

Pacific Operational Science and Technology Conference

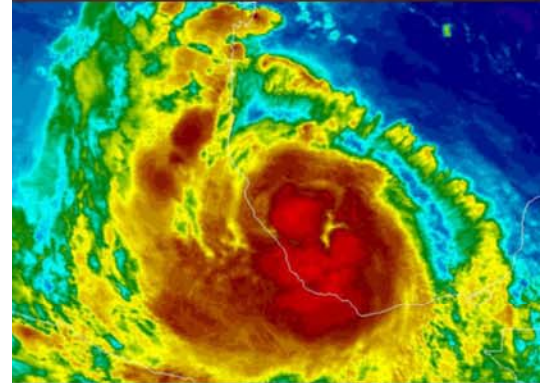
DHS Science and Technology Directorate Brief

Honolulu, Hawaii • July 15, 2008

Jay M. Cohen

Under Secretary for Science and Technology

U.S. Department of Homeland Security



Homeland Security



When Natural Disasters Strike

Impacts on Pacific Rim/Asian Nations

Typhoon Fenghen- Philippines



Floods/Mudslides – NE India



Earthquake – NE Japan



Cyclone Nargis - Burma



Asian Tsunami - 14 countries



Sichuan Earthquake - China



TERRORIST ROADMAP

LIKELIHOOD OF OCCURRENCE

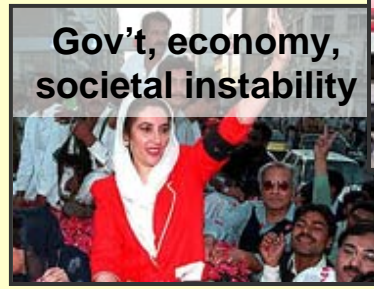
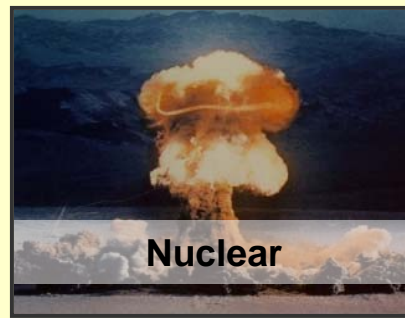
LOWER

HIGHER

HIGHER

LOWER

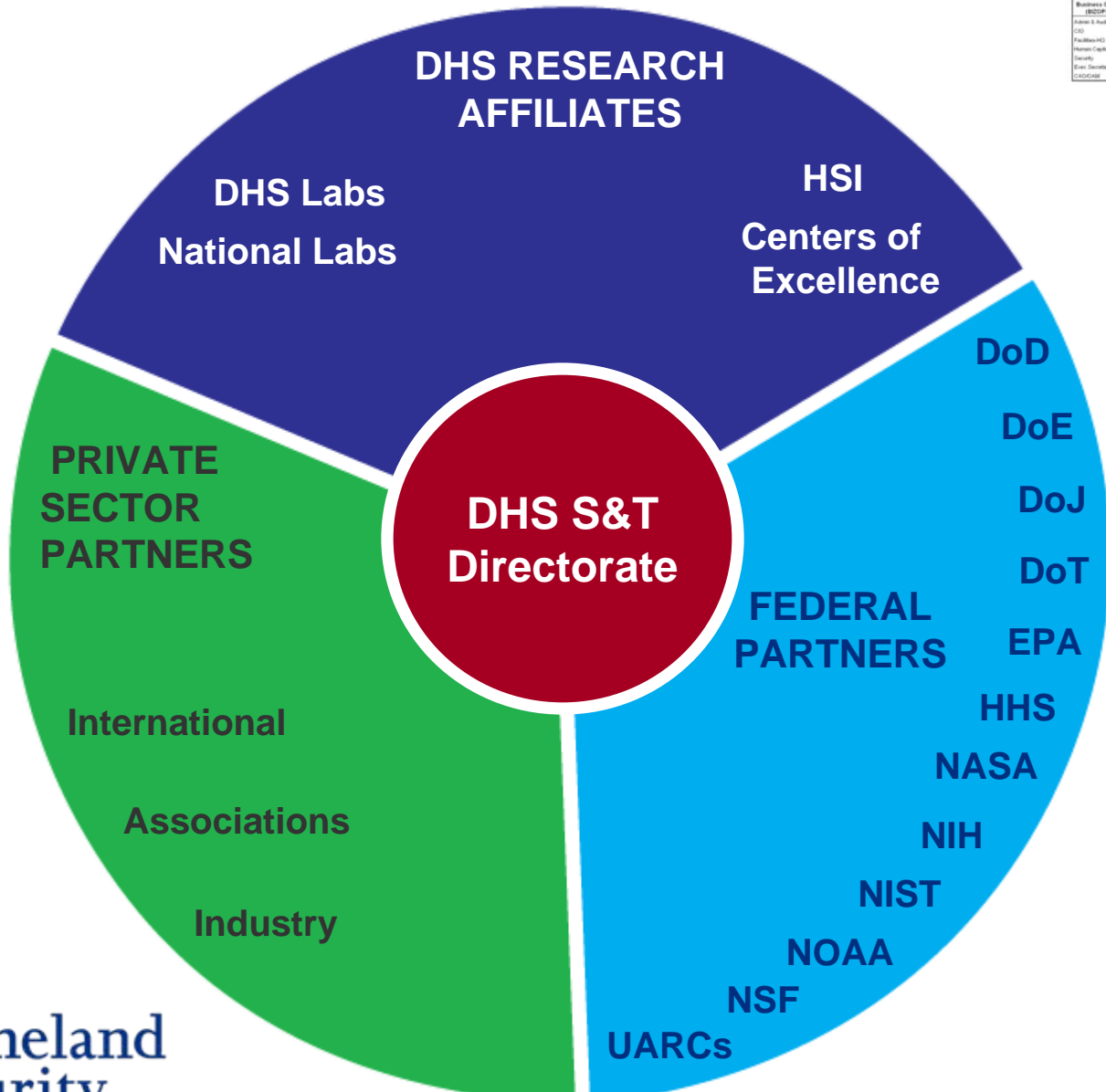
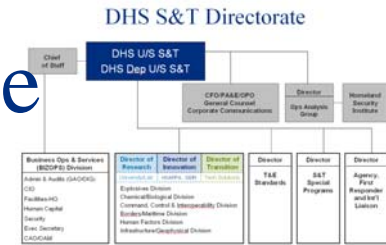
CONSEQUENCE OF OCCURRENCE



BOMBS, BORDERS, BUGS, BUSINESS, BODIES & BUILDINGS



Homeland Security S&T Enterprise



Homeland Security



Partner Countries

Formal Bilateral Agreements:



Canada



Australia



Sweden



Israel



UK



Singapore



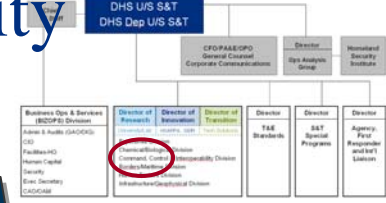
Mexico



U.S. DEPARTMENT OF
Homeland
Security



S&T Challenge: To Address Interoperability Across Disciplines and Jurisdictions



AWACS



Cavalry – NORTHCOM
PACOM



National Guard



Federal National
Guard

County Police



State Troopers



Sheriff of Mayberry



Homeland Security

Get People Right
Get Books Right
Get Organization Right
Get Content Right

Bombs
Borders
Bugs
Business
Bodies
Buildings

People + Process + Partnerships = Product

Product is Job One!

