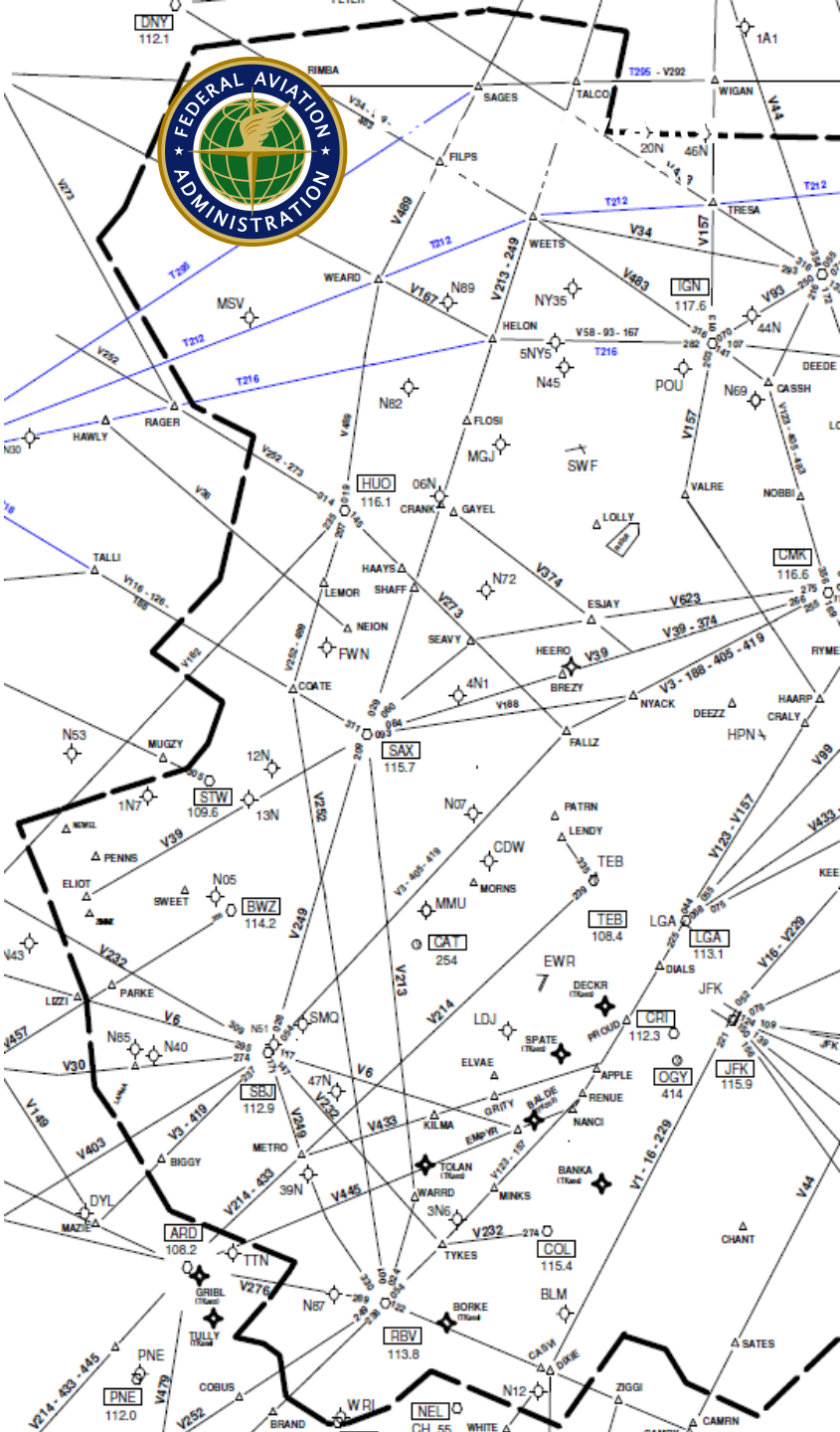
ATC/Technical Operations Human Factors Research Program



Presented to: NAS OPS REDAC Subcommittee

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Expected Shortfalls Addressed

