Suicide Bomb and Vehicle Borne Improvised Explosive Device Detection and Defeat Program

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"Putting First Responders First"

Homeland Security
Science & Technology

Overview

- Explosives Division Overview
- Suicide Bomber and Vehicle Borne Improvised Explosive Devices Program
  - Standoff Detection
  - Response
- S&T's Integrated Process Team Overview

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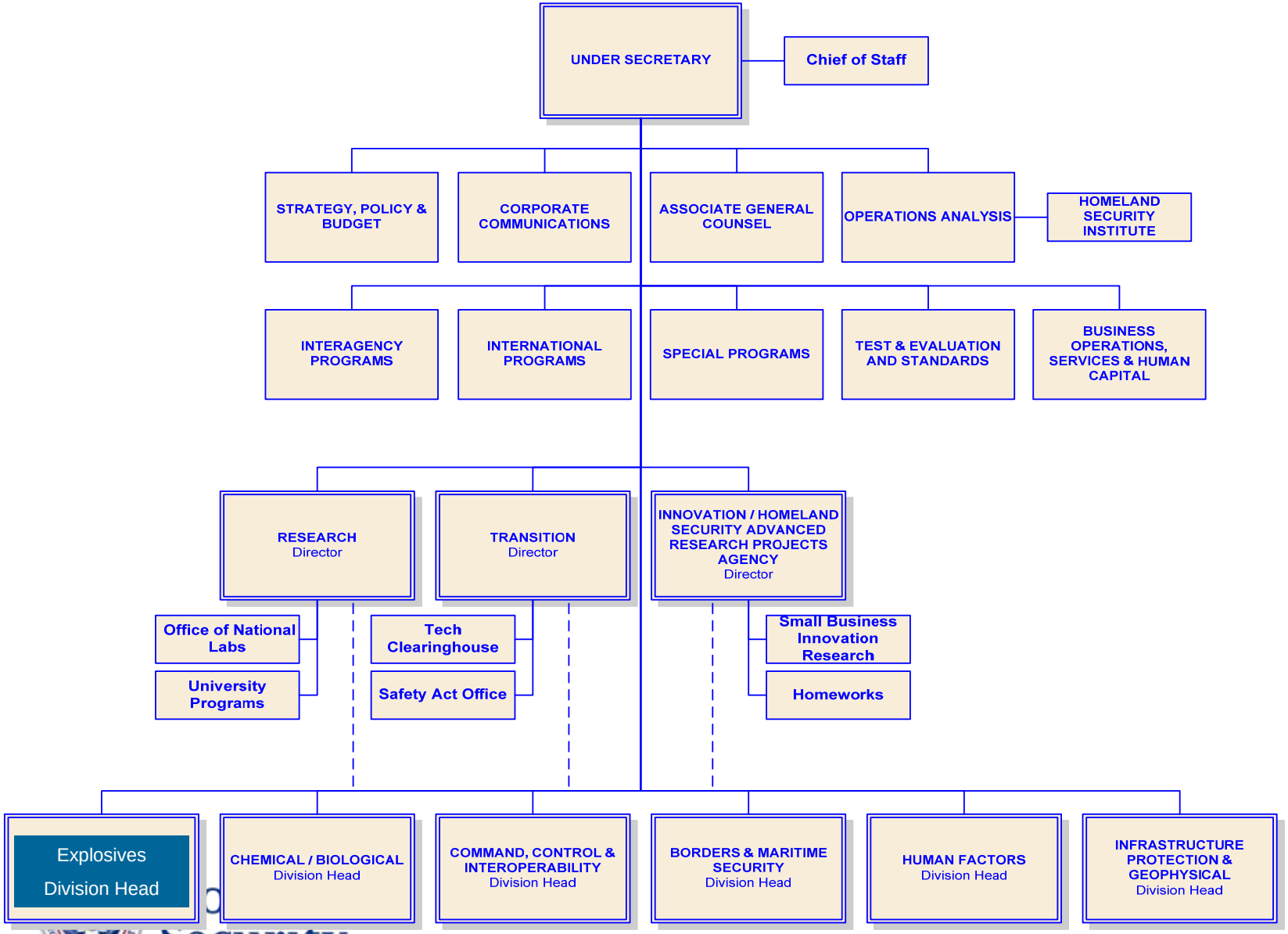
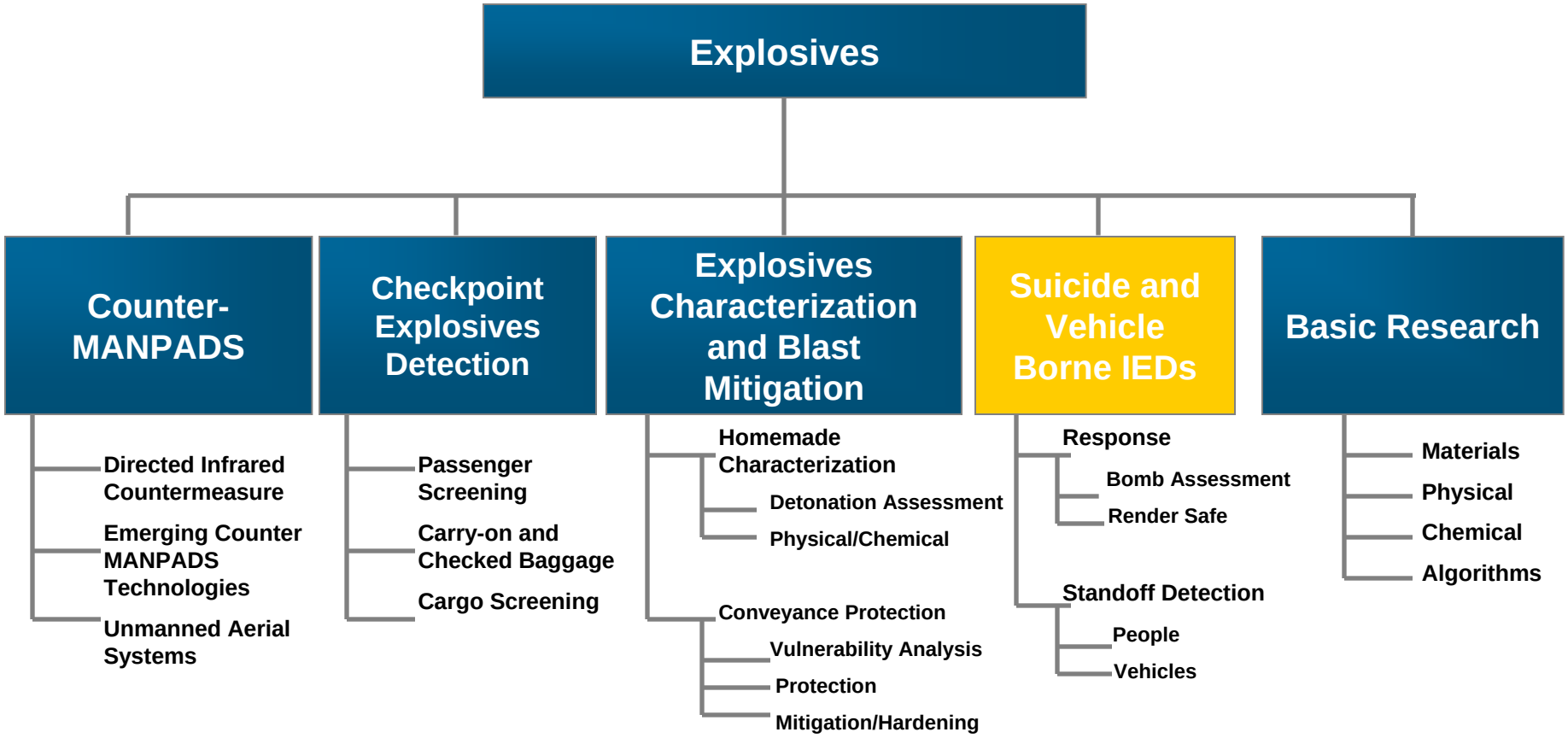
Office of the Under Secretary for Science and Technology



