



# Human Factors Engineering at the Transportation Security Administration

Office of Security Capabilities/  
Human Factors Engineering



Transportation  
Security  
Administration

# AGENDA

- Human Factors at TSA
- Human Factors in the Airport Checkpoint Environment
- Current Efforts
- New TSA Initiatives
- Questions

# HUMAN FACTORS AT TSA

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TSA's Human Factors (HF) engineers provide input on how to improve operational performance with the end user in mind, thus improving efficiency and effectiveness

## Goals of Human Factors Engineering

- Enhance safety and usability when the human interacts with their work environment
- Provide design criteria to guide HFE implementation
- Enhance transportation security and performance by providing input to the design of:
  - Human-centered automation and interfaces that help prevent operator error and provide for error prevention, enhance detection,
  - Decision support tools
  - Training
  - Team and organizational practices
- Maintain vigilance and identify fatigue onsets
- Develop tools and metrics for the evaluation of human performance
- Advance the fundamental understanding of how screeners process information, make decisions and collaborate with colleagues, passengers, and systems

Understanding and maximizing human perceptual capabilities, cognition, image interpretation, and decision making strategies with empirically validated data will inform technology decisions, procedures, training, and overall optimize human performance.

# **HUMAN FACTORS IN THE AIRPORT CHECKPOINT ENVIRONMENT**

# HUMAN FACTORS AT THE CHECKPOINT

TSA views the human as an integral part of a system. The system to be described for the purposes of this brief is the passenger screening checkpoint at the airport.

## — System Overview

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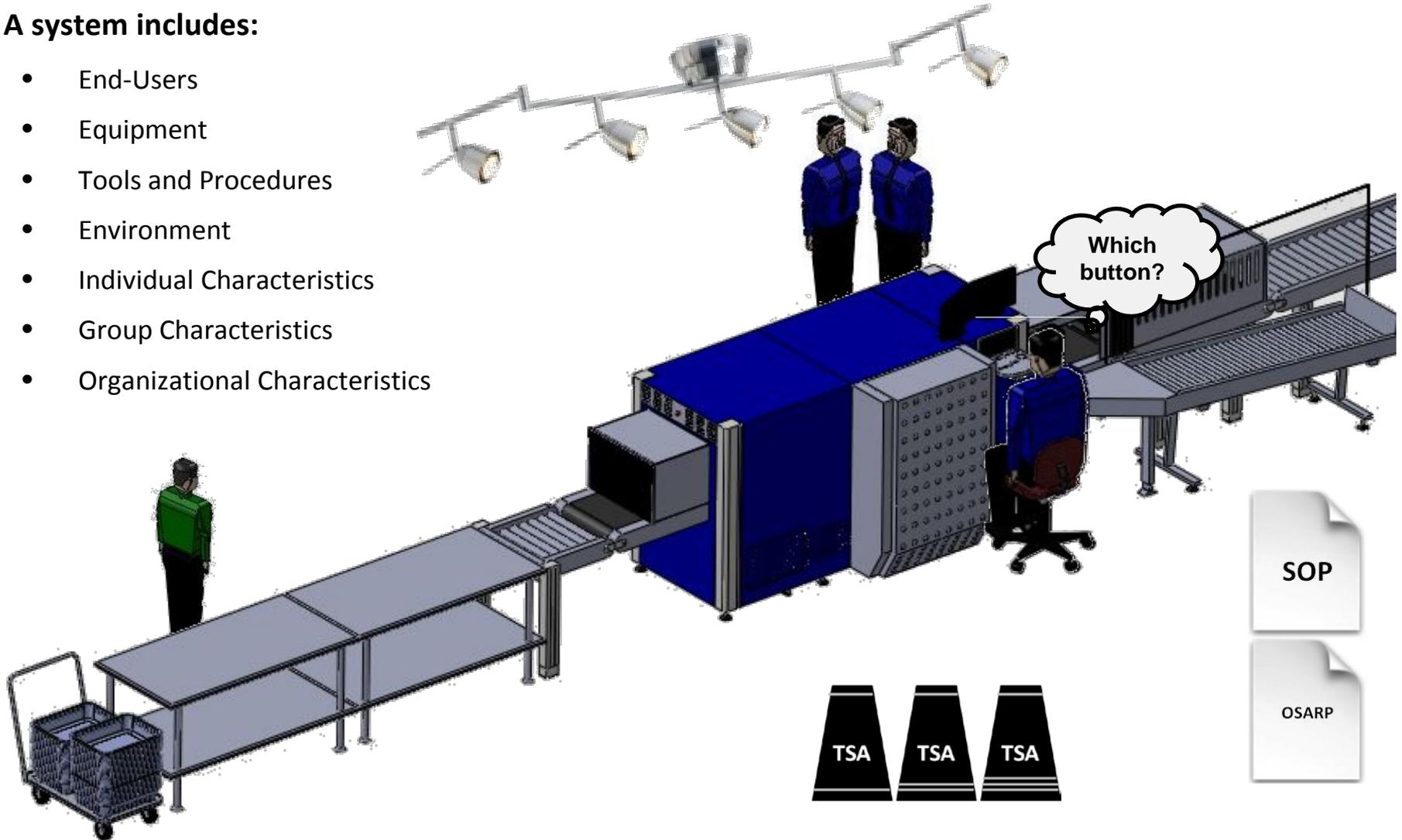
- The checkpoint environment is a noisy, bustling, often space-constrained, crowded airport, where the passengers are not always amenable to the procedures being carried out by the Officers on behalf of TSA
- The Officer positions from Travel Document Checker through to Dynamic Officer form a cohesive team of security personnel, augmented with hardware and software contained in the deployed technology at the checkpoint
- Human factors engineers at TSA are concerned with common problems in the human / system interface: cognitive processing demands, fatigue, scheduling, team performance, ergonomics, and control and display design

Human Factors research at TSA is designed to optimize the interactions between the user and the system.

