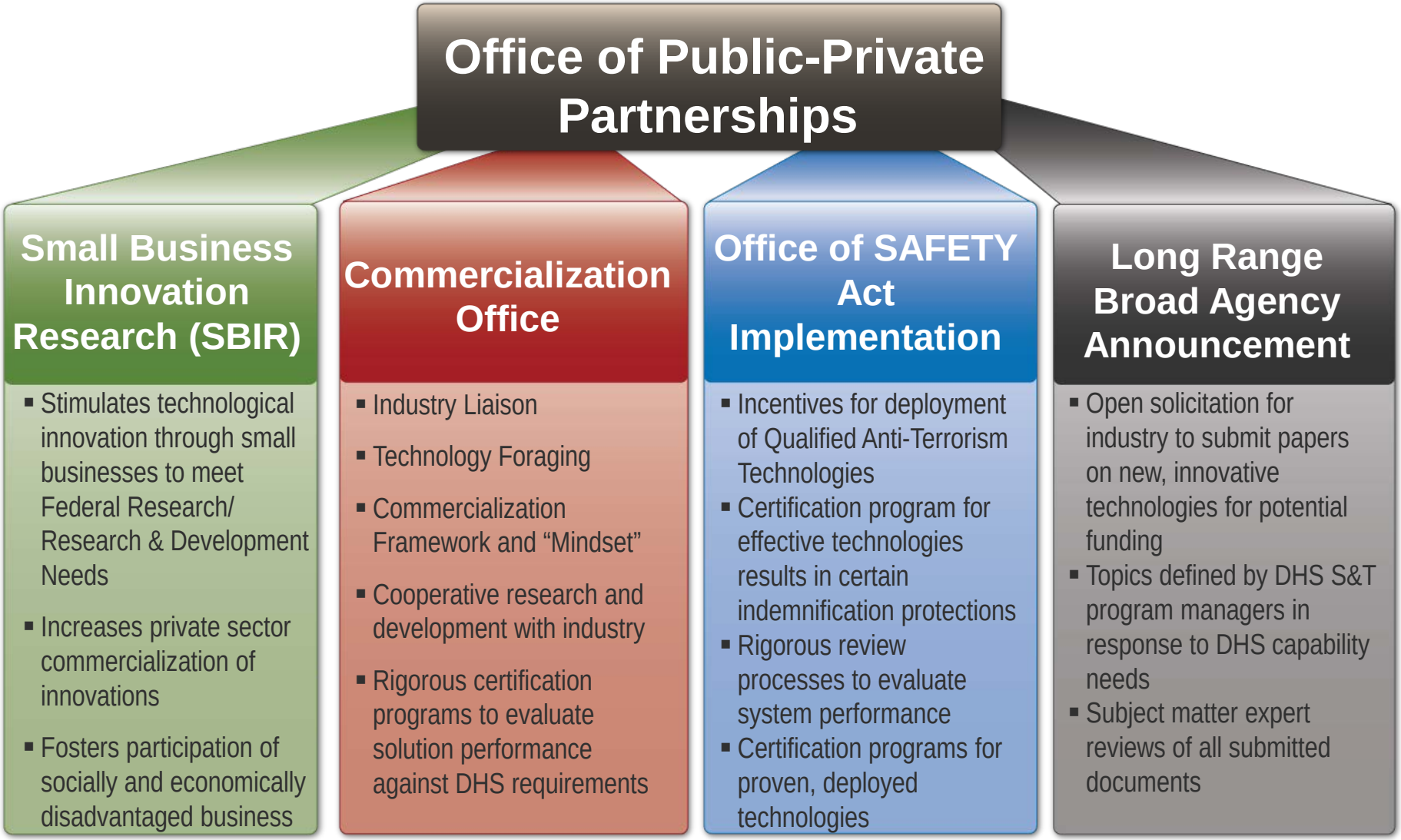
# Office of Public-Private Partnerships




https://sbir2.st.dhs.gov

http://www.dhs.gov/commercialization-office

http://www.safetyact.gov

https://sbir2.st.dhs.gov

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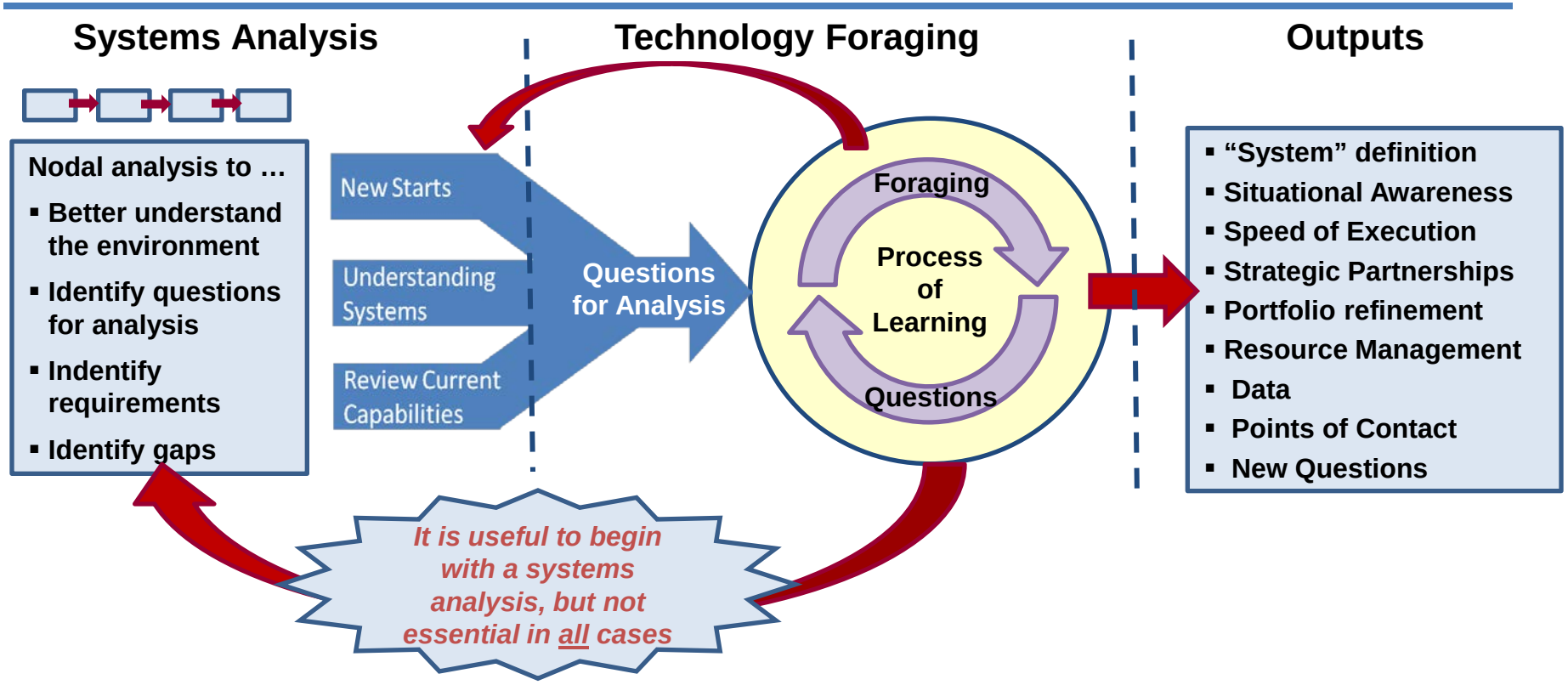
# Technology Foraging




## *Examples*

- ❑ Automated Pollen Recognition
- ❑ Seized Information Exploitation
- ❑ Stand-off Detection of Trapped Victims
- ❑ Rapid Bio-Diagnostics
- ❑ Next-Gen Textiles for PPE
- ❑ Virtual Gaming to Aid First Responder Training