Approved: January 29, 2007

Division Organization

Managed by the DHS Science and Technology Directorate, the Explosives Division delivers on its mission through five thrust areas.



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Explosives Division

Mission Statement

Develop technical capabilities to detect, interdict, mitigate, and respond to the effects of non-nuclear explosives terrorism and accidents.

Key Deliverables

- IED Detection and Defeat Systems (Vehicle-borne, Leave Behind, Suicide Bomber)
- Primary & secondary passenger screening systems
- Checked bagged screening systems
- Cargo screening systems
- Production-ready commercialized airborne Counter-MANPADS system

Customers

- Transportation Security Administration
- U.S. Secret Service
- Customs and Border Protection
- U.S. Coast Guard
- Office of Bombing Prevention

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SB-VBIED Detection and Defeat Program

Mission and Objectives

- **Mission:** To develop new or improve existing technical capabilities to detect, interdict, and mitigate the effects of SB-VBIED
- **Critical Requirements**
  - Significant increase in standoff distance
  - Significantly improve sensor performance (i.e., increase P_D while decreasing FAR)
  - Screen vehicles while driver/passengers remain inside
  - Develop or improve diagnostics/imaging technologies for bomb technicians to scan suspicious vehicles
  - Improved canine explosive detection performance
  - Improved training aids and advanced training techniques

- **Operational Considerations**
  - Ability to operate in a range of environments under a variety of CONOPS
  - Minimize acquisition, manpower, and O&M costs to make affordable to State and local governments and private firms
  - Address and mitigate privacy issues

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SB-VBIED Countermeasures

Investment Strategy

- Investment strategy
  - Basic Research utilizing university fundamental research and government lab discovery and invention
  - Transition focused on delivering near-term products/enhancements to acquisitions
  - Innovation focusing on high-risk/high payoff prototypes for testing and deployment
  - Leveraging other agencies
    - TSWG
    - DOJ/NIJ
    - ARL
    - AFRL
    - JIEDDO