# HUMAN FACTORS AND TSA SYSTEMS

## A system includes:

- End-Users
- Equipment
- Tools and Procedures
- Environment
- Individual Characteristics
- Group Characteristics
- Organizational Characteristics



# CURRENT EFFORTS

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Human Factors projects focus on improving threat detection, identifying commonalities across the architecture, and delivering innovative screening technologies to the field

## Project Description

## Benefits / Outcomes/Efficiencies

### PATT

- The Pat-down Accuracy Training Tool (PATT) is life sized mannequin with embedded pressure sensors specifically designed to provide TSOs with objective feedback regarding their ability to apply the appropriate amount of pressure and coverage needed to detect prohibited items during a pat-down exam

- Improved passenger experience
- Objective customized training exercises
- Increased ability to detect threats and PBIEDs
- Improved confidence while conducting pat-downs

### Performance Decrement

- Research will investigate how long TSOs can assess images and render an accurate decision before a decrement in performance occurs
- Performance decrement is defined as the point where a TSO's ability to perform at their optimal level begins to decrease

- Identified / verified duty cycles, resulting in optimized human performance, increased threat detection, and security **effectiveness**
- Improved cognitive workload for TSOs / reduction in TSO fatigue
- Reduced human error

### Remote Screening

- This project will research innovative operational concepts aimed at streamlining TSO work processes, while eliminating bias, improving human performance, and reducing error

- Increased optimization of TSO resources.
- Reduced cognitive load of TSOs
- Streamline TSO work processes
- Eliminate bias
- Improve human performance and reduce error

### Designated Research Airports

- The DRA effort establishes working "designated research areas" within at least one airport in each of the 7 regions in which to conduct Human Factors research and Operational Test and Evaluation

- Ability to support defined test objectives
- Demographic diversity will provide more robust and valid data
- Timely data collection which will enhance budget and schedule constraints

# CURRENT EFFORTS CONTINUED

In order to optimize current and future TSO and system capabilities, assessments need to be made of current capabilities in the areas of technology, processes, and procedures across the system.

	Project Description	Benefits / Outcomes/Efficiencies
PTDR	<ul style="list-style-type: none"><li>• Research will include identifying and validating existing tools that will properly detail the aptitudes and attributes required for a TSO to excel in these positions</li></ul>	<ul style="list-style-type: none"><li>• Increased throughput of screened items or persons</li><li>• Minimal disruption to the screening process</li><li>• Increased customer satisfaction</li><li>• Improved checkpoint <b>efficiency</b></li></ul>
ITDR	<ul style="list-style-type: none"><li>• Research to identify the aptitudes/attributes required for a TSO to excel in the Image Threat Detection Resolution (ITDR) position</li></ul>	<ul style="list-style-type: none"><li>• Increased screener ability to accurately resolve alarms, resulting in higher hit rates and lower false alarm rates</li><li>• Decreased time to make a determination (decision making time)</li><li>• Decreased bag / secondary searches</li></ul>
ScreenADAPT	<ul style="list-style-type: none"><li>• The ScreenADAPT tool is a training system incorporating portable eye tracking technology to provide real-time performance feedback for customized training (exposure or adaptive) to maximize screener performance</li></ul>	<ul style="list-style-type: none"><li>• Customized and improved training</li><li>• Improved screener performance</li><li>• Reduced human error</li></ul>

Utilizing a holistic system approach to human factors research will enhance transportation security and performance by providing input to the design of the current and future security system.

# **NEW TSA INITIATIVES**

# FUTURE HF RESEARCH AT TSA

The Human Factors Engineers at TSA collaborate with stakeholders to identify human-rich research topics, leverage best practices, and utilize lessons learned.

Project	Description	Benefit
<b>SOP Transformation</b>	This research is designed to identify areas to improve performance of TSOs by determining ways to ensure SOP compliance, revising current SOPs, and recommending specific changes in the revised SOPs to optimize performance, ensure readability, comprehension and retention.	<ul style="list-style-type: none"><li>• This project will Improve readability, comprehension, adherence, and utilization of procedures.</li></ul>
<b>Threat Detection Sensitivity BDO Assessment</b>	This research is designed to identify areas to improve performance of BDOs by defining personality correlates and other measures that are present in current BDOs.	<ul style="list-style-type: none"><li>• This research will improve inform data driven decisions on performance hiring and retention.</li></ul>
<b>SOP Comms Effectiveness Improvement</b>	TSA's OSC seeks a review of industry best practices and tested recommendations for tailored approaches for communicating time-sensitive operational information to geographically dispersed personnel such that the information is appropriately comprehended and implemented by the workforce.	<ul style="list-style-type: none"><li>• Recommendations could include a uniform approach adopted by all airports or a "franchise" approach that ensures standardization of the execution of SOP modifications across the Nation.</li></ul>

The Human Factors Engineers focus to the future in order to continuously identify ways to improve operational efficiencies while enhancing security.

# QUESTIONS

