SECURITY PROCESSES AND TECHNOLOGICAL INNOVATIONS

Session 4
Welcoming Remarks

Ms. Angela Gittens
Director General, Airports Council International (ACI) World
Security Processes And Technological Innovations

Dr. Harry Martz
Director, Center for Non-destructive Characterization Institute, Lawrence Livermore National Laboratory
Case Study 4.1
Innovation at the Security Checkpoint

Moderator:
Mr. Jeffrey Barrow, Manager, Smart Security, ACI World

Presenters:
• Mr. Sebastien Colmant, Development Manager, Smart Security, IATA
• An Airport’s Perspective, France - Mr. Erick Bouraï, Head, Aviation Security Policy, Groupe ADP, Paris, France
• Mr. James McDonald, Head, Threat, Risk & Innovation Policy, DfT, United Kingdom
• Mr. José Bonilla, Director, Innovation Task Force, Office of Requirements and Capabilities Analysis (ORCA), TSA, United States
Efficiency Measurement at Passenger Checkpoints

ICAO AVSEC 2017

Montreal, 13 Sept. 17
Smart Security envisions a future where passengers proceed through security checkpoints with minimal inconvenience, where security resources are allocated based on risk, and where airport facilities can be optimized, thus contributing towards an improved journey from curb to airside.
Inefficient by nature

- Bottlenecks
- Suboptimal utilization of screening equipment capacity
- Suboptimal utilization of staff capacity (especially at x-ray)
- Rigid staffing model
- Multiple lanes required to deliver limited capacity
Current and emerging Trends

- Lane automation
- Centralized Image Processing (remote screening)
- Advanced cabin baggage screening (EDS – CT)
- Passenger security scanners
- Checkpoint Management System
- Checkpoint Environment
Checkpoint Efficiency Measurement

Benchmarking checkpoints?

Throughput

Airport A

2015

Airport B

Throughput

Airport A

2015

2016
Checkpoint Efficiency Measurement

Throughput or Staff efficiency?

5 staff
34 pax/h/staff
170 Pax/h

6 staff
31.67 pax/h/staff
190 Pax/h
Checkpoint Efficiency Measurement

Throughput or Surface efficiency?

207 sq. m.  2.17 pax/h/sq. m.  450 Pax/h

93.5 sq. m.  2.35 pax/h/sq. m.  220 Pax/h
### Checkpoint Efficiency Measurement

#### Staff efficiency or Surface efficiency?

<table>
<thead>
<tr>
<th></th>
<th>Checkpoint A</th>
<th>Checkpoint B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of lanes</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Sustainable lane throughput</td>
<td>400 pax/hour</td>
<td>200 pax/hour</td>
</tr>
<tr>
<td>Sustainable throughput per entire checkpoint</td>
<td>800 pax/hour</td>
<td>800 pax/hour</td>
</tr>
<tr>
<td>Checkpoint footprint</td>
<td>260 sq. m.</td>
<td>288 sq. m.</td>
</tr>
<tr>
<td>Staff per lane</td>
<td>10</td>
<td>4.5</td>
</tr>
<tr>
<td><strong>Staff efficiency</strong></td>
<td><strong>40 pax/staff/hour</strong></td>
<td><strong>44.44 pax/staff/hour</strong></td>
</tr>
<tr>
<td><strong>Surface efficiency</strong></td>
<td><strong>3.08 pax/sq. m./hour</strong></td>
<td><strong>2.77 pax/sq. m./hour</strong></td>
</tr>
</tbody>
</table>

**Set your objectives!**
AVIATION SECURITY
THE WAY FORWARD

by Erick BOURAI, Head of AVSEC International affairs
SECURITY SCREENING
NOTICE

All individuals are subject to screening beyond this point.
**RECENT HISTORY**

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977</td>
<td>Mogadishu</td>
<td>Passenger Screening, Cabin Baggage Screening</td>
</tr>
<tr>
<td>1989</td>
<td>Lockerbie</td>
<td>- Check of Hold Baggage Reconciliation, Passenger Screening, Cabin Baggage Screening</td>
</tr>
<tr>
<td>2001</td>
<td>9/11</td>
<td>- Aircraft and vehicle checks (APIS, No Fly), Cockpit Doors reinforced, Continuous baggage surveillance, 100% Staff Screening, 100% Hold Baggage Screening, 100% Baggage Reconciliation, Passenger Screening, Cabin Baggage Screening</td>
</tr>
<tr>
<td>2006</td>
<td>Liquid plot</td>
<td>- Ban on liquids, Aircraft and vehicle checks (APIS, No Fly), Cockpit Doors reinforced, Continuous baggage surveillance, 100% Staff Screening, 100% Hold Baggage Screening, 1005 Baggage Reconciliation, Passenger Screening, Cabin Baggage Screening</td>
</tr>
<tr>
<td>2009</td>
<td>Detroit</td>
<td>- Security Scanners, Second screening US-flights, Ban on liquids, Aircraft and vehicle checks (APIS, No Fly), Cockpit Doors reinforced, Continuous Baggage surveillance, 100% Staff Screening, 100% Hold Baggage Screening, 100% Baggage Reconciliation, Passenger Screening, Cabin Baggage Screening</td>
</tr>
<tr>
<td>2015</td>
<td>Inspire</td>
<td>- Explosive Detection (ETD/EDS), Security Scanners, Second screening US-flights, Ban on liquids, Aircraft and vehicle checks (APIS, No Fly), Cockpit Doors reinforced, Continuous Baggage surveillance, 100% Staff Screening, 100% Hold Baggage Screening, 100% Baggage Reconciliation, Passenger Screening, Cabin Baggage Screening</td>
</tr>
<tr>
<td>2016-2017</td>
<td>- Landside security measures, PED ban</td>
<td>- Security Scanners, Second screening US-flights, Ban on liquids, Aircraft and vehicle checks (APIS, No Fly), Cockpit Doors reinforced, Continuous Baggage surveillance, 100% Staff Screening, 100% Hold Baggage Screening, 100% Baggage Reconciliation, Passenger Screening, Cabin Baggage Screening</td>
</tr>
</tbody>
</table>
Isaiah 2:4* “...and they shall beat their swords into plowshares, and their spears into pruning hooks: Nation shall not lift up sword against nation, neither shall they learn war anymore.”