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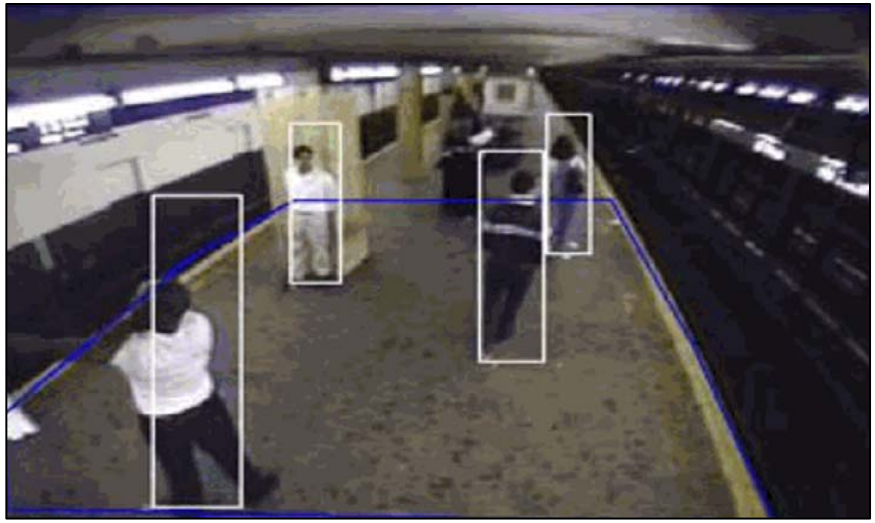
Standoff Detection

MISSION, GOALS & OBJECTIVES

- Detect Suicide, Leave-Behind, and Vehicle-Borne Explosives in Aviation, Rail, Ship, Bus, Truck, Container, Bridge, Tunnel, Tower, and Terminal environments
- **NEEDS**
  - Increased detection & throughput
  - Decreased false alarm rates
  - Non-obtrusive
  - No choke points
  - Standardized/common display
  - Layered approach (Systems-of-Systems Architecture)



RECENT ACCOMPLISHMENTS

- Completed Source Selection for SBIR 07.2:
- Completed Source Selection for BAA 07-05:
- Initiated a System-of-Systems concept definition for detection capabilities in large arena public domain

DELIVERABLES

- Improved trace sample collection efficiency
- Improved image quality specifications
- Prototype Mobile Explosives Detector (enhanced trace detection)
- Prototype Checkpoint Vehicle Detector (vibrometry and neutron-gamma detection)
- System-of-Systems Architecture for the next generation of checkpoint screening

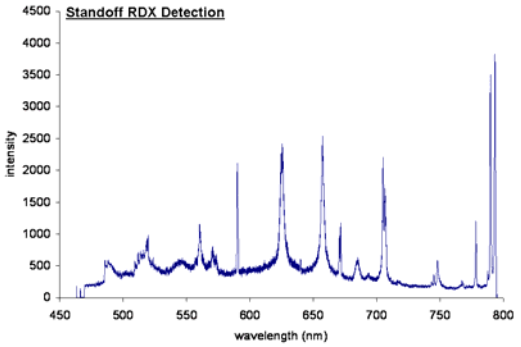
Program Plan—Detection Modes

The SB-VBIED detection program will be <u>organized in three major components</u>:

