Emergent Challenges in Aviation Security that Drive the Need for Enhanced Detection Equipment

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Enhanced Detection Equipment Solutions

Mission

Improve detection capability for emergent threats to commercial aviation security

- Prioritize the focus on **explosive threats in checked baggage**
- Leverage capabilities: **checkpoint, cargo, soft targets,** and **other applications**
- Ensure **suitability in end-use** with respect to **systems integration, security screening processes, passenger facilitation,** and **business economics**

Problems

- Detection standards become more challenging in response to threats
- Single- and dual-energy x-ray absorption characterization and detection of threats may no longer suffice
- Increasingly congested Region of Responsibility (RoR)
- Additional material discrimination capability may be needed to maintain the Probability of Detection (Pd) and to control the Probability of False Alarms (Pfa)
- Solutions must be effective, reliable, deployable, and affordable

Partner Roles

- Next Generation Technology Working Group (WG)
- S&T Broad Agency Announcement (BAA) and TSA Innovation BAA
- Industry participation in standards development
- Collaborative Testing and Evaluation (T&E) and data collection

Evolution of Detection Equipment

Full Threat Weight (FTW)

v5.8

v7.2

v7.3a/b

v8.x

- Computed Tomography (CT) Explosive Detection Systems (EDS) have been around for **30 years**

Advances in EDS Technology

- Sources and detectors
- Software and algorithms
- Mechanical engineering

- Advent of **new and additional threat materials**
  - Adding Home-Made Explosives (HME), adjusting threat mass
- EDS and Checkpoint Property Screening System (CPSS) fleet contain many makes and models, but are essentially the **same technology**

New Standards

- **Detection Standards Progression**
  - Threat weight reduction, HMEs, more HMEs
- **What will v8.x do?**
  - Respond to latest intel, push the edge of current technology, probably require more than algorithm advances
- **What is DSARM and its criteria?**
  - A forward-looking methodology for prioritizing threat materials
  - Main charge, raw threat, and incident history factors
  - Essentially looks at how likely, easily, and effectively the adversary could use material
- **What is an RoR and what does "congestion" mean?**
  - Region of Responsibility (RoR) plots x-ray attenuation as function of mass density
  - Congestion caused by increasing number of materials… resulting in overlap and loss of discrimination

Challenges and Solution Pathways

Identified Challenges

- Need **additional capabilities** to **detect more threat materials**
- Need to **maintain Pd and control Pfa**
- Need to **support or improve screening operations**
- Need to **ensure human-systems integration**, for both operators and passengers
- Need to create additional **development and acquisition investments**
- Need to make **system procurement and lifecycle support affordable**

Pathways to Solutions

- Milestones and timelines tracked in **Capability Roadmaps**
- **Next Gen WG membership and activities**
- **BAA and other avenues**
- **Partners already engaged**
  - ✓ *DHS Science & Technology*
  - ✓ *Other US Government organizations*
  - ✓ *Industry*
  - ✓ *Academia*
  - ✓ *International partners*


TRANSPORTATION SECURITY
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