CRITICAL RESEARCH/INNOVATION FOCUS AREA DOCUMENT

Improvised Explosive Device (IED) Access and Defeat

Dr. Ruth Doherty
Counter Improvised Explosive Devices (C-IED)
U.S. Department of Homeland Security, Science and Technology (S&T) Directorate

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Please note that as more details are available, DHS will post updated research/innovation focus area overviews on the FutureTECH website. This is a pre-decisional draft document of the NSTC Subcommittee on Domestic IEDs. Please contact Dr. Ruth Doherty, ruth.doherty@dhs.gov for more information.

Who?

Identify any DHS component stakeholders that contain or represent potential end users. Also name any Capstone IPT(refer to http://www.dhs.gov/xres/programs/gc_1234200779149.shtm and the article entitled "Making it Easier to Work with DHS"), if any, which identified a capability gap related to this research/innovation focus area.

The U.S. Department of Homeland Security (DHS) leads for CIEDs are the Office for Bombing Prevention and United States Secret Service (USSS). The corresponding DHS Science and Technology (S&T) Capstone IPT that identified capability gaps related to this focus area is entitled "Counter-IED."

What?

Describe a required technology/capability. Describe how a technology will provide the capabilities and functional improvements needed to address the DHS need. Do not describe a specific technical solution. Instead, describe a conceptual technology for illustrative purposes. Define typical missions that the proposed technology could be utilized to accomplish.

The preservation of human life is paramount in conducting improvised explosive device (IED) defeat operations. To the greatest extent possible, IED access and render-safe procedures are performed remotely in order to reduce risk of harm to personnel. In most instances, this is accomplished through the use of robotic platforms which are controlled by either radio or fiber-optic cables. However, the use of non-radio frequency (RF) methods of remote control for robots and other explosive ordnance disposal (EOD) tools is required to address the remote control improvised explosive device (RCIED) threat.

Due to the potential for creation of an infinite number and variety of IEDs, bomb technicians require a wide range of tools in order to be prepared for all possible scenarios. These tools range from simple hand tools to radiographic equipment and in some cases disruption charges that weigh hundreds of pounds when assembled. Therefore, in addition to remotely operated tools, IED defeat operators need the ability to quickly and easily transport tools, equipment and the technician themselves to the incident site and subsequently down range. This is especially true for larger tools such as those used for vehicle-borne improvised explosive devices (VBIEDs).

Every IED defeat operation carries some risk of a high-order detonation, but proper training of bomb disposal personnel helps mitigate this potential. However, training alone may not ensure that IED defeat operators are able to quickly and easily select the most appropriate tool to render safe a given device depending on the sophistication of the device; the complexity of the tool; and the experience level of the technician. Because of this, access and defeat tools should be sufficiently characterized to allow operators to select the appropriate tool based on the devices construction and its placement.

Science and technology can contribute to the problem of access and defeat of IEDs in a number of areas by developing:
1. Approaches to access the device that are minimally disruptive and hence unlikely to cause unintended initiation of the IED.
2. Approaches to protecting operators who must approach the IED to do manual defeat.

3. Methods of mitigating blast when defeat must be done in a location where collateral damage must be minimized (e.g., in an urban setting).
4. Tools that can function in the presence of and interoperable with electronic countermeasures (ECM) equipment.
5. Defeat techniques that do not require substantial amounts of explosive (which carries with it a hazard of its own) or water (which may not be readily available in large quantities at the site).

References
a. HSPD-19 4 (b, c, d), 9; HSPD-19 I-Plan (Draft) Task Ref: 3.2.1, 3.2.2, 3.2.3, 3.2.4, 3.2.5
b. National Guidelines for Bomb Technicians (Revised 4/06)
c. National Strategy for U.S. Bomb Squads (December 2007) page 19, Section 7.
d. FBISpecial Technicians Bulletin 2007-3: Vehicle Borne Improvised Explosive Device Response Bomb Squad Readiness.
e. Bomb Squad Response to Suicide Bombers and Vehicle Borne Improvised Explosive Devices: Categories of Situations and Strategies for Each Category

Why?

Describe the analysis and rationale for requiring a new technology/capability. Describe why existing technologies cannot meet current or projected requirements. Describe what new technologies/capabilities are needed to address the gap between current capabilities and required capabilities.

IED design is unpredictable and IED defeat operations do not follow rigid courses of action. Today's devices and those developed by future bomb makers will likely contain not only a high explosive charge and improvised initiator, but a power source and activation mechanism that reflects state-of-the-art technology. However, as newer and more technologically advanced devices emerge, the simple device consisting of readily obtainable low explosive or pyrotechnic materials and a rudimentary firing mechanism will remain a deadly variant in the bombers arsenal. Therefore response technologies must address the entire spectrum of possible threats, not just the latest devices design and employment strategy.

Bomb technicians and other IED defeat operators must penetrate the barrier materials or structures surrounding or containing the item of primary concern (gain access to), as well as the contents and components of suspect packages in order to decide upon the selection of appropriate tools to disrupt or disable the device without causing the device to function as designed.

Gaining access to critical components and materials is an integral part of the render safe procedure. This requires that IED defeat operators receive standardized training and equipment in order to access and perform render-safe procedures on all types of IEDs, including VBIEDs and RCIEDs.

When?

If a technology/capability is intended as a countermeasure to a threat, summarize the threat to be countered and how the technology could be used (i.e., concept of operations). If applicable, provide a schedule/timeframe to capture when the technology/capability is needed in order to address the DHS gap.

The range of IEDs that may be encountered is very broad from tens of pounds of explosive that might be found in a leave-behind IED to thousands of pounds that might be present in a VBIED. The energetic materials used in the devices also range in sensitivity from fairly insensitive [e.g., ammonium nitrate (ANFO)] to extremely sensitive [e.g., acetone peroxide (TATP)]. Approaches to defeating one of these materials might initiate the other. A variety of tools applicable to the range of IEDs is needed.

Where?

Describe the projected threat environment in which the technology/capability may be potentially deployed.

Threats identified in urban areas or areas where a high-order detonation would not be warranted require careful planning for access and defeat.