NextGen Enterprise Human Factors (BLI 1A11B0) Review of FY2021 Proposed Portfolio

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Program Overview

- The Enterprise Human Factor Development program will provide integrated guidance on human performance considerations to concept development, validation, and implementation teams.

- Research efforts to identify and mitigate systemic human factors considerations may yield the following benefits:
  - Increasing the utilization rate of concepts and systems among controllers;
  - Ensuring controller acceptance of concepts and systems;
  - Increasing safety through the mitigation of known human factors risks; and
  - Decreasing controller workload through improved tools and techniques.

Program Benefits

What are the benefits to the FAA?

- Human factors high-level (enterprise) guidance to assist with the evolution of the NAS infrastructure and its workforce

What determines program success?

- Successful transition of Human Factors products.
- Early identification of HF opportunities, to minimize a program's cost, safety and operational risks.

NextGen Enterprise HF "Team"

Sponsors and Customers

- ANG NextGen
- AJM ATO Program Management Office ("PMO")
- AJI ATO Safety and Technical Training
- AJV ATO Mission Support Services
- AJT ATO Air Traffic Services
- AJW ATO Technical Operations

ANG-C1 Program Management

- PM – Bill Kaliardos
  - In recent years changed from Jerome Lard, to Stephanie Kreseen, to Bill

First, a few slides on TBO…

Trajectory Based Operations (TBO)

…an air traffic management (ATM) method for **strategically** planning, managing, and optimizing flights throughout the operation by using **time-based management, information exchange** between air and ground systems, and the **aircraft's ability to fly precise paths in time and space.**

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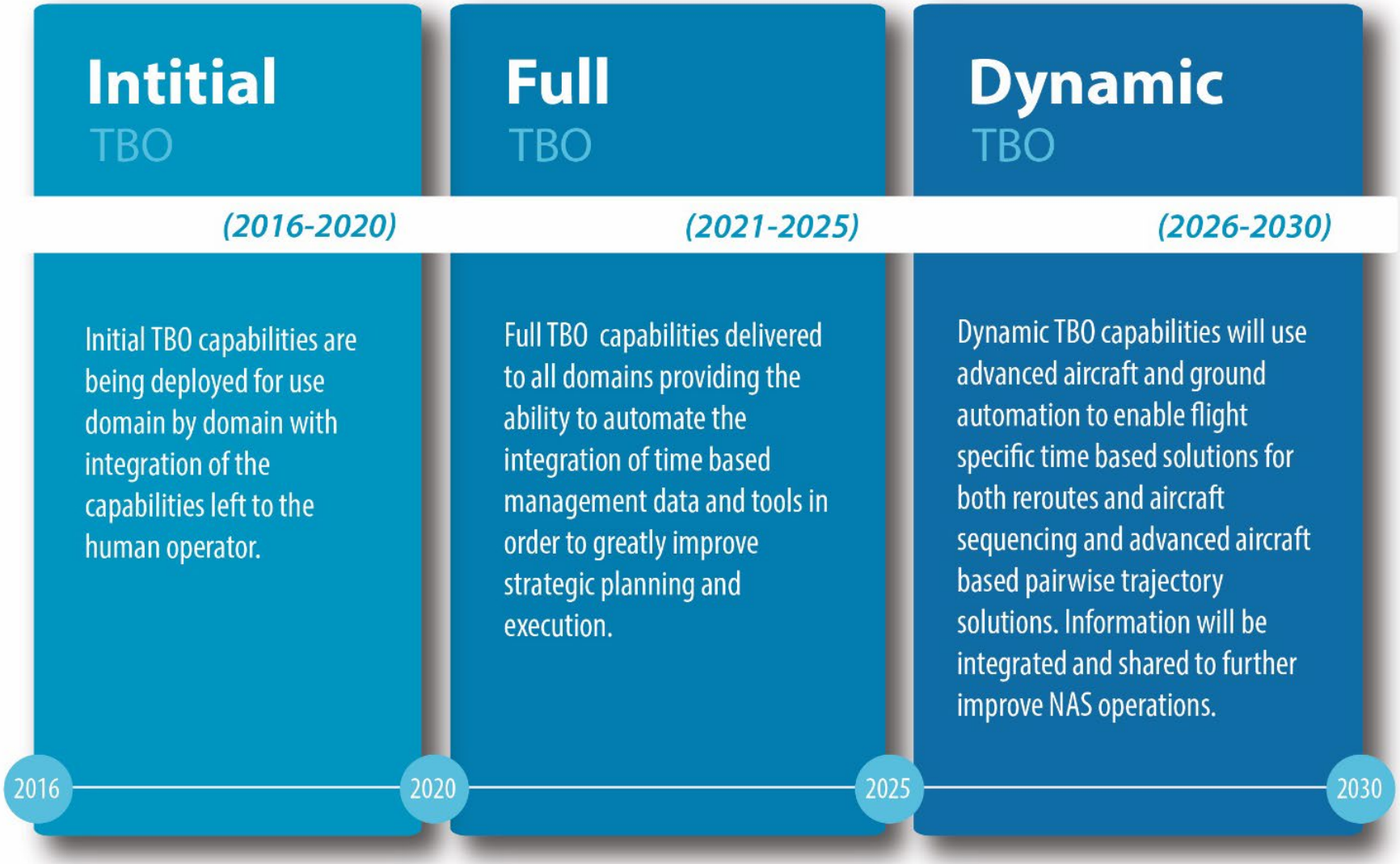
TBO Evolution



