

Eleventh *Advanced* Development for Security Applications
Workshop (ADSA11):

Explosives Detection in Air Cargo – Part II

Workshop Objectives



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So What? Who Cares?

- Known:
 - Airlines favorite target of terrorists and they have put IEDs in cargo
 - Known shipper and equipment [mainly trace] on qualified product list (QPL) satisfies US congressional legislation to mandate the screening of all commercial air cargo
- Problem: Detecting explosives in cargo very difficult problem in part because of:
 - Size/penetration
 - Neutrons moderated by hydrogen
 - X-rays moderated by large path lengths, high Z material or do not create contrast
 - Sampling for particle and vapor
 - Concept of operations
 - Resolution of false alarms
 - Screening/scanning not done by TSA
 - Costs
- Solution: Assemble very bright people and allow scientific method to develop improved methods for detecting explosives and concepts of operations in air cargo
- Successful workshop: People here working on the problem with DHS, TSA, vendors

Rule #1 – Open Discussions

- This is a workshop, not conference
- Conversation and questions expected at all times, especially during presentations
- Moderator responsible for keeping discussions focused and initiating discussion
 - Will *try* to allow speakers to complete their introduction

Rule #2 – Speaker Instructions

- 2nd slide has to be “so what who cares”
 - State how technology will improve explosive detection
 - Optimum presentation: stop at 2nd slide
- Don't get trapped into developing the whole story before giving the bottom line.

Rule #3 – Public Domain

- Do not present classified, SSI, FOUO or proprietary material
- Presentations, minutes and proceedings will be placed in the public domain
 - After review for SSI and classified material

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ADSA10 Findings (I)

- There are advantages and disadvantages with all the deployed and the potential future technologies, especially in light of the following considerations.
 - Type of containment: break-bulk, palletized, containerized
 - Type of cargo: hydrogenous, highly attenuating, heterogeneous
 - Location of screening: off-site or at airport
 - Total cost of ownership: equipment, labor
 - Concept of operation: throughput, alarm resolution
 - Type of explosive: mass, thickness, density, elemental composition

ADSA10 Findings (II)

- QPL includes trace, CT EDS, 2D projection
 - Trace mainly used because of cost
- Many promising technologies were discussed including high-energy x-rays, neutrons, nuclear resonance fluorescence, risk-based screening, sparse view sampling and interior tomography.
- However, many may not be suitable for deployment as stand-alone devices.
- Instead, these technologies may be more suitable for fusing with other technologies.

ADSA10 Findings (III)

- The next ADSA should continue to address air cargo inspection. The topics that should be discussed include the following topics as applied to cargo inspection:
 - Concept of operation
 - Cost of ownership
 - Financial considerations – externality
 - “an externality is the cost or benefit that affects a party who did not choose to incur that cost or benefit”
 - Canine inspection
 - Particle and vapor inspection including sampling
 - More viewpoints of the following stakeholders: airlines, freight forwarders, insurers and US governments and ROW
 - Differences between screening and scanning
 - Risk-based screening and scanning

Points to Consider

- Screening includes known shipper
- “There are advantages and disadvantages with all the deployed and the potential future technologies”
 - Cannot discuss here
- Externality
 - Shippers may not know detection specs
 - Purchase cheapest equipment – trace
- How to get “better” equipment developed and deployed?
- Assume for this workshop that TSA’s needs may change in the future, especially if there is an event.

DHS Tactics

- Augment abilities of vendors with 3rd parties
 - Academia
 - National labs
 - Industry other than the vendors
- Create centers of excellence (COE) at universities
- Hold workshops to educate 3rd parties and discuss issues with involvement of 3rd parties
 - Algorithm Development for Security Applications (ADSA)
- Forage for technology in other fields

Equipment Requirements

- Probability of detection (PD)
- Probability of false alarm (PFA)
- FA resolution
- # types of threats
- Minimum mass
- Minimum sheet thickness
- Total cost of ownership
 - Purchase price
 - Siting
 - Labor
 - Maintenance
- Extensibility
- Ability to fuse
- Compatible with risk-based screening
- False alarm resolution methodologies
- Siting
- HVAC, space, weight shielding
- Throughput
- Safety

Questionnaire

- Request for everyone to answer questions preferably during the workshop
- ~10 questions – 10 minutes
- Available via Survey Monkey

<https://www.surveymonkey.com/s/ADSA11>



SurveyMonkey.com
because knowledge is everything

Minutes

- Minutes will be taken of discussion
 - Sensitive information to be redacted
- Please identify yourself and institution first time you speak

Acknowledgements

- Northeastern University (NEU)
- Awareness and Localization of Explosives-Related Threats (ALERT) DHS Center of Excellence
- Department of Homeland Security (DHS)
- Presenters
- Participants



Acknowledgements

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 - Harry Martz, LLNL
 - Laura Parker, DHS
 - George Zarur, DHS/TSA (retired)
 - Peter Harris, Yankee Foxtrot
 - Allan Collier, TSA
- Agenda suggestions
 - Doug Pearl, Inzight Consulting

Logistics

- Melanie Smith, lead
- Deanna Beirne
- Kristin Hicks
- Teri Incampo
- Anne Magrath

Let them know if you need support during or after workshop.

ADSA12 Provisional Topics

- Risk-based screening & gaming theory
 - Hardening, deterrence
- Computer simulations
 - X-ray transmission, back-scatter, diffraction, MMW, neutrons
 - Standardized phantoms
- Improving statistical significance of testing

ATR Program Review

- Thursday, November 6th, here
- 5 groups developed automated threat recognition (ATR) algorithms for CT-based EDS
- Detect objects of interest from scans on medical CT scanner
- All data, results and tools in public domain
- Details in your folders
- All are welcome to attend

Final Remarks

- “Terrorism causes a loss of life and a loss of quality of life,” Lisa Dolev, Qylur
- Need improved technology
- Thank you for participating



No Passengers if
Cargo Onboard