* American Standard Version
« So let us not give up in doing what is fine, for in due time we will reap if we do not tire out »

Saul of Tarsus (born in 5CE, died in 67CE)
“…We will also increase our investment in counter-terrorism police and more than double our spending on aviation security around the world”

“…We will invest in developing new technologies to keep pace with evolving risks, and to help airports and airlines to screen out threats”
Future Aviation Security Solutions (FASS)

Airports & Airlines

Solution Providers

Other Government Departments & International Partners
5 People Screening
3 Shoe Screening
3 Machine Learning
2 Imaging Modalities
Stand off Vapour Detection
Passive Vapour Sensing

Future Research Calls

Defence and Security Accelerator

Open Call for Innovation

From: Defence and Security Accelerator and Defence Science and Technology Laboratory
Part of: Defence and Security Accelerator funding competitions
Published: 26 January 2017
Last updated: 31 July 2017, see all updates

The DASA Open Call for Innovation wants good ideas to innovate across Defence and Security.

Document

Accelerator Open Call for Innovation

HTML
Testing, Trialling & Demonstration

- **Sandbox**
- **Lab Testing**
- **Representative Testing**
- **Operational Trial**

TRL 3/4  TRL 5  TRL 6  TRL 7  TRL 8/9
Thank You
Innovation Task Force

Jose Bonilla
Director
Innovation Task Force
AVSEC ICAO Global Aviation Security Symposium
September 13th, 2017

Transportation Security Administration
Innovation Task Force (ITF)

ITF is pursuing innovation and informing emerging people, process, and technology solutions to establish the future state of transportation security in the United States.

**Innovation Task Force**

**Mission**

- **Foster innovation** by integrating key stakeholders to **identify and demonstrate emerging solutions** that increase security effectiveness, improve passenger experience and the flow of commerce, and deliver solutions that secure the freedom of movement throughout the transportation security system.

**Responsibilities**

- **Demonstrate emerging capabilities** across the transportation security ecosystem in partnership with industry, airports, and airlines, and support TSA’s broader goal to pursue advanced capabilities through continuous innovation and adaptation.

- **Diversify the industrial base and provide industry increased access to operational data**, which allows solution providers to better integrate and quickly develop or mature solutions that will meet TSA’s needs.

**ITF success depends on the support of multiple stakeholders in the transportation security ecosystem for solution identification and demonstration.**
Domestic Aviation Security System

Aviation security is enforced through dynamic partnerships among TSA, airport operators, airlines, other government agencies, law enforcement, and the traveling public. Together, these stakeholders form the **domestic aviation security system** based on risk and real-time intelligence.

**Ticketing/Vetting:** Vet passenger information against trusted traveler lists to determine passenger risk (trusted, unknown, high)

**Public area:** Monitor activities and patrol parking garages, airport curbside, airline check-in counters, and other areas for suspicious individuals and objects

**Checkpoint:** Screen passengers and property based on risk for prohibited items

**Restricted areas:** Prevent unauthorized entry to hangars, cargo holding facilities, offices, gates, and all passenger waiting areas beyond security checkpoints and access control doors

**Aircraft:** Deploy specially trained flight crews and federal air marshals to provide real-time, in-flight security measures
Creating an Innovative Environment

ITF creates an environment to focus on redefining the security experience through accelerated solution assessments that inform requirements development and have the potential to improve overall passenger satisfaction.

ITF solutions **are**…
- Technological, automated, ergonomic, environmental, or aesthetic improvements
- Enhancements to detection or passenger satisfaction
- Inserted for a finite amount of time at existing checkpoints, to conduct technical and operational assessments
- Future-focused

ITF solutions **are not**…
- Operational tests included in the formal testing and evaluation (T&E) process
- Initially a permanent deployment solution
- An obligation from TSA to procure solutions in the future
- Surge responses to targeted needs
- Local optimization efforts
ITF conducts a robust solution identification and selection process in order to grow its portfolio of solutions. In May of 2017, ITF launched its second Broad Agency Announcement (BAA) to identify innovative people, process, and technology solutions. Proposed solutions are currently under review for selection for demonstration.

**Innovative Demonstrations for Enterprise Advancement (IDEA)**

ITF’s second BAA, IDEA, has five submission categories that highlight the types of innovative solutions that ITF is interested in demonstrating in a live airport environment.

- Mobile Screening
- Security Design
- Queuing and Passenger Flow
- Training, Development, &
- Detection Capabilities
How does ITF demonstrate?

Once a solution is selected, ITF follows a specified solution demonstration lifecycle. This lifecycle allows vendors to demonstrate their solutions in the field, capture operational data, and then refine their solution for potential future engagement with TSA.

*Note: Solution is mature enough for operational deployment, but not necessarily “perfect”*
ITF Demonstrations

Automated Screening Lanes

Computed Tomography Systems

Solicitation Cohort 1 Solutions

Biometric Authentication Passenger Communications

Note: Representative Sample Only, not all solutions or vendors presented
ITF relies on collaboration across transportation security stakeholders to spur innovation. ITF’s Industry Exchange (iX) strategy will allow ITF to customize activities for different industry events based on the expected audience, type of event, and intended outcome.

**Inform Stakeholders**

In order to successfully demonstrate solutions, ITF must identify partners in airports, airlines, and other federal agencies. By targeting exchange efforts to answer industry’s questions, ITF will have more informed stakeholders and greater industry knowledge making future BAAs and solution demonstrations go more smoothly.

- **Classic Brief**
- **ITF Hot Seat**
- **ITF and Partners Panel**
- **Webinar**

**Pulse the Market**

Industry events bring together the most innovative ideas and top solution providers. ITF can use these events to collaborate with industry and spread awareness of future solicitations, identify solutions for demonstration, and enhance industry’s understanding of TSA’s requirements and needs.

- **ITF Booth**
- **Shark Tank**
- **Innovation Tournament**
By collaborating across multiple divisions both within and outside of Office of Requirements and Capabilities Analysis, ITF plans to drive forward strategic goals through executable innovation.