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Expected Accomplishments in FY 18-19
(under previous BLI, funded in FY 16-17)

- PBN Human Performance Metrics
  - Tools and methods to “measure” and mitigate PBN ops from a ATC HF perspective
- Established-on-RNP (EoR) HF Implementation Guidance
  - Guidance for facilities on EoR implementation, from primarily a ATC HF perspective
- Time/Speed/Spacing Integration
  - Recommendations on HF integration for suites of NextGen tools/procedures (vs. individual tools), from primarily a ATC HF perspective. Focus is on Time/Speed/Spacing tools and Initial-TBO (iTBO).
- ATC Skill Degradation from Use of NextGen Tools
  - Documentation of potential cognitive skill degradation risks from long-term use of NextGen decision support tools. Focus is on subset of Time/Speed/Spacing tools and iTBO. Risk mitigations will also be provided.

Anticipated Research, FY 18 – 20 Funding (Enterprise HF)

- HF Integration Considerations of Time/Speed/Spacing Tools, Part 2
- iTBO Training, Front-end development and recommendations for detailed development
- HF integration of UAS compliance with ATC visual procedures
- HF integration for TBO
- HF Cross-domain automation enhancements
- HF Traffic Flow Management concept development

NextGen Enterprise Human Factors - Summary

Research Requirement

Provide integrated enterprise HF guidance to:

- Increase the utilization rate of concepts and systems among controllers
- Ensure controller acceptance of concepts and systems
- Increase safety through the mitigation of known human factors risks
- Decrease controller workload through improved tools and techniques

Outputs/Outcomes

PBN Human Performance Metrics

Tools and methods to "measure" and mitigate PBN ops from a ATC HF perspective

Established-on-RNP (EoR) HF Implementation Guidance

Guidance for facilities for EoR implementation, from primarily a ATC HF perspective

Time/Speed/Spacing Integration

Recommendations on HF integration for suites of NextGen tools/procedures (vs. individual tools), from primarily a ATC HF perspective. Focus is on Time/Speed/Spacing tools and iTBO.

ATC Skill Degradation from Use of NextGen Tools

Documentation of potential cognitive skill degradation risks from long-term use of NextGen decision support tools. Focus is on subset of Time/Speed/Spacing tools and iTBO. Risk mitigations will also be provided.

Planned Research

- HF Integration Considerations of Time/Speed/Spacing Tools, Part 2
- iTBO Training, Front-end development and recommendations for detailed development
- HF integration of UAS compliance with ATC visual procedures
- HF integration for TBO
- HF Cross-domain automation enhancements
- HF Traffic Flow Management concept development

Out Year Funding Requirements

FY19	FY20	FY21	FY22	FY23
$1.5 M	$1.5 M	$1.5 M	$1.5 M	$1.5 M

Considerations for FY 21-Funded Research

- This research can address cross-program “enterprise” aspects
  - E.g., identifying HF opportunities to improve interoperability of capabilities through design, procedures, and training.
- This research can not directly support specific concept development programs
- Most NextGen programs do not involve NextGen HF
- Acquisition of new capabilities is owned by programs who determine the extent of their HF efforts
- HF = HF research + HF application

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Questions?

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Background Slides (on TBO)

