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# University Network Summit

## DHS Science & Technology R&D to Counter IED s

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*PARTNERING FOR A SAFER NATION*

# Domestic IED Incidents

May 1927 – Suicide bombing of school kills 45, injures 58, Bath, MI



Feb. 1993 – VBIED attack on World Trade Center garage, kills 6 and injures 1,042



March 2003 – Farmer drives tractor into pond near Washington Monument, threatens IED attack



March 1970 – IED detonates prematurely, killing 3 Weatherman “urban guerillas”, NYC



April 1995 – VBIED attack on Murrah Federal Building kills 168, injures 388, OK City



July 1996 – 2 killed, 111 injured in Centennial Park bombing, Atlanta Olympics



March 2008 – IED explodes at military recruiting center in Times Square

# TERRORIST ROADMAP

LIKELIHOOD OF OCCURRENCE

LOWER

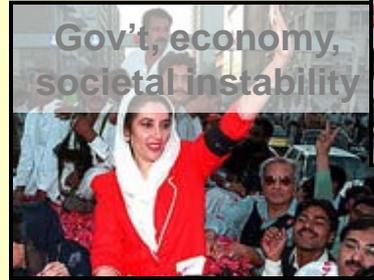
HIGHER

LOWER

CONSEQUENCE OF OCCURRENCE



Physical Critical Infrastructure Attack



Gov't, economy, societal instability



IEDs



Cyber



Trans Nat'l Migration



Chemical



Biological

HIGHER



Radiological



Nuclear

*BOMBS, BORDERS, BUGS, BUSINESS, BODIES, & BUILDINGS*

# Homeland Security Presidential Directive 19

## *“Combating Terrorist Use of Explosives in the United States”*

- Signed February 12, 2007
- Establishes a national policy on the prevention and detection of, protection against, and response to terrorist use of explosives and Improvised Explosive Devices (IEDs) in the United States
- Calls for the development of a National Strategy for IEDs including recommendations

### Paragraph (4):

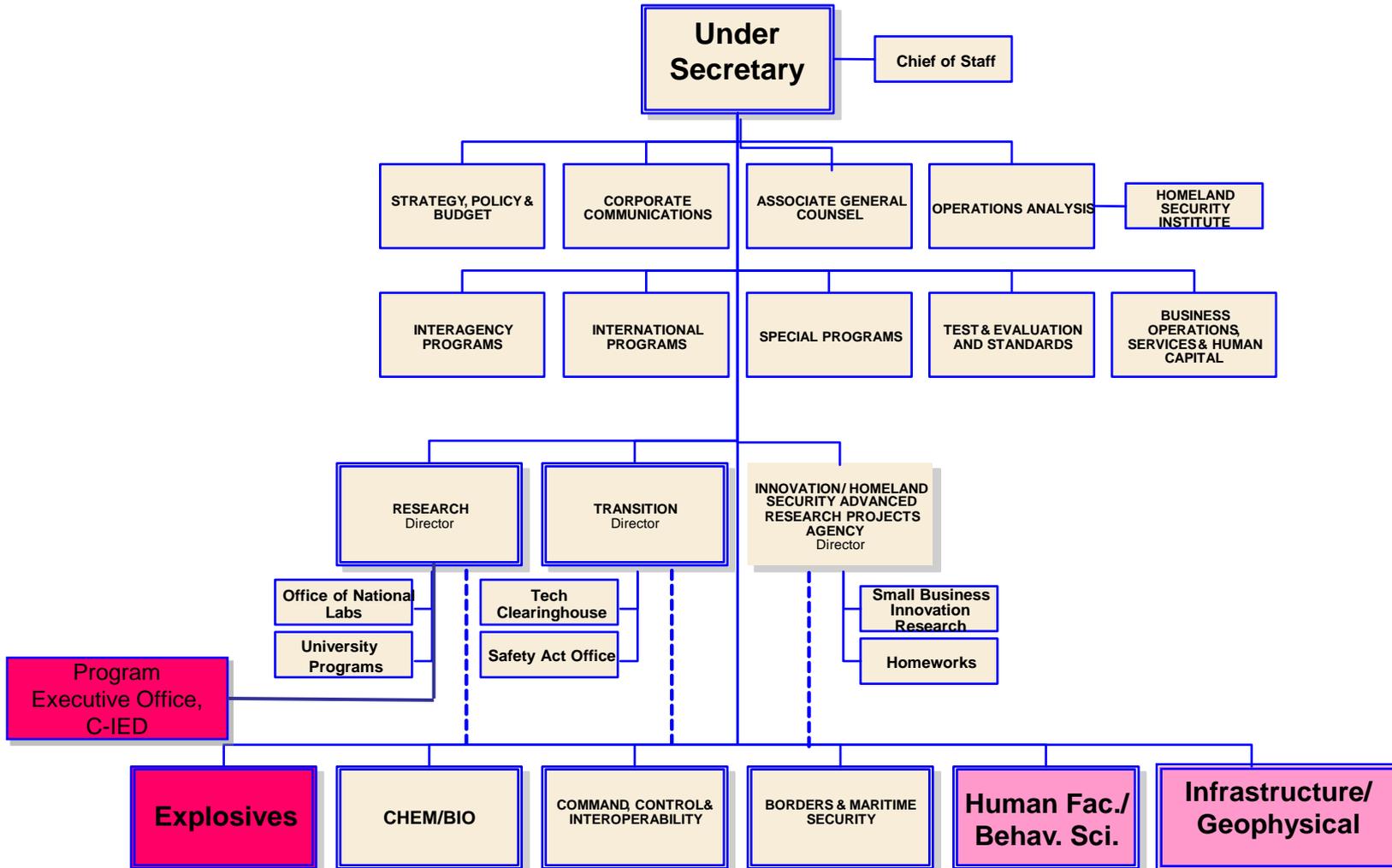
“It is the policy of the United States to counter the threat of explosive attacks aggressively by coordinating Federal, State, local, territorial, and tribal government efforts and collaborating with the owners and operators of critical infrastructure and key resources to deter, prevent, detect, protect against, and respond to explosive attacks, ....”