Establish mechanisms to source innovative solutions from industry

Build a hub for people who work differently and develop an internal culture of innovation

Identify New Solutions and Capabilities

Build New Relationships Through Industry Exchange

Defy the Status Quo for Team Operations

Develop a New Way of Doing Business

Change how TSA engages with stakeholders to open new doors for solutions and ideas

Question the status quo and enable change
Case Study 4.2
Amsterdam Airport Schiphol

Moderator:
Mr. Sebastien Colmant
Development Manager, Smart Security, IATA

Presenter:
• Mr. Bart Mos, Senior Security Officer, Amsterdam Airport Schiphol
Activity 4.1

Innovation in Aviation Security – Practical Applications

Moderator:
Mr. Sebastien Colmant
Development Manager, Smart Security, IATA

Presenters:
• Mr. Daniel Goh, Assistant President, NUCTECH Company Limited
• Mr. Antonino Scribellito, Projects Director, PostEurop
• Mr. Neal Owens, Senior Business Development and Program Representative, Battelle
Case Study 4.3
Faces on the Move – Facial Recognition for Traveller Screening

Mr. Ilan Arnon
Chief, Technical Officer, Face4 Systems Inc
Case Study 4.4

Biometrics for Identity Management in India AADHAAR Enabled Entry and Biometric E-Boarding Process

Ms. Christine Riveau
Deputy Vice President, Oberthur Technologies and Safran Identity & Security (OT-Morpho)
AADHAAR enabled entry & Biometric E-Boarding Process System

BANGALORE INTERNATIONAL AIRPORT

13 Sept 2017
AVSEC
Christine RIVEAU
Bangalore experimentation in the perspective of Aadhaar

Aadhaar:
an Identity for all Indian Citizen

eBoarding (this experimentation):
paperless secured biometric processing
based on aadhaar authentication

Digi Yatra: Digital No Fly list on Indian
Citizens flagged in Aadhaar system
Voice of the Airport
The Vision, Strategy & Roadmap

**BIAL Vision**

**Vision**
Consistent & Reliable Authentication of Passengers’ Identity & Ticket at Airport entry
Seamless, Paperless & Hassle-free experience to all Passengers at all Check Points

**Strategy**
Embrace Digital
Leverage Technology to Bring a “Radical Change” in Passenger processes across all Indian Airports

**Roadmap**
User AADHAAR & Biometrics as a “Single token”
Collaborate with Airlines/ OTAs
Set Standards for a uniform process
Vision

Step 1: airline booking
Step 2: check-in
Step 3: airport entry
Step 4: Live Pax dataset
Step 5: airport check-in
Step 6: PESC entry
Step 7: Frisking
Step 8: Boarding

# Aadhaar
Prerequisites: Airlines & Airports

- **Airline & OTAs**: Standard Travel Document integrating Aadhaar Number
- **Airline**: Allow airport to access PNL via web service
- **Airline**: Open Standard DCS to integrate with AEBEPS
- **Airport**: AUA & KUA
- **Airport**: Front end infrastructure to interact with passenger
- **Airport**: Back-end infrastructure to process passenger data
Governance & SOPS

- Under the leadership of MOCA a Governing Body to be created to Govern and Regulate the Standards, Procedures and Policies for all Airports in India.

- In the event of Failure of the AEBEPS system, All Agencies including CISF, Airlines and other stakeholders at the Airport shall resort to Manual mode of Operations as per their Standard Operating Procedures.
Benefits to Passengers

- No need to Carry Paper Ticket and ID throughout the Airport.
- Integrated Travel Document and Identity Document
- Seamless Access across all the Check-Points at the Airport
- Reduced Queue waiting times
- Enhanced Experience, Seamless, Hassle-Free & Paperless
Benefits: Airlines

- Airline KPIs
  - Security
  - PAX Experience
  - Punctuality
  - Peace of Mind
  - Savings ₹ ₹ ₹ ₹

- Actionable Intelligence, Zone wise
  - PAX location per flight

  - Airport Entry
  - Check-in/ Bag Drop
  - PESC zone
  - Boarding Gate
Benefits: Airport and Security Agencies

- **Security agencies KPIs**
  - ID validation
  - Process traceability
  - Time stamped logs: Forensic

- **Airport**
  - Actionable intelligence of pax traffic
  - Efficiencies: -30% infrastructure cost
  - Innovation attractiveness
## Stakeholders & Role

<table>
<thead>
<tr>
<th>Stakeholders name</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airlines</td>
<td>Enabler</td>
</tr>
<tr>
<td>Online Ticketing Agencies (OTAs)</td>
<td>Enabler</td>
</tr>
<tr>
<td>Airport Operators</td>
<td>Execution</td>
</tr>
<tr>
<td>MOCA</td>
<td>Policy &amp; Guidelines</td>
</tr>
<tr>
<td>BCAS</td>
<td>Policy &amp; Guidelines</td>
</tr>
<tr>
<td>CISF</td>
<td>Execution</td>
</tr>
<tr>
<td>UIDAI</td>
<td>Support Agency</td>
</tr>
</tbody>
</table>
Solution experimentation
BIOMETRICS OFFERS ENDLESS POSSIBILITIES

EFFICIENCY
SECURITY
FACILITATION
Why biometrics?

Biometrics = universal data model to create a unique passenger identifier
Secured identification and traceability of passenger

Registration → Access to Terminal → Screening SHA → Boarding → Boarding Passenger manifest
SIMPLE TO USE: REGISTRATION IN 2 STEPS
CONTROLS WITHOUT TOKEN + BIOMETRICS REPLACES STAMPING
BOARDING + NO NEED FOR STAMPING / ID VERIFICATIONS
# Biometric Choice: Speed, Security, and Convenience

## Biometrics Key Performance Indicators

<table>
<thead>
<tr>
<th></th>
<th>Face</th>
<th>Fingerprint</th>
<th>Iris + Face</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Matching</strong></td>
<td>1:1 and 1:few</td>
<td>1:1 and 1:n</td>
<td>1:1 and 1:n</td>
</tr>
<tr>
<td><strong>Accuracy @ FAR &lt; 0.5%</strong></td>
<td>FRR &lt; 5%</td>
<td>FRR &lt; $10^{-5}$</td>
<td>FRR &lt; $10^{-6}$</td>
</tr>
<tr>
<td><strong>Capture</strong></td>
<td>Video 3D face</td>
<td>Hand wave</td>
<td>Video 3D face and IR</td>
</tr>
<tr>
<td><strong>Ergonomics</strong></td>
<td>&lt; 2 sec No need for pause</td>
<td>&lt; 1 sec contactless</td>
<td>&lt; 2 sec No need for pause</td>
</tr>
<tr>
<td><strong>Experience</strong></td>
<td>No extra light No moving parts Natural move</td>
<td>Ease of use Hygienic No latency</td>
<td>No extra light No moving parts Natural move</td>
</tr>
</tbody>
</table>
Security Processes And Technological Innovations

Mr. Steve Karoly
Acting Assistant Administrator, ORCA, TSA, United States
The Future of Aviation Security

Steve Karoly
Acting Assistant Administrator
Office of Requirements and Capabilities Analysis

ICAO Symposium Program
Security Processes and Technological Innovations
TSA Operational Challenges

2,500,000
Passengers a day.

