DHS Science & Technology: Alignment for Success

Pacific Operational Science & Technology Conference

Honolulu, Hawaii · April 3, 2007

Jay M. Cohen
Under Secretary
Science and Technology Directorate
Surprise is nothing new to Hawaii!
## DHS S&T Investment Portfolio
Balance of Risk, Cost, Impact, and Time to Delivery

<table>
<thead>
<tr>
<th>Product Transition (0-3 yrs)</th>
<th>Innovative Capabilities (1-5 yrs)</th>
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<tbody>
<tr>
<td>▪ Focused on delivering near-term products/enhancements to acquisition</td>
<td>▪ High-risk/High payoff</td>
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<tr>
<td>▪ Customer IPT controlled</td>
<td>▪ “Game changer/Leap ahead”</td>
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<tr>
<td>▪ Cost, schedule, capability metrics</td>
<td>▪ Prototype, Test and Deploy</td>
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<td>▪ HSARPA</td>
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<th>Basic Research (&gt;8 yrs)</th>
<th>Other (0-8+ yrs)</th>
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<td>▪ Enables future paradigm changes</td>
<td>▪ Test &amp; Evaluation and Standards</td>
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<tr>
<td>▪ University fundamental research</td>
<td>▪ Laboratory Operations &amp; Construction</td>
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<tr>
<td>▪ Gov’t lab discovery and invention</td>
<td>▪ Required by Administration (HSPDs)</td>
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<td>▪ Congressional direction/law</td>
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**Customer Focused, Output Oriented**
Transition Portfolio

Enabling Capabilities, Supporting Mission Critical Needs of DHS

Integrated Product Teams (IPTs)

- 11 Capstone IPTs form the centerpiece of S&T’s customer-driven approach to product transition
- Engage DHS customers, acquisition partners, S&T technical division heads, and end users in product research, development, transition and acquisition activities
- Identify our customers’ needs and enable and transition near-term capabilities for addressing them
DHS Requirements/Capability Capstone IPTs

DHS S&T Product – “Enabling Homeland Capabilities” (EHCs)

**Information Sharing/Mgmt**
- OIA
- Acquisition
- C2I
- OOC/HITRAC

**Border Security**
- CBP/ICE
- Acquisition
- Borders/Maritime
- Agents

**Chem/Bio Defense**
- CMO/IP
- Acquisition
- Policy
- Chem/Bio

**Maritime Security**
- USCG
- Acquisition
- Guardsmen
- Borders/Maritime

**Cyber Security**
- CS&T
- Acquisition
- Infrastructure Owners/Operators
- C2I

**Explosive Prevention**
- TSA/USSS
- Acquisition
- Agents
- Explosives
- Policy

**Cargo Security**
- CBP
- Acquisition
- Officers/Industry
- Borders/Maritime

**People Screening**
- SCO/CIS
- Acquisition
- Human Factors
- US VISIT/TSA

**Infrastructure Protection**
- IP
- Acquisition
- Infrastructure/Geophysical
- Infrastructure Owners/Operators

**Incident Management**
- FEMA
- Acquisition
- C2I
- First Responders
- Infrastructure/Geophysical
Basic Research Portfolio

*Discovery and Invention to Enable Future Capabilities*

- Brings the capabilities, talent and resources of the Homeland Security Centers of Excellence, DOE National Laboratories and DHS Labs to bear to address the long-term R&D needs for DHS in sciences of enduring relevance

- This type of focused, protracted research investment has potential to lead to paradigm shifts in the nation’s homeland security capabilities
Homeland Security Act of 2002

HSARPA will....

“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.”
Innovation Portfolio
High Risk, High Gain, Game Changers for Leap-Ahead Results

- Promotes revolutionary changes in technology
- Focus on prototyping and deploying critical technologies
- Includes:
  - HSARPA – Homeland Security Advanced Research Projects Agency
  - “Homeworks” – 1% of budget highest risk, highest pay-off
  - Small Business Innovation Research program
HIPS and HITS

Homeland Innovative Prototypical Solutions (HIPS) are designed to deliver *prototype-level demonstrations* of game-changing technologies in two to five years. Projects are moderate to high risk, with high payoff.

