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FAA Office of NextGen (ANG)

REDAC / NAS Ops

Review of FY2024 – 2026 Proposed Portfolio

New ATM Requirements

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Presenter Name: Steve Bradford, ANG-3

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New ATM Requirements Overview

What are the benefits to the FAA

- The New Air Traffic Management (ATM) Requirements program is needed to identify new opportunities to improve the efficiency and effectiveness of air traffic management operations
- Activities include the research and development of procedures, tools, and systems in support of operational improvements
- These developments support the NextGen goal of expanding capacity and improving the strategic management of operations in the NAS

What determines program success

- The service analysis and operational demonstration activities within this program support the development of operational improvements that will increase the number of arrivals and departures at major airports
- The results of these early development efforts will transition into future standards, tools, guidance, and applications necessary for safe and effective airspace operations

New ATM Requirements Program Support

People:

- Portfolio Manager: Casey Hines, ANG – C74
- Project Managers
- Subject Matter Experts (air traffic control specialists, meteorologists, information management and communications specialists)

Laboratories:

- Boeing Avionics Lab
- Honeywell IPS Labs
- Rockwell Collins Labs
- NASA Glenn Labs (communications standards development and validation work)
- NextGen Integration and Evaluation Capability (NIEC)
- Embry Riddle Florida Test Bed (FTB)

Current FY24 Accomplishments

- A/G SWIM is currently working on developing the Integrated Framework and the Controller Decomposition. Architectural updates on the App Store (App Store Architecture Design Report Update) have been done through feedback from initial RDOE users (Stakeholder Feedback Evaluation (Release 1)).
- Weather Transition has continued developing Emerging Weather Requirements results and have completed economics work related to this subproject. Have also tech transferred the FY-21 Concept Definition Report to continue advancing the project. Work has also been continuing the remaining subprojects with the completion of the Meteorological Technical Analysis and Requirements and the Final Domestic SIGMET Implementation Plan so far, this fiscal year.
- Ongoing and completed work into researching the ability of the NAS to support the integration of UAS by painting a clear picture of the current technology available, identifying gaps, identifying requirements, and developing FAA processes for the integration.
- Continued Research to support the Flight and Flow Information for a Collaborative Environment Release 2 (FF-ICE/R2) Concept. The following activities have been completed in FY24 thus far:
  - FF-ICE/R2 Modeling and Verification Report
  - International Support for FF-ICE/R2 and Information Management Document
  - FF-ICE/R2 Service Description and Functional Requirements
- Working on updating the certification framework based on the outcome discussion and adjudicated comments from stakeholder engagement from Machine Learning/Artificial Intelligence in the NAS.

Synchronization of Air/Ground SWIM (Connected Aircraft)

The activity will evaluate system architecture alternatives, performance and safety requirements, and establish an integrated roadmap for the development of future air traffic management services and policies that take advantage of the emerging air/ground connectivity. In order to ensure global interoperability, this activity will include the necessary coordination with applicable International Civil Aviation Organization (ICAO) technical panels to mature the development of a global Connected Aircraft concept in accordance with the Aviation System Block Upgrade (ASBU) framework.

Planned Research Activities

- FY24 – Deploy Data Distribution Platform that allows for the organization and distribution of connected aircraft software applications
- FY25 – Conduct Hyper Connected ATM Systems Test/Analysis, Develop Concept Framework for Aircraft-to-Aircraft information exchange to expand from procedural "visual separation" to digital maneuvers.
- FY26 – Develop concept and analysis on performance and implementation tradeoffs of various multi-path communications architectures, Complete an Integrated Framework update to include findings of Hyperconnected ATM Test/Analysis

Expected Research Products

- An integrated CA framework to further advance concepts that leverage the connected aircraft, including the exchange of safety critical information based on applicable performance standards

Machine Learning/Artificial Intelligence in the NAS

This activity conducts engineering and analysis to support the potential use of Machine Learning/Artificial Intelligence (ML/AI) to support controllers in functions including aircraft separation. The ML/AI in the NAS program seeks to engage with industry partners in digitization, to outline learning algorithm lessons and develop a path to integrating user benefit driven AI application for improving the NAS.