1,200,000
Checked bags a day.

6,250,000
Carry-on items a day.

With operational challenges at an all time high, we must think outside the box to enhance the future of aviation security for years to come.
Our Goal and Principles

Our Goal:
The ultimate objective is to reengineer aviation security from top to bottom with a continued focus on increasing security throughout the system.

Guiding Principles:
Innovation at TSA

At TSA we are reimagining the traditional notion of innovation and fostering innovation beyond technology.

**PEOPLE**
- Human factors
- Staffing model
- Feedback integration

**PROCESS**
- Checked baggage
- EAPS
- System Effectiveness

**TECHNOLOGY**
- Automated Screening Lane
- Biometric Authentication Technology
- CT Systems
Domestic aviation security is enforced through dynamic partnerships with industry and government stakeholders.

Together, we form the **domestic aviation security system** based on risk and real-time intelligence.

Vet passengers and determine risk level

Monitor and ensure safety throughout airports

Screen passengers and their property

Prevent unauthorized entry beyond checkpoints

Provide real-time, in-flight security
An aviation security architecture would leverage capabilities across TSA to enable the flow and use of risk and operational data to proactively adapt to emerging threats through a comprehensive view of the security landscape.

**Layers of the Security Screening System**

- **NATIONAL** — secure flight, enterprise risk, intel sharing
- **AIRPORTS** — ticket purchasing, check-in, screening
- **SCREENING SYSTEMS** — checked baggage and checkpoint
- **TSE** — modularization, GUI

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67
A suite of checkpoint scanning capability upgrades will enable enhanced detection and greater efficiency.

New checkpoint systems deliver a bundle of operational efficiency benefits:
- ASLs offer larger/fewer bins, continuous infeed flow from divestiture to avoid starving bottleneck
- CT scans lower secondary screening rates
- Matrix AT lays out infrastructure for greater screening automation
- LT, system lays out infrastructure for remote screening
Closing Remarks

**CURRENT STATE**
• People
• Process
• Technology

**UPCOMING Advancements**
• Aviation Security Architecture
• Domestic Aviation Security System

**FUTURE STATE**
• Together we will ensure that the traveling public is protected by an effective and efficient aviation security system
• We will work with innovation partners across the industry to ensure the delivery of the best aviation security experience for years to come

**Improve our innovation framework**

**Partner and protect**
Case Study 4.5

InnerEye: Revolutionizing X-Ray Screening

Mr. Oren Sapir
President, ICTS Europe Holdings
Presents

INNEREYE

Technology to enhance the X ray operator brains potential
The Future homeland security specialist
Is Bionic
He can scan 6,000 images per hour, streamed from the security checkpoints of an entire terminal.
EVOLUTION OF CHECKPOINTS

Background

- MMW
- Tray and Lane Management
- ETD
- Liquids & Gels
EVOLUTION OF CHECKPOINTS

Background

Little to nothing was done in the context of image interpretation
EVOLUTION OF CHECKPOINTS

Background

We thought it’s time to boost the capabilities of the human factor ...

by optimising the brains potential
InnerEYE
The solution

Target
Increase Screeners performance and productivity

Technology
EEG, brainwaves analysis and tailor-made algorithm application

Tool
Human brains
What is EEG?

EEG is a portable equipment consisting of a set of electrodes and an amplifier. It is used to passively and non-invasively to record the brain's electrical activity.

EEG signal reflects the neural activity, such as state of the person or the brain response to stimuli (for example: visual images).

EEG has been used for nearly 100 years. EEG systems today are widely deployed and are used also in non-medical and non-research applications.
InnerEYE
The Technology

- Trained Screener
- Software Algorithm
- EEG Headset
Regular brain process:

The concept of InnerEYE

An add-on EEG interface connecting the data from the screeners' brains to the software, bypassing the need for a report.

- Image
- Sensation
- Visual Processing
- Decision Making
- Response Planning
- Distraction caused by motor response
- Motor Execution

Brain Activity Measurement
User Response
# TRIALS

## Background

<table>
<thead>
<tr>
<th>Checkpoint</th>
<th>HBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Athens International Airport</td>
<td>Location: London Gatwick Airport</td>
</tr>
<tr>
<td></td>
<td>Screeners: 30</td>
</tr>
<tr>
<td></td>
<td>Background: Varied</td>
</tr>
<tr>
<td></td>
<td>Machine: Smiths/Rapiscan/L3 – Offline</td>
</tr>
<tr>
<td></td>
<td>Threat type: IED/DG</td>
</tr>
<tr>
<td></td>
<td>Images: 35,400</td>
</tr>
<tr>
<td></td>
<td>Rate: 3 images per second</td>
</tr>
<tr>
<td></td>
<td>Varied</td>
</tr>
<tr>
<td></td>
<td>Offline</td>
</tr>
<tr>
<td></td>
<td>AMM/BLU/DG/GUN/IED</td>
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<tr>
<td></td>
<td>137,600</td>
</tr>
<tr>
<td></td>
<td>3 images per second</td>
</tr>
<tr>
<td></td>
<td>Smiths – Offline</td>
</tr>
<tr>
<td></td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Varied</td>
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</tbody>
</table>
InnerEYE
Advantages

Productivity
- 20 times faster processing
- Increased productivity
- Checkpoint fluidity

Cost Reduction
- Higher speed
- Fewer screeners
- Cost savings

Multiple Decision Layers
- Can double-check every image
- Increase detection
- Improve security
Advantages

- Fewer screeners = higher quality
- Possibility to define employee profile
- Specialisation of individuals on particular threats
- Track record of brainwave activity for each and every image
- Track record of duration of brain activity per shift, etc.