- **Shortfalls addressed by this program**
  - More tools deployed in the NAS, without validation/evaluation of objective human performance assessment
  - Safety of operations with the new tools and procedures is not measured before full deployment
  - System acquisition will be limited to HW/SW target performance measures
  - Improvement of human task force, training and maintaining safety is difficult when no agreed to criteria for evaluation of performance are defined
  - Lack of NAS wide repository for “lessons learned” or easily identified source to point to Human Factors issues related to user (ATC/Pilot) and airport questions concerning PBN (wealth of information and lessons learned) around previous design efforts that is not easily available
  - Lack of a consolidated knowledge base causes errors to be repeated and potential benefits can be delayed or are minimized

Expected Benefits Realized

- **NextGen ATC/Tech Ops Human Factors Engineering Support provides:**
  - Effective systems integration to support PBN operations deployment and maintain separation
  - Specific human aspects of the operational performance is considered before each operational initiative is fully deployed
  - Specific human aspects of the operational performance is objectively measured and evaluated based on an agreed upon set of criteria
  - Operational performance goals of NextGen are achieved through Stakeholder buy-in and an agreed upon process, and roles/responsibilities have been identified
  - Consolidation and aggregation of Human Centered specific knowledge for distribution and re-use in program decisions

Human Factors Engineering support activities are required to resolve potential problems and ensure operational viability, continuity, integration, and expected benefits are realized.

Overall Budget and Plans

- **FY-14 PLA**
  - Activities planned to be kicked off in the next months
  - budget: $4.6M
- **FY-15 PLA**
  - Working now on amendment to FY-14 PLA
  - Total remaining funds for that mod are expected be valued at NTE $3.2M
  - Closing the work started with remaining FY-14 funds for FY-15/16
  - FY-15 has $0 in funding
  - FY-16 budget line currently has $1M for HF under INDP/PBN
- **FY-17/FY-18 Plans**
  - Focus on two major areas SepMan / PBN for controller efficiency
  - Future of Tech Ops focused research unclear (e.g. Human Error and Hazards Analysis for Tech Ops in the NextGen environment, Ensure TechOps Business Continuity)
  - Build ATC/TO Knowledge Base (Task/Activities/Lessons Learned/Safety-Risk/Hazards and Mitigations strategies) for SepMan and PBN

Ongoing Activities

- **AMS HF tools and guidance for early stages of acquisition**
- **Human Error and Safety analyses assessment focused on Controllers**
- **NAS Enterprise Architecture HSI Roadmap Support and Harmonization**
- **Tech Ops Strategic Job Analyses, focusing on critical NAS Integration issues and major segment Bravo drivers**
- **Guidance materials for use of automation/DSTs and information management**
  - System resiliency modeling, evaluation and design recommendations, consequence of systems failures on workload and impact of skill degradation
  - Guidance for Alarms and Alerts Integration across platforms and prioritization schema

Accomplishments

- **Collected and shared FY13 PLA task deliverables**
  - Most projects are closed
  - Deliverables provide to the NextGen Office for review
  - Knowledge Base created and used as a stepping stool for current and future activities
- **FY14 PLA projects all started between 11/2015 and 08/2015**
  - No deliverables yet
- **FY15 PLA* Scope addressed and documented in PLA document**
- **Starting INDP and SepMan portfolio coordination meetings with portfolio managers and support staff for FY16 – FY18 scoping activities for Human Factors**

*Funded with FY14 dollars

Ongoing Projects with the Tech Center and CAMI

- **Prioritization Process for Information Elements to be Displayed on the Data Block**
- **NextGen HF Guidance on the Display of Information from Air traffic Time-Based Systems**
- **Guidance for the Display of NOTAMs on the IDS (w/USAF)**
- **Develop Implementation Plan and Recommendations for Convergence of En route/Terminal Functions (w/CAMI)**
- **Recommended NextGen Alarms and Alerts Association Method**
- **Traffic Manager Job and Tool Analysis and Recommendations**

Overview of Program FY16 and Beyond

- **No Single BLI for HF ATC/TechOps F&E funded work**
  - ATC/TechOps funding shared with Separation Management and INDP/PBN Portfolios
  - Work planned directly supports the portfolios' objectives
  - Engineering Analysis performed by HF need to be available and can be integrated as portfolio results supporting the NextGen increments

- **Funding reduced**
  - $0 FY15
  - *$1M FY16
  - *$0.5M FY17 for SepMan
  - *$1M FY17 for INDP/PBN

*Current funding target

G05A.02-04 - Integrated National Airspace Design and Procedure Planning - Human Factors

Research Requirement

- Contribute to the average daily airport capacity metric by providing the modeling and analysis needed to modify airspace and procedures. This will result in more efficient use of airspace through repeatable and dependable operations resulting in a more consistent daily capacity

