

# **CRITICAL RESEARCH/INNOVATION FOCUS AREA DOCUMENT**

## **Standoff Rapid Detection of Person-Borne Improvised Explosive Devices (PBIEDs)**

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**May 4, 2009  
Version 1.0**

*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](mailto: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](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.*

A solution is needed that provides the ability for security personnel to detect PBIEDs at a sufficient distance, to a reasonable degree of certainty and in sufficient time to allow reasoned decisions to be made and effective actions to be taken to safely deal with the threat posed by that device in a public venue.

The solution must be unobtrusive because if the bomber knows that they are being observed they are likely to detonate causing as much damage as possible. Ideally, the solution will require no cooperation from the subjects under observation.

When the individual carrying an improvised explosive device (IED) is in a crowd, the solution must be able to detect the device without impeding pedestrian traffic flow.

The solution must have a high probability of detection and low false alarm rate. False positives—an indication that there is a PBIED when there is not one—are acceptable within limits. False negatives—an indication that there is not a PBIED when there is one—are not.

The solution may provide stationary, portable or mobile adaptations and/or all three if possible. The solution must be easy to use, require minimum training and be cost effective.

References:

- a. HSPD-19 Requirement 5(d): Improving Capabilities to Combat Terrorist Use of Explosives within the United States.
- b. High Priority Technology Needs, June 2008, Science and Technology Directorate, Department of Homeland Security, page 10, Counter-IED.
- c. National Strategic Plan for U.S. Bomb Squads, December 2007, National Bomb Squad Commanders' Advisory Board, page 12, Section. 5.1.1; page 19, Section 7.

## 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*

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*technologies/capabilities are needed to address the gap between current capabilities and required capabilities.*

Countering PBIEDs is a particularly difficult problem in a free and open society such as ours where individuals are free to travel without leave or hindrance, and where the Fourth Amendment to our Constitution guarantees protection from unreasonable searches and seizures. Fourth Amendment rights pose particular challenges in the context of protecting the public from PBIEDs in a public venue where they are most likely to be used.

Portal-based solutions to PBIED detection require proximity to the suspected bomber and the cooperation of the individuals going through the portal thereby impeding traffic flow and causing people to collect in a relatively small area making them potential targets for PBIEDs. Increased range for the detection of PBIEDS either remotely or at standoff distances is desirable to minimize the accumulation of people and to give additional time to react to a detected threat.

The main challenges associated with PBIEDs are the need for detection before the bomber is in a position to carry out his mission and with enough time to allow an effective response once the PBIED is detected. PBIEDs can have a large lethal radius, much more than the 15 meters nominally assigned to handguns, with instantaneous effect. The problem is further complicated by the fact that PBIEDs are usually concealed so the detection methodology must be able to cope with clothing or other cover as well as the possibility that the aspect presented to the detector may hide the device or other materials being probed.

Since they can have minimal metal content, PBIEDs are hard to detect with technologies that presume the presence of metallic components and rely on that feature for positive detection.

## **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.*

Response to a PBIED is a more complex undertaking particularly for domestic law enforcement agencies than dealing with other types of deadly force situations such as those involving handguns. The PBIED is ordinarily concealed under clothing/other cover and may not be exposed before the device is detonated. Whatever approach is taken to the identification of a PBIED and subsequent incapacitation of the bomber must have a degree of certainty that is legally sufficient to justify the use of whatever means of incapacitation is employed up to and including deadly force.

## **Where?**

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

PBIEDs are terror weapons that are typically employed in venues where large concentrations of individuals congregate such as at major sporting events, airports and/or shopping malls. The presence of a crowd makes the detection problem more difficult due to clutter and possible interferences.

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Many of the venues in which detection of PBIEDs is conducted are outdoors and do not have controls over environmental conditions (temperature, humidity, precipitation, dust, etc.). Any proposed solution must be able to detect PBIEDs that have minimal metal content under a variety of clothing, in all weather, day or night, outdoors and that may contain a variety of different types of explosives.

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