High Impact Technology Solutions (HITS) are designed to provide *proof-of-concept* answers within one to three years that could result in high-payoff technology breakthroughs. While these projects are at considerable risk for failure, they offer the potential for significant gains in capability.
## Homeland Innovative Prototypical Solutions (HIPS)

<table>
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<tr>
<th>Explosives</th>
<th>Chem/Bio</th>
<th>Command, Control &amp; Interoperability</th>
<th>Borders/ Maritime</th>
<th>Human Factors</th>
<th>Infrastructure/ Geophysical</th>
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<tr>
<td><strong>Project Chloe</strong> – High altitude aerial platform existing above civil aviation Counter-MANPADS</td>
<td><strong>SENSIT</strong> – System to identify numerous liquids in baggage</td>
<td><strong>SCOPE</strong> (Scalable Common Operational Picture Experiment) – Leverages Global Observer JCTD</td>
<td><strong>Scalable Composite Vessel Prototype (SCVP)</strong> – Lightweight, composite material with high speed hull</td>
<td><strong>FAST M2</strong> (Future Attribute Screening Technology Mobile Module) – Relocatable Lab capable of testing for behavioral/ physiological cues of “hostile intent”</td>
<td><strong>Resilient Electric Grid</strong> – System that will prevent cascading effects of power surge on electrical grids</td>
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<tr>
<td><strong>IED Defeat / APE VBIED Defeat</strong> – Detection/prevention and mitigation technologies to counter IEDs</td>
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<td><strong>Levee Strengthening and Rapid Repair</strong> - rapidly stop a breach in a levee</td>
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<td><strong>Storm Surge and Hurricane Mitigation</strong></td>
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## High Impact Technology Solutions (HITS)

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<th>Real Time Bio Detection and Identify</th>
<th>First Net - First Responder Reliable Relay Link</th>
<th>Tunnel Detect – Ability to detect, identify, and confirm illegal and clandestine underground border structures and activities</th>
<th>Document Validator – High proficiency scanner that can identify fraudulent docs Leverage USSS system</th>
<th>Wide Area Surveillance/ Change Detection for Critical Infrastructure</th>
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<td><strong>Cell-All</strong> - Ubiquitous Chem/Bio/agent detector</td>
<td><strong>Phone Home</strong> – Inter-operative and inexpensive hand-held radios</td>
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<td><strong>Resilient Tunnel</strong>– Tunnel Protection/Blast Mitigation</td>
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### High Impact Technology Solutions (HITS)

- **Real Time Bio Detection and Identify**
- **First Net** - First Responder Reliable Relay Link
- **Tunnel Detect** – Ability to detect, identify, and confirm illegal and clandestine underground border structures and activities
- **Document Validator** – High proficiency scanner that can identify fraudulent docs, Leverage USSS system
- **Wide Area Surveillance/ Change Detection for Critical Infrastructure**
- **Resilient Tunnel** – Tunnel Protection/Blast Mitigation
Homeland Innovative Prototypical Solutions
Counter-MANPADS/Persistent Surveillance

Project Chloe

**Counter-MANPADS Functions**
1. MWS Detect & Declare
2. Slew & Hand-off
3. Track
4. Jam

**Engagement Time:** 3-10 Seconds

**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)

**65K Feet**

**Border & Critical Infrastructure Surveillance**

**Maritime Surveillance & Interdiction**
High Innovative Prototype Solutions
Improvised Explosive Devices Defeat

- *Puffers* for explosives trace material detection on people, bags/parcels, and vehicles
- Walk-through/whole-body imaging (e.g., backscatter)
- Advanced Protection Explosive (APE): cancellation methods for explosive shock waves
- Drive-through imaging technology (x-ray, neutron of materials only)