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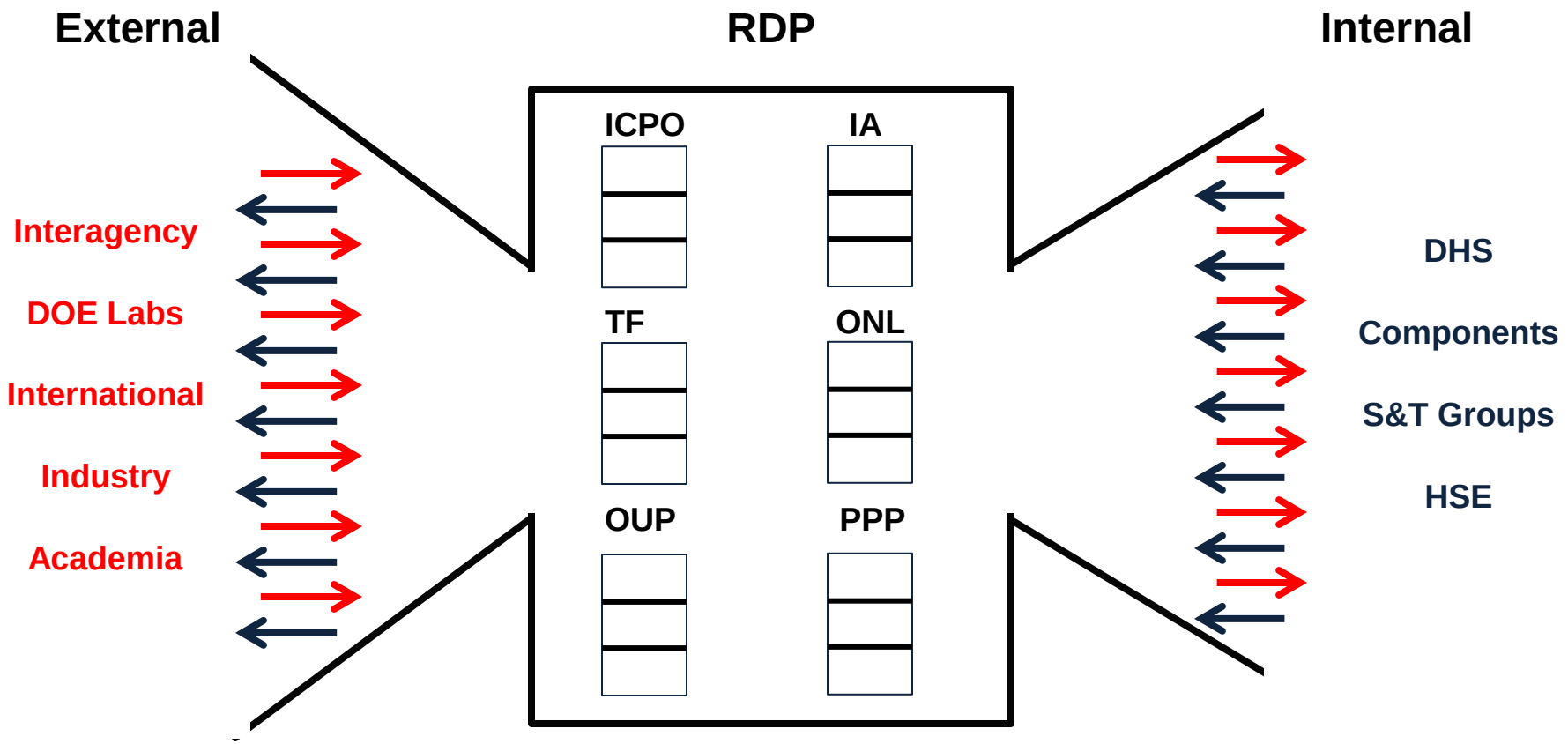
# Research & Development Partnerships




| | |
|---|---|
| ICPO | International Programs |
| IA | Interagency Programs |
| ONL | Office of National Labs |
| TF | Technology Foraging |
| OUP | Office of University Programs |
| PPP | Public Private Partnerships |

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# Research & Development Partnerships

| | Strategic | External to S&T | Internal S&T |
|---|---|---|---|
| **International Programs** | International agreements for DHS | Agreements for other DHS Components | ❑ Monitor and administer bilateral programs<br>❑ Coordinate bilaterals |
| **Technology Foraging** | Support for strategic requirements such as QHSR | Support to DHS Components | ❑ Support Internal S&T requirements including PMs, group leads and leadership requests |
| **Office of University Programs** | Outreach with U.S. and international universities | Support to DHS Components | ❑ Support Internal S&T requirements including PMs, group leads and leadership requests |
| **Interagency** | ❑ Link US/DUS with Interagency<br>❑ High level linkages<br>❑ Strategic scouts | Same as above except with Group Lead focus | PM interface done internally with support from IA |
| **Office of National Labs** | ❑ Monitor use of external/internal labs<br>❑ MEC type activities | Support Components use of the national labs | ❑ Assist PMs as required in use of the labs<br>❑ Support discovery for S&T |
| **Public Private Partnerships** | Support in the development of transition oriented activities | Support to DHS Components as required | ❑ Support Internal S&T requirements including PMs, group leads and leadership requests |