Online feedback:
- Each image seen
- Real-time TIP feedback
- Fatigue monitoring

Real-time performance assessment

Specialisation

Audit trail functionality
**Summary**

**Revolutionise** your existing security process

...without changes to existing Security hardware infrastructure

**Optimise** your security costs

by improving both staff efficiency and security process flow

**Improve** quality assurance and safeguards for your x-ray screening teams

through the use of real-time analytics and layered decision processes
InnerEYE DEMO

- X-ray screener with 6.5 years of experience in cabin baggage screening at Athens International Airport, Greece
- 1,600 x-ray cabin baggage images containing innocent items, firearms and IEDs
- Screening time: 10 minutes
Activity 4.2

Explosive Detection Canines – Live Demonstration

Presenter:
Mr. Azat Zaripov, Deputy Director, Aviation Security Management Department, PJSC "Aeroflot - Russian Airlines"

Presenters:
• Inspector Akrum Ghadban, Officer in Charge, Police Dog Services, Royal Canadian Mounted Police (RCMP)
• Sergeant Germain Daigle, Dog Handler, RCMP Special Support, CBRNE Operations and Evette
ICAO GLOBAL AVIATION SECURITY SYMPOSIUM – AVSEC 2017

Development and implementation of Olfactory Biotechnical System for EDD

Azat G. Zaripov, Deputy Head of Aviation Security Management Department PJSC «Aeroflot – Russian airlines»

Montreal, Canada
12-14 September 2017
Introduction

Application of patrol dogs in huge international airports

Key issues:

- Efficiency of patrol dogs’ application fully depends on environment conditions
- Time limits of non-stop activity of patrol dogs
- Lack of objective (instrumental) control of dogs’ activity
- Lack of full-value standard and methodical base regulating application of dog-detectors for the purposes of transport security
Olfactory biotechnical system

Detecting target substances by means of Sulimov dog and hardware-software complex for objectification

**Principle:** technique – animal (bio-system) – human is provided
Sulimov Dogs within aviation security department of Aeroflot

- aircraft control
- cargo control
- patrols in the airport facilities
- detecting target substances at suspicious objects
- olfactory monitoring technology
- insider risk mitigation
Remote Explosive Scent Tracing (REST)

REST is optional olfactory research with specially trained dogs acting as a sensor, and filters with air pumped through them from target object subjected to inspection.

Application of REST allows organization of systematic and continuous inspection of probable places of production, storage and transportation of subversive and terrorist means. It complies with the concept of "monitoring" and provides control over transported cargo and detection of explosive objects and other forbidden substances.

Explosive detection

- yes
- no

Protocol

Air sampling

Transportation

Express - analysis
Application of REST to high risk transport vehicles and containers inspection allows definition/exclusion of presence of objects and substances with specific olfactory signs without opening of locking devices of containers.

Sampling is carried out by means of specially developed Device of accumulation of gaseous components of explosives (DAGCE) equipped with electrical activator of air consumption.
Objectification of dogs’ search activity

Role of objectification

- Reliability of research results is a priority for decision-making
- Reliability of olfactory research results in target substances detecting is provided by odororogical dogs’ choice objectification
- Upon results of search activity a protocol is automatically formed – it is based on objective data of psychophysiological characteristics
Objectification of dogs’ search activity

TRUE REACTION (FOUND)  FALSE REACTION (NOT FOUND)

False  True
Objectification of dogs’ search activity

Individual results of EEG analysis:
Frequency and amplitude changes of the main EEG rhythm range 1-30 Hz
Because of escalation of international terrorism there is particular worldwide interest in application of EDD capable to detect explosive items and substances by their odor. Special interest to Aeroflot research in the field of cynology was demonstrated by our colleagues (Montreal, Paris, Kuala Lumpur, London)

Particularly at the ICAO 27-th AVIATION SECURITY (AVSEC) PANEL, (Montréal, March 2016) as a result of consideration and discussion of Aeroflot report the following conclusions and recommendations have been made:

• deploying explosives detection dogs (EDDs) has potential benefits
• it’s necessary to continue exploring practical application of EDDs
• it’s reasonable to organize development of the advanced methods of best practice of EDDs through the WGIAS
• for distribution of EDDs methods among the States it is recommended to include them into ICAO’s technical assistance program to Member States
Olfactory Biotechnical System allows:

- to carry out systematic and regular cynological inspection of the controlled objects to provide their security from explosions of a criminal or terrorist orientation;
- to carry out olfactory investigation in crowded places during mass actions;
- to control transport vehicles and transported freights in order to exclude the delivery of explosives;
- to increase efficiency of dogs’ search activity;
- to provide objectification of dogs’ search activity and its documentation.
Sincerely yours
Royal Canadian Mounted Police
Police Dog Service

Inspector Akrum Ghadban
Officer in Charge
RCMP Police Dog Service
Royal Canadian Mounted Police

Canada’s National Police Force
Police Dog Service Training Centre

Police Dog Service established in 1935
Location

Innisfail, Alberta, Canada
Police Dog Service Training Centre

- 25 Staff members
- 8 Whelping Units
- 42 Outdoor Kennels
- 21 Indoor Kennels
- 4 Quarantine Units
RCMP Dog Teams

146 General Duty Police Dog Teams Across Canada

21 Detection Profile Teams

- Narcotics, or
- Explosives
External Agencies
7 Teams Across Canada
Multi Purpose Police Service Dog

- Tracking Human Scent
- Searching Human Scented Evidence
- Narcotics / Explosives Searching
- Criminal Apprehension / Handler Protection
- Firearms Detection
- Cadaver Searching
- Obedience / Agility
Tracking Human Scent

Level 1 - Rural
Level 2 - Industrial / Suburban
Level 3 – Residential
Field Validation – City Centre (Hard Surface)
Searching

- Evidence at Crime Scenes
- Stolen / lost property
- Human scent
- Firearms / Expended shell casings
- Trained Odours
- Search and Rescue
Criminal Apprehension

- On command
- Protect the handler
- Protect themselves
Public Order / Riot Response
Emergency Response Team
Avalanche Search and Rescue
RCMP Breeding Program