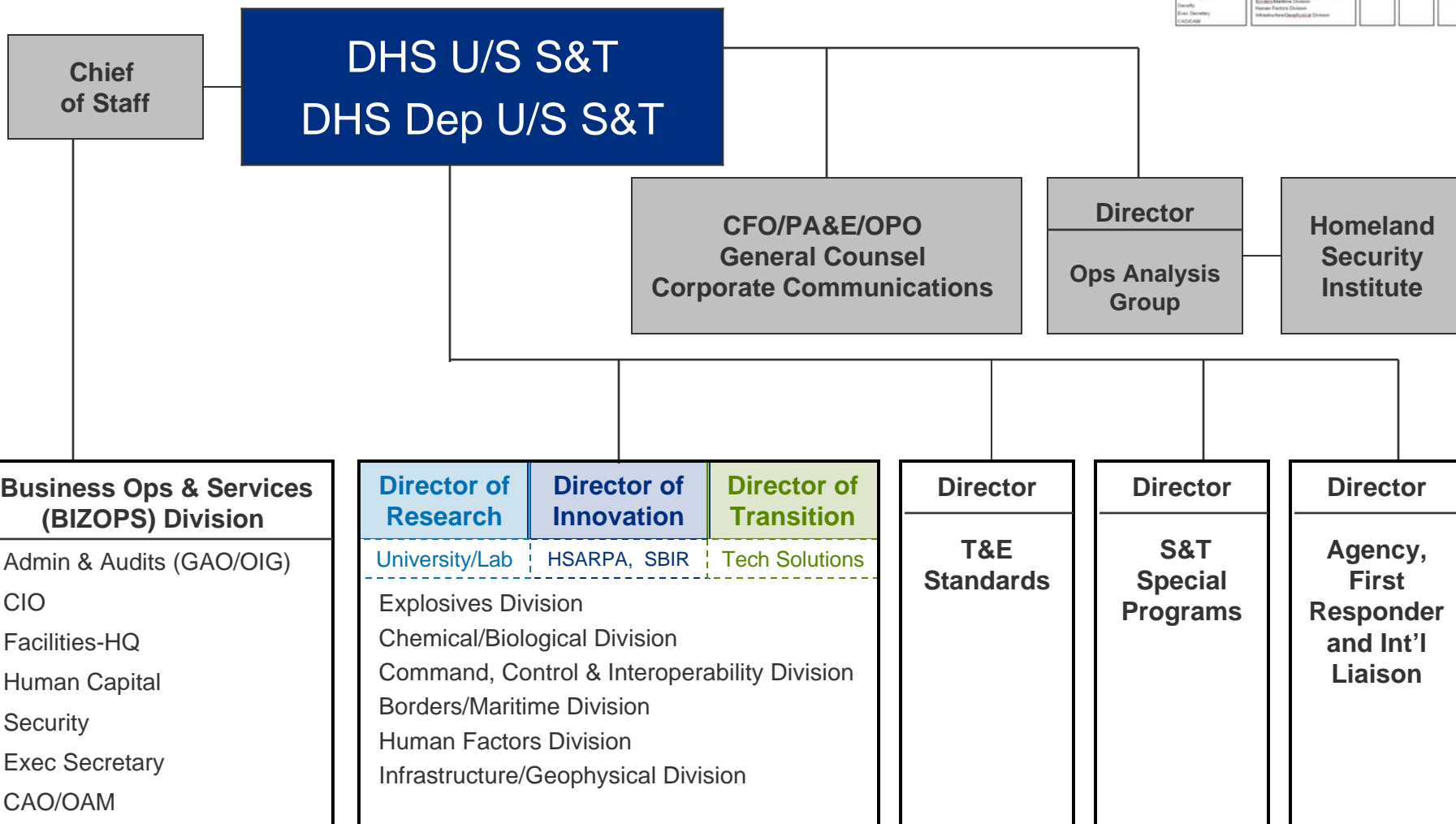
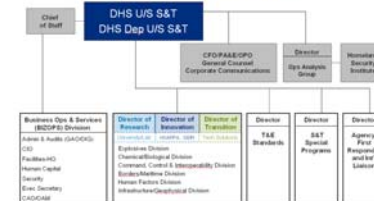


**Homeland
Security**



DHS S&T Organization

DHS S&T Directorate



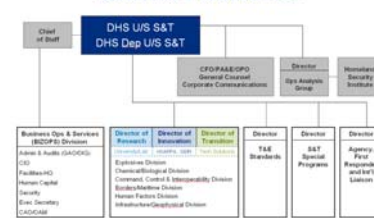
Homeland Security



DHS S&T Investment Portfolio

FY 2009

DHS S&T Directorate

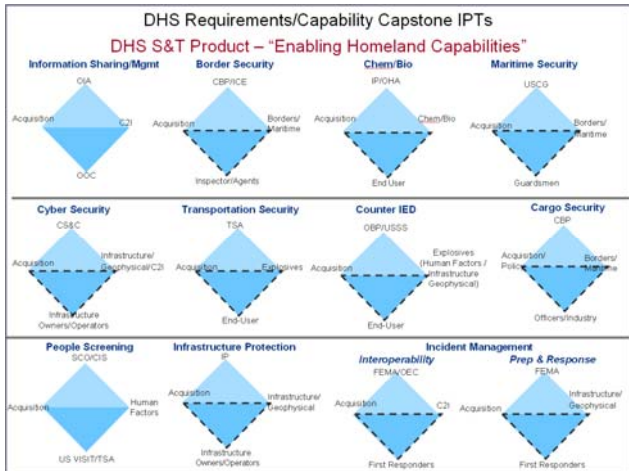
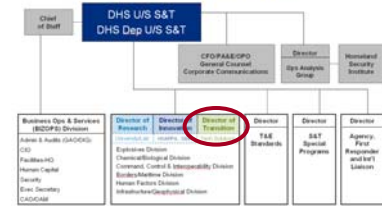


Balance of Risk, Cost, Impact, and Time to Delivery

<p>Product Transition (0-3 yrs)</p> <ul style="list-style-type: none"> Focused on delivering near-term products/enhancements to acquisition Customer IPT controlled Cost, schedule, capability metrics <p>Goal: 50% FY07: 45% FY09: 49%</p>	<p>Innovative Capabilities (2-5 yrs)</p> <ul style="list-style-type: none"> High-risk/High payoff “Game changer/Leap ahead” Prototype, Test and Deploy HSARPA <p>Goal: 10% FY07: 7% FY09: 8%</p>
<p>Basic Research (>8 yrs)</p> <ul style="list-style-type: none"> Enables future paradigm changes University fundamental research Gov’t lab discovery and invention Homeland Security Institute <p>Goal: 20% FY07: 11% FY09: 20%</p>	<p>Other (0-8+ years)</p> <ul style="list-style-type: none"> Test & Evaluation and Standards Laboratory Operations & Construction <p>FY07: 37% FY09: 23%</p>
<p>Customer Focused, Output Oriented</p>	



Product Transition



High-Priority Technology Needs

June 2008

Homeland Security
Science and Technology

Chem/Bio Defense (cont'd)

Jeff Runge, MD
Chief Medical Officer
Assistant Secretary OHA

Bob Stephan
Assistant Secretary IP

S. Elizabeth George, PhD
Chem/Bio Division

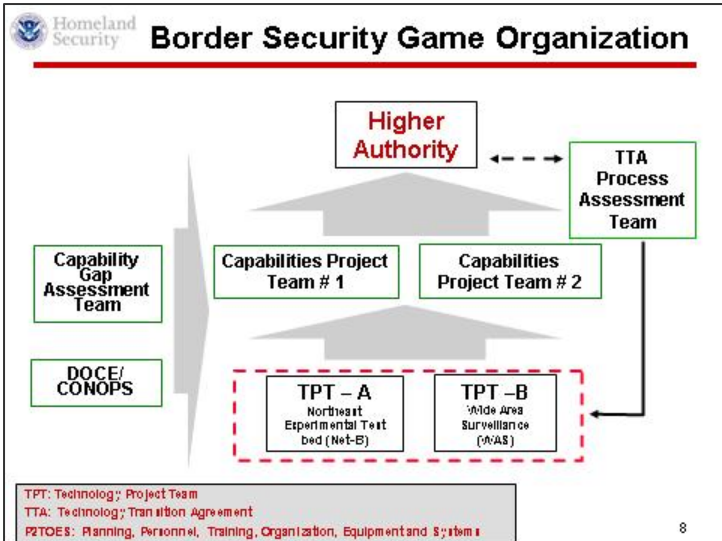
Agency Representation
 OHA OIP
 CBP PLCY
 I&A TSA
 USCG FEMA

Cost
 ● +/- 10% of planned
 ● +/- 10% - 30% of planned
 ● +/- 30% of planned

Schedule
 ● 0 - 1 Quarter Delay
 ● > 1 Quarter < 2 Quarters Delay
 ● > 2 Quarters Delay

Technical
 ● Delivering at or better
 ● Less than agreed
 ● Tried & failing
 ○ Product Not Started

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
08-09-01-01	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000