# Department of Homeland Security
# Science & Technology

## Presentation to the Homeland Security Science & Technology Advisory Committee

**Richard Williams**
**Chief Financial Officer**
**Science & Technology Directorate**

**September 27, 2012**

Homeland Security

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# S&T Budget Information

## FY10 - FY13 S&T Budget Final RAD

($ in thousands)

| PPA | Enacted | CR | Enacted | President's Budget | House Mark | Senate Mark |
|---|---|---|---|---|---|---|
| | FY10 | FY11 | FY12** | FY13 | FY13 | FY13 |
| Management and Administration | 143,200 | 140,918 | 135,000 | 138,008 | 130,000 | 138,008 |
| | | | | | | |
| **RDA&O** | **863,271** | **686,660** | **538,000** | **693,464** | **695,971** | **693,464** |
| Laboratory Facilities* | 150,188 | 140,000 | 181,500 | 127,432 | 202,432 | 127,432 |
| ***NBAF Construction*** | ***32,000*** | ***40,000*** | ***50,000*** | | ***75,000*** | |
| Acquisition and Operations Support | 65,260 | 47,034 | 54,154 | 47,984 | 47,984 | 47,984 |
| University Programs | 49,350 | 39,999 | 36,563 | 40,000 | 40,000 | 40,000 |
| Research Development and Innovation | 598,473 | 459,627 | 265,783 | 478,048 | 405,555 | 478,048 |
| Total including M&A | 1,006,471 | 827,578 | 673,000 | 831,472 | 825,971 | 831,472 |

* Lab Facilities includes $15M each year for facilities upgrades.

** Includes $5M reprogramming for Plum upgrades

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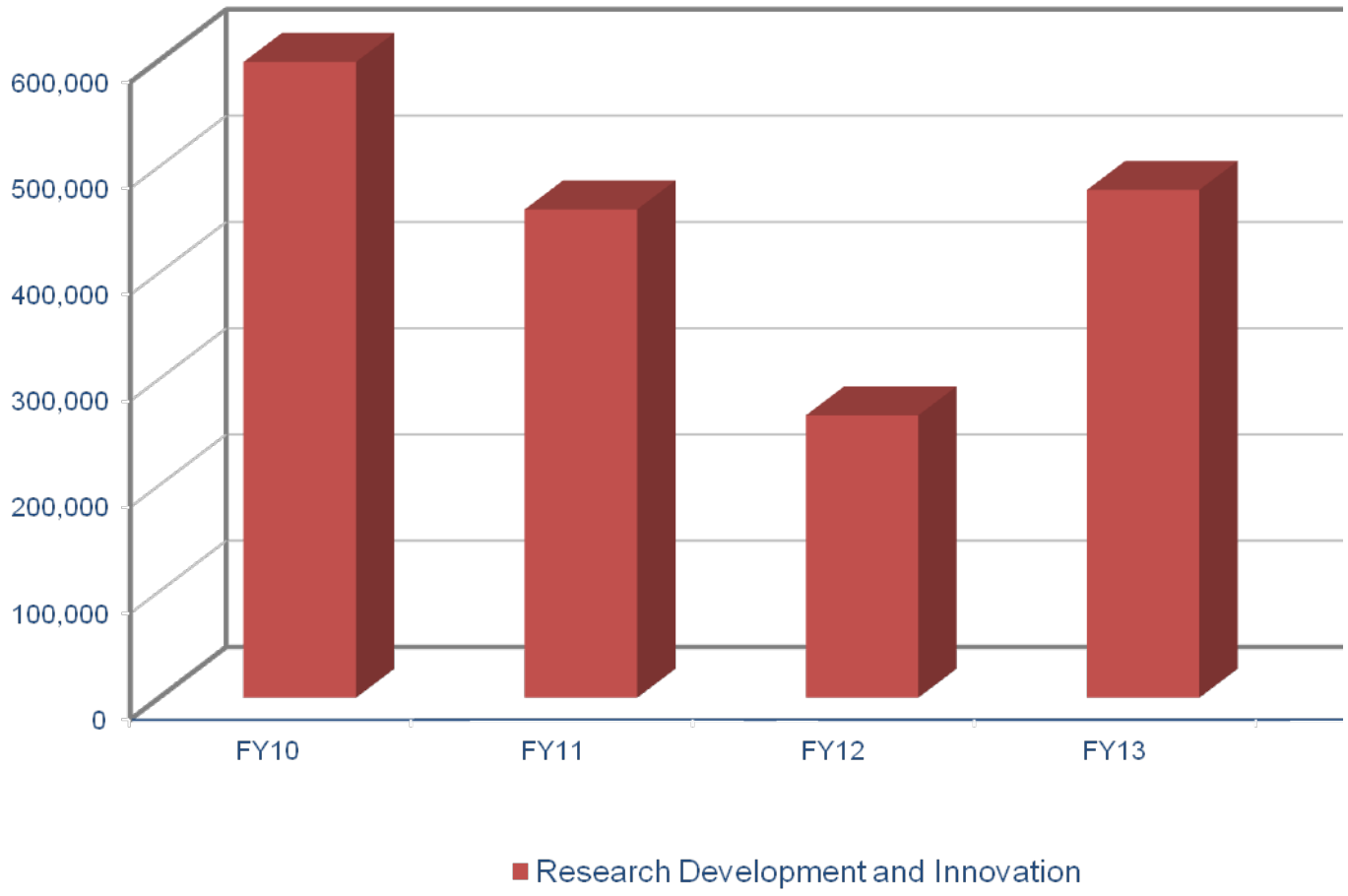
# S&T Budget Information