• Global Demand for German Shepherds (Working Lines)
• World Trade Centre – 911
• Quality and Quantity
  • Require 30-35 dogs trained
• Goal of producing quality working German Shepherds
• 26.8 % of acquired dogs would complete training

Dilemma - No Dogs
Why Use German Shepherds

• Best all around dog for police work
• Work well in all provinces & Territories
• Courageous, trainability, confident, intelligent, powerful, loyal
• Excellent versatility of the breed
• Multi profile dog (criminal apprehension, tracking, drug or explosives trained)
Traits

• Foundation lines from Czech Rep/Slovakia, East Germany
• Sound temperament
• Aggression – natural prey / defence
• Tracking – desire to follow a human scent
• Searching / hunting ability
• Trainability, energy, high drive
• Medium stature dogs
Explosive/Narcotic Searching

- Started in 2\textsuperscript{nd} level of training
- Take advantage of the dogs natural instinct to search
- Introduce odours individually
- Use passive confirmation
The Search Wall
Search Wall

- Total control of environment
- Establishes proper search sequence (search, odour recognition, pursuit to source, sit confirmation, reward)
- Control distractions
- Patterning (dog following handler directions)
Search Wall

- Pursuit to source
- Timing of reward
- Hide focus
- Passive confirmation
Search Wall

- Enhances ability of handler to learn or read the dog’s behaviour
- Easy to manipulate training / learning environment
- Control contamination
- Control of corrective training
- Portable
Search Wall
Progression

- Once search sequence is established
- New environments (warehouses, offices, vehicles, public places etc)
- Add environmental distractions
- Add odour distractions
Search Areas

- Hotel rooms
- Vehicles
- Cargo
- Baggage
- Terminal
- Plane/Train/Bus
- Outdoor
The Way Forward

- Work with international partners to identify emerging threats

- Introduction of new odours

- Fentanyl
The End!

THAT AWKWARD MOMENT

WHEN YOU REALISE IT WAS YOUR TURN TO BRING THE DONUTS
Case Study 4.6

Behaviour Detection

Mr. Ilan Weinmann
Director, Product Quality Control and Training, ICTS Europe Holdings

Mr. Declan Troy
Manager, Security, Dublin Airport
BEHAVIOR-DRIVEN RISK ASSESSMENT
The Passenger Experience

Ilan P. Weinmann - Director, Product Quality Control & Training - ICTS Europe
Ph.: +41-79-9161285 - Email: ilan.weinmann@ictseurope.com
Significant In-flight Security Events After 9/11

Richard Reid, Shoe Bomber
Paris CDG, 2001

Amanat Nagayeva
Chechen Widow
Moscow DME, 2004

Oumar Farouk Abdulmutallab,
Underwear Bomber, 2009

Metrojet bombing, Egypt (Sinai) 2015

Daalo Airlines, Somalia, 2016 (PED: laptop)
Two Key Judgments (2016)

“Among domestic terrorists there is a change from a long radicalization process towards rapid recruitment”

“The nature and structure of IS training apparently enables its operatives (including returnees) to execute terrorist acts in an emotionally detached manner”

Source: Europol, TE-SAT 2016
Interviewing Passengers for Behaviour-driven Assessment of Risk
(Console Controlled Cognitive Engagement)

Scope: Detection of deceptive individuals (offenders are deceptive)

Method: Verbal engagement for behaviour-driven risk assessment:
(controlled, structured, measurable interview)

I. Assessment of the individual’s behaviour when non-deceptive (“baseline”)

II. Increasing the mental load: Questions on unpredictable topics, in an unpredictable sequence & follow-up questions for triggering involuntary reactions, and shifts in the behaviour and the narrative of deceptive passengers

III. Observing and assessing the passenger’s reactions for any change, indications of deception, unusual reactions, errors and ruptures
Interviewing Passengers for Behaviour-driven Assessment of Risk
Main Training Topics

- **Kinesics**: body language, facial tells, and decoding normative and deceptive behaviour
- **Engagement & interviewing techniques**
- **Customer service**
- **Decision making**
- **Notification and reporting**
- **Interviewing role play and behaviour observation exercises**
Cultural Awareness
Passenger Interviewing - Facts & Figures

Interviewer qualities
Verbal communicator, cultural awareness, assertiveness, a positive attitude/demeanor. No specialists. No higher education required.

Duration of the training
3-4 days + 3-4 days OJT

Training failure rate
< 10%

Duration of a security interview
2-3 minutes

Acceptance by staff and pax (customer service): Excellent!

Outcome of the interview
Enhanced security 0.1 - 6% (1%)

TravelDoc fraud prevention *
- Impostors 138 (0,07%)
- Forgeries 286 (0,15%)

* Based on observation of 186,660 pax at one airport, January-June 2017
The Human Factor for Behavior-driven Risk Assessment
YOUR BODY LANGUAGE SAYS YOU'VE LOST INTEREST.
BEHAVIOR-DRIVEN RISK ASSESSMENT
The Passenger Experience

Ilan P. Weinmann - Director, Product Quality Control & Training - ICTS Europe
Ph.: +41-79-9161285 - Email: ilan.weinmann@ictseurope.com
Security Awareness and Behavior Observation
Dosed Training for Various End-users

1. Dedicated BDOs
2. Immigration fraud prevention agents
3. Guards, access controllers, checkpoint operators
4. Check-in operators
5. Airside staff
6. Staff of critical infrastructures
7. CCTV operators
8. Managers and supervisors
9. HR staff
10. Passenger interviewers

The added value:
insider threat mitigation

DetAct
Behaviour Detection Operations
Dublin Airport

Declan Troy, daa
Background

- Decision to Pilot Behaviour Detection
- Behaviour Detection Pilot & establishment of a Permanent Behaviour Detection capability
Methodology

Identify Behaviour

Resolution
Conversation

Referral

Escalation
Performance Management
Benefits of Behaviour Detection

- Above Baseline
- Human Factors
- Complementary
- Deterrent Effect
- BD for aviation Security
- Risk Basis
- Detection
- Unpredictable
- Wider Security Culture
Conversations

- Behaviour Resolution: 29%
- Random Conversations: 71%
Referrals/Escalations from Behaviours