Border Technologies - Project Status

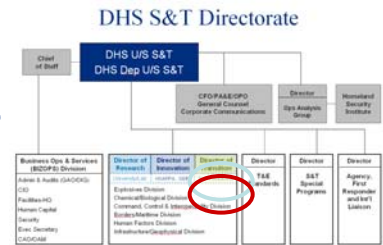
Constituent Projects	07	08	09	10	11	12	13	Cost	Sched	Tech
CBP LRT P-3 Sensors Upgrade (Radar and EOR performance assessments)	▲	▲	▲	▲	▲	▲	▲	●	●	●
BorderNet (Geo-spatial SA, biographic/biometric detainee background checks, multi-sensor integration, wireless connectivity)	▲	▲	▲	▲	▲	▲	▲	●	●	●
Tunnel Detection - HITS (Multiple technologies to detect, identify, and confirm illegal cross-border tunnels)	▲	▲	▲	▲	▲	▲	▲	●	●	●

Legend:
 ▲ Represents original transition date
 ▲ Represents accelerated transition date
 ▲ Represents delayed transition date
 ● Represents a Major Milestone

Rows Indicated High Priority



High Priority Technology Needs



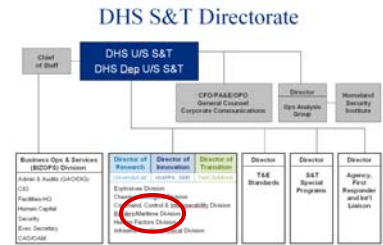
- S&T investments are tied directly to the technology needs of our customers, represented by leadership of DHS components, and *their* customers on the front lines of homeland security
- Requirements are updated on annual cycle aligned with DHS funding and acquisition processes
- **New!** Updated High Priority Technology Needs brochure identifies 94 technology needs of DHS components and their customers
- Brochure is posted online:
http://www.dhs.gov/xlibrary/assets/High_Priority_Technology_Needs.pdf



Customer Focused...Output Oriented



Maritime Security IPT: Representative Technology Needs



- Wide-area surveillance from the coast to beyond the horizon; port and inland waterways region - detect, ID, and track
- Data fusion and automated tools for command center operations
- Improve capability to continuously track contraband on ships or in containers
- Develop improved ballistic personal protective equipment for officer safety
- Vessel compliance through less-lethal compliance methods
- Detect and identify narcotics, chemical warfare agents, toxic industrial chemicals, explosives and contraband – identify multiple threats with one unit and be able to sample for and detect contraband without direct contact



S&T Lead Division: Border/Maritime

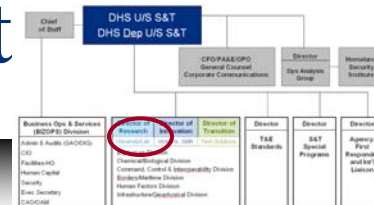


Homeland
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Centers of Excellence Alignment

DHS S&T Directorate



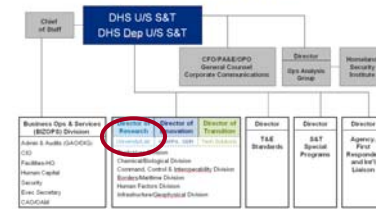
S&T DIVISIONS					
Explosives	Chemical/Biological	Command, Control & Interoperability	Borders/Maritime	Human Factors	Infrastructure/Geophysical
<p><i>COE for Explosives Detection, Mitigation & Response</i></p> <p><i>COE for Transportation Security</i></p>	<p>NATIONAL CENTER FOR FOOD PROTECTION AND DEFENSE A HOMELAND SECURITY CENTER OF EXCELLENCE</p> <p>FAZD CENTER NATIONAL CENTER FOR FOREIGN ANIMAL AND ZOOLOGICAL DISEASE DEFENSE</p> <p>CAMRA Center for Advancing Microbial Risk Assessment</p> <p><i>Consolidated Chem/Bio Center</i></p>	<p>IDS-UACs</p> <p>RVACs</p> <p><i>Consolidated CCI Center</i></p>	<p><i>COE for Border Security & Immigration</i></p> <p><i>COE for Maritime, Island & Port Security</i></p>	<p>START →</p>	<p>PACER A HOMELAND SECURITY CENTER OF EXCELLENCE</p> <p><i>COE for Natural Disasters, Coastal Infrastructure & Emergency Management</i></p>

← **Operations Analysis, Risk Sciences Branch & HSI Risk Modeling** →



New DHS Centers of Excellence

DHS S&T Directorate



Explosives Detection, Mitigation and Response

- Northeastern University (Research)
- University of Rhode Island (Education)

Border Security and Immigration

- University of Arizona (Research)
- University of Texas at El Paso (Education)

Maritime, Island and Port Security

- University of Hawaii (Ocean and Islands – Research & Education)
- Stevens Institute of Technology (Port Security – Research & Education)

Natural Disasters, Coastal Infrastructure and Emergency Management

- University of North Carolina at Chapel Hill (Research)
- Jackson State University (Education)

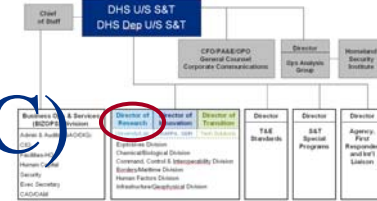
Transportation Security

- University of Connecticut (Research)
- Tougaloo College (Education and Training)
- Texas Southern University (Petro-Chemical Transportation Security)



DHS National Biodefense Analysis and Countermeasures Center (NBACC)

DHS S&T Directorate



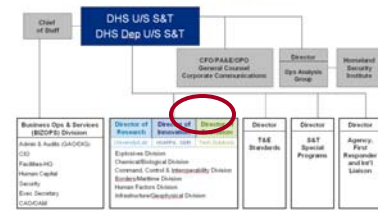
- Primary Focus: Threat characterization and bioforensics
- New facility at Fort Detrick, MD will be operational in Winter 2009
- Currently operates with limited capability in DOD facilities at Fort Detrick
- First new lab developed by DHS
- An FFRDC; science and research program managed by Battelle
- Will provide nation with an enduring capability to protect against biological threats



Homeland Security



Homeland Security Act of 2002



“Support basic and applied homeland Security research to promote *revolutionary* changes in technologies; advance the development, testing and evaluation, and deployment of critical homeland security technologies; and accelerate the prototyping and deployment of technologies that would address homeland security vulnerabilities.”



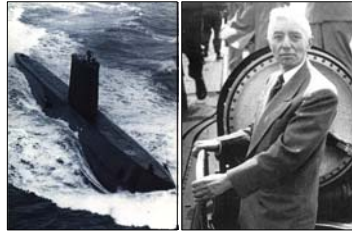
Homeland Security



Why Federal R&D Investment?

ONLY the Federal Government can take “game-changing” risks that benefit society, create leading-edge AMERICAN technology, AMERICAN JOBS and assure AMERICAN security!

Nautilus
SSN 571
~ 1954



Navy Nuclear
Submarine

Hyman G.
Rickover



Civilian Nuclear Power

~ 1955



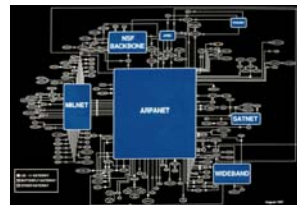
KC-135

Curtis LeMay



Boeing 707

1960's



ARPANET



World Wide Web

> 2000



DDG 1000
“Electric Navy”



AMSC - 50,000 SHP (36.5MW)
HTS AC Synchronous Motor



Countering the IED Threat

Obtain Funds

Deter & Predict

Develop Organization

Gather & Provide Material

Improvise CONOPS/Tactics/Devices

Plan Attacks

Detect & Defeat

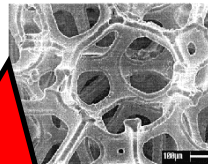
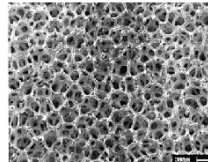
Perform Attacks

Consequence Management

Attribution

Mitigate

BOOM



Breaking the links in the IED Delivery Chain



Homeland Security

Science and Technology

Homeland Innovative Prototypical Solutions (HIPS)

LEVEE STRENGTHENING

September 30, 2008 & October 21, 2008 – New survey methods demonstration using a variety of geophysical sensors on multiple platforms and address weak levees at the Army Corps of Engineers, Vicksburg, MS



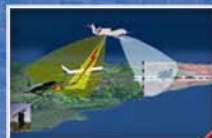
REG

September 17-19, 2008 – Laboratory demonstrations of fault limiting superconducting cable at Oak Ridge National Laboratory, TN



CHLOE

September 9, 2008 – Live-Fire Counter-Manpads Detection demonstration at White Sands Missile Range



MagViz

August 8, 2008 – Liquid explosives field demonstration of a screening prototype for TSA 3-1-1 bags in a coin size tub at Los Alamos National Laboratory, NM