Planned Research Activities

- FY24 – Complete initial analysis of requirements for potential use of AI in support of controller functions. Complete initial safety risk management analysis for potential use of AI in support of controller functions
- FY25 – Complete final analysis of requirements for potential use of AI in support of controller functions. Complete final safety risk management analysis for potential use of AI in support of controller functions
- FY26 – Conduct initial study using a limited sample size to determine the effectiveness of AI learning on data related to aircraft separation.

Expected Research Products

- Determine assess capabilities and controller functions that may be enhanced by the use of artificial intelligence
- Learning algorithm lessons take advantage of the digitization industry knowledge and enables the FAA to develop a path toward integrating user benefits-driven application in the NAS.
- Develop initial digital backbone, architectures, key metrics dashboard, identify critical deep learning algorithms and certification methods, as well as recommend the initial set of capabilities to be explored.

Automation Evolution Strategy

Focuses on the future evolution of NAS automation systems to a layered, service-based architecture that can support modern development, and operations methodologies while taking advantage of cloud computing technologies. Strategic objectives of AES include; Seeking efficiencies for developing, operating, and sustaining NAS automation systems/services, Reduce time to develop, integrate, and deploy new capabilities, Leverage commercial industry best practices and Promote industry competition; mitigate vendor lock-in and associated risks

Planned Research Activities

- FY24 – Conduct activities in the development of a to-be architecture of the future ATM systems that leverage innovation such as edge computing, cloud platform and micro-services for separation and flow services
- FY25 – Conduct activities in the development of a future services-based architecture for the ATM systems that leverage modern technologies and innovation such as edge computing, cloud, platform and microservices.
- FY26 – Continue engineering analysis and validation activities to identify functionality in NAS that can be deployed as common mission services for reusability

Expected Research Products

- Establish framework to potentially enable internet-based exchange of command-and-control information.

IP Based Command and Control Data Links

This activity will conduct engineering and analysis to support the potential use of internet-based data exchange for command-and-control applications.

Planned Research Activities

- FY24 – Develop and test prototype systems to support the potential use of internet-based data exchange for command-and-control applications.
- FY25 – None
- FY26 – None

Expected Research Products

- Establish framework to potentially enable internet-based exchange of command-and-control information.

Post-departure Coordination and Airborne Negotiation (PCAN)

This activity continues the maturation of FF-ICE/R2 concept. The project will build upon the outcomes and lessons learned of previous projects including FF-ICE/R1 Demonstration and 4DT Live Flight Demonstration. The project will continue to investigate and perform required engineering analysis to mature the FF-ICE/R2 concept. Additionally, the project will include collaboration with other Air Navigation Service Providers (ANSPs) and airspace users, specifically as part of Tabletop Exercises (TTXs) and validation activities.

Planned Research Activities

- FY24 – Flight and Flow Information for a Collaborative Environment (FF-ICE) Release 2 (R2). Concept Maturation Define Services and Functional Requirements for FF-ICE-R2.
- FY25 – None
- FY26 – None

Expected Research Products

- FF-ICE/R2 Support Package collected from International Panels
- Initial Engineering Analysis Reports – Manage Agreed Trajectory & Clearance Coordination

Unnamed Aircraft Systems (UAS) Operational Improvement (OI) – Qualification of Third-Party Weather Providers (3PWP)

This activity will coordinate efforts to determine where 3PWPs will provide weather information beyond that provided for traditional aviation to assist non-traditional aviation users with their flight planning and operations. As non-traditional aviation, such as UAS and High-Altitude Long Endurance vehicles that fly at altitudes below and above traditional aircraft, the weather information they need to plan their flight is not provided through approved aviation weather information sources. For example, a small UAS may need precise wind direction and speed information just above ground level in downtown areas of cities, in residential neighborhoods or remote areas, whereas aviation weather only provides ground observations and forecasts for airport locations. These new FAA processes will qualify the performance of 3PWP for these new entrants to use their weather information for regulatory dispatch purposes.

Planned Research Activities

- FY24 – Develop initial qualifications process policy.
- FY25 – Complete development of initial qualifications process policy
- FY26 – Refine initial qualifications process policy

Expected Research Products

- FAA processes that will qualify the performance of supplemental 3PWPs in the provision of weather information in order to support the integration of non-traditional aviation users (UAS and High-Altitude Long Endurance vehicles) into the NAS.

