

# Human Factors REDAC Subcommittee

*Update on F&R  
Winter 2015 Finding #4  
Current Status: OPEN*

*Human Factors Division, ANG-C1*

*March 2016*



Federal Aviation  
Administration



# Recommendations from Finding #4

- Complement Human Factors (HF) Flight Deck work focusing on the successful *design, adoption, implementation and evaluation of Performance Based Navigation (PBN)* in the performance of Air Traffic Control (ATC), Traffic Flow Management (TFM) and Flight Operations Control (dispatch) tasks
  - Our primary efforts will focus on the evaluation piece of PBN
- Ensure that work is completed in a cohesive *collaborative* manner to provide guidelines grounded on an integrated systems perspective
  - Collaboration is key for current and future research as we work to identify and establish relationships between NextGen concept work and Air/Ground efficiency improvements

# Summary of Key Concept Exploration to Date

Opportunities for HF involvement has focused on two areas: Established on RNP (EoR) and 4-D Trajectory (4DT)

## EoR Takeaways

- Integrated Systems topics:
  - FMA monitoring
  - TSAS integration
  - Mixed equipage
  - Trust in automation
- EoR is currently operational at Denver with preparations for a second site (Seattle) in the next 18 months
- Opportunity to collect data and provide HF guidance for EoR rollout NAS-wide

## 4DT Takeaways

- Three concepts under 4DT:
  - Dynamic RNP
  - Advanced Interval Management
  - ATC Winds
- Finalizing operational scenarios by the end of FY16
- Will conduct one demo in first quarter of FY17 to test the three concepts
- Opportunity to provide HF support during concept validation

# Suggested Focus Areas for ATC HF Involvement

ANG-C1 recommends providing HF leadership in the following areas:

- Lessons Learned comparative analysis for Denver and Seattle EoR implementations to provide guidance for NAS-wide rollout.
- Further safety and human performance analyses of the EoR concept to support successful NAS-wide rollout.
  - Results could also be integrated into the SMS process before additional flight trials.
- Review of existing training approach for EoR to facilitate concept acceptance and use.
- Human performance analysis support during the 4DT demo slated for first quarter of FY17.
  - The demo will include DRNP, Advanced IM, and ATC Winds.

# Air/Ground Integration Opportunities

## *Current PBN related Flight Deck Projects*

### **Subjective Instrument Procedure Complexity**

**Output:** Report on human factors issues for instrument procedures' complexity (8/16)

**Impact:** Data will help guide designers of instrument flight procedures through updates to the FAA's 8260 series orders



## *Complimentary ATC PBN Projects*

Develop and execute subjective complexity work on the ATC side to inform PBN-related updates to the 7110.65, training requirements, and change management approach.

### **Briefing Strips for Arrivals & Departures**

**Output:** Report summarizing need for alternate depiction for RNAV/RNP arrival/departure procedures (2/17)

**Impact:** Support updates to FAA Orders in the 8260 series, FAA Order 8900.1, and to mitigate complexity and challenges to flight crew compliance with PBN procedures



Develop evaluation strategy to demonstrate ATC efficiency and safety improvement with Pilot/Flight Crew using Briefing Strips; demonstrate increased compliance with published RNAV/RNP constraints requiring less ATC instructions and potential recovery for non-compliance.

# Coordination with AJV-14

- Coordination activities should be scheduled between ANG-C1/AJV-14/AVS/AJR to identify areas of analysis for Human Factors as part of the FAA response to the RTCA (6/2015).
- Initial meeting on 8/31 to discuss PTT/Lessons Learned
  - Human Factors support to “Recommendations for Technical Stakeholders” (Recommendation 2), to analyze stakeholder roles and responsibilities, and to identify additional training needs for controllers concerning PBN procedures with the deployment of new DSTs
  - Human Factors support to “Outcomes and Metrics” (Recommendation 1, 2, 3, 4), for the development of cost effective solutions to Air Traffic Controller and Flight Crew Workload evaluation
  - Human Factors support to “Capturing Lessons Learned and Future Efforts” (Recommendation 3, 4, 5), for cost effective and PTT usability study and user interface development oversight; link to ATIS study and potentially D-ATIS down the road.

