Federal Aviation Administration

REDAC / NAS Ops

Review of FY 2021 Proposed Portfolio

New ATM Requirements

BLI Number: 1A09D

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New ATM Requirements

What are the benefits to the FAA

- 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.
- 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, and implementations.

New ATM Requirements / BLI Number: 1A09D Overview Capabilities

People:

- Program Manager / Portfolio Manager
- 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)

New ATM Requirements

FY18 Accomplishments

- Conducted best practices assessment of industry and government implementation and governance of information services.
- Completed flight, aeronautical and weather information exchange models (FIXM, WXXM, AIXM), system migration recommendations and overall XM governance recommendations.
- Completed system requirements specification and conducted safety analysis for the Airborne Collision Avoidance System (ACAS) variant for unmanned aircraft, ACAS Xu.
- Completed airborne weather observations gap assessment and gap mitigation recommendations.
- Completed analysis for wind compression forecasting for the Weather Transition program.
- Initiated work on synchronization of trajectory information between aircraft and ATM systems. Completed initial concept of use, operational use cases, and functional analysis.
- Continued work at ICAO and RTCA in development of standards for Aeronautical Telecommunications Network (ATN) over Internet Protocol (IP) communications.

Enterprise Information Protocol & Exchange Standards (EIPES)

This activity addresses the necessary governance for current and future information services that are exchanged with NAS stakeholders. The activity will evaluate industry and government best practices; identify the minimum level of information services to be provided; define the required operational standards for implementation; and inform the development of policies and governance structure to manage services, procedures, processes, and tools while maintaining interoperability with the International Civil Aviation Organization (ICAO) System Wide Information Management and Information Services concepts.

Planned Research Activities

- FY18 - Draft information service governance recommendations.
- FY19 - Complete draft guidance material for the implementation of information services governance.
- FY20 - Complete final guidance material for the implementation of information services governance.
- FY21 – No activities currently planned.

Expected Research Products

- Policies and governance structure to manage services, procedures, processes, and tools while maintaining interoperability with the International Civil Aviation Organization (ICAO) System Wide Information Management and Information Services concepts.

Future Collision Avoidance Systems (Future CAS)

Future CAS will complement work planned under the Airborne Collision Avoidance System (ACAS) X program to include new user classes such as Unmanned Aircraft Systems (Xu) and General Aviation /Rotorcraft Systems (Xp). This activity will conduct research to develop requirements for these new classes of users to ensure future collision avoidance systems are interoperable within the NAS.

Planned Research Activities

- FY18 - Complete ACAS Xu safety performance analysis.
- FY19 - Develop ACAS Xp system concept and requirements (including rotorcraft) to inform ongoing ACAS X development activities.
- FY20 - Complete ACAS-Xp (rotorcraft) interoperability assessment and updates to applicable encounter models to include trajectory considerations; and proof of concept to inform standards development activities.
- FY21 - Develop System Requirements Specification (SRS) document for ACAS Xp (rotorcraft) and complete flight demo.
- FY22 - Complete report on Operational Tuning for ACAS-Xp (rotorcraft) logic and complete safety and operational suitability analysis
- FY23 – Complete draft version of minimum operational performance standards for ACAS Xp.

Expected Research Products

- Standards for collision avoidance systems for new user classes

Weather Transition

This activity ensures that aviation weather research concepts are matured and technically developed under FAA guidelines to a level of readiness for operational use in the NAS. This includes Concept Maturity and Technology Development based work in support of the Research for Service Analysis and Service Analysis AMS lifecycle phases. The matured capabilities developed will support future weather information enabled decision support for the NAS.

Planned Research Activities

- FY18 - Conduct studies surrounding the operational usage of wind information support capabilities and determine the performance level of current weather products and develop report.
- FY19 - Analyze operational needs, usage, and service shortfalls for in-flight icing information support capabilities and develop report..
- FY20 - Analyze current winter weather information support capabilities in operations to determine unmet FAA needs and develop report.
- FY21 - Analyze current ceiling and visibility information support capabilities in operations to determine unmet FAA needs and develop report.
- FY22 - Analyze current convective weather information support capabilities in operations to determine unmet FAA needs and develop report
- FY23 - Develop an operational description outlining the usage of current and future Model of Icing Conditions for Real-Time Operations (MICRO) information in the NAS.

Expected Research Products

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

Synchronization of Air/Ground Procedures

The Air/Ground Procedure Synchronization activity will explore the trajectory synchronization concept of use and validate proposed solutions in collaboration with industry partners and operational stakeholders through simulations and flight trials. In current operations, various ATM and airspace user functions utilize disparate trajectory predictions for future position of aircraft. Trajectory synchronization will provide a common picture of trajectory information between flight deck, air traffic systems, and airspace user systems. The activity will document and provide recommendations for the implementation of trajectory synchronization methodologies and integration of gate-to-gate ATM functions to enable Trajectory Based Operations.