Predict, Detect, Defeat and Destroy
IED/VBIED at range (100 yards) to change the calculus of the bomber versus the defender
Homeland Innovative Prototype Solutions
Technologies for Suicide Bomber Defeat & Blast Mitigation

Suicide Bomber & Device Detection

Blast Mitigation

Explosive Device Deactivation

Reactive & Shaping Walls
Homeland Innovative Prototypical Solutions

SENSIT

Liquid & Solid Explosive Detection at Ultra-Low Field without radiation

Magnetic Resonance Technology

- Detect Liquid & Solid Explosives
- Detect Explosive Components
- Simple “Green” / ”Yellow” / ”Red” alerts
- Non-contact
- Extremely sensitive
- Materials remain inside baggage
- Applicable at any security portal
Homeland Innovative Prototypical Solutions
Scalable Common Operating Picture Experiment JCTD
Homeland Innovative Prototypical Solutions
Scalable Composite Vessel Prototype

Gel-coated Composite eliminates manpower, cost, and environmental impact of constant hull preservation

Stern Launch and Recovery of 7 meter RHIB

Monolithic composite hull provides robust structure without seams or joints
Homeland Innovative Prototypical Solutions
SAFECON

Quickly Detect and Identify Dangerous Cargo

- **Integrated Sensor Suite**: explosives, chemical agents, biological agents, human cargo, contraband

- **Scan for WMD, contraband, and human cargo during normal crane transport operations**

- Improved Non-Intrusive Inspection (NII) capability
- Improved Sensors for explosives, Chem and Bio agents
Homeland Innovative Prototype Solutions
Future Attribute Screening Technology Mobile Module (FAST M2)

**Systems**
- Queue management
- Behavioral profiling
- Rapid risk assessment
- Screening methodologies

**Operational Characteristics**
- Discover screening methods for intent
- Privacy protection for all participants
- Simple to operate and use

**Functions**
- Identity verification
- Attribute measurement
- Risk determination
- Behavior focused screening
Homeland Innovative Prototypical Solutions
Levee Strengthening and Rapid Repair

- Pre-emptive mapping of weak levees
- Pre-Flood Deployment of Protective and Rapid Repair Supplies to Problem Locations
  - Drop-in structures lofted by aircraft
  - Float-in structure guided by cables
  - Explosively Emplaced Support Structures
  - Roll-out protective coverings such as articulated concrete mats
High Impact Technology Solutions
Real Time Bio Detect

Systems to detect biological agents in less than 60 seconds, and then provide RF information transfer to various centers for decision making and corrective action.
High Impact Technology Solutions
First Net
High Impact Technology Solutions

Tunnel Detection

- Air circulation
- Electricity
- Concrete infrastructures
High Impact Technology Solutions

Document Validator

Systems
• Immigration Control
• Queue Management
• Identity databases

Functions
• Document Validation
• Identity verification
• Global identity awareness
High Impact Technology Solutions
Biometric Detector

Functions
• Identity verification
• Denies right of passage to those on watch lists
• Mobility allows for use in remote locations
• Improved movement of legitimate individuals through checkpoints
High Impact Technology Solutions
Cell-All Ubiquitous Chem/Bio Detect
High Impact Technology Solutions
Critical Infrastructure Change Detection

Explore Methods to Monitor Critical Infrastructure

Large and Remote Locations

Densely Populated Urban Environments
Innovation/HSARPA BAAs

Broad Agency Announcements Released February 1:

- Tunnel Detection Technologies - develop and demonstrate a capability for rapidly detecting tunnels
- SAFE Container (SAFECON) – develop the capability to detect and identify WMD, explosives and contraband cargo and to detect humans in shipping containers
- Future Attribute Screening Technology (FAST) Demonstration Laboratory – provide efficient, rapid and accurate security screening of people and their credentials and belongings