Behaviour resolution  Referred from behaviour  Escalated from behaviour

[CELLRA NGE]  [CELLRA NGE]
Referrals/Escalations from Random

Random

Referred from random

Escalated from random

[CELLRA NGE] [CELLRA NGE]
- Customs
- Airport Police
- Immigration
- Supervisor
- State Police
Thank You!
Plenary 4

Addressing Emerging Threats through Technologies

Moderator:
Mr. Domenic (Nick) Bianchini
Co-Chair, ICAO Working Group on Innovation and Deputy Director, ORCA, TSA, United States

Panellists:
• Mr. Kenn Mann, Chairman, Security Screening and Detection Working Group, European Organisation for Security
• Mr. James McDonald, Head, Threat, Risk & Innovation Policy, DfT, United Kingdom
• Mr. Dave Hernandez, Deputy Program Manager, Explosives Division, Science and Technology Directorate, Department of Homeland Security, United States
• Ms. Anne Marie Pellerin, Managing Partner, Lam Lha Security Innovation
ICAO AVSEC 2017
ADDRESSING EMERGING THREATS THROUGH TECHNOLOGY

SEPTEMBER 2017
Ken Mann
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Director Checkpoint Integration, Rapiscan Systems
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EOS SSD - members and technologies

Liquid Explosive Detection Systems, MatID

X-ray

X-ray, LEDS, EDS for Cabin Baggage

LEDS, EDSCB, RadNuc

Explosive Trace Detection, Security Scanners, EDS, X-ray, EDSCB, Remote Screening, TRS

EDSCB / X-Ray components

LEDS, EDSCB, Remote Screening, Tray Return Systems

EDS, ETD, EDSCB, X-ray, LEDS, WTMD, TRS, RadNuc

LEDS, ETD, SSc, EDS, X-Ray, EDSCB, RadNuc, MatID
Threat – trend towards concealed IEDs

<table>
<thead>
<tr>
<th>Period</th>
<th>Event/Action</th>
<th>Method</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960/70s</td>
<td>Hijacking</td>
<td>Guns / knives</td>
<td>Cabin / person</td>
</tr>
<tr>
<td>1980s</td>
<td>El Al, Air India, Lockerbie</td>
<td>IED</td>
<td>Hold</td>
</tr>
<tr>
<td>1990s</td>
<td>Bojinka, Hijacking</td>
<td>Guns, Knives, IED</td>
<td>Cabin / person</td>
</tr>
<tr>
<td>2001</td>
<td>9/11, Shoe Bomber</td>
<td>Knives / IED</td>
<td>Cabin / Person</td>
</tr>
<tr>
<td>2006</td>
<td>Liquids plot</td>
<td>IED</td>
<td>Cabin</td>
</tr>
<tr>
<td>2010</td>
<td>Underpants</td>
<td>IED</td>
<td>Person</td>
</tr>
<tr>
<td>2011</td>
<td>Printer Cartridges</td>
<td>IED</td>
<td>Cargo</td>
</tr>
<tr>
<td>2012</td>
<td>Underpants 2</td>
<td>IED</td>
<td>Person</td>
</tr>
<tr>
<td>2015</td>
<td>Metrojet – drink can</td>
<td>IED</td>
<td>Cabin ? / Hold? / Insider</td>
</tr>
<tr>
<td>2016</td>
<td>Dallo – lap top</td>
<td>IED</td>
<td>Cabin / Insider</td>
</tr>
<tr>
<td>2017</td>
<td>Personal Electronic Devices</td>
<td>IED</td>
<td>Cabin</td>
</tr>
<tr>
<td>2017</td>
<td>Australia – meat grinder</td>
<td>IED</td>
<td>Hold?</td>
</tr>
</tbody>
</table>
• Are ICAO minimum technology standards enough?
• Detection of the key threat (artfully concealed IEDs) can/must be improved
• Authorities in USA, EU, Canada, Australia working hard to improve and reduce risks from explosives:
  – Requiring LEDS, ETD, Security Scanners, EDS, EDSCB etc
  – Defining detection requirements and testing
• Threat is global not just EU / US / Canada / Australia
• Results of weaker security:
  – Gate screening, electronics bans or even no-fly – inbound security a big concern for many countries
  – Effect on trade and tourism of attacks can be catastrophic
  – Reputational damage difficult or impossible to repair
Improved technologies are key

Improved technology brings security and potential facilitation and efficiency

- EDS for Cabin Baggage brings better detection PLUS potential efficiencies - platform for new threats detection
- Body scanners better than metal detectors—find all threat types, targeted search rather than random
- Explosive Trace Detection better than x-ray or metal detectors alone—specifically detects explosives
- EDS better security than x-ray for hold bags and much cargo—much more efficient
- LEDS facilitate and improve security—Liquids are a real threat
- Automation / remote screening brings better detection and passenger facilitation

Manufacturers develop the capability and must be involved in the development of requirements
Example – EDS for Cabin Baggage

**Better Security**
- High levels of detection
- Better tools for alarm resolution
- Platform technologies – allow new threats to be added

**Improved Airport Operations**
- Higher security
- Potential for
  - less images per PAX
  - Higher throughput
  - Risk based

**Improved Passenger Experience**
- Potential for:
  - No/less divestment
  - Liquids back?? Or at least less requirement to search....

---

**EDS-CB Standard C1, C2, C3 - Concept of Operations (CONOPS)**

<table>
<thead>
<tr>
<th></th>
<th>Standard C1</th>
<th>Standard C2</th>
<th>Standard C3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquids, Aerosols and Gels (LAGs)</td>
<td>Screened Separately</td>
<td>Screened Separately</td>
<td>Can be left inside the cabin baggage</td>
</tr>
<tr>
<td>Portable computers/other large electrical item</td>
<td>Screened Separately</td>
<td>Can be left inside the cabin baggage</td>
<td>Can be left inside the cabin baggage</td>
</tr>
</tbody>
</table>

However, if threat levels rise, benefits may have to be traded for better detection – e.g. PEDS screening
• Threat is global – artfully concealed Explosive threat is the trend which must be addressed
• Technology a big part of the solution – need to specifically find explosives (x-ray / WTMD alone are no longer enough)
• Technologies need to be developed by manufacturers in partnership with global regulators and end users
• New technologies now provide screening platforms
  – new threat materials can be added
  – detection thresholds can be adjusted
  – risk based security can be facilitated
  – operational efficiencies may be gained
• Cost of not deploying appropriate screening (or preventing attacks) is huge (or even catastrophic)
ICAO AVSEC 2017
ADDRESSING EMERGING THREATS THROUGH TECHNOLOGY

SEPTEMBER 2017
Ken Mann
Chair, EOS Security Screening and Detection Working Group
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Addressing Emerging Threats through Technologies

Landside Security

United Kingdom
If an armed attack happens, you should always follow the National Counter Terrorism Policing advice for everyone in the UK to

RUN  HIDE  TELL
First developed over 20 years ago

Introduces the concept of “security in design”, where security measures are designed in during construction.
Thank You
Explosives Division

Mission:
• To develop technologies and systems to detect explosives and mitigate the effects of non-nuclear explosive blast.

