



Apex: Screening at Speed (SaS)

ADSA14 – Development and Deployment of Fusible Technologies for the Checkpoint

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John Fortune

Program Manager, Apex SaS
HSARPA / Explosives Division
Science and Technology Directorate



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Program Challenges

Security and Throughput

- Security is affected by the systems' capability to detect evolving threats
- Throughput is affected by divestiture requirements, false alarms, and secondary screening.



False alarms and checkpoint complexity drive TSA to allocate **more than half** of Aviation Security funds to screener staffing



Why is checkpoint screening hard?

- Passenger and baggage screening systems will not meet TSA's highest security objectives through incremental upgrades
- Current baggage screening cannot distinguish between some threats and some innocuous objects
 - Need more views (current x-ray technology only produces two or four views)
 - Need data beyond density
- Passenger screening causes frequent false alarms
 - Little to no depth/thickness information
 - No material discrimination
- Reliably discriminating the vast array of conventional and homemade threats requires **more information** than current methods produce
 - Not simply a data quality issue – need new technical approaches to detect challenging threats and reduce false alarms



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SaS Operational Impact

- TSA requires new technology to reach their highest threat detection Categories
- Program would reduce the 2,200 lanes used for present CONUS throughput [1]
- Reducing divestiture and false alarms could allow up to 40% of checkpoint staff at Standard lanes to be redeployed to support other critical tasks
- The FAA projects domestic air travel volume to grow 2.2%/year [2]
- **Goal: Increase TSA's efficiency, and outpace growing screening demand**



SaS Outcome	SaS Impact
Improved threat detection	Improved security
Fewer new lanes needed	Fewer systems and screeners
Reduced false alarm rates	Fewer searches/searchers
Walk-through screening	Shorter lines, fewer complaints

[1]: TSA Full Operational Capacity, 2014

[2]: FAA Aerospace Forecast, Fiscal Years 2016-2036

Throughput Improves Security

- Screening delays create crowds of unscreened, vulnerable passengers, tightly packed in open environments
- Throughput limitations hinder other CONOPS (stadiums, transit, etc.)
- Adversaries have attacked airports outside of the secure area:
 - 1/24/11: Suicide bombing at Moscow's busiest airport, Domodedovo International, kills 37 and injures 173
 - 3/22/16: Suicide bombings at Brussels Airport in Zaventem kill 17 and injure 81

CCTV Video: Moment of explosion caught on tape at Domodedovo airport



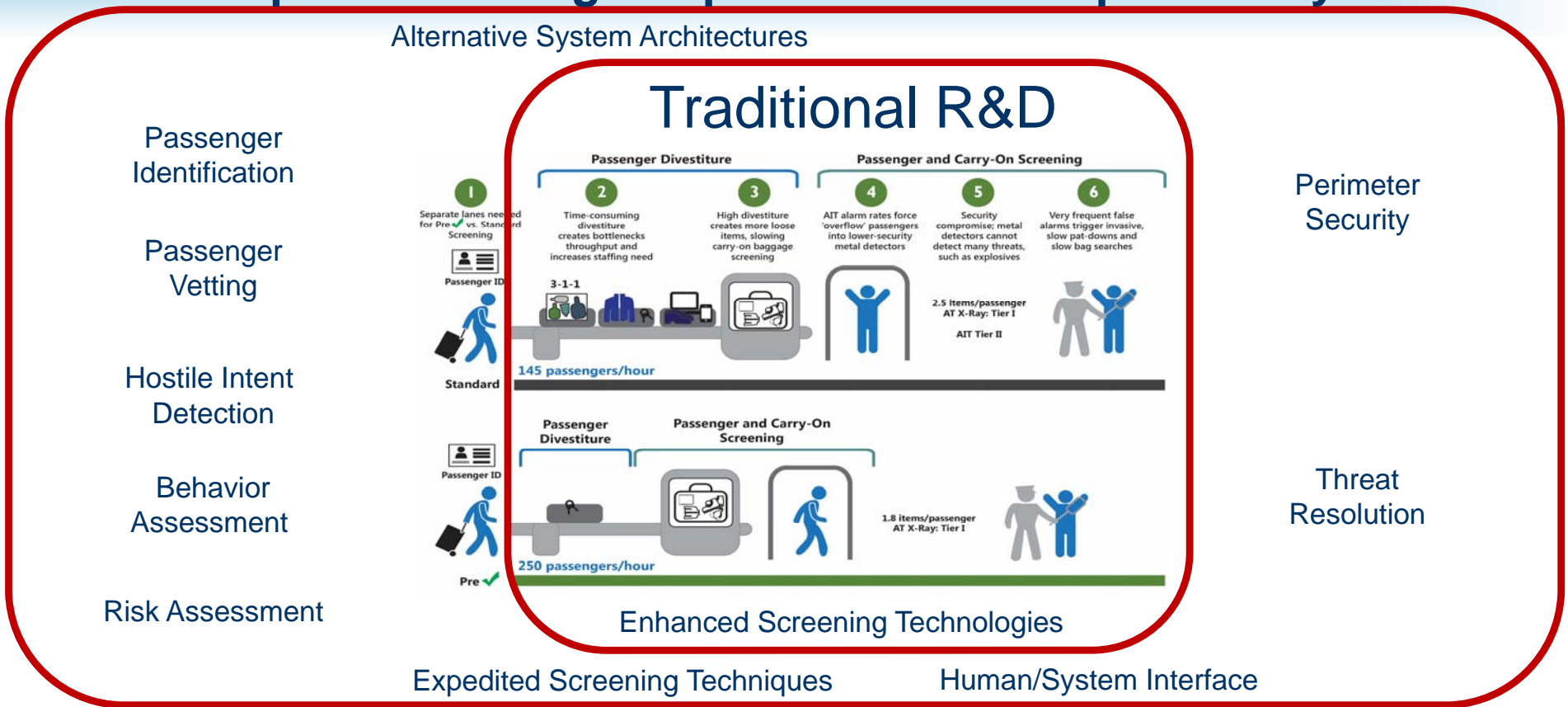
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Apex SaS must go beyond traditional threat screening