Visit www.FedBizOpps.gov or www.hsarpabaa.com for more information
Upcoming BAA Topic Areas

- Long-Range - Varied S&T Topic Areas
- CHLOE - High Altitude Endurance Unmanned Aerial System-Based Counter-MANPADS Technology Assessment
- IED & Vehicle-Borne IED Defeat - Technologies for Blast Mitigation and Suicide Bomber Defeat
- SBIR - Small Business Innovation Research Program
- First NET - First Responder Reliable Link
- Document Validator
- Biometric Detector
- SCOPE: Scalable Common Operating Environment

Visit www.FedBizOpps.gov or www.hsarpabaa.com for more information
DoD-DHS Technology Transfer

- Identify and transfer technology from DoD to homeland security applications for emergency responders
- Create a coordinated, sustainable, iterative and inclusive process for tech transfer
- Leverage innovation and investments
- Promote agency and first responder awareness of process
S&T Directorate’s A/P Liaison

- Gary Jensen, Director, Asia-Pacific Liaison
- DHS Science & Technology Directorate
- 26 years experience in the Pacific Region
- Established first Mid-Pacific Office for Naval Research
- Coordinated Pacific Region International Field Offices for ONR

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S&T Activities in PACASIA

• Government to Government Agreements
  ➢ An existing umbrella S&T agreement with the Government of Australia,
  ➢ An umbrella S&T agreement in progress with the Government of Singapore
  ➢ Ongoing collaborations with both industry and government in Japan to test cargo container tracking devices under real-world operational conditions.
  ➢ Plans to expand this cargo security initiative to Singapore as soon as our S&T agreement is in place.
S&T Focus in PACASIA

• Needs of our customers

  ➢ Chemical and biological countermeasures and forensics;
  ➢ Behavioral and physiological tools for people screening; and
  ➢ Cargo tracking and inspection systems.

• Capitalize on the environment and challenges for innovative and leap-ahead capabilities in support of DHS missions and to save American lives. These include

  ➢ Investigating emergency responder tools used by the Japanese government in response to earthquakes
  ➢ Developing satellite-based tsunami forecasting capabilities with our partners in Naval Research
  ➢ Developing hurricane intensity prediction approaches in partnership with the Office of Naval Research and the Mexican Navy
  ➢ Maritime domain awareness and port security tools in partnership with Naval Research, TSWG, and allies such as Singapore.
It’s ALL about the ‘Human Element’!

Dow’s “Human Element” Ad
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**FROM SCIENCE...SECURITY**

**FROM TECHNOLOGY...TRUST**
Back-Up
# S&T Points of Contact

<table>
<thead>
<tr>
<th>Division</th>
<th>Email</th>
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Border Security: Representative Technology Needs

• Improved ballistic protection via personal protective equipment
  (Borders/Maritime Division Lead)

• Improve detection, tracking, and identification of all threats along the terrestrial and maritime border
  (Borders/Maritime Division Lead)

• Ability to access ICE databases in which voice information is entered; provide analytical, reporting, and automated case deconfliction; classify, identify voice samples (C2I Division)

• Non-lethal compliance measures for vehicles, vessels, or aircraft allowing for safe interdiction by law enforcement personnel (Borders/Maritime Division Lead)

• Non-destructive tools that allow for the inspection of hidden or closed compartments to find contraband or security threats (Borders/Maritime Division Lead)

• Improved analysis and decision-making tools that will ensure the development/implementation of border security initiatives (Borders/Maritime Division Lead)

• Ability to non-intrusively determine the intent of subjects during questioning (Human Factors Division)

• Ability for law enforcement personnel to quickly identify the origin of gunfire and classify the type of weapon fired (Borders/Maritime Division Lead)

• Ability for law enforcement officers to assure compliance of lawful orders using non-lethal means (Borders/Maritime Division Lead)
Cargo Security: Representative Technology Needs

