Federal Aviation Administration

REDAC / NAS OPS

Review of FY 2020 Proposed Portfolio

A11.i Air Traffic Control / Technical Operations Human Factors

BLI Number: 8BA000 (Core Program)

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ATC / Tech Ops Human Factors – Core Program Overview

- Purpose:
  - To provide technical sponsors with timely and appropriate R&D products and consultation services, as identified by the ATO Human Factors R&D Roundtable and ANG-C management, that improve safety and efficiency of complex ATC systems
  - Provide support to Human Factors efforts for FAA acquisition programs through In-Service Review (ISR) Checklist human factors approval responsibility, and Acquisition Management System (AMS) Policy updates
- Methods used:
  - Measuring individual and team performance of air traffic controllers and technical operations specialists.
  - Recommending and testing improvements to design, procedures, training, selection and placement; and mitigations to address human performance shortfalls.

ATC / Tech Ops Human Factors Benefits

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.

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 and acquisition 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. This increases the likelihood for successful system implementation and operation, while reducing the likelihood for system design and engineering rework.

ATC / Tech Ops Human Factors – Core Program Team

ATO Sponsors (also members of the annual ATO R&D Requirements Roundtable):

- AJG – Management Services
  (also supports AHF-02, Deputy Director HR Services)
- AJI – Safety and Technical Training
  (also supports AMA-1 FAA Academy Superintendent)
- AJM – Program Management Office
- AJW – Technical Operations Services

ANG-C1 Program Management:

- BLI PM – Dan Herschler

FAA Research Performers:

- FAA Civil Aerospace Medical Institute (CAMI)
  - Aerospace Human Factors Research Division (AAM-500)
    - » AAM-520 – Carol Manning, Manager
- FAA William J. Hughes Technical Center
  - Aviation Research Division (ANG-E2), Human Factors Branch
    - » ANG-E25 – Kenneth Allendoerfer, Manager

ATC / Tech Ops Human Factors Focus Areas

- The program addresses R&D needs within five focus areas:

  1. Human Factors Standards
  2. Workforce Optimization – Human Factors Efforts
  3. Improved Safety – Human Factors Efforts
  4. Human Factors in NAS Technology Integration
  5. Human Performance Enhancement

- The program also supports Human Factors efforts for FAA acquisition programs through ISR Checklist human factors approval responsibility, and AMS Policy updates

8BA000 Funding Status

as of December 31, 2017

Organization	FY2016	FY2017	FY2018	$ Total
ANG-C1	284,447	1,117,569	5,353	1,407,369
ANG-E25	35,649	150	0	35,355
AAM-520	351,977	600,250	0	853,286
Total	672,073	1,717,969	5,353	2,296,010
FY2018 Roundtable Planned Commitments	672,073	1,222,927	0	1,895,000
FY2019 Planned Commitments	0	495,042	5,353	500,395

FY2017 Research Requirements

No.	Title	Technical Performer	Acquisition Status
HF17-AJG-1	Determine if attachment of job jeopardy to performance in the Common Principles (FAA 43078001) is supported by content validation	CAMI	FY2017 CAMI PD (project completed)
HF17-AJG-2	Update and maintain an ATCS longitudinal training and performance database to support evaluation of proposed strategies, tests, or interventions in training, placement, and/or promotion of ATCSs	CAMI	FY2017 CAMI PD
HF17-AJG-3	Conduct strategic job analysis for NAS Security and Enterprise Operations (NASEO) Directorate	CAMI	FY2017 CAMI PD
HF17-AJG-4	Develop recommendations for increasing the likelihood that controller trainees will succeed in field training to ensure that trainees are not lost due to factors other than their ability to control air traffic	CAMI	FY2017 CAMI PD
HF17-AJI1-2	Visual Scanning Techniques Research Study	CAMI	FY2017 CAMI PD
HF17-AJI1-3	Human Factors for NextGen Remote Towers	CAMI	Deferred to FY2018 CAMI PD
HF17-AJI2-1	Assess the Radar Vectoring Aptitude Test (RVAT) as a measure of vectoring aptitude and assist in determining its predictive validity, utility, and fairness use in the placement of newly hired air traffic developmental controller	CAMI	FY2017 CAMI PD
HF17-AJI2-2	Conduct research to provide data and targeted analyses to support data-driven decision-making at the FAA Academy Air Traffic Division, including documenting and improving the reliability of the raters	CAMI	FY2017 CAMI PD
HF17-AJI2-3	Evaluate AT-CTI Program effectiveness	CAMI	FY2017 CAMI PD
HF17-AJM-1	Optimizing Air Traffic Control Information Presentation	ANG-E25	ANG-E25 LOEA Deferred to FY2018
HF17-AJM-2	Color palette development and deployment	CAMI	FY2017 CAMI PD
HF17-AJM-3	NAS Capability Utilization Analysis	ANG-E25	ANG-E25 LOEA Deferred to FY2018
HF17-AJW-1	Revising HF Style Guide for New ATO Equipment	ANG-E25	FY2017 ANG-E25 LOEA