FAA Strategic Priority 2 – Deliver Benefits through Technology and Infrastructure.
FAA Performance Metric 2 – Maintain an average daily capacity for Core airports of 59,122, or higher, arrivals and departures.*

Sponsor Outcome

- Human factors activities will focus on the interaction between the air and ground domains to evaluate and validate PBN procedure designs and,
- Document "lessons learned" to provide guidance for future PBN procedure implementations

Critical Milestones

- Safely design and implement various EoR IAPs in an effort to provide shorter, repeatable and stabilized paths to the runway for RNP aircraft
- Validate concepts that increase capacity and improve efficiency and throughput, while leveraging PBN technologies

Contract Funding ($K)

Funded	Request	Planned	Target	Target
FY15	FY16	FY17	FY18	FY19
$0	$1,000	$1,000	$1,000	$1,000

Source: F&E CIP

G01M.02-04 - Separation Management Concept & Analysis – Human Factors

Research Requirement

- Precise trajectories will require accurate monitoring capability to maintain consistent or increasing levels of airspace capacity and efficiency while maintaining safety

FAA Strategic Priority 2 – Deliver Benefits through Technology and Infrastructure.
FAA Performance Metric 2 – Maintain an average daily capacity for Core airports of 59,122, or higher, arrivals and departures.*

Sponsor Outcome

- Document initial research for assessing "No Closer Than" Spacing operations in the terminal area where TBFM is not being used
- Understand the roles and interactions of the controller, ground automation, and the interaction with the avionics required on the flight deck for successful operation
- Document procedures which increase reliance on automation for routine tasking, and evaluate its effect on controller workload, and controller efficiency when performing separation activities

Critical Milestones

- Assess the required human performance of controllers and technical operations personnel to ensure safe operations at increased capacity levels and by monitoring more precise trajectories

Contract Funding ($K)

Funded	Request	Planned	Target	Target
FY15	FY16	FY17	FY18	FY19
$0	$0	$500	$1,500	$2,000

Source: F&E CIP

* http://www.faa.gov/about/plans_reports/operational_metrics/

Emerging FY18 Focal Areas

- **To support NextGen Operational Increments under the Separation Management and PBN Portfolio**
  - Provide human performance/controller efficiency analysis for new automation tools and procedures to maintain separation across multiple domains (en route and terminal)
  - Separation Management and RNAV/RNP are performed by controllers differently in each domain; Specific human aspects of the operational performance must be considered for each role, responsibility associated with nominal and off nominal operations
  - Develop materials for inclusion in a NAS wide centralized repository for lessons learned, focusing on human factors issues associated with the design and use of RNAV/RNP procedures

Backup

Proposed FY15 PLA Activities

NextGen Human Error Conditions for TechOps

Purpose: Understand the individual and aggregate impacts that NextGen changes will have on new and existing Tech Ops human error modes and conditions

Description: Identify human error conditions, prioritize human error conditions based on criticality, and develop mitigation strategies for human error conditions

Who will use the product? Data will be included in ANG-B3 Integrated System Safety Assessment (ISSA) and Hazard Traceability Views (HTVs)

Coordination: AJW-13, ANG-C1, ANG-B2, ANG-B3, AJM-352

Proposed FY15 PLA Activities

RNAV/RNP Procedure Deployment and Impact on Human Performance

Purpose: Assess the impact of tactical vs. strategic planning of RNAV/RNP procedure on operator acceptance, system safety, and efficiency.

Description: Work will look to assess the impact of RNAV/RNP procedures on controller performance and workload. Assessment is needed to address issues with RNAV/RNP deployment in order to gain proposed benefits.

Who will use the product? Assessment outputs will be provided to AJV-1 to assist in support of PBN procedure development to reduce workload of ATCs

Coordination: AJV-1, AFS-400, ANG-C1, AJM-352

Proposed FY15 PLA Activities

Automation and DST Deployment and Impact on Human Performance

Purpose: Assessment of NextGen decision support tools for impacts on human performance and workload, as well as, overall “system” resiliency

Description: Review of current guidance and automation philosophies, assessment of system resiliency, and review of ATC skill degradation due to increased automation reliance

Who will use the product? Outputs of this effort will be provided AJM-352

Coordination: AJM-352, ANG-C1, AAM-500, ANG-E25