RESILIENT TUNNEL

August 2008 – Trial prototype inflatable tunnel device testing in a transit tunnel environment



FAST M2

June 24 & September 17 & 18, 2008 –

Non-invasive sensor demonstration, validation and metrics at MIT Draper Laboratory



TUNNEL DETECTION

July 2, 2008 – Field experiments for improved airborne wide area surveillance system to increase the accuracy of detection



CRITICAL INFRASTRUCTURE CHANGE DETECTION

Summer 2008 – Examine technical characteristics of a new ultra high resolution optical sensor in lower Manhattan in coordination with the New York Police Department



FY-08 Planned Demonstration Timeline

High Impact Technology Solutions (HITS)
Science & Technology Innovation Portfolio
HSARPA



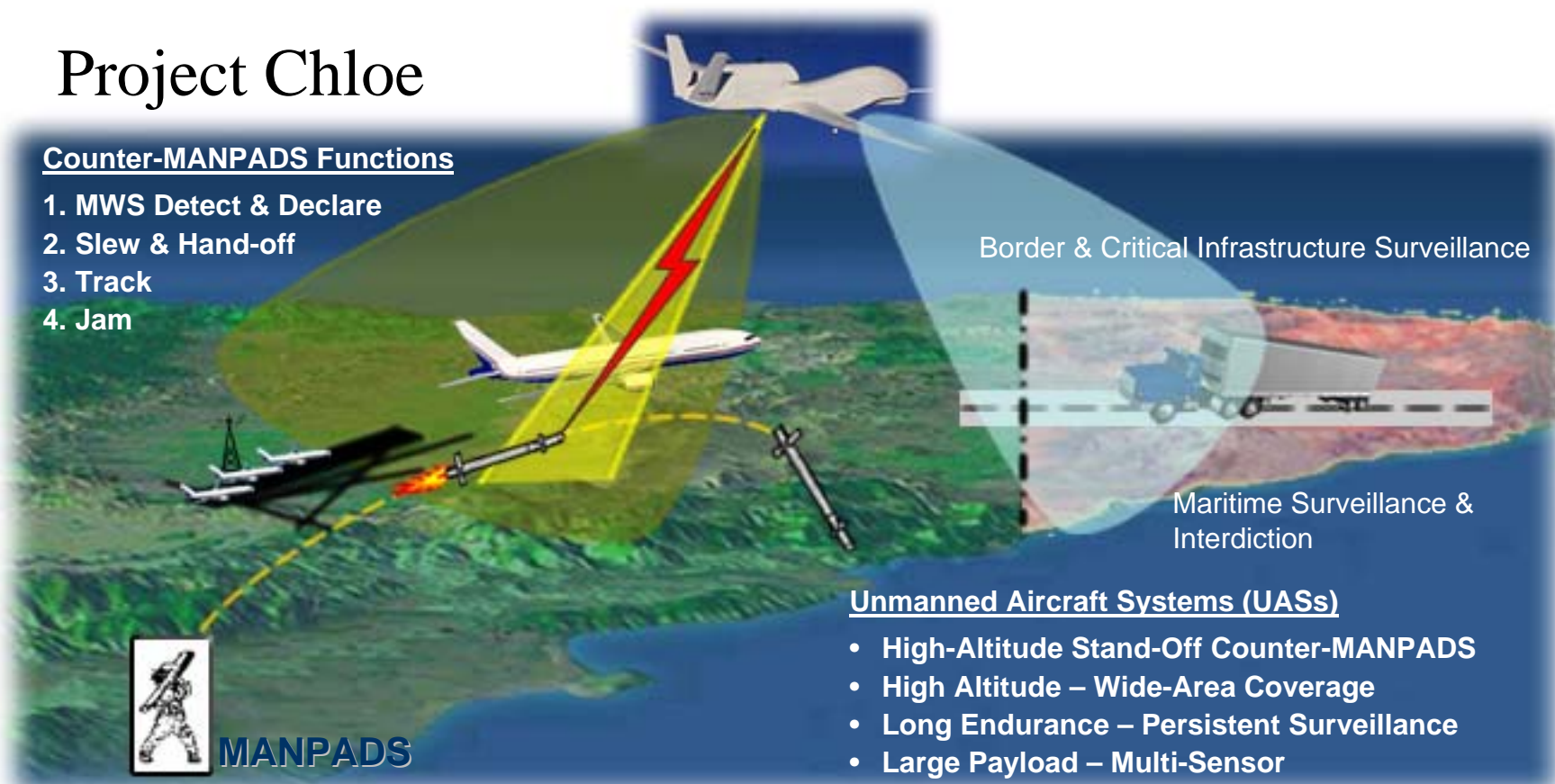
Counter-MANPADS/Persistent Surveillance

Office of Innovation - Homeland Innovative Prototypical Solutions

Project Chloe

Counter-MANPADS Functions

1. MWS Detect & Declare
2. Slew & Hand-off
3. Track
4. Jam



Unmanned Aircraft Systems (UASs)

- High-Altitude Stand-Off Counter-MANPADS
- High Altitude – Wide-Area Coverage
- Long Endurance – Persistent Surveillance
- Large Payload – Multi-Sensor

Operational Characteristics

- Real-time sensor fusion/dissemination
- Multi-user / border surveillance requirements
- Commercial Aircraft MANPADS protection
- Automatic target detection/recognition
- Persistence (24/7, all-weather coverage)



Project CHLOE

High Altitude Unmanned
Counter-MANPADS / Persistent Surveillance



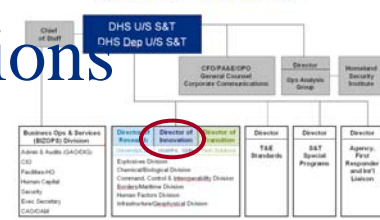
**Homeland
Security**



Homeland Innovative Prototypical Solutions

HIPS FY 2008 Planned Demonstration Timeline

DHS S&T Directorate



HUMAN FACTORS
FAST M2



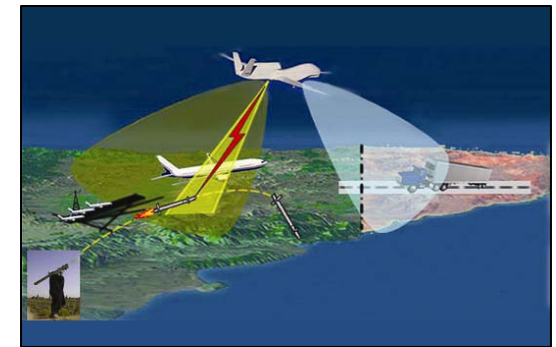
EXPLOSIVES DETECTION
MagViz



CRITICAL INFRASTRUCTURE PROTECTION

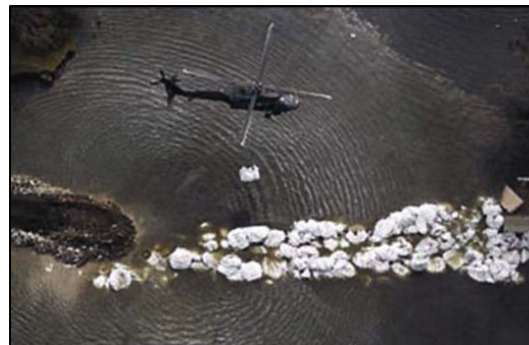


Resilient Electric Grid
REG



CHLOE

Levee Strengthening





Maritime Security/Maritime Domain Awareness

Leveraging Capabilities through Inter-Agency Collaborations



Seahawk - multi-agency intermodal task force, fusion and T&E center, Charleston Harbor, SC (DHS, DOJ, DOD, DOS, state/local)



Persistent wide-area surveillance technologies for USCG detection, identification and tracking (DHS S&T, USCG)



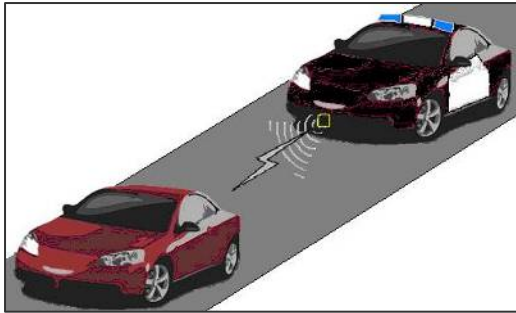
Improved low cost port and coastal radar systems with sophisticated signal processing (DHS S&T)