Weather Transition

The Weather Transition PLA identifies research concepts and capabilities that have appropriately matured and transitions them from RE&D to F&E funding. This PLA manages Acquisition Management System (AMS) Concept Maturity and Technical Development activities. It funds the development of Pre-Concept and Requirements Definition Readiness AMS artifacts. It also supports the transition of weather capabilities to operations.

The Weather Transition program is composed of the following four sub-projects:

1. Weather Requirements Service (WRS): Ensures the FAA identifies the best available weather needs, requirements, and information exists within the NAS and helps safeguard the NAS through continual weather requirements monitoring, levying, and oversight to preserve NAS weather compatibility for NextGen principles, systems, and operations.

2. Weather Information Modernization and Transition (WIMAT): Identifies obsolete and legacy weather products ripe for replacement with better weather information already available from the meteorology community to ensure compatibility with NextGen (SWIM) or other concepts.

3. Emerging Weather Requirements Service (EWRS): EWRS identifies future NAS weather needs at an enterprise level. EWRS identifies system agnostic needs that can be provided to the NAS for future systems, decision support tools, and consistency.

Planned Research Activities

- FY24 - Develop an initial list of prioritized FY 2024 WIMAT/WRS/EWRS program support capabilities, activities, and candidates for change.
- FY25 - Develop an initial list of prioritized FY 2025 WIMAT/WRS/EWRS program support capabilities, activities, and candidates for change.
- FY26 - Development of improved weather performance requirements that enable enhanced forecasting capabilities in support of FAA operational decision-making

Expected Research Products

- Matured capabilities to support future weather information-enabled decision support for the NAS

Emerging FY26 Focal Areas

- **A/G SWIM – Hyper Connected ATM Concept**
  - Facilitate stakeholder concept discussions for Hyperconnected ATM to coordinate across organizations
  - Explore additional concepts related to Hyperconnected ATM
  - Analyze applying edge computing for flow management at airports

- **Automation Evolution Strategy (AES)**
  - Conduct activities in the development of a future services-based architecture for the ATM systems that leverage modern technologies and innovation such as edge computing, cloud, platform and microservices

- **Artificial Intelligence for Air Traffic Management**
  - Develop prototype services for testing and evaluation

- **3rd Party Weather Providers**
  - Continue the development of the certification framework to qualify 3rd party weather providers in the NAS

- **Weather Transition**
  - Development of improved weather performance requirements that enable enhanced forecasting capabilities in support of FAA operational decision-making

New ATM Requirements

Research Requirements

- The New ATM Requirements program is needed to identify new opportunities to improve the efficiency and effectiveness of air traffic management operations. Activities include the research and development of procedures, tools, and systems in support of operational improvements.

Outputs/Outcomes

- Weather data integrated into air traffic management systems.
- Advanced communications technologies for data exchange between air and ground systems.
- Transition strategy and technology transfer package for Command and Control in the Cloud technologies.
- Enterprise solution to next generation input devices for automation systems in the NAS.
- Improvements of NAS Surveillance Services infrastructure.
- Analysis in the potential use of AI to support controller functions.
- Establish framework to enable internet-based exchange of command-and-control information.

FY 2026 Planned Research

- Development of improved weather performance requirements that enable enhanced forecasting capabilities in support of FAA operational decision-making.
- Identification and replacement of obsolete weather products with more efficient weather information already available from the meteorological community to ensure capability with existing FAA systems.
- Continue development of qualifying 3rd party weather providers in the NAS
- Investigate the extension of IPS to support Connected Aircraft usage
- Facilitate stakeholder concept discussions for Hyperconnected ATM to coordinate across organizations.
- Explore additional concepts related to Hyperconnected ATM
- Analyze applying edge computing for flow management at airports

Out Year Funding Requirements

	FY24 (Enacted)	FY25 (President's Budget)	FY26 (CIP)	FY27 (CIP)	FY28 (CIP)	FY29 (CIP)
F&E	$6.0M	$7.0M	$7.0M	$7.0M	$7.0M	$8.0M