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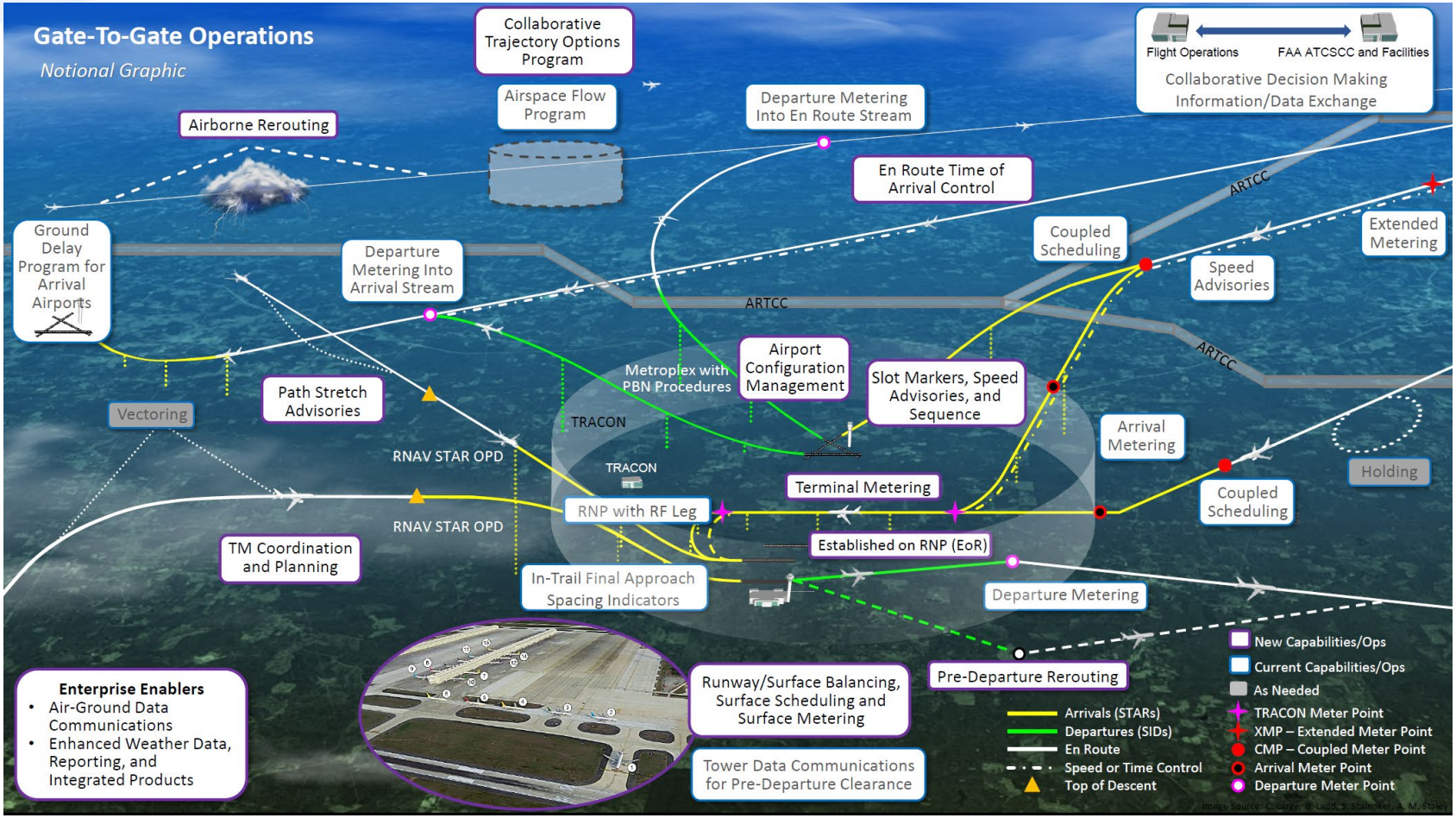
Candidate Capabilities for (early) TBO



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….and supporting technologies (1 of 2)

Function Category	Capabilities	Supporting Technologies
PBN	**RNAV STAR Optimum Profile Descent (OPD)** **RNAV SIDs** **RNP / RNP with RF leg** **Established on RNP (EoR)***	FMS/ RNAV (LNAV/VNAV), RNP, RNP-AR, A-RNP
Strategic Planning / Flow Management	**Airspace Flow Program (AFP), Ground Delay Program (GDP)** **Collaborative Decision-Making*** **Collaborative Trajectory Options Program (CTOP)*** **TM Coordination and Planning**	TFMS/ FSM SWIM, TFMS, Operator Ground Automation TFMS/ FSM TBFM/ TM Ops Dashboard and Planning Tool
Route Management	**Automated Reroutes** **Pre-Departure Rerouting*** **Airborne Rerouting***	TFMS/ ERAM PDRR ABRR

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….and supporting technologies (2 of 2)

Function Category	Capabilities	Supporting Technologies
Time-Based Scheduling (Airborne and Surface)	**Arrival Metering** **Coupled Scheduling/Extended Metering** **Departure Metering (scheduling) into Arrival Stream** **Departure Metering (scheduling) into En Route stream** **Terminal Metering** **Runway/Surface Balancing** **Surface Scheduling and Metering**	TBFM/ GIM-S T-to-T, IDAC EDC, IDAC TSAS TFDM
En Route and Terminal Spacing Tools	**Delay Countdown Timer** **Speed Advisories** **In-Trail Final Approach Spacing Indicators** **Path Stretch Advisories** **Slot Markers, Speed Advisories, and Sequence** **En Route Time of Arrival Control (TOAC)**	TBFM/ DCT/MRL GIM-S ATPA Path Stretch TSAS TBFM, FMS/ RTA
Surface Management	**Tower Data Communications for Pre-Departure Clearance** **Electronic Flight Data*** **Airport Configuration Management**	Tower Data Link Services TFDM
Enterprise Enablers	**Information and Data Exchange** **Air-Ground Data Communication** **Enhanced Weather Data, Reporting, and Integrated Products**	SWIM En Route Initial Services NWP, CSS-Wx