Next Generation Explosives Trace Detection Project

Science and Technology

CHALLENGE: EVOLVING THREATS

Attacks and plots targeting commercial airlines underscore the importance of aviation security and the enduring need to detect and identify emerging explosive threats. Using evasion tactics, bad actors employ conventional, liquid, and homemade explosives (HMEs) to threaten aviation security.

In partnership with Transportation Security Administration (TSA) Requirements and Capabilities Analysis (RCA) and Component representatives, the Department of Homeland Security (DHS) Science and Technology Directorate's (S&T) Next Generation Explosives Trace Detection project is developing research and development solutions to provide Transportation Security Officers (TSOs) and explosive specialists across the homeland security enterprise with state-of-the-art explosives trace detection and identification capabilities. These include:

- Characterizing and understanding the nature of the threats
- Developing advanced training tools and curriculum to enhance operators' capabilities in the field
- Enhancing capabilities of currently deployed explosive trace detectors (ETD)
- Developing enhanced sampling, upgradable and expandable threat libraries, and threat identification for both current and emerging threats
- Developing efficient non-contact sampling methodologies and explosives trace vapor detection technologies
- Educating and training the current and future homeland security workforce

OPERATIONAL IMPACT IN THE FIELD

The NextGen ETD project is providing frontline operators the right training, tools, and capabilities to detect, identify, and defeat explosive threats. Operational impacts include delivering: 1) knowledge products that help DHS Components understand the nature of explosive threats, and 2) novel explosives detection capabilities (e.g., contact trace, vapor, and through barrier detection) to enhance end-users' detection performance while reducing their cognitive overload.

RECENT ACCOMPLISHMENTS

- Validated Explosives Vapor Testbed using real-life scenarios. (Fiscal Year (FY) 22 Quarter (Q) 2)

- Delivered Quality Assurance/Quality Control kits to provide a safe, rapid verification method that trace detection equipment is working in an operational environment to the U.S. Secret Service (USSS), TSA Systems Integration Facility, and TSA Red Team Index Division Inspection. (FY22 Q4)

UPCOMING MILESTONES

- Deliver a Next Generation Mass Spectrometer ETD with increased probability of detection of over 20 threat-related compounds as well as a decrease in the probability of false alarm rate to the USSS. (FY23 Q3)

- Demonstrate a machine learning explosive detection algorithm that allows TSA to add new explosive detection capabilities to rapidly respond to emerging threats using already deployed detection systems. (FY23 Q2)

- Complete a design review for a small-bulk confirmatory prototype that screens through barriers. (FY23 Q4)

CUSTOMERS

- TSA
- U.S. Customs and Border Protection
- USSS
- U.S. Coast Guard

PARTNERS

- Department of Defense, Combating Terrorism Technical Support Office
- Defense Advanced Research Projects Agency
- United Kingdom Home Office