1. Explosive ***Device*** Detection

2. Explosives Detection

3. Integration and Algorithm Development



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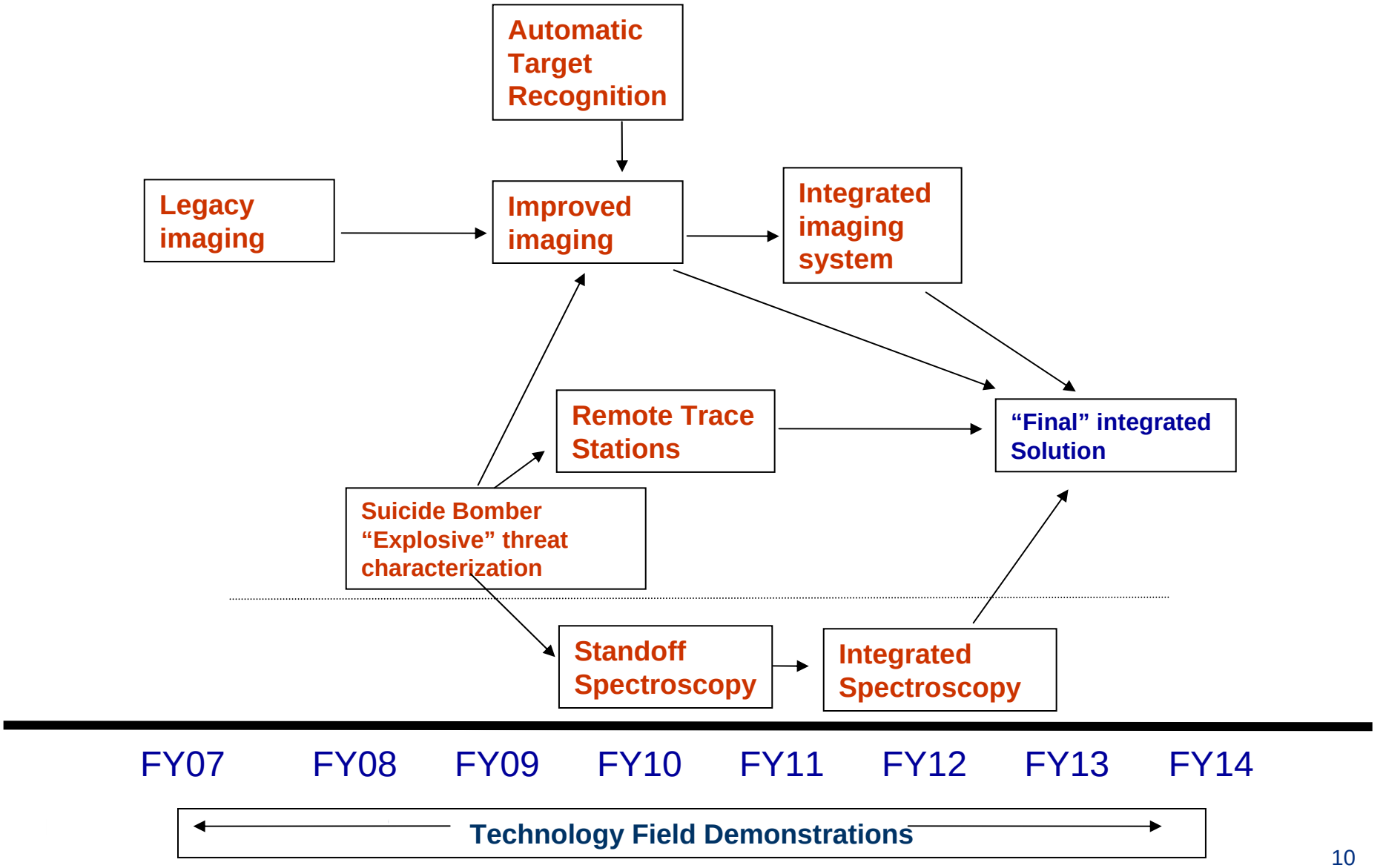
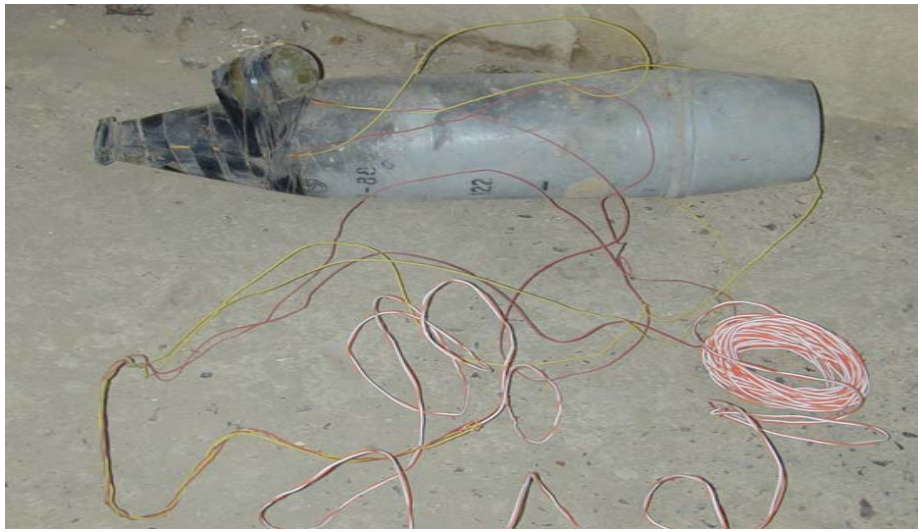
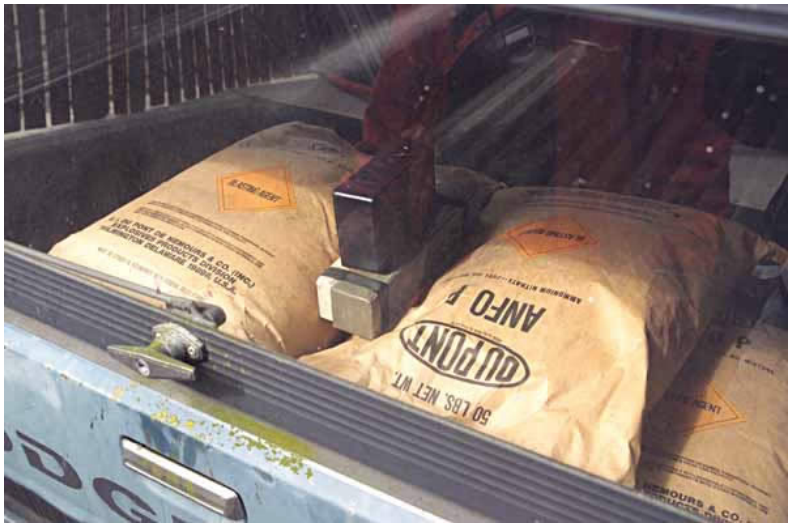
Standoff Detection Strategy



Program Plan—
Distinguishing DHS & DOD Threats

- Threat Materials: Surplus Ordnance vs Commercial Explosives, HME, etc.
- Device Deployment: Concealed Roadside Device vs "Flow of Commerce" Camouflage
- Distinguishing Features for Domestic Suicide Bombers?