# Current Flight Deck Projects

- **BACKUP**



# Subjective Instrument Procedure Complexity (FY13 PLA 03.11.00)

## •Description / Benefits

- The Flight Technologies and Procedures Division of the Flight Standards Service has requested human factors R&D to support updates to the FAA's 8260 series orders that guide designers of instrument flight procedures. Research will support development of human factors guidance that will address issues concerning the design and depiction of terminal instrument flight procedures and associated aeronautical charts.
- Research will provide data to help the FAA consider flightcrew issues as early as possible in the design of new flight procedures to smooth their operational implementation. The data will allow Flight Standards human factors specialists to develop guidance to address hazards and risks associated with human-automation interaction in multiple aircraft types, operators, and equipment (e.g., VNAV).

## •Task / Project Profile

- Project Manager: Sherry Chappell
- Requirement: Human Factors Guidelines for Advanced Instrument Procedure Design and Use
- Performer: Divya Chandra, Volpe
- Sponsor: John Swigart AFS-470 and Kathy Abbott, CSTA (AIR-100)

## •Recent Accomplishments

- Presentations on the subjective procedure complexity study to FAA Flight Standards and Aeronautical Information Services, Jeppesen, CNS TF, PARC PCPSI WG, HF REDAC, and ICAO between August and December 2015.
- Draft of technical report submitted January 2016.
- Annual update to SharePoint site and public website, September 2015

## •Future Plans

- Complete full technical report on instrument procedure complexity and prepare a conference paper on the study by August 2016 .
- Continue participation in PARC working groups.
- Identify follow-on research priorities with program managers and technical sponsors. Several proposed tasks under consideration.

## •Deliverable Schedule

Task Name Deliverables	Completion Date	Status
(D) Report on human factors issues for instrument procedures' complexity	08/31/2016	G

## •Funding Profile

BLI Number	Project Name	Project Funding
111110	Subjective Instrument Procedure Complexity	FY13 \$400,000

## •Issues / Risks

- There are no issues or risks.

Outcome: Empirical basis for instrument procedure design for NextGen arrivals and departures to update FAA's 8260 series orders to mitigate complexity in flightcrew interaction with flight deck systems.



# Briefing Strips for Arrivals & Departures (FY14 PLA 03.01.00)

## •Description / Benefits

The Flight Standards Flight Technologies and Procedures Division has identified a human factors concern for flightcrew use of area navigation ( RNAV) and required navigation performance ( RNP) Arrival and Departure Procedures. Complexity of the procedures may pose challenges for effective crew coordination. Prior studies on Instrument Approach Procedures (IAP) led to development of IAP briefing strips and identified the potential need for alternative visual depiction of information for RNAV and RNP Arrival and Departure procedures to facilitate rapid and accurate crew briefings.

**Outcome:** Empirical basis for instrument procedure design for NextGen arrivals and departures with recommendations of potential content for alternate visual depictions of information on RNAV and RNP Arrival and Departure Procedures that may support updates to FAA Orders in the 8260 series, FAA Order 8900.1 to mitigate complexity and challenges to flight crew compliance with PBN procedures.

## •Task / Project Profile

- Project Manager: Regina Bolinger
- Requirement: Instrument Procedure Design and Evaluation, A12B.HFNG.2
- Performer: Wes Olsen, MIT Lincoln Labs
- Sponsor: Mark Steinbicker, AFS-470

## •Recent Accomplishments

- Reviewed relevant Volpe studies
- Developed initial draft questions for structured interviews with pilots/training personnel

## •Future Plans

- Conduct structured interviews/focus group discussions with representatives of the pilot and/or ATC communities to:
- Coordinate findings with instrument procedures developers/publishers, aircraft operators, and the operational community

## •Deliverable Schedule

Task Name Deliverables	Completion Date	Status
(D) Report summarizing need for an alternate visual depiction for RNAV/RNP arrival/departure procedures*	02/28/2017	G

\*Originally Instrument Procedures Report

## FY16 BP Target

- Report on finding of IAP Briefing Strips assessment and the potential applicability to RNAV/RNP approach and departure procedures (09/30/2016)

## •Funding Profile

BLI Number	Project Name	Project Funding
111110	Briefing Strips for Arrivals & Departures	FY14: \$174,917

## •Issues / Risks

- Part of the FY14 Proposed Amendment not yet signed