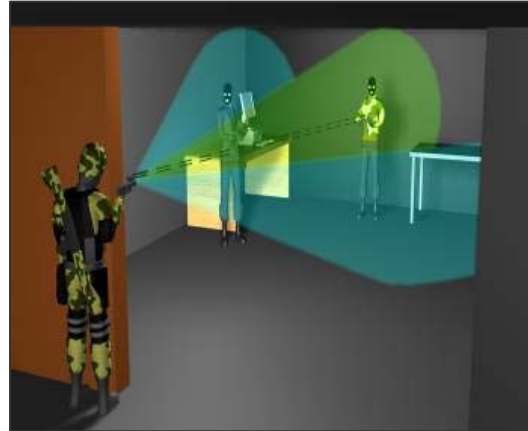
Semi-submersible technologies to support Joint Task Force requirements (DOD, Intel communities, DHS-S&T, CBP, USCG)



Border Officer Tools and Safety



Microwave Vehicle Stopper



**Light Emitting Diode
Incapacitor**



**Officer Safety Load
Carriage System**



Integration of Mobile Biometrics



**Homeland
Security**

USCGC Bertholf

First National Security Cutter



Amphib Alaska



Homeland
Security



Scalable Common Operating Picture Experiment (SCOPE) Global Observer Joint Capability Technology Demonstrations High Impact Technology Solutions



Customs and Border Patrol

- Persistent wide area surveillance of land and maritime borders to detect & characterize individuals, vehicles, and low flying aircraft
- Relay of Predator B links
- RF emitter geolocation platform



FEMA

- Pre-disaster evacuation route monitoring
- Post-disaster damage assessment/mapping
- Post-disaster communications relay
- Surveillance for National Special Security Events



National Oceanic and Atmospheric Administration

- Weathersonde/hurricane tracking
- Fisheries protection
- Satellite calibration/validation

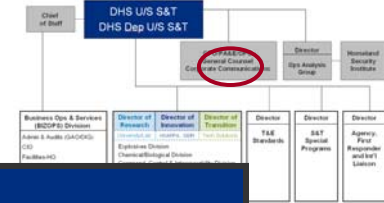


U.S. Coast Guard

- Persistent wide area surveillance of maritime areas and ports to detect & characterize vessels



S&T Outreach



2008 Schedule

- **S&T Stakeholders West**, Los Angeles, January 14-17
- **ChemBio Conference**, January 28-February 2
- **Second Annual DHS University Network Summit**, Washington, DC, March 19-21
- **S&T Stakeholders East**, Washington, DC, June 2-5
- **S&T Stakeholders PacAsia**, Hawaii, October 7-10

2009 Plans

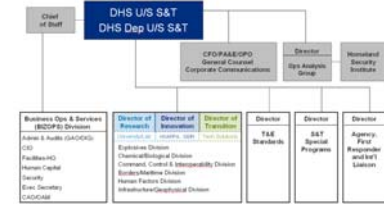
- **S&T Stakeholders West**, Bellevue, WA, February 23-26
- **Global Security Asia**, Singapore, March 17-19
- **S&T Stakeholders East**, Washington, DC, May
- **S&T Stakeholders Eurasia**, Sweden, Fall





DHS S&T Directorate

DHS S&T Directorate



Organized for Success...
Enabling DHS Missions...
Ready for Transition...

1993.....2001.....20??

Get People Right
Get Books Right
Get Organization Right
Get Content Right

Bombs
Borders
Bugs
Business
Bodies
Buildings

People + Process + Partnerships = Product
It's About our Relevance & Credibility!
Product vs. Overhead!?

U.S. ARMED FORCES
CAREER CENTER

I WANT YOU

TIMES SCARE
Attack shows no amount of security is enough

DHS Basic Research Alignment
Innovation: Defense
Chem/Bio Threat
Interoperability C-IED
SB/sect Cyber security
Safer Nation

Have we done enough?

Questions?





**Homeland
Security**



Homeland Security

FROM SCIENCE...SECURITY

Explosives

Chemical/Biological

Command, Control, & Interoperability



Borders/Maritime

Human Factors

Infrastructure/Geophysical



FROM TECHNOLOGY...TRUST

Back-Up Slides



Low Vapor Pressure Chemical Detector

Objective:

- Stand-off surface detection of persistent chemical threat substances having low vapor pressures ($<10^{-4}$ Torr)

Advantages:

- UV-Raman for stand-off detection – no need to collect/transfer analyte to spectrometer for detection and identification
- Leverages extensive DoD development
 - Joint Contaminated Surface Detection-Advanced Concept Technology Demonstration (vehicle mounted)
 - LISA-Laser Interrogation of Surface Agents Inspector (cart mounted)
- No consumables



Backpack < 18 kg



- LISA Manportable: UV-Raman Sensor

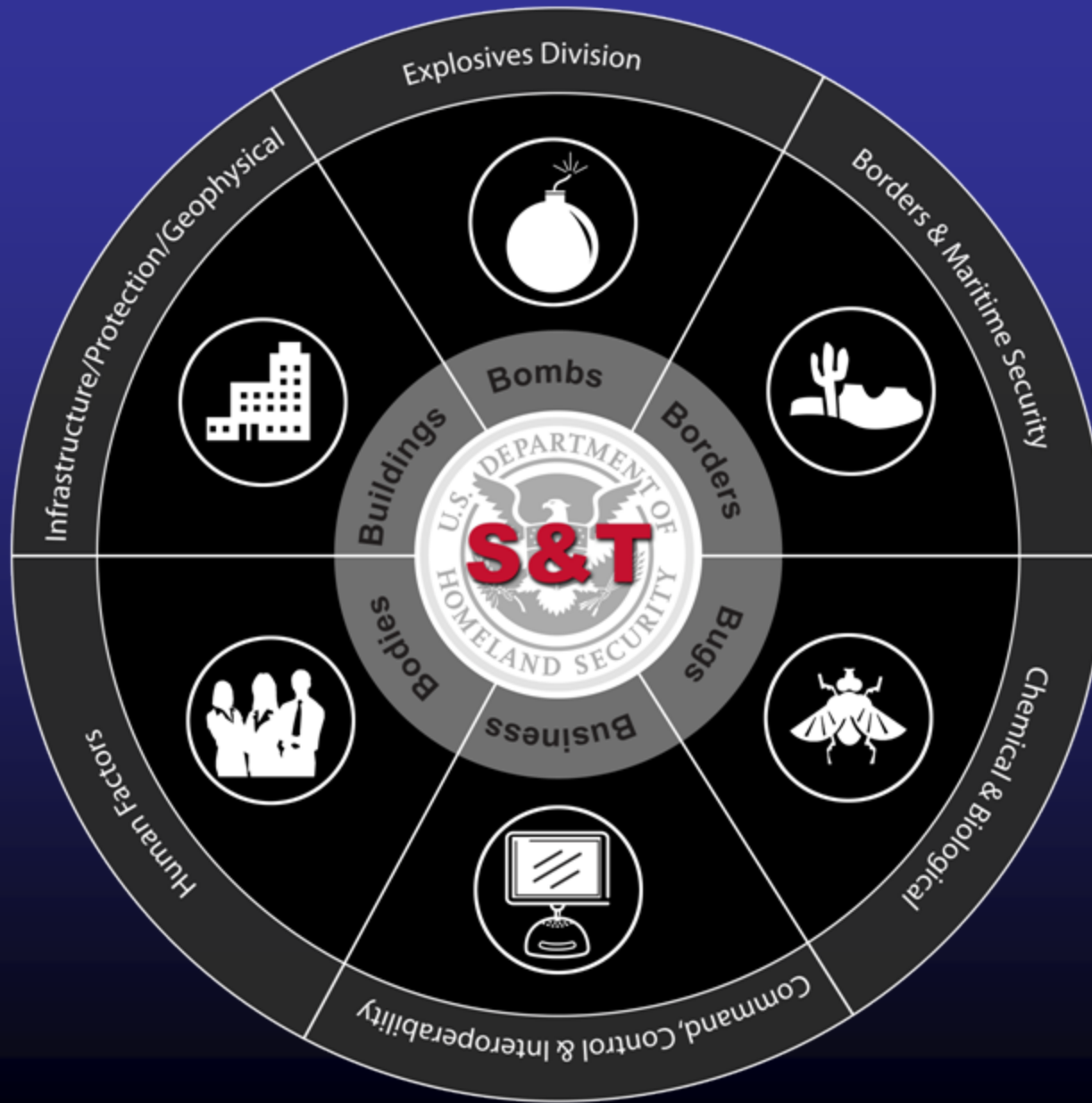
Challenges:

- Miniaturization
- Time to scan large surface areas when contaminant location is unknown
- Fluorescent surfaces

Schedule:

- FY06 - Project Initiation
- FY07 - Prototype developed
- FY09 - Engineering Development Model
- FY10 - Development, Test & Evaluation

S&T Division Alignment with the Six B's





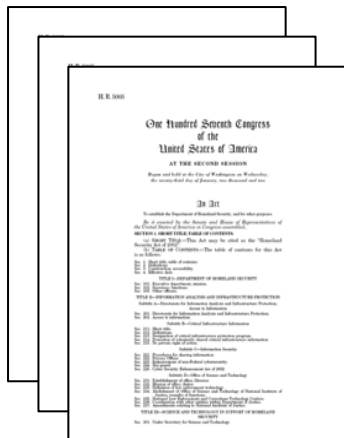
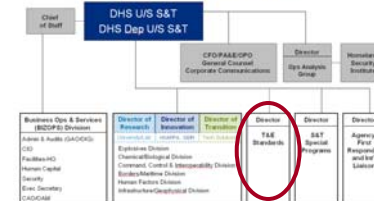
Test & Evaluation and Standards



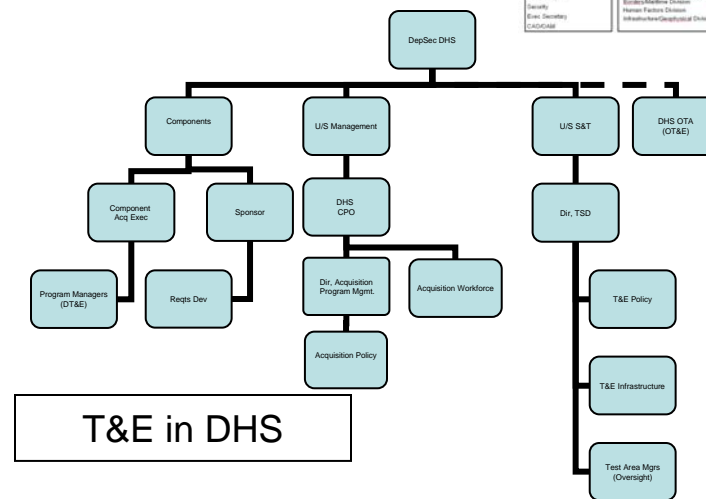
- T&E and Standards organization coordinates and integrates all research, development, demonstration, testing, and evaluation activities of the Department
 - T&E – Policy, Modeling and Simulation, Infrastructure and Test Area Managers
 - Standards – Deputy for Standards, Standards Development Program Manager and Standards Policy
- DHS T&E Program Involvement
 - Transportation Worker Identification Credentialing, SBInet, Western Hemisphere Travel Initiative, S&T Integrated Product Team programs, National Incident Management System Support Center, Counter-MANPADS
 - Advanced Spectroscopic Portal Operational Test Authority
- S&T Office of Standards serves as Standards Executive for all of DHS



T&E Standards



Sec. 302 (12) coordinating and integrating all research, development, **demonstration, testing, and evaluation** activities of the Department

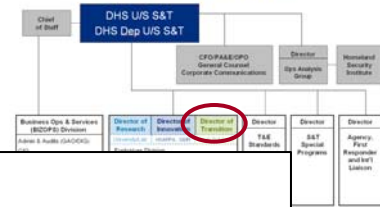


- T&E and Standards Organization established
 - T&E – Policy, M&S, Infrastructure and Test Area Managers
 - Standards – Deputy for Standards, Standards Development PM and Standards Policy
- T&E Policy – MD is being developed in alignment with updated MD 1400
- DHS T&E Program Involvement
 - TWIC, SBInet, WHTI, S&T IPT programs, NIMS SC, CounterManpads
 - ASP – OTA
- S&T Office of Standards serves as Standard Executive for all of DHS

- Supports development and adoption of relevant consensus standards for equipment, training and systems – for both DHS and grant recipients
- Leverages federal agency, standards development organizations and industry relationships
 - ANSI, INCITS, UL, IEEE, ASTM, NIST, DOJ, HHS, EPA, NIOSH
- TSD Councils
 - Standards Council – DHS wide standards needs/adoption
 - T&E Council – Policy IPT (policy and OTA development) and T&E Infrastructure (DHS Current Infrastructure and requirement then gaps)



Tech Solutions for First Responders



The Dazzler Wins TIME Magazine Award!



Law & Order

Blinded by the Light

The hunt for better non-lethal weaponry gained new urgency when several people died in recent years after being shocked by a Taser. The LED Incapacitator, funded by the Department of Homeland Security, is a novel alternative. When officers shine the flashlight-like device in a person's eyes, high-intensity LEDs, pulsating at varying rates, will make the suspect temporarily blind and dizzy.

Available: 2008



TechSolutions Projects

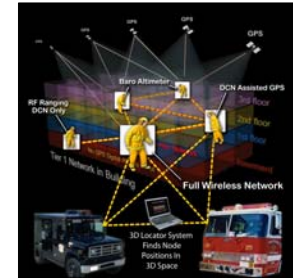
Next Generation Breathing Apparatus



Ocular Scanning Nerve Agents/Toxic Gases



3-D Location



Fire Ground Compass



Biometric Identification



Carrizo Cane – Bio Agent



TechSolutions

Mission: To rapidly address technology gaps identified by Federal, State, Local, and Tribal first responders

- Field prototypical solutions in 12 months
- Cost should be commensurate with proposal but less than \$1M per project
- Solution should meet 80% of identified requirements
- Provide a mechanism for Emergency Responders to relay their capability gaps
- Capability gaps are gathered using a web site (www.dhs.gov/techsolutions)
- Gaps are addressed using existing technology, spiral development, and rapid prototyping
- Emergency Responders partner with DHS from start to finish

Rapid Technology Development
Target: Solutions Fielded within 1 year, at <~\$1M



28



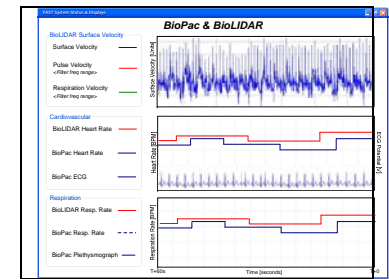
Homeland Security

Putting HIPS to the Test

First in a Series of Technology Demonstrations

Demo of Sensors for Physiological Cues, Draper Laboratory, Cambridge, MA

- Purpose of Demo – To exhibit progress in sensor selection and validation of **physiological** cues in real time that may be indicative of a person who intends to do harm (Malintent Theory)
- Sensors measure various autonomic nervous system reaction and includes Cardiovascular and Electrodermal measurements
- Goal is to use a suite of sensors to increase the accuracy and validity of identifying people who may require additional screening.



Putting HITS to the Test

Summer 2008 Series of Technology Demonstrations

Tunnel Detection Demo of UAV-Mounted Sensors

- Purpose of Demo – To demonstrate a tunnel detection capability from an Unmanned Aerial Vehicle
- To be carried out on a simulated border tunnel in soil conditions similar to those found at the Southwest border
- Part of a larger effort to demonstrate a game changing approach to the detection of tunnels that ranges from wide-area surveillance to more sensitive ground validation and long-term deterrence





DHS S&T Laboratories



Environmental Measurements Laboratory



National Biodefense Analysis and Countermeasures Center (NBACC)