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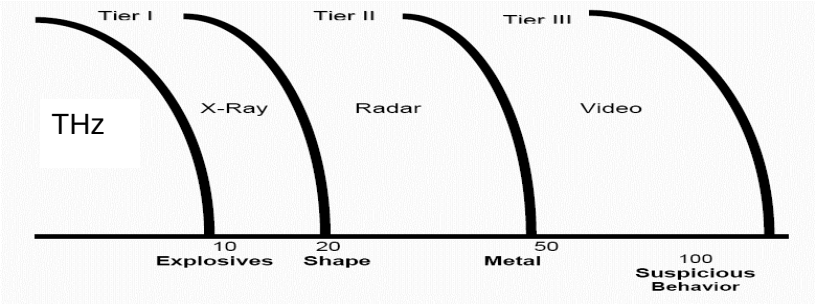
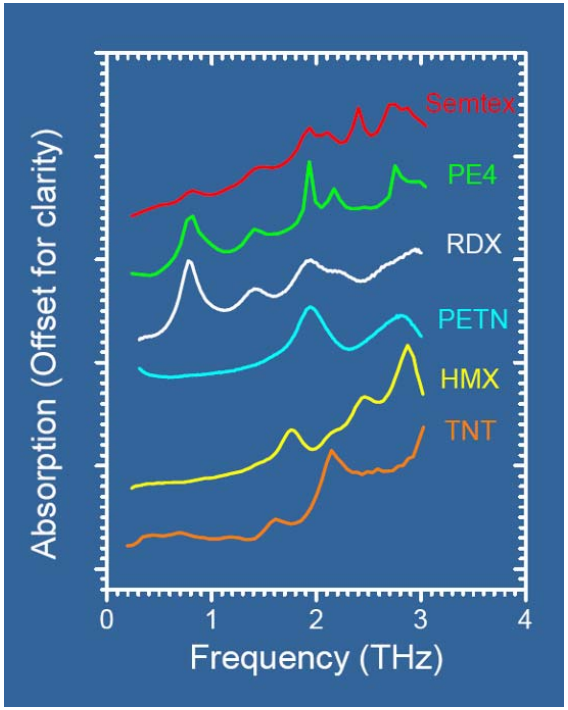
Program Plan—Focus on Standoff Detection

- Fiscal Years ’09 -’14
- Standoff and Remote Detection
  - Active & Passive
  - “Non-Intrusive”
  - Screening of persons and vehicles without impeding flow of commerce
- Integration, Automation, and Data Fusion
  - Layered security approach
- Spectroscopic techniques





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Response

MISSION, GOALS & OBJECTIVES

- Identify, prioritize, and execute RDT&E projects that satisfy interdepartmental requirements to more safely and effectively render terrorist devices safe.
- Emphasis on technologies to access, diagnose, and defeat
  - improvised explosive devices (IEDs)
  - vehicle-borne improvised explosive devices (VBIEDs).

ACCOMPLISHMENTS

- Completed Source Selection for BAA 07-05: Improvised Explosive Device & Vehicle-Borne Explosive Device Defeat: Technologies for Blast Mitigation and Suicide bomber Defeat

DELIVERABLES (planned)

- Develop advanced technologies for diagnostic analysis of improvised explosive devices
- Develop advanced technologies to defeat IEDs and VBIEDs
- Develop or improve the performance and reliability of robotic systems for the bomb squad technician
- Develop improved tools and equipment to increase the safety and effectiveness of bomb squad response
- Develop information resources and delivery systems to enhance response capabilities

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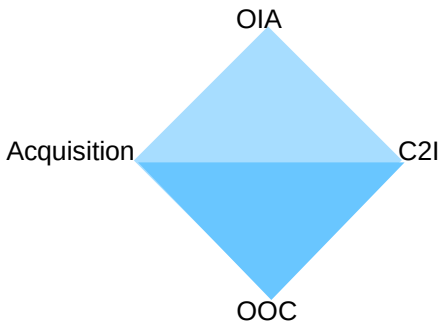
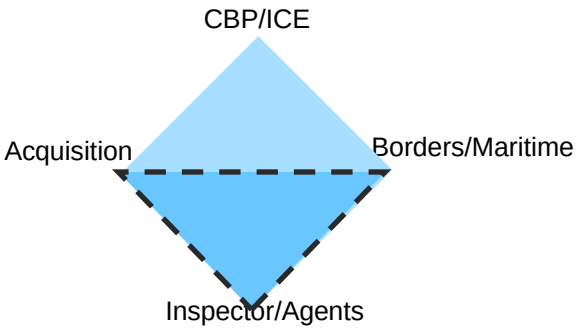
Supporting first responders and protecting the public with appropriate tools, techniques, and procedures