Apex Screening at Speed Area of Responsibility

Alternative System Architectures



Expedited Screening Techniques

Human/System Interface



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Where does security happen?

**Ticketing/
Vetting**

Airport Arrival/Entry
 Identification - unknown
 Trust - unknown
 Threat – unknown
 Density - high

Current Security Checkpoint

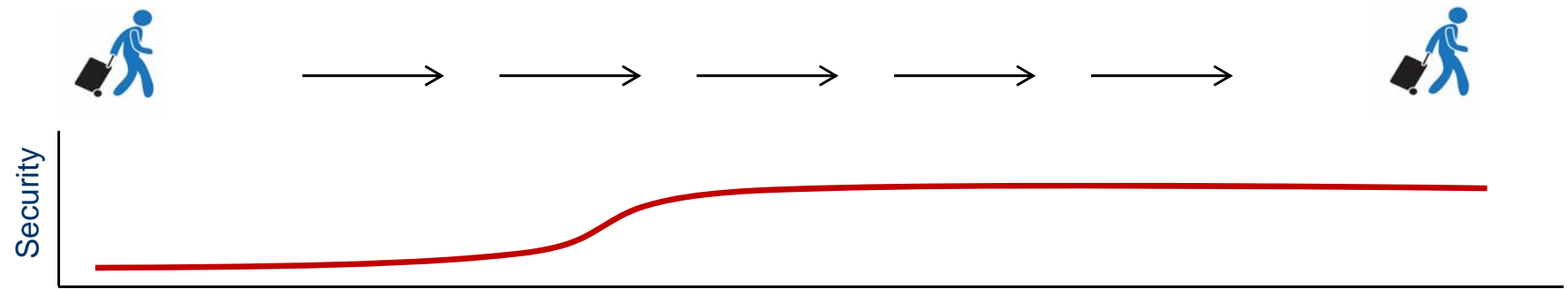
Gate
 Identification - Known
 Trust – Assumed
 Without Threat - Known

Current



Ideal

High-Flow Security



Passenger Analysis

Pre-Passenger & Carry-on Screening

High-Definition
Wide-Area
Surveillance

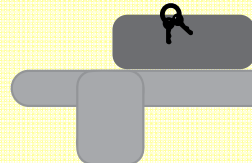
Behavior
Detection and
Hostile Intent in
Unstructured
Crowds



Standoff trace (eye-safe
IR, hyperspectral,
Raman, etc.)



