

FY 2020 NextGen Flight Deck Human Factors Research Plan

NextGen Air-Ground
Integration Human Factors

BLI A12.B

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To: REDAC Human Factors Subcommittee

Date: February 27-28, 2018



Federal Aviation
Administration



NextGen: Human Factors Guidelines for Advanced Instrument Procedure Design and Use (A12B.HFNG.2)

Research Requirement

- Research is needed to anticipate, mitigate, and reduce potential pilot performance issues related to flying advanced NextGen instrument procedures, including Trajectory-based Operations. Procedures such as RNAV/RNP SIDs, RNAV/RNP STARs, and RNP (AR) approach operations are of particular interest. Pilot errors when flying these advanced procedures could result in reduced airspace capacity, reduction of operational effectiveness, loss of separation, and other safety consequences. This research will inform procedure design requirements, related ACs, training material, and associated regulations. It will help in meeting goals such as “delivering and using resilient navigation services.”

Sponsor POC: J. Kerr (AFS-470) K. Abbott (AVS)

Research POC: S. Chappell (ANG-C1)

Sponsor Outcome

- Reduced accident rate due to human error with airspace procedure design/use as a causal or contributing factor and improved operational implementation of PBN-based airspace procedures, with reduced need for redesign after initial implementation. Policy documents that may be informed by this research include: FAA Order 8900.1, ACs (e.g., AC 90-105A, AC 90-100A, AC 90-101A) 8260-series Orders as needed including 8260.19, 8260.46, and 8260.58, FAA Aeronautical Charting Standards for PBN and recommended guidelines for airspace procedure design.

Research Deliverables

- Report on the development and test of new operational implementation methods for PBN
- Human factors recommendations for the design and interactive use of electronic charts and other electronic flight deck displays of chart and procedure data
- Evaluation of the effectiveness of subjective complexity factors in improving procedure design
- Report documenting review of existing guidance on how pilots monitor compliance with vertical flight path and how this would apply to future 4-D trajectories

Contract Funding (\$K)

		Request	Request	Target
FY16	FY17	FY18	FY19	FY20
◆	◆	0	◆	◆

NextGen Procedures, Tasks, Skills and Training for NextGen Air Carrier Pilots and Dispatchers (A12B.HFNG.3)

Research Requirement

- Research is needed to evaluate procedures and training and checking requirements for pilots as their jobs change in NextGen operations, including Trajectory Based Operations. This will inform NextGen procedures and training guidance.

Sponsor POC: R. Burke (AFS-280) K. Abbott (AVS)

Research POC: S. Chappell (ANG-C1)

Sponsor Outcome

- Update regulations (as needed) and guidance to enable pilots and operators to adequately train for the changes coming to the NAS through NextGen enhancements, including support of Trajectory Based Operations. The guidance to be updated will include AC 120-51, AC 120-71 and new AC 120-FPM.

Research Deliverables

- Report on findings from all current relevant NextGen documentation published and available by the FAA
- Complete instructional specification for all pilot training required for on-going transition to emerging NextGen technologies including the results of training validations

Contract Funding (\$K)

		Request	Request	Target
FY16	FY17	FY18	FY19	FY20
0	0	0	◆	◆

NextGen Flight Deck Systems-Flightcrew Interfaces, Installation, Integration, and Operations (A12B.HFNG.4)

Research Requirement

- This research will investigate pilot performance and evaluate human factors considerations, as well as identify the human factors/pilot interface issues associated with NextGen technologies and procedures.

Sponsor POC: C. Swider (AIR-134)

Research POC: R. Bolinger (ANG-C1)

Sponsor Outcome

Incorporate human factors best practices, early in the design process. Create comprehensive human factors guidelines that will assist certification and flight standards personnel. Examples include:

- Job aids and checklists to assist engineers and inspectors in the field
- Empirical data for updating FAA guidance and industry standards
- Human factors guidelines and recommendations for NextGen technologies

Research Deliverables

Advanced display technologies – Retinal, head-worn glasses/displays.

- Guidelines and recommendations based on a literature review and industry/product review, research plan, experiment design and test plan, and HITL results

Advanced control systems – Gestures, haptic/tactile, and multi-modal (combined)

- Guidelines and recommendations based on a literature review and industry/product review, research plan, experiment design and test plan, and HITL results

Advanced EFVS – Millimeter wave, LIDAR, and combined sensor technologies

- Guidelines and recommendations based on a literature review and industry/product review, research plan, experiment design and test plan, and HITL results

Contract Funding (\$K)

		Request	Request	Target
FY16	FY17	FY18	FY19	FY20
◆	◆	◆	◆	◆

FY16-FY20 NextGen Flight Deck Research Requirements Overview

	FY16	FY17	FY18	FY19	FY20
Human Factors Guidelines for Advanced Instrument Procedure Design and Use (A12B.HFNG.2)	◆	◆	-	◆	◆
Procedures, Tasks, Skills and Training for NextGen Air Carrier Pilots and Dispatchers (A12B.HFNG.3)	-	-	-	◆	◆
Flight Deck Systems-Flightcrew Interfaces, Installation, Integration, and Operations (A12B.HFNG.4)	◆	◆	◆	◆	◆
DataComm Human Factors R&D (A12B.HFNG.6)	-	◆	-	-	-
Human Error and Complex Systems (A12B.HFNG.6)	◆	◆	◆	◆	-

◆ indicates years with actual or proposed funding