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S&T Stakeholders Conference

S&T's Counter-IED Program

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June 2-5, 2008

PARTNERING FOR A SAFER NATION

Counter-IED Program:
Actionable Information and Technology Needs

DHS S&T has identified the following goals and principles to guide the development of technologies that deter, predict, detect, defeat, and mitigate the impact of IED attacks

To protect the U.S. population and critical infrastructure from Improvised Explosive Devices (IEDs)

- Proactive Strategy
  - Predict, identify and deter terrorists before an IED mission
  - Protect people and critical infrastructure
- Utilize security processes that allow for free flow of people and commerce
- Technology solutions that fit the domestic requirements and conditions
  - No practical, effective countermeasure capabilities currently exist for the public domain
  - Military solutions conflict with domestic privacy laws or are unsuitable for maintaining open civilian commerce
  - DoD IED threats are exceedingly different (e.g. roadside IEDs)

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C-IED Technology Development Plan:

What We Have Done

- Engaged with the interagency, international, and academic communities to better understand existing research efforts aimed at **deter**ring and **predict**ing IED attacks to identify research gaps and develop a strategy
- Established relationships with the intelligence, policy, and operational communities who will be the customers of research being funded in the **deter** and **predict** programs
- Developed an initial roadmap identifying existing capabilities, operational applications, technology gaps and potential basic research investment opportunities with regard to **detect**ion technology
- Worked with DHS customers to ensure coordination of research and development **detect**ion and **defeat** efforts
- Developed a multi-agency strategic plan for blast **mitigat**ion research & development
- Coordinated **mitigat**ion research needs with more than 30 Federal agencies, States, and Private Industry primarily through the National Infrastructure Protection Plan's coordinating councils

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C-IED Technology Development Plan:

What We Need To Do

- Identify long-term basic research fields of study
  - Multi-year research investment
  - New enabling concepts
  - New applications of existing technologies
- Update technology analysis and documentation
  - Updating prior technology assessments
  - Leverage basic research activities within National Academies of Science, National Science Foundation and National Labs
  - Characterization of basic research needed to address technology gaps
- Identify near-term technological improvements
  - Less than 5 years
  - Short-term impact/improvements for customers

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C-IED Technology Development Plan:

Approach

- Coordinate and leverage other interagency activities against IED threats
  - Department of Defense
  - Department of Justice
  - Department of Energy
  - National Labs, Universities
  - International Partners
  - Industry
  - Others
- Outline a Basic Research Strategy to advance and enable new scientific achievement
- Develop a comprehensive S&T Technology Roadmap for the Homeland by reviewing existing data, documentation and analysis into an integrated, cross-agency National Strategy

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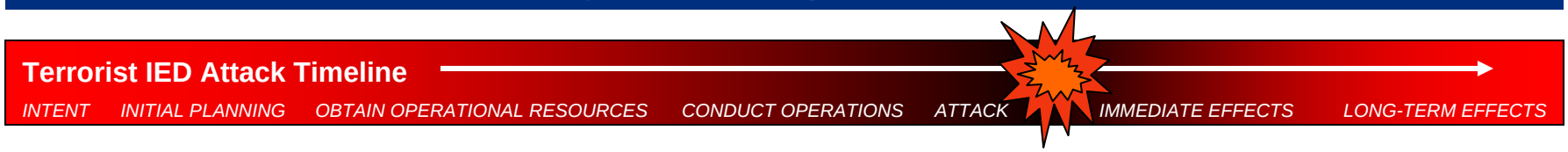
DHS S&T Counter-IED Program

DHS S&T has established a counter-IED program to leverage existing multi-agency research and investments to deter, predict, detect, defeat and mitigate the impact of IED attacks



Deter

Human Factors

- Actionable Indicators
  - Group Characteristics
  - Pre-incident Rhetoric
  - *Pre-incident Behaviors*
  - Community Characteristics
  - *Integration*
- Countermeasures
  - Comparative Counter Red/IED Strategies
  - *Strategy Impact*

Predict

Human Factors

- Predictive Screening
  - Behavior Analysis
  - Video Tracking
  - Video Identification & Alert
- *Risk Prediction*
  - *Target Prediction*
  - *Staging Area Prediction*

Detect

Explosives

- Person Borne IED Detection
- Vehicle Borne IED Detection
- *Canine/Biological*
- *Marking*

Defeat

Explosives

- Bomb Assessment/ Diagnostics
  - Type of Explosive
  - Device Triggers
- Render Safe
  - Electronic Countermeasures (IR/RF Jamming)
  - *Directed Energy*
- *Robotics*
- *Bomb Components*

Mitigate

Infrastructure

- Blast Mitigation
  - Affordable blast resistant materials
  - Rapidly stabilize damaged structure

Explosives

- *Body Armor*
- Inerting
- *Tagging (Forensics)*
- *Post Blast (Forensics)*

Cross Cutting:

- *Standards; Outreach*; Technology Demonstration/ System Integration
- Intel Data Sharing (FBI, CIA, DIA); Technology resource & Test sharing (DoJ, DoD, DoE)

Deter – Actionable Indicators

- **Description**: Develop a framework of actionable indicators and analytic tools based on empirically validated social science research to aid the intelligence and operational communities in identifying IED threats.
- **Operational Need:** Will improve intelligence estimates regarding the actors that pose IED threats.
- **Deliverables / Impact:** Actionable indicators and analytic tools derived from:
  - Analysis of characteristics of groups that conduct IED attacks
  - Analysis of the relationship between broader community attitudes and actual instances of terrorist violence
  - Comparison of the rhetoric of groups and individuals who have – and have not – engaged in terrorist violence

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Deter – Tested Countermeasures

- **Description**: Provide policymakers with data to aid in developing long-term deterrence efforts.
- **Operational Need:** Will increase knowledge of how to counter radicalization and prevent IED attacks.
- **Deliverables / Impact:** Evaluation of the successes and failures of counter-radicalization and counter-IED strategies used in various countries

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Predict - Predictive Screening

- **Description:** Develop technologies to automatically identify, alert authorities to, and track behavioral indicators that precede a suicide bombing attack
- **Operational Need:** Access control and critical infrastructure protection:
  - Increased capability to identify suicide bombing behaviors pre-attack
  - Significant expansion of the active surveillance area to include the entire airport, mass transit portal, and special event venue, etc.
  - Increased deterrence of travelers carrying illegal weapons
- **Deliverables / Impact:**
  - Validated indicators of behaviors that precede a suicide bombing attack
  - Automated video identification and alert of suicide bombing behavioral indicators
  - Automated video tracking capability

Detect - Person Borne IED Detection

- **Description:** Baseline existing technologies, integrate hardware and perform basic research into understanding and improving imaging technologies (infrared, millimeter-wave, terahertz, backscatter x-ray) to be utilized in explosive detection
- **Operational Need:** Portable screening capability for non-contact, standoff interrogation of persons
- **Deliverables / Impact:**
  - Standalone imaging prototypes for real-time screening of suspected suicide bombers from a standoff distance
  - Integrated imaging/spectroscopic technologies to increase probability of detection, lower false alarm rates
  - Prototype demonstration annually

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Detect - Vehicle Borne IED Detection

- **Description:** Focuses on detection of IEDs, either the explosive or the container device, in vehicles utilizing an array of imaging technologies (infrared, millimeter-wave, terahertz, backscatter x-ray), spectroscopic, and trace technologies (infrared, fluorescence)
- **Operational Need:** Screening capability for non-contact interrogation of moving or stationary vehicles while driver/passengers remain inside
- **Deliverables / Impact:** Standalone prototypes for real-time screening of vehicles from a standoff distance

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Defeat - Render Safe/Diagnostics

- **Description:** Develop response and neutralization tools for First Responders to Defeat IEDs; radio frequency jammers; light, fast robotics; multi-shot disruptors; body armor; etc.
- **Operational Need:** Technologies and capabilities that will defeat, neutralize and render-safe IEDs, protecting the First Responder and the public
- **Deliverables / Impact:**
  - Tool Characterization Guide
  - Single-Sided Imager Prototype
  - Proof of Concept for Non-explosive IED Defeat Tool

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Mitigate - Render Inert (Explosives)

- **Description:** Experimental research program to investigate methods or technologies capable of rendering inert many common explosives; developing additives or agents that reduce the blast effect of explosive materials
- **Operational Need:** Provide First Responders with the ability to render explosives and explosive precursors inert at the scene of the IED incident
- **Deliverables / Impact:** Proof of concept study

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Mitigate – Infrastructure Blast Mitigation

- **Description:** Develop affordable blast, fragment, and fire resistant construction materials for before-the-blast protection. Develop rapidly deployable methods to stabilize damaged structures
- **Operational Need:** Reduce casualties, prevent or delay collapse to increase evacuation times, limit cascading damages, and increase safety for first responders
- **Deliverables / Impact:**
  - Proven, affordable blast, fragment, and fire resistant materials for new or retrofit construction
  - Innovative stabilizing methods for safe entry and exit from damaged structures

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Mitigate – Infrastructure Blast Mitigation

- **Description:** Develop tools to determine vulnerability of dams, tunnels and bridges to blasts and develop hardening strategies
- **Operational Need:** Vulnerability analyses developed for buildings do not apply to dams, bridges and tunnels, so new tools are needed to determine vulnerability and design protective measures
- **Deliverables / Impact:**
  - Quantify blast damage (surface, buried, waterside IEDs) to embankments and develop simplified guidance
  - Develop hardening/ fire proofing/ flood proofing options for tunnels
  - Develop protective sleeves for bridge cables
  - Develop composite protective measures for bridge towers

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