Passenger ID



Credential
Authentication

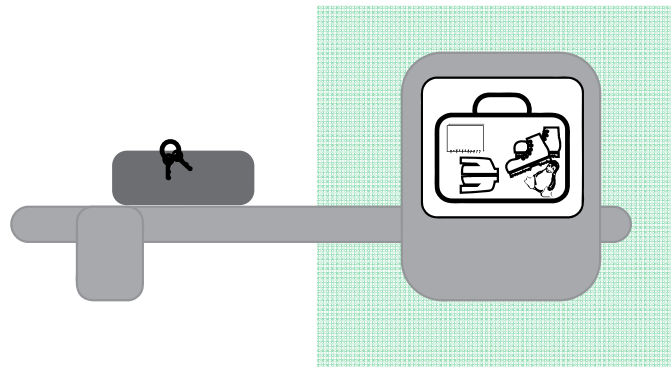
Bag/Traveler
Association

Baggage Screening

Computed Tomography
(hundreds of views)
geometry

X-Ray
Diffraction

Long-range/high-risk
techniques: Positrons,
muons, etc.



Phase Contrast Imaging

Multi-Energy
Detection

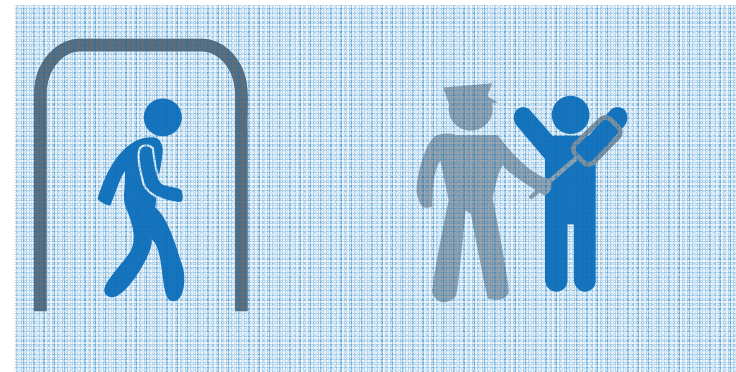
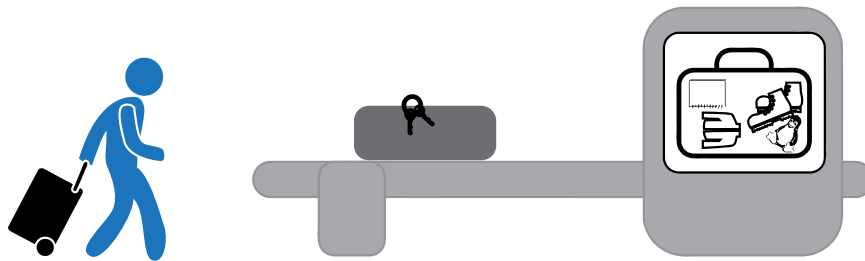
Integrated
Trace

Passenger Screening

Standoff/walk-through
video-rate acquisition
and processing

Proposed Activity

Prize Competition for algorithm improvement
in collaboration with TSA and TSL



Multiple
angles/frequencies,
including shoe scanning

Integrated Non-
Contact Trace

Handheld active or
passive AIT wands for
resolving alarms

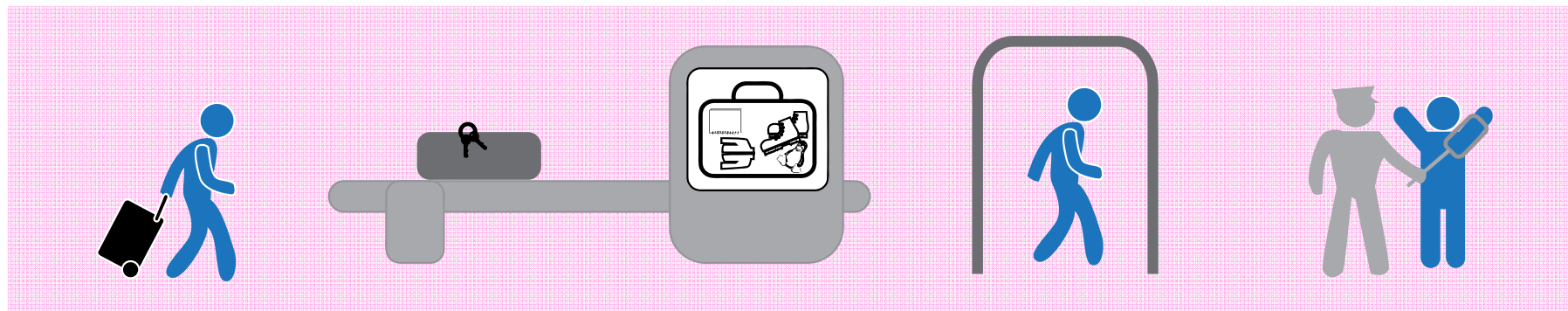
Broader Architectures

Dynamic Risk-Based
Screening

- Airport of the Future
- Futures Workshop



Innovation Lanes



Sensor Fusion / Layers



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