DHS S&T provides the science and technologies needed to combat terrorist use of IEDs within the US



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# OFFICE OF THE UNDER SECRETARY FOR SCIENCE AND TECHNOLOGY



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# Countering the IED Threat

Obtain Funds

Deter & Predict

Develop Organization

Gather Materiel

Plan the Attack

Detect

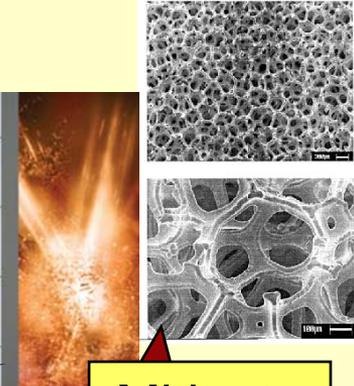
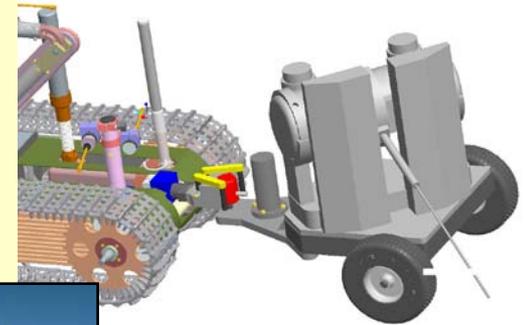
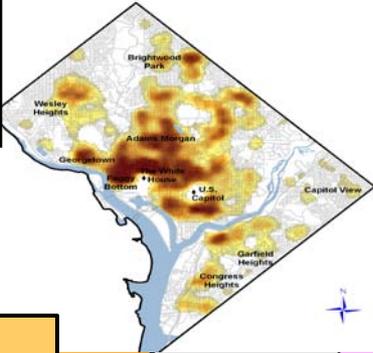
Defeat

Conduct the Attack

Mitigate

Observe Consequences

Attribute Responsibility



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Breaking the links in the IED Delivery Chain

# Prioritization of Needs



Research Challenges in Combating Terrorist Use of Explosives in the United States

Subcommittee on Domestic Improvised Explosive Devices

December 2008

## Critical Needs

- C-ED Network Attack and Analysis
- Detection of Homemade Explosives
- Standoff Rapid Detection of Person Borne IEDs
- Vehicle-borne IED Detection
- IED Access and Defeat
- Radio-controlled IED Countermeasures
- IED Assessment and Diagnostics
- Waterborne IED Detect and Defeat Systems
- IED Warnings
- IED Threat Characterization and Signatures

