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FAA Office of NextGen (ANG)

REDAC / NAS Ops

Review of FY2023 – 2025 Proposed Portfolio

ATC / Technical Operations Human Factors

BLI Number: a11i

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ATC Technical Operations Human Factors Overview

What are the benefits to the FAA

- Improving the safety and efficiency of complex ATC systems by application of R&D to address factors affecting human performance in air traffic control operations and ATC system maintenance through improved guidance, selection, and training.
- Recommending and testing improvements to design, procedures, training, selection and placement; and mitigations to address human performance shortfalls.

What determines program success

- R&D Sponsors and Stakeholders in the ATO are able to make important workforce policy, acquisition, and operational management decisions based on the results of thorough, timely, and focused R&D efforts.
- When programs embrace human factors processes and requirements during system acquisition, they reduce human factors risks.
- Reducing human factors risks increases the likelihood for successful system implementation and operation, while reducing the likelihood for system design and engineering rework.

ATC Technical Operations Human Factors Program Support

People:

- Program Managers – Karl Kaufmann
- Project Manager – Sabreena Azam
- Subject Matter Experts – Bill Kaliardos

Laboratories:

- ANG-E25 Human Factors Branch, NextGen Aviation Research Division
- Research and Development Human Factors Laboratory
- AAM-520 NAS Human Factors Safety Research Laboratory
- John H. Volpe National Transportation Center

Current FY23 Accomplishments

- Human Autonomy Teaming : A Literature Review
- A Handbook for Signal Design: Alarms Alerts, and Warnings in Air Traffic Control
- A Structured Interview for Alarm Design – peer reviewed journal submission
- Completed update to FAA HF-STD-001 on requirements for displays, testing, maintenance and training

Anticipated Research in FY24

Planned Research Activities

- Develop facility operational guidance and training for recognition and mitigation of workload effects on controller fatigue and performance.
- Develop ATC maintenance task guidance and user interface standards for Technical Operations personnel performing Remote Maintenance Monitoring functions, to include use of AR/VR capabilities.
- Update the Human Factors Design Standard (FAA HF-STD-HF-001) to incorporate the latest scientific information in design requirements for automated ATC systems, information display and management, workstation arrangement and display characteristics.

Expected Research Products

- ATC facility operational guidance and training recommendations for mitigating workload-induced fatigue effects
- Maintenance guidance and Tech Ops workstation user interface design requirements for incorporation of AR/VR capabilities for Remote Maintenance Monitoring and site repair collaboration
- Updated Human Factors Design Standard (will be version HF-STD-001C)

Emerging FY25 Focal Areas

- Stress and Performance - Improved training to improve controller resilience and response to stress
- Controller Job Performance Standards - Controller performance standards that can be used to consistently measure progress in training, and to support job placement and selection decisions
- Expanded Use of Alternative Training Delivery Systems – Increased use of AR/VR and remote learning alternatives to reduce training cost while improving training effectiveness (skill acquisition and skill retention)
- Human Factors Research To Support Adoption and Implementation of Virtual and Augmented Reality Applications across multi-disciplinary areas (e.g., training and remote maintenance)
- Continued Exploration of Automation Impacts on Controller Performance and Development of Mitigations – Increase controller and controller team performance with alternative procedures and other mitigations to address increases in system automation and less frequent need for coordination among adjacent control positions
- Display Input Display End Coordination Alternatives for the Tracon Environment – Develop guidance on Advanced Automation with AI and ML Capabilities

ATC Technical Operations Human Factors

Research Requirements

The Program strives to provide useful human factors R&D results that support the ATO's development and implementation of new technologies and procedures in the national airspace in accordance with FAA Order 9550.8

- Improved safety, reduced hazards and error mitigation in ATC
- Automation effects and controller performance
- Improved design and operation of ATC systems
- Improved controller selection and training
- Controller and technical operations workforce optimization

Outputs/Outcomes

- Guidance document on Advanced Automation with AI and ML Capabilities
- HF assessment and recommendations report to help facilitate adaptation of VR/AR applications across multi-disciplinary areas
- A HF comparison analysis between existing TRACON Display End Coordination Alternatives and industry. Accompanied with a recommendations report identifying down selection of modern alternatives for the TRACON environment.

FY 2025 Planned Research

- Controller Job Performance Standards
- Human Factors Research To Support Adoption and Implementation of Virtual and Augmented Reality Applications across multi-disciplinary areas (e.g., training and remote maintenance)
- Continued Exploration of Automation Impacts on Controller Performance and Development of Mitigations
- Display Input Display End Coordination Alternatives for the TRACON Environment

Out Year Funding Requirements

RE&D

FY23	FY24	FY25
$ 5.9M	$ 5.9M	$ 5.9M