## S&T Discretionary R&D
## ($ in Thousands)



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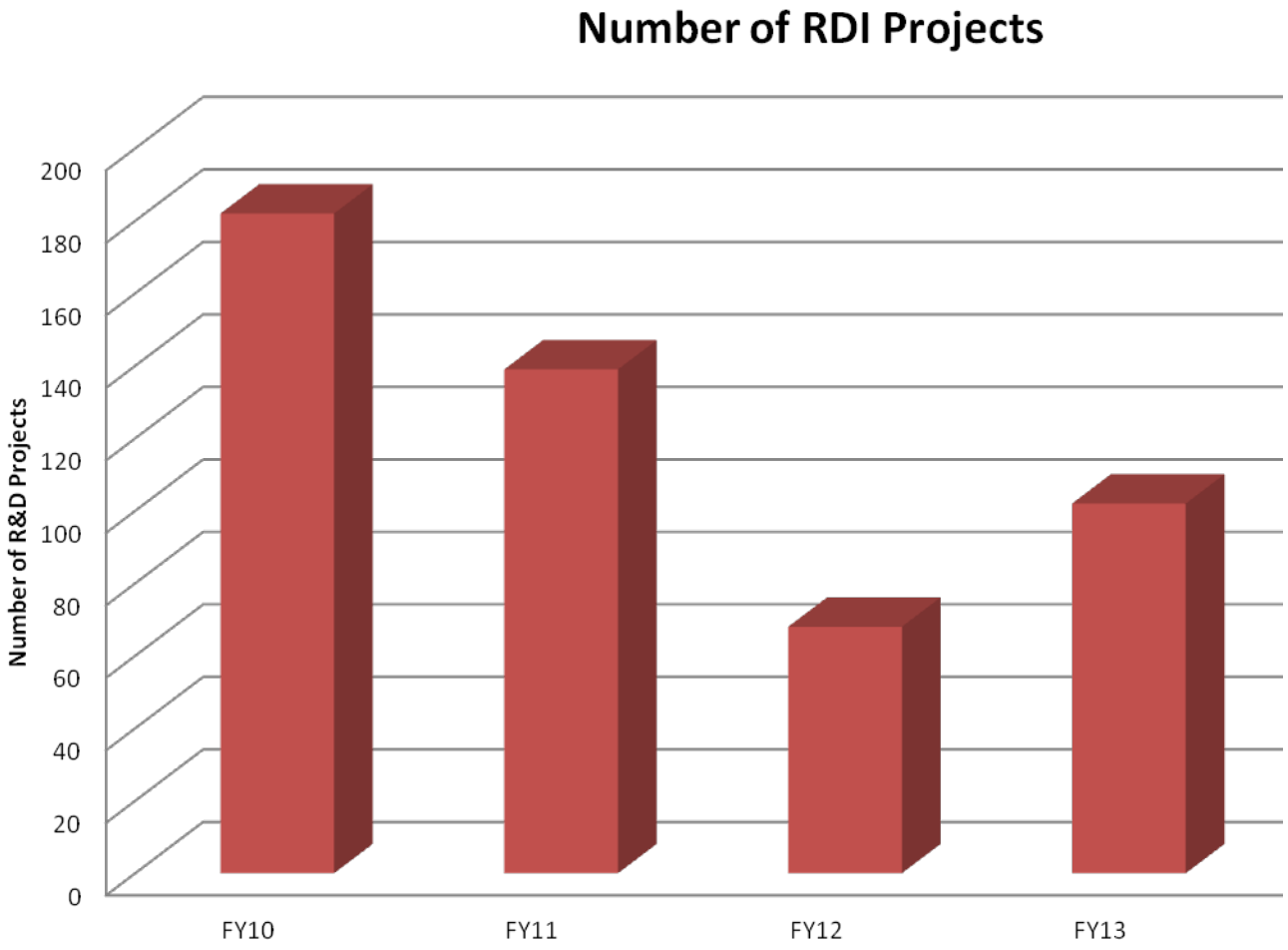
# S&T Budget Information