Requirements/Capability Capstone IPTs

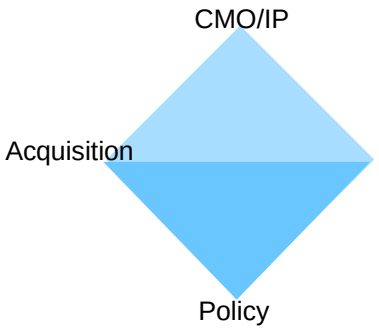
Information Sharing/Mgmt



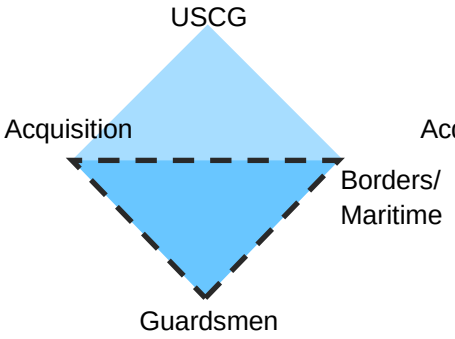
Border Security



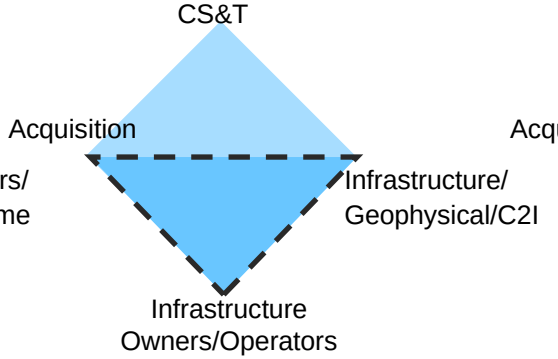
Chem/Bio Defense



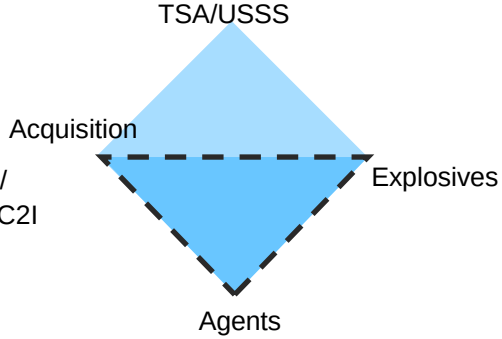
Maritime Security

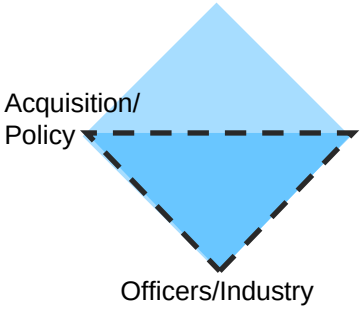


Cyber Security

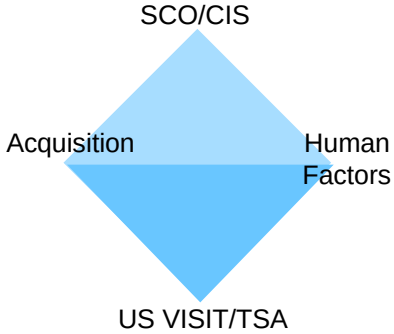


Explosive Prevention

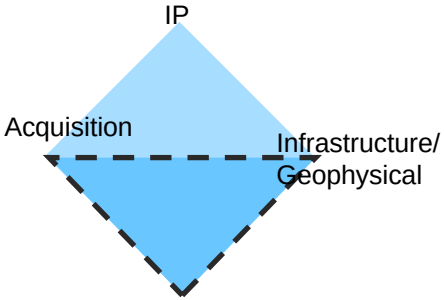




People Screening

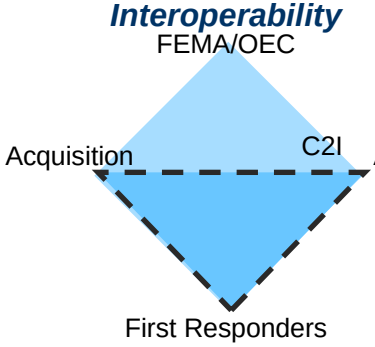


Infrastructure Protection

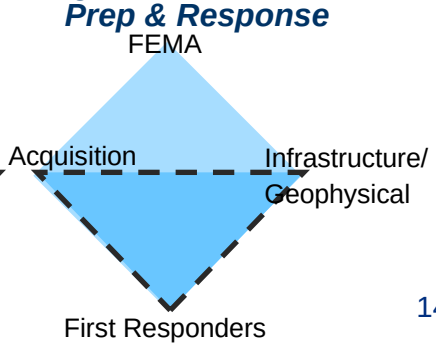


Incident Management

Interoperability



Prep & Response



Representative Technology Needs

- Standoff detection on persons (portable solutions)
- Screen People at checkpoints for explosives and weapons
- System solution for detection in baggage (checked & carried)
- Screen Air Cargo for Explosives
- Capability to detect VBIED / large threat mass (container, trailer, ship, vessel, car, rail)
- Capability to detect homemade or novel explosives
- Capability to assess, render safe, and neutralize explosive threats
- Optimize canine explosive detection capability