Anticipated Research in FY18 and FY19

Planned Research Activities

- ATC and Tech Ops Equipment Design Standards & Guidance – FY18-FY20
- Tech Ops Workforce Transition Job Analysis Efforts – FY18
- Identify NAS ATC Capability and Equipment Utilization, HF Issues – FY18-FY20
- ATCS Selection, Placement, Training and Performance Evaluation and Effectiveness R&D – FY18-FY20
- Runway Visual Scanning Research to Develop Best Practices – FY18-FY19
- Assess Controller Fatigue and Recommend Mitigations – FY18-FY19

Expected Research Products

- Technical Operations Graphical User Interface (GUI) Style Guide for New ATO Equipment – Part 1 FY18, Part 2 FY19, Part 3 FY20
- ATC Display Color Standard with Color Palette that Accommodates Color Vision Deficient Users – FY18
- Controller Performance Standards for Field Facility and Academy Training – FY18, FY19, FY20
- Recommended Interventions to Mitigate Non-Task Factors Impacting ATCS Training Success – FY18
- Recommended Training Methods for Improving ATCS Visual Scanning Techniques – FY18

FY2018 Research Requirements

No.	Title	Technical Performer	Acquisition Status
	ATO Management Services (AJG) Total = 6 projects		
FY18-AJG-1 New	Evaluation of ATCS Selection Process in relation to Predictors of FAA Academy and Field Training Success	CAMI	FY18 CAMI PD in development
FY18-AJG-2 Ongoing	Develop Longitudinal Database for Human Factors Research and the Investigation of Attributes that Predict ATCS Training Success	CAMI	FY18 CAMI PD in development
FY18-AJG-3 Ongoing	Strategic Job Analysis for NAS Security and Enterprise Operations Directorate (NASEO) Workforce	CAMI	FY18 CAMI PD in development
FY18-AJG-4 New	Capitalize on ATSS 2101 Job Task Analysis findings (Previously - Talent Acquisition Process)	CAMI	FY18 CAMI PD in development
FY18-AJG-5 New	Strategic Job Analysis for Engineering Services	CAMI	FY18 CAMI PD in development
FY18-AJG-6 Ongoing	Understanding Why Some Developmental Controllers Fail to Succeed in Field Training	CAMI	FY18 CAMI PD in development
	ATO Program Management Organization = 6 projects		
FY18-AJM-1 Ongoing	Optimizing Air Traffic Control Information Presentation	ANG-E25	FY18 LOEA in development
FY18-AJM-2 Ongoing	Color Palette and Palette Deployment	CAMI	FY18 CAMI PD in development
FY18-AJM-3 Ongoing	Capability Utilization Analysis	ANG-E25	FY18 LOEA in development
FY18-AJM-4 New	Update HFDS Chapter 5 “Displays and printers” section	ANG-E25	FY18 LOEA in development
FY18-AJM-5 New	Integration of alarms and alerts into air traffic systems (handbook)	ANG-E25	FY18 LOEA in development
FY18-AJM-6 New	Integration of decision support tools and procedures into air traffic systems (handbook)	ANG-E25	FY18 LOEA in development

FY2018 Research Requirements (cont.)