Operational Focus Areas:
• **Aviation Solutions** – detection of threats concealed in checked baggage, carry-on baggage, bottles, shoes, personal items, and air cargo
• **Intermodal Solutions and Facilities Protection** - protection of commuters and infrastructure in subway, maritime (ferries), and surface (buses and heavy rail) transportation
Division Program Drivers

Stream of Commerce/Operations:
• 2M passengers fly domestically every day
• Approximately 12 million pounds of cargo are transported daily on passenger aircraft in the US
• 95 percent of domestic passenger flights carry air cargo
• TSA currently screens 400M checked bags/year for explosives
• Mass transit - no fixed checkpoints, open system, 15M/day
• 2M+ employees & visitors enter GSA operated federal facilities daily
• GSA operates 9000+ facilities with more than 13,000 security guards

Customers:
• TSA is the primary component supported by the Explosives Division
  • Office of Requirements and Capabilities Assessment (ORCA)
  • Also provide support to USSS, NPPD, etc.
  • 47 Projects in FY 17; the Screening at Speed Apex is the major initiative.
Screening At Speed

Efficiently detect more advanced aviation threats while outpacing the growing population of travelers

Alternative System Architectures

- Passenger Identification
- Passenger Vetting
- Immersive Video
- Risk Assessment

Traditional R&D

- Efficiently detect more advanced aviation threats while outpacing the growing population of travelers

Enhanced Screening Technologies

- Perimeter Security
- Threat Resolution

Expedited Screening Techniques

- Buy Ticket
- Check-in
- Transit to airport
- Enter airport
- Transit to security checkpoint
- Go through security checkpoint
- Enter Sanitized area
- Board Plane

DHS Science and Technology Directorate | MOBILIZING INNOVATION FOR A SECURE WORLD
Homemade Explosives

Understand homemade and emerging explosive threats to improve detection technology, inhibit the unlawful use and manufacture of HMEs, and provide solutions to counter the threat:

- Investigate and characterize explosive detection characteristics, physical blast performance, and develop threat prioritization in order to support detection programs and identify mitigation strategies against current and evolving threats.
- Validate and develop testing methods to create standards and methods to characterize non-ideal explosives, ensure safety protocols are sound, and develop analytical tools for evaluation of explosive threats.
- Conduct vulnerability assessments and threat definition to inform detection.

Emerging Explosives Threats:
- Relative to manufactured conventional explosives, HMEs have highly variable properties (related to detection). A new detection strategy is needed to counter this threat.
- Threats emerge quickly and must be countered by dynamically reconfigurable screening capability.
Defining the Threat Space

- Identifies current and emerging threats at home and abroad through various intel sources (I&A, FBI, Intelligence reports) and other characteristics such as ease to manufacture and availability of precursors.
- Identifies capability gaps and defines interagency requirements.
- Facilitates collaboration and consolidation of efforts that support operationally relevant technology solutions.
- Shares identified technologies, capabilities and capability gaps with Interagency and international partners.

The HME threat spectrum involves a wide variety subject areas and diverse but interdependent stakeholders committed to meeting the challenge.
Data Collection Process

1. Threat Identification
2. Modeling
3. Down Select
4. Safety/Synthesis
5. Formulation and Preparation of Materials
6. Data Acquisition for Each Material
7. Analysis
8. Material ROR
9. TSA Acceptance and Inclusion in Detection Standards
10. Vendor Algorithm Development
11. CRT/CERT and Deployment to Fleet
HME Laboratory Capabilities

Three test facilities to evaluate the performance and suitability of explosive threat detection equipment.

• Transportation Security Lab (TSL) – USG-operated lab dedicated to screening technology T&E, readiness assistance, assessment of system vulnerabilities, and excursion testing

• Tyndall Reactive Materials Group (TRMG) - Synthesis of full threat weight explosive compounds for DHS S&T Data Collection Efforts; rapid response assessments in support of enhanced detection equipment and algorithm deployment; explosive equivalency; supports DT&E and has range up to 1,000 lbs. Net Explosive Weight

• TEDAC IED and Synthesis Center Detection Technology Center (TIEDS DeTeC) - Analysis of emerging threats, synthesis and physical characterization, and testing of HMEs in a variety of experimental scenarios; increased throughput of HME Data Collection Efforts

• DOE Laboratories – LLNL and LANL conduct threat prioritization research, Region of Responsibility Modeling and Data Analysis to bring all the data from the three laboratories together
DIGITALIZATION & AVIATION SECURITY

ICAO Global AVSEC Symposium 2017

12 – 14 September 2017
Montreal, Canada
OUT-INNOVATING THE ADVERSARY

Recent advancements in technology provide us an unprecedented opportunity to find the needle in the haystack.
The use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business.
HOW WILL DIGITALIZATION ENHANCE DETECTION?
BETTER SCREENING OF PEOPLE & THINGS

- Networking & Standardization (CIP & STIP) – allowing real-time & centralized analysis
- Machine Learning – leveraging data to enhance detection
- Automation – re-focusing the role of the screening officer
CONTINUOUS OPERATIONAL IMPROVEMENT

- Forecasting & Planning
- Staffing & Scheduling
- Operations Mgt. (# pax/officer)
- Tech Evolution (e.g. optimizely)
RISK-BASED DECISION-MAKING

• More robust risk analysis
• Risk-based passenger/belongings screening
• Enhanced pre-screening
• Integration of processes/seamless travel
• Regulatory evolution
SECURITY PROCESSES AND TECHNOLOGICAL INNOVATIONS

Session 4