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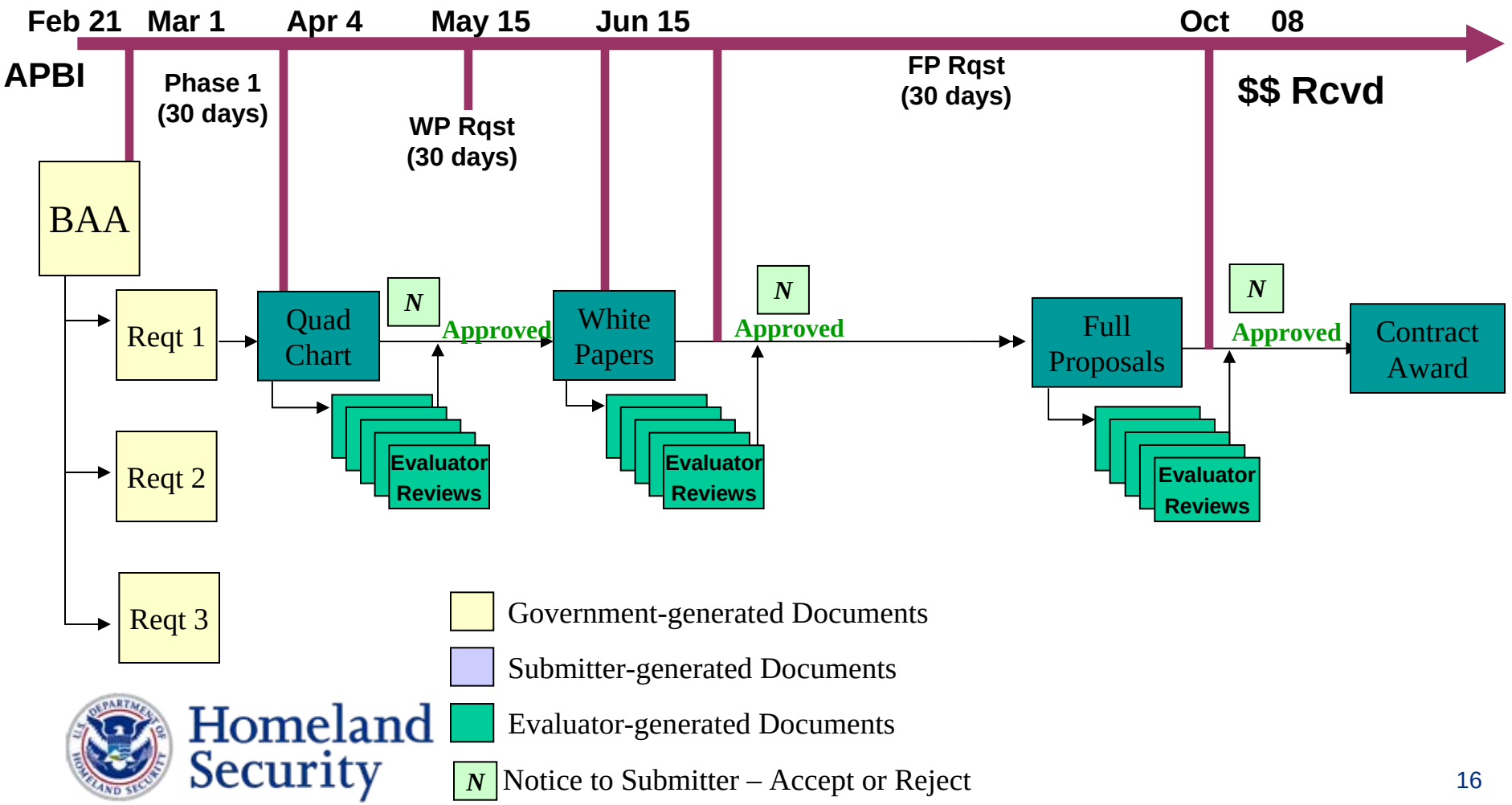
Program Plan FY09

SB/VBIED BAA Solicitation Process And Notional Schedule



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What Makes a Good Requirement?
----------GIVE SPECIFICS----------

- **Users:**
  - Coordinate requirements with other potential end users prior to the meeting
  - Examples: TSA, CBP, Bomb Techs

- **Desired Capabilities:**
  - General Capabilities: size, weight, cost, etc.
  - Technical Requirements: PoD, Pfa, Through-put, Detection time, clear down time, etc.

What Makes a Good Requirement?
----------GIVE SPECIFICS----------

- **Threat/Operational Scenario:**
  - How the capability will be used
  - Example: single agent uses handheld detection capability

- **Rationale for Requirement:**
  - What are the shortfalls of existing systems that attempt to meet the requirement
  - Example: new operational requirements or current tools do not meet detection requirement

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Requirements Request Form
----------GIVE SPECIFICS----------

- **Logistics and Interoperability:**
  - Other constraints
  - Examples: wireless capability, communications protocols

- **Point of Contact/Task Manager:**
  - Name, agency, phone (voice) number, fax number, and e-mail for coordination
  - Example: Joe Foster, DHS S&T

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Requirements Request Template

PRESENTATION OF TECHNICAL REQUIREMENTS

EXAMPLE

Requirement for Response and Canine Sub-IPT Consideration

Title:

Agency Sponsor:

Other Agency Funding?:

User(s):

Desired Capabilities:

Threat Environment:

Threat Operational Scenario:

Rationale for Requirement:

Logistics and Interoperability:

Point of Contact/Task Manager:

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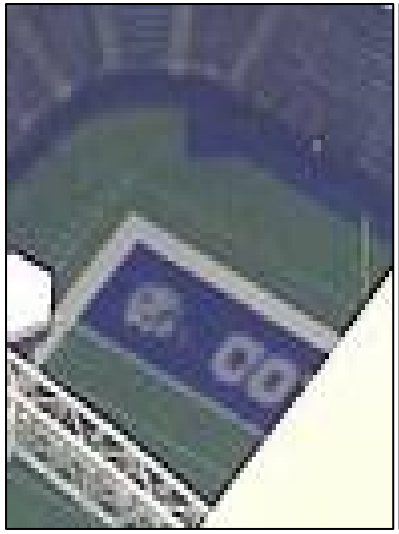
Suicide Bomber Detection:

Standoff, Transportable, and Semi-Automated

Capability

- Addressing the Suicide Bomber detection gap by providing 3 Tiers of standoff detection capabilities. Ultimately, an integrated standoff solution, comprised of both "explosive" and "explosive device" detection technologies, will be offered in late FY13



Metrics

- Prototypes for the detection of concealed explosive devices at 10 - 50 meters standoff - FY09
- Advanced standoff (and/or remote) detection capabilities for explosives and explosive devices - FY11
- Integrate system(s), comprised of mature technologies, for standoff suicide bomber detection at 50-100 meters – FY13