• Enhanced screening and examination by non-intrusive inspection *(Borders/Maritime Division)*

• Increased information fusion, anomaly detection, Automatic Target Recognition capability *(Borders/Maritime Division)*

• Detect and identify WMD materials and contraband *(Borders/Maritime Division)*

• Capability to screen 100% of air cargo *(Borders/Maritime Division)*

• Test the feasibility of seal security; Detection of intrusion *(Borders/Maritime Division)*

• Track domestic high-threat cargo *(Borders/Maritime Division)*

• Harden air cargo conveyances and containers *(Borders/Maritime Division)*

• Positive ID of cargo & detection of intrusion or unauthorized access *(Borders/Maritime Division)*
Explosives Prevention: Representative Technology Needs

- Standoff detection on persons (portable solutions) *(Explosives Division)*
- System solution for detection in baggage (checked & carried) *(Explosives Division)*
- Capability to detect VBIED / large threat mass (container, trailer, ship, vessel, car, rail) *(Explosives Division)*
- Capability to detect homemade or novel explosives *(Explosives Division)*
- Capability to assess, render safe, and neutralize explosive threats *(Explosives Division)*
- Optimize canine explosive detection capability *(Explosives Division)*
Incident Management: Representative Technology Needs

• Integrated Modeling, Mapping and Simulation capability *(IP/Geophysical Division)*

• Personnel Monitoring (Emergency Responder Locator System) capability *(IP/Geophysical Division)*

• Personnel Monitoring (Physiological Monitoring of Firefighters) capability *(IP/Geophysical Division)*

• Incident Management Enterprise System *(IP/Geophysical Division)*

• Logistics management tool *(IP/Geophysical Division)*
Interoperability: Representative Technology Needs

- Development and evaluation of Internet Protocol (IP) enabled backbones (*C2I Division*)
- Test and evaluation of emergent wireless broadband data systems (*C2I Division*)
- Acceleration of development and testing of P25 IP-based interfaces (*C2I Division*)
- Identification and development of message interface standards (*C2I Division*)
- Transition of Land Mobile Radios communication architectures to cellular based architectures (*C2I Division*)
- Evaluation of access technologies (*C2I Division*)
- Development of the complementary test procedures (*C2I Division*)
Maritime Security: Representative Technology Needs

• Wide-area surveillance from the coast to beyond the horizon; port and inland waterways region - detect, ID, and track (Borders/Maritime Division Lead)

• Data fusion and automated tools for command center operations (Borders/Maritime Division Lead)

• Vessel compliance through non-lethal compliance methods (Borders/Maritime Division Lead)

• Enhanced capability to continuously track contraband on ships or containers (Borders/Maritime Division)

• Improved ballistic personal protective equipment for officer safety (Borders/Maritime Division Lead)

• Improved WMD detection equipment for officer safety; improved screening capability for WMD for maritime security checkpoints (Borders/Maritime Division Lead)
People Screening: Representative Technology Needs

• Systematic collection and analysis of information related to understanding terrorist group intent to engage in violence (*Human Factors Division*)

• Non-invasive monitoring: Identifying and tracking unknown or potential threats from individuals at key checkpoints. Real-time detection of deception or hostile intent through integrated system of human and machine methods (*Human Factors Division*)

• Capability in real-time for positive verification of individual's identity utilizing multiple biometrics (*Human Factors Division*)

• Capability for secure, non-contact electronic credentials; contactless readers or remote interrogation technologies for electronic credentials (*Human Factors Division*)

• Mobile biometrics screening capabilities, to include hand-held, wireless, and secure devices (*Human Factors Division*)

• High-speed, high-fidelity ten-print capture capability (*Human Factors Division*)
2007 S&T Stakeholders Conference
Washington, DC

For more information visit:
http://www.ndia.org/meetings/7680

Coming Up…
DHS S&T Conference
London - Dec. 4, 2007
Details to follow