No.	Title	Technical Performer	Acquisition Status
	ATO Safety and Technical Training (AJI) Total = 7 projects		
FY18-AJI-1a/b Ongoing	a. Academy Pass Rates Analysis - Conduct research documenting and improving the reliability of the raters who evaluate ATC student performance b. Conduct research to improve inter-rater agreement in the assessment of ATC trainee performance	CAMI	FY18 CAMI PD in development
FY18-AJI-2 Ongoing	Visual Scanning Techniques Research Study	CAMI	FY18 CAMI PD in development
FY18-AJI-3 New	Research on ATO Fatigue Mitigation Effectiveness	ANG-E25	
FY18-AJI-4 Ongoing	Evaluate AT-CTI Program effectiveness	CAMI	FY18 CAMI PD in development
FY18-AJI-5 Ongoing	Develop strategy - scenarios on weather information dissemination for ATCS Training	**TBD**	Evaluating alternatives
FY18-AJI-6 Ongoing	ATC field training effectiveness study - Evaluate the air traffic control field qualification training process to identify ways to improve training effectiveness	CAMI	FY18 CAMI PD in development
FY18-AJI-7 Ongoing	Identify human factors issues for integrating remote towers into operations	CAMI	FY18 CAMI PD in development
	ATO Technical Operations (AJW) Total = 1 project		
FY18-AJW-1 Ongoing	Revising HF Style Guide for New ATO Equipment – Tech Ops Phase 2	ANG-E25	FY18 LOEA in development
	ANG Human Factors Division (ANG-C1) Total = 1 project		
FY18-ANG-C1-1 Ongoing	Support the FAA Human Factors Coordinating Committee, the DoD HFE Technical Advisory Group, the DOT Human Factors Coordinating Committee, and the DHS Cross-Agency Human Factors Coordination Team. Support the HF.FAA.GOV website and coordinate/provide annual report inputs and other periodic information and summaries of programmatic accomplishments.	ANG-E25	FY18 LOEA in development
	FY2018 Total = 21 projects		

FY2018 Deferred Research Requirements (cont.)

No.	Title	Technical Performer	Acquisition Status
	***Deferred Requirements* ATO Safety and Technical Training (AJI) Total = 5 projects**		
FY18-AJI-7 Ongoing	Identify human factors issues for integrating remote towers into operations (focus group, cognitive walk-through, prototyping and part-task simulation evaluation)	ANG-E25	deferred
FY18-AJI-8 New	Runway Safety Call to Action: Human Factors Study in the Airport Environment (field survey and prototyping, part-task simulation evaluation)	ANG-E25	deferred
FY18-AJI-9 New	Develop En Route Controller Certification Training Standards	Industry	deferred
FY18-AJI-10 New	Develop Tower Controller Certification Training Standards	Industry	deferred
FY18-AJI-11 New	Runway Safety Call to Action: Human Factors Study in the Airport Environment	ANG-E25	Evaluating alternatives

Emerging FY20 Focal Areas

- Research to Support Controller Selection, Placement, and Training Performance Evaluation
  - Evaluate controller selection in relation to predictors of FAA Academy and field training success, and use the results to identify potential areas for AJG and AHR to improve the selection process
  - Provide recommendations to AJI and ATO facility managers to address training environment challenges that adversely affect performance of developmental and CPC-IT controllers during field training.
  - Continue effort to identify and mitigate factors “Understanding Why Some Developmental Controllers Fail to Succeed in Field Training”
  - Evaluate factors that improve the learning and transfer of training of ATC training games and applications (Apps) to controller knowledge and skills, and recommend to AJI the criteria for selecting and developing future Apps.