# 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

## Terrorist IED Attack Timeline

INTENT    INITIAL PLANNING    OBTAIN OPERATIONAL RESOURCES    CONDUCT OPERATIONS    ATTACK    IMMEDIATE EFFECTS    LONG-TERM EFFECTS

<p><b>Deter</b></p> <p><b>Human Factors</b></p> <p><b>Actionable Indicators</b></p> <ul style="list-style-type: none"> <li>Group Characteristics</li> <li>Pre-incident Rhetoric</li> <li>Pre-incident Behaviors</li> <li>Community Characteristics</li> <li>Integration</li> </ul> <p><b>Countermeasures</b></p> <ul style="list-style-type: none"> <li>Comparative Counter Red/IED Strategies</li> <li>Strategy Impact</li> </ul>	<p><b>Predict</b></p> <p><b>Human Factors</b></p> <p><b>Predictive Screening</b></p> <ul style="list-style-type: none"> <li>Behavior Analysis</li> <li>Video Tracking</li> <li>Video Identification &amp; Alert</li> </ul> <p><b>Risk Prediction</b></p> <ul style="list-style-type: none"> <li>Target Prediction</li> <li>Staging Area Prediction</li> </ul>	<p><b>Detect</b></p> <p><b>Explosives</b></p> <ul style="list-style-type: none"> <li><i>Person Borne IED Detection</i></li> <li><i>Vehicle Borne IED Detection</i></li> <li>Canine/Biological Marking</li> </ul>	<p><b>Defeat</b></p> <p><b>Explosives</b></p> <ul style="list-style-type: none"> <li><i>Bomb Assessment/Diagnostics</i></li> <li><i>Type of Explosive</i></li> <li><i>Device Triggers</i></li> <li><b>Render Safe</b></li> <li><i>Electronic Countermeasures (IR/RF Jamming)</i></li> <li><i>Directed Energy</i></li> <li><b>Robotics</b></li> <li><b>Bomb Components</b></li> </ul>	<p><b>Mitigate</b></p> <p><b>Infrastructure</b></p> <ul style="list-style-type: none"> <li><b>Blast Mitigation</b></li> <li>Affordable blast resistant materials</li> <li>Rapidly stabilize damaged structure</li> </ul> <p><b>Explosives</b></p> <ul style="list-style-type: none"> <li><b>Body Armor</b></li> <li>Inerting</li> <li><b>Tagging (Forensics)</b></li> <li><b>Post Blast (Forensics)</b></li> </ul>
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### Cross Cutting:

- **Standards; Outreach; Technology Demonstration/System Integration**
- **Intel Data Sharing (FBI, CIA, DIA): Technology resource & Test sharing (DOJ, DOD, DOE)**



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# Counter-IED Investment Areas

- Social and behavioral science to identify potential IED threats
  - Real-time, automated video-based identification of suspicious behaviors
  - Integrated social and behavioral science indicators of radicalization
- Strategies to deter potential IED attacks before they occur
  - Intent-focused deterrence measures that could be used in the United States

**A human factors portfolio focused on identifying and deterring potential IED threats**



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# Counter-IED Investment Areas

- Improved detection capabilities for known and emerging IED threats
  - Imaging technologies
  - Spectroscopic and trace detection technologies
- Improved probability of detection by screening for IEDs more efficiently to while minimizing effect on flow of people and commerce
  - Non-contact interrogation
  - Enhanced algorithms for automation
- Improved first responders' ability to react to and defeat discovered IED threats
  - IED identification and defeat tools
  - Radio frequency jamming equipment

**Diversified investment portfolio to maximize potential for success**



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# Counter-IED Investment Areas

- Enhanced blast resistance
  - Advanced blast-resistant materials
  - Models for assessing damage from blast
- Mitigation of effects
  - Rapidly deployable means to stabilize damaged structures
- Community resilience
  - Communication of clear, understandable, credible warnings in the event of an IED threat
  - Recovery in the aftermath of an attack

**Preventive measures to reduce effects of an event, help for recovery afterwards**



# Future Requirements

## Immediate Goals & Objectives (0-1year)

- Utilize current tools and equipment

## Near Term Goals & Objectives (1-3 years)

- Currently under development

## Far term Goals & Objectives (3-10 years)

- Concepts and Innovative solutions
- Basic Research vs. Applied Research



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# DHS S&T CIED Challenge:

*From Securing Special Events to Transportation Security and Beyond*





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