Transportation Security Laboratory



Plum Island Animal Disease Center



... DHS S&T has four labs and access to 10 DOE National Labs



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SAFE

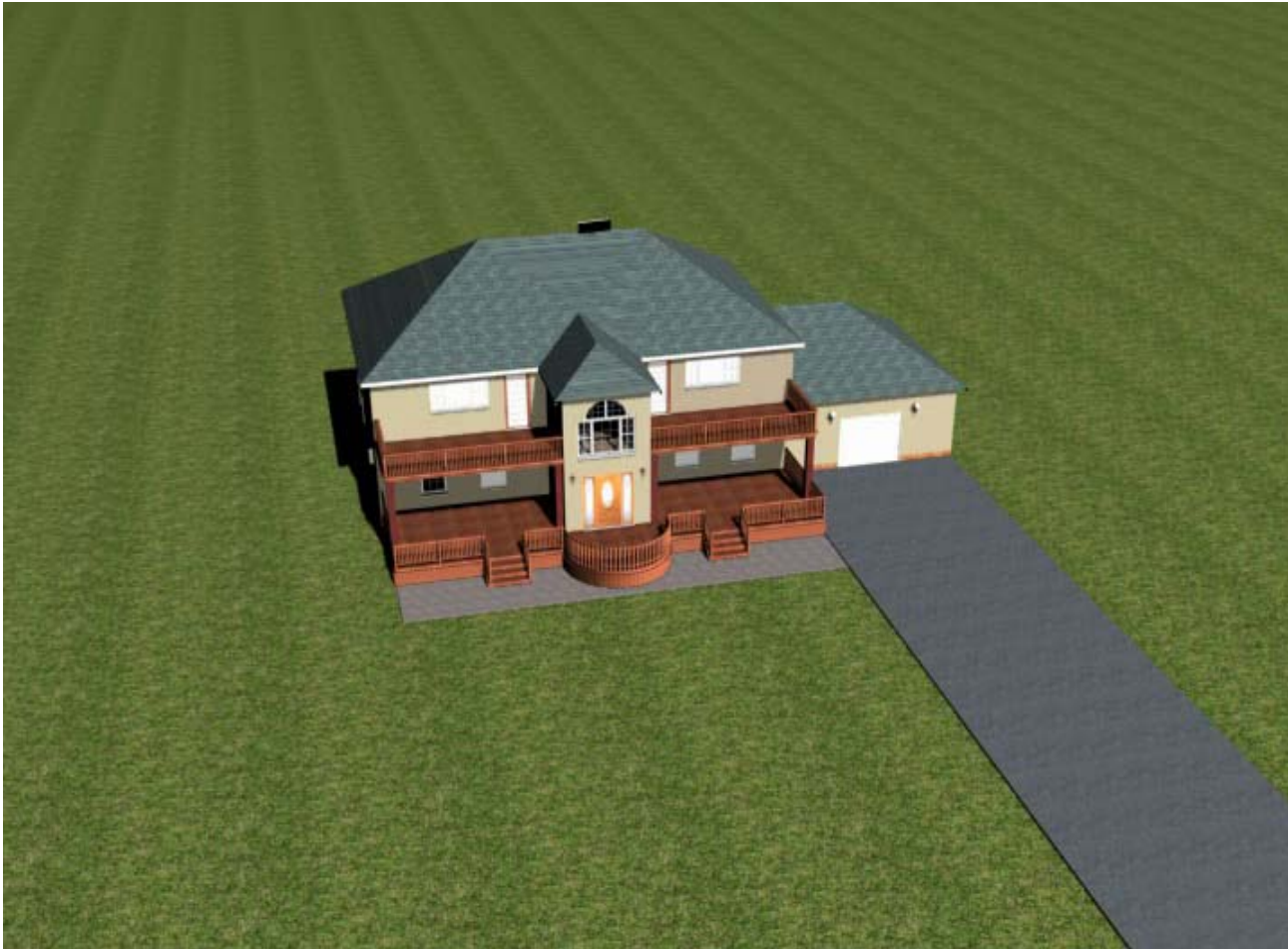
Secure Against Fires and Embers



Homeland
Security



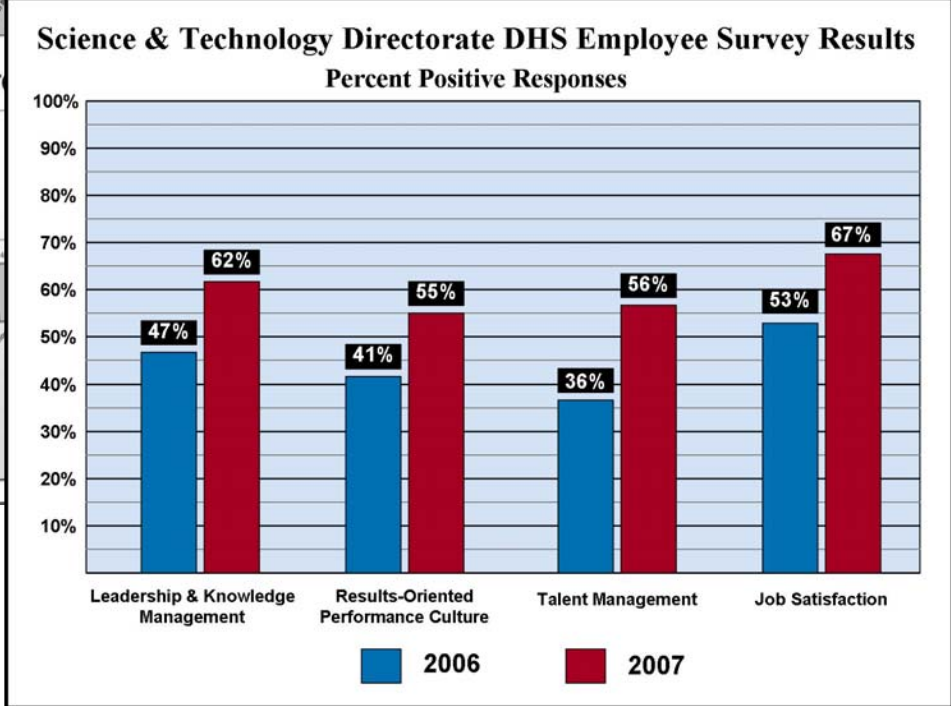
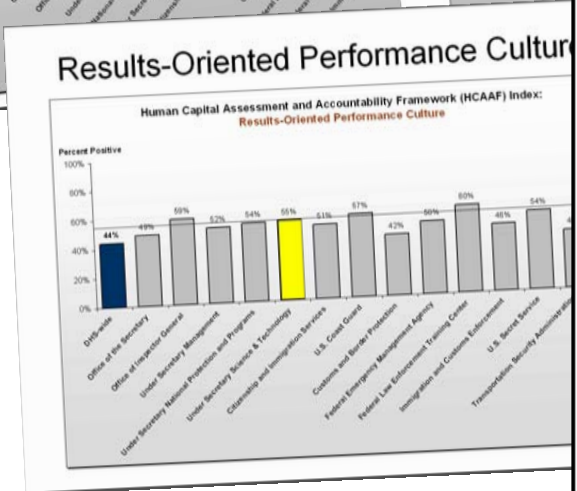
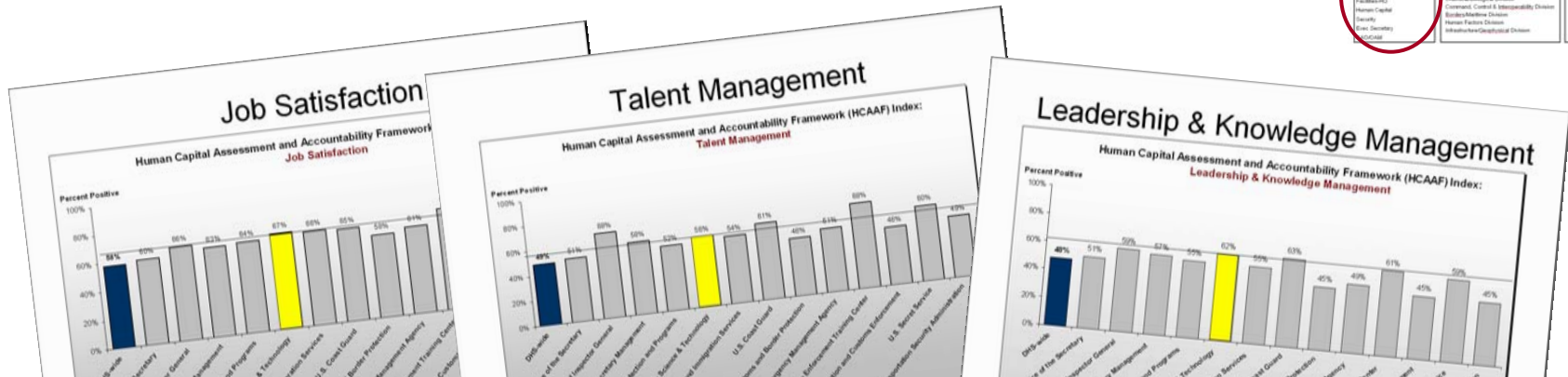
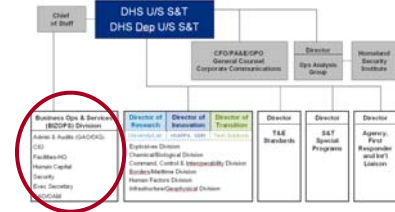
Homeland
Security