- Air Traffic Control Safety Research
  - Recommend improvements to controller visual scanning techniques to reduce runway incursions and loss of standard separation at tower-controlled airports.
  - Conduct simulation research to identify and recommend mitigations to AJM for operator and maintainer performance risk posed by ATC automation.
  - Research the relation between perceived controller workload and fatigue and provide recommendations to the ATO for the management of fatigue-inducing workload using FRMS strategies.
  - Conduct research to identify and mitigate controller performance risk posed by ATC automation and provide recommendations to AJM

Emerging FY20 Focal Areas (continued)

- Research to Support Selection, Placement, and Training Performance Evaluation of Technical Operations Personnel
  - Conduct Strategic Job Analysis for ATSS 2101 by integrating in the NAS Security and Enterprise Operations (NASEO) Workforce findings
  - Complete Engineering Services Strategic Job Analysis (started in FY2018)
  - Conduct research to identify and mitigate maintainer performance risk posed by ATC automation and provide recommendations to AJM and AJW

A11.i – Air Traffic Control/Technical Operations Human Factors, Base Program - RE&D

FAA Strategic Initiatives

Priority 1: Make Aviation Safer and Smarter
Priority 2: Deliver benefits through Technology and Infrastructure
Priority 4: Empower and innovate with the FAA's people

Need

The ATC/TO Human Factors research program supports FAA strategic goals for increased safety and greater capacity by developing research products and promoting the use of those products to meet the future demands of the aviation system.

Research Goals

Standards - Implement human factors standards for design requirements for new and modified air traffic control systems

Workforce Optimization – Provide research results to ATO and FAA Academy sponsors on policies affecting controller and technician recruitment, selection, placement, staffing, and performance evaluation

Improved Safety – provide recommendations to improve procedures and operating practices for ATC and Technical Operations personnel

Human Factors in NAS Technology Integration - Provide methods and tools to support air traffic control system acquisition programs as they address human factors during concept development, including prototyping and scenario evaluations

Human Performance Enhancement - Identify minimum qualification standards of performance of ATC and Technical Operations personnel (e.g., initial training)

FY 2020 Accomplishments

Evaluate controller selection in relation to predictors of FAA Academy and field training success, and use the results to identify potential areas for AJG and AHR to improve the selection process.

Provide recommendations to AJI and ATO facility managers to address training environment challenges that adversely affect performance of developmental and CPC-IT controllers during field training.

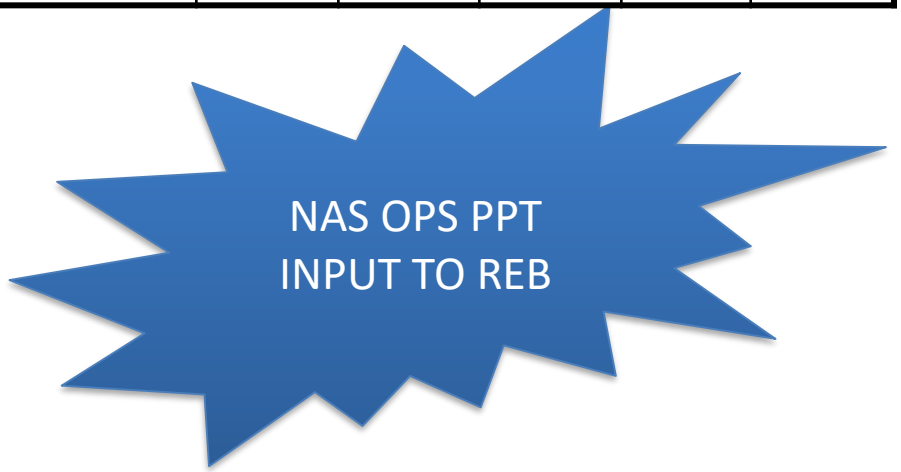
Conduct simulation research to identify and recommend mitigations to AJM for operator and maintainer performance risk posed by ATC automation.

Research the relation between perceived controller workload and fatigue and provide recommendations to the ATO for the management of fatigue-inducing workload using FRMS strategies.

Evaluate factors that improve the learning and transfer of training of ATC training games and applications (Apps) to controller knowledge and skills, and recommend to AJI the criteria for selecting and developing future Apps.

Out Year Funding Requirements

	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Funding Target ($000)	$141	$139	$136	$134	$131



Risks

Requirements Process (Roundtable Timing)

Risk: The FY2018 Roundtable was held relatively late in the FY (the first week of February 2018), delaying implementation of the R&D slate of projects.

Mitigation: The Roundtable is now hosted by AJG and the new AJG Roundtable chair expects to hold quarterly meetings and to schedule the FY2019 Roundtable before the start of the FY.