Associated Products

- Standoff Imaging of Explosive Devices
- Standoff/Remote Spectroscopic Detection of Explosive Residues
- Suicide Bomber Threat Characterization for Detection Capabilities
- Integration/Algorithm Development
- Technology Demonstration

Capability Gap Addressed

- Standoff Detection on Persons

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Vehicle Borne IED and Large Threat:

Mass Detection for the Transit Environment

Capability

- Addresses the VBIED detection gap by providing technologies focused on multiple aspects of the threat. Non-contact, remote, and standoff techniques will contribute to an integrated system for VBIED based "explosives" and "explosive device" detection

Metrics

- Remote / Standoff detection capabilities of moving vehicles for anomalous mass loads
- Man-portable bulk explosive (>50lbs) screening capability for vehicle compartments
- Non-contact explosive residue screening capabilities for VBIED Indication
- Integrated, semi-automated VBIED inspection system, comprised of both "explosive" and "explosive device" detection technologies

Associated Products

- VBIED Based Explosives Detection
- VBIED Based Explosives Device Detection
- Integration/Algorithm Development

Capability Gap Addressed

- Detection of VBIEDs

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RenderSafe Technologies

Capability

- Addresses advanced technologies to defeat and render-safe IEDs, VBIEDs, and improvised CBRN devices on land in underwater

Metrics

- Increase standoff by 10 feet
- Reduce collateral damage by 10%
- Increase precision disruption by 20%
- Reduce explosive content by 10%

Associated Products

- Characterization Disruption Tools
- Non-Explosive IED Defeat Tool
- Multi-Shot Disruptor
- Miniature Enhanced Access/Defeat Tools

Capability Gap Addressed

- Response: Assessment / Render Safe / Neutralize explosive threats

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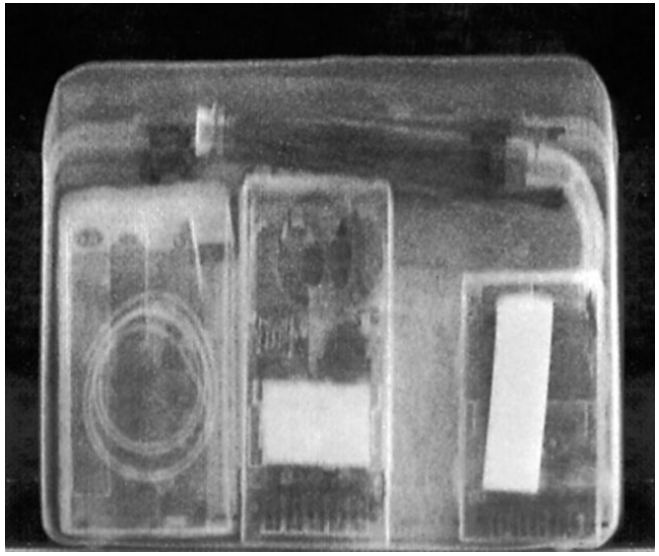
Diagnostic and Assessment Technologies

Capability

- Addresses technologies to rapidly determine the type circuitry of a bomb and to accurately identify all components of the device in stand-off mode



Metrics

- Increase standoff by 100 feet
- Reduce weight to 40 lbs
- Reduce footprint to 3 square feet
- Reduce power requirement by 10%
- Reduce battery size by 25%
- Decrease cost to $50K per unit

Associated Products

- Single Sided Imaging Systems
- Improved Visibility
- Improved Imaging Systems

Capability Gap Addressed

- Response: Assessment / Render Safe / Neutralize explosive threats

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Detection and Neutralization Tools

Capability

Detection:

- Secondary device detection or booby-trap detection. Currently there are no technologies to quickly search for and detect secondary devices or booby traps from a distance

Neutralization:

- Radio Frequency (RF) or Infrared jamming. New jamming technologies are needed in order to inhibit the RF hazardous device while allowing the bomb squad to maintain the RF capabilities of their robot and communications system during an emergency. State and local bomb technicians currently do not have the capability to neutralize IR beams from a distance when detected

Metrics

- Detect booby traps/IR beams from 10 feet
- Improve jamming capability in an urban environment by 25%
- Reduce footprint to 3 square feet
- Reduce power requirement
- Reduce battery size by 25%

Associate Products

- Improved RF Jamming
- Decision Tools

Capability Gap Addressed

- Response: Assessment / Render Safe / Neutralize explosive threats

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Optimize Canine Explosive Detection

Capability

- Increase detection and maximize work potential for canine teams
- Deploy best canine for specific functional and operational need
- Canine inspection enhancements are required to meet new threats and increased demands for canine teams
- Provide communications and data linking for canine, first responders, and remote Command, Control, Communications, Computers and Intelligence (C4I)

Metrics

- Enable DHS canine user agencies such as TSA, CBP, USSS, and IP to:
  - Select or breed the best canines for their needs
  - Better understanding of capabilities of their canines, and plan to optimize their strengths
  - Provide non-hazardous training aids of selected explosives for canine training
  - Provide capability for a monitoring sensor suite for remote canine deployment

Associated Products

- Canine Structure and Function
- Canine Enhancements
- Canine Remote Sensor Tools

Capability Gap Addressed

- Canine Explosives Detection Optimization

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