Homeland
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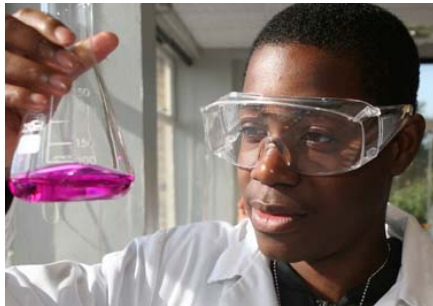
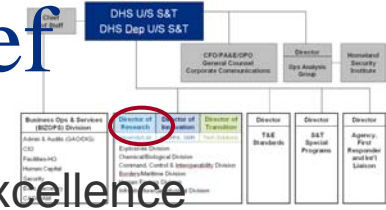


Getting the People Right





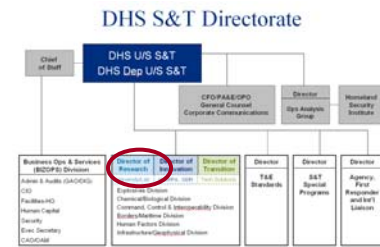
DHS University Programs in Brief



- 13 Homeland Security Centers of Excellence aligned with six DHS S&T divisions
- Nearly 160 U.S. colleges and universities, including several Minority Serving Institutions (MSIs)
- Nearly 30 other partners from laboratories, private industry and think tanks
- HS-STEM career development grants to institutions; pilot programs for middle and high school STEM education
- New scholarships and fellowships in 16 research areas
- Naval Postgraduate School Ph.D. program in homeland security
- Scientific leadership grants, workshops and summer research teams at Centers of Excellence for MSIs



National Bio and Agro-Defense Facility (NBAF)



- Proposed replacement for the Plum Island (PIADC) facility
- Provides needed BSL 3/4 livestock research capability to protect from foreign animal and zoonotic diseases
- Provides research for countermeasure and vaccines development
- Diagnostics and response
- Coordination with USDA
- Feasibility Study = 500,000 sf

Environmental Assessment Process for Six Sites

- Athens, Georgia
- Manhattan, Kansas
- Flora, Mississippi
- Plum Island, New York
- Butner, North Carolina
- San Antonio, Texas

Development Schedule

Select Site: Oct 2008
 Detailed Design: Jan 2009
 Start Construction: 2010
 Facility Operational: 2015

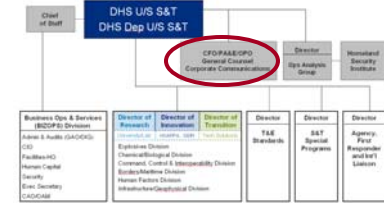


Homeland Security



Getting the Books Right

DHS S&T Directorate



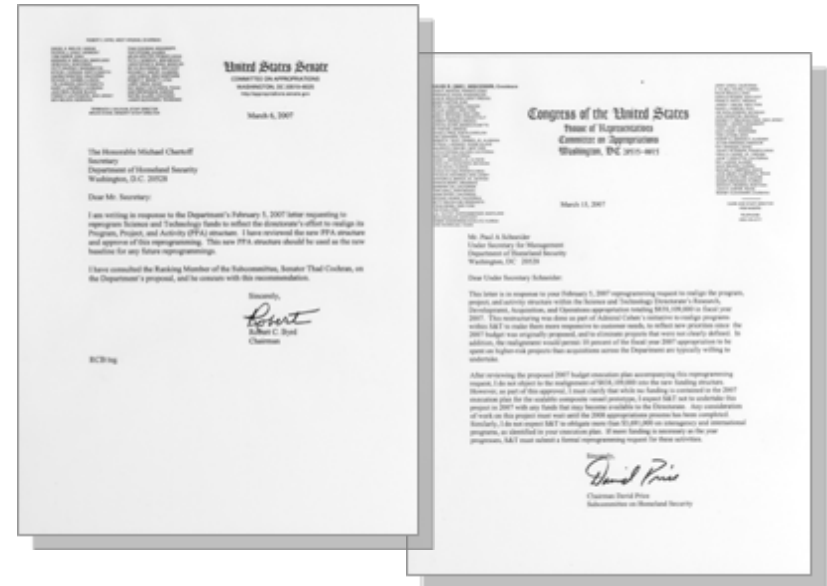
“This component {DHS S&T} is a rudderless ship without a clear way to get back on course.”
– FY 2007 Senate Appropriations Report

Established ‘One Set of Books’

Consolidated all financial functions under the S&T CFO

Produced the first S&T 5-Year R&D Plan

Established detailed Spend Plans and Performance Metrics



Congress Approves FY 07 OMNIBUS S&T Realignment (\$839M– March 2007)

“The Committee is pleased with the rapid progress S&T appears to be making toward resolving past deficiencies.”
– FY 2008 Senate Appropriations Report



Homeland Security



KNOW Risk KNOW Reward



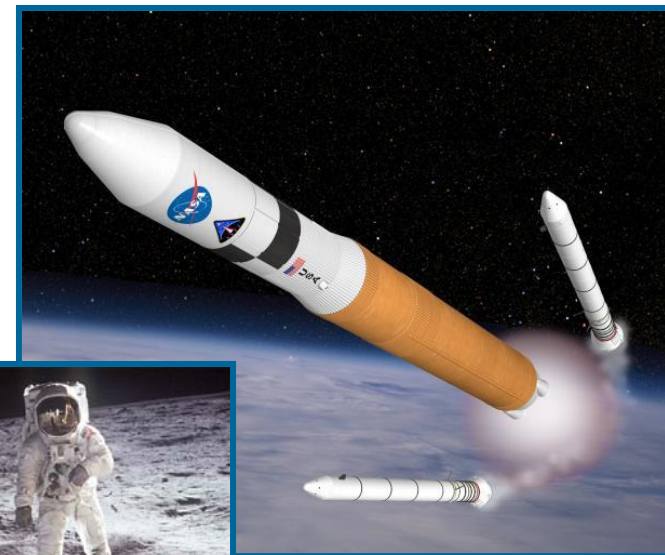
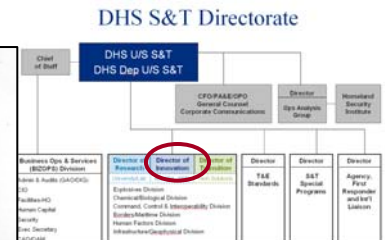
The Wright Brothers First Flight



Boeing 787 Dreamliner



Robert Goddard & First Liquid-Fueled Rocket



NASA Goddard Rocket Launch



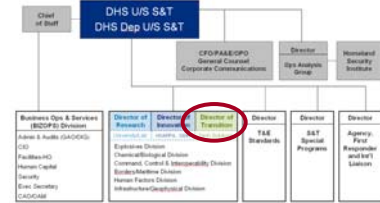
First Man on Moon



Homeland Security



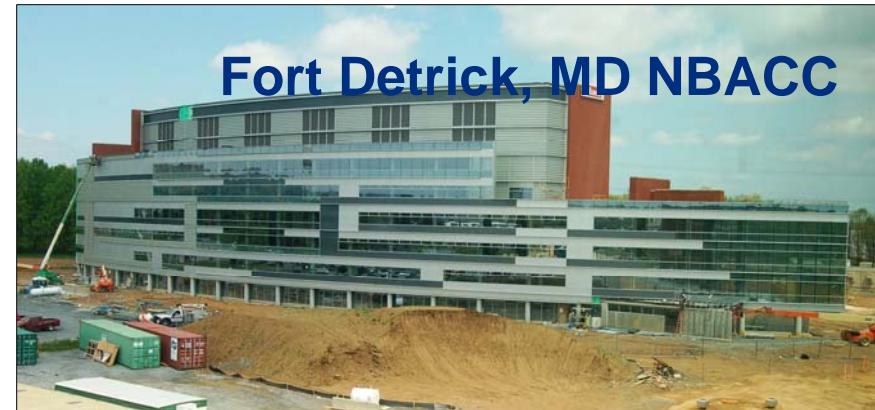
Way Ahead - Transition



- T&E – DNDO (ASP) OPEVAL OCT 08
- National Bio- and Agro-Defense Facility (NBAF) selection NOV 08
- National Biodefense and Analysis Countermeasures Center (NBACC) dedication OCT 08
- Chemical Security Analysis Center (CSAC) NOV 08
- PEO – Counter-IED Program (HSPD 19)
- Cyber Security Research (HSPD 23)
- Interoperability Technology and Governance Initiatives



Aberdeen, MD CSAC



Fort Detrick, MD NBACC

Bottom line – “Transition is.....Cohen ‘who’?.....”