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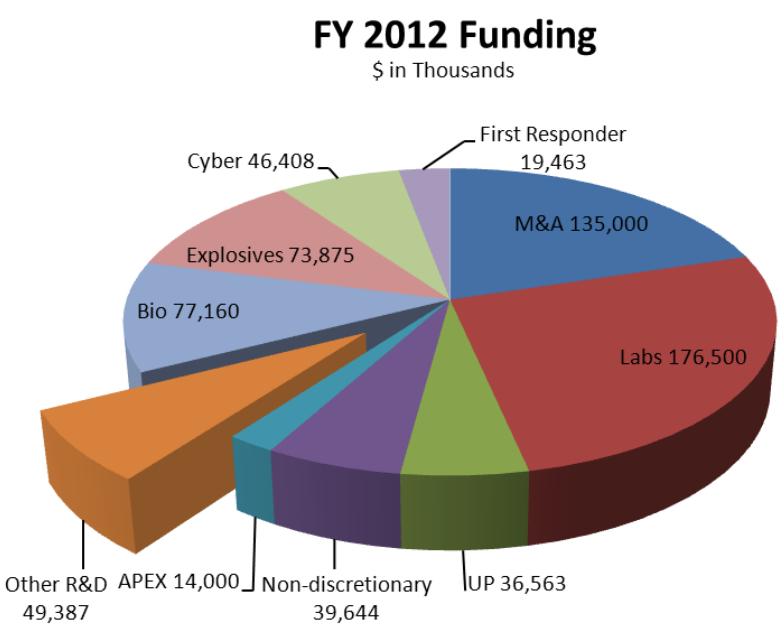
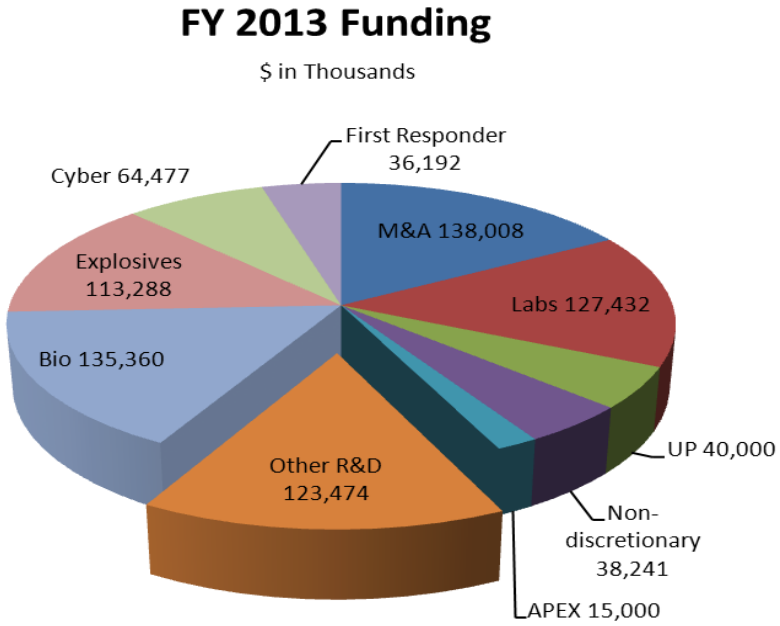
# S&T Budget Information



# Introduction to DHS S&T

## Homeland Security Science & Technology Advisory Committee

**Tara O'Toole, M.D., M.P.H.**
**Under Secretary for Science and Technology**
**U.S. Department of Homeland Security**

**September 27, 2012**

Homeland Security