Planned Research Activities

- FY18 - Develop air/ground trajectory synchronization simulation plan.
- FY19 - Complete prototype development of trajectory synchronization demonstration systems.
- FY20 - Complete trajectory synchronization simulation.
- FY21 - Conduct trajectory synchronization shadow evaluation, and complete and document analysis.
- FY22 - Complete trajectory synchronization flight demonstration/trial and document lessons learned.
- FY23 - Develop preliminary air/ground trajectory synchronization implementation recommendations and strategy.

Expected Research Products

- Recommendations for the implementation of trajectory synchronization methodologies and integration of gate-to-gate ATM functions to enable Trajectory Based Operations.
- Requirements for exchange and synchronization of trajectory information between aircraft and ATM systems.

Advanced Air/Ground Communications

In collaboration with international partners, this activity will support the development of advanced communication technologies such as the Aeronautical Telecommunications Network (ATN) Internet Protocol Suite (IPS) standards for operational usage. This activity will result in the development and validation of Standards for Future Communications Infrastructure technologies. These advanced communications technologies will help to alleviate spectrum congestion issues and enable the achievement of more stringent NextGen performance requirements needed for future applications.

Planned Research Activities

- FY19 – Develop IPS Standards to support the FAA's Data Comm Segment 2 and Future Communication Systems
- FY19 - Complete draft Security standards development for future ATN/IPS Air-Ground Communication Systems.
- FY20 - Complete final standards for future ATN/IPS Air-Ground Communication Systems.
- FY21 - Complete report documenting requirements for a Software Defined Radio to support multi-modal operation
- FY22 - Complete a report on the findings of investigating further usage of Software Defined Radios to support Multi-modal operations in the NAS environment.
- FY23 - Document the findings of potential use of Commercial Off the Shelf (COTS) Equipment to meet future Data Communications requirements, including the quality service levels required and the regulatory and security considerations associated with the use of COTS hardware and software.

Expected Research Products

- Development and validation of Standards for Future Communications Infrastructure technologies.

Command & Control in a Cloud Environment

This activity will evaluate technical assumptions based on safety, mission criticality, and the ability of current and planned cloud architecture to provide command and control services in the future.

Planned Research Activities

- FY18 - Begin evaluation of current cloud infrastructure's ability to support command & control capabilities for NAS Systems.
- FY19 - Assess gaps in current cloud architecture to support command and control capability for NAS systems.
- FY20 - Identify and evaluate NAS Systems potentially suitable for command and control in a cloud environment.
- FY21 - Develop prototype command and control instance in the cloud for a selected demonstrator system.

Expected Research Products

- Evaluation of and recommendations for cloud architecture to provide command and control services in the future.

Common/COTS Displays

As part of this effort, requirements definition for displaying strategic decision data will be completed and a transition strategy for the possible use of COTS displays as Common Displays in the NAS will be developed.

Planned Research Activities

- FY18 - Complete report evaluating performance requirements for NAS information systems displays.
- FY19 - Evaluate existing commercial common display/COTS capabilities.
- FY20 - Assess and validate previously identified gaps in common display/COTS and develop transition strategy for NAS systems.
- FY21 - Build prototype common display and complete report on shadow-mode testing of prototype display at an operational facility.

Expected Research Products

- Transition strategy for the possible use of COTS displays as Common Displays in the NAS.

Next Generation Automation Input Devices

This activity will support the definition of requirements and concept development for an enterprise solution to next generation input devices for automation systems in the NAS.

Planned Research Activities

- FY20 - Complete an engineering analysis to define performance requirements for an enterprise solution to next generation input devices for automation systems in the NAS.
- FY21 - Identify gaps in current input device capabilities for automation systems in the NAS and complete report.
- FY22 - Identify and evaluate candidate technologies suitable for an enterprise solution for automation systems in the NAS and develop transition strategy.

Expected Research Products

- Recommendations for next generation input devices for automation systems in the NAS.

Upper Class E Airspace Traffic Management

This activity will explore the safe and efficient management of traffic in the upper airspace (Class E) above FL600. This activity will build upon a concept of operations developed under previous work to define requirements for traffic management, communications, and surveillance in upper Class E airspace.

Planned Research Activities

- FY19 - Complete analysis to develop air traffic management requirements document for upper Class E airspace operations.
- FY19 - Complete analysis of current traffic management standards against requirements for upper Class E airspace operations to identify shortfalls.
- FY20 - Complete analysis to develop communications requirements document for upper Class E airspace operations.
- FY21 - Develop surveillance requirements document, complete analysis of current surveillance capabilities and standards against requirements for upper Class E airspace operations to identify shortfalls
- FY22 - Report on international coordination of standards and practices for upper Class E airspace traffic management.
- FY23 - Report on conclusions of international coordination of standards and practices for upper Class E airspace traffic management.

Expected Research Products

- Requirements for traffic management, communications, and surveillance in upper Class E airspace.

Emerging FY21 Focal Areas

- **Upper Class E airspace**

1A10D – G01M.02-02 New Air Traffic Management (ATM) Requirements – F&E

Research Requirement

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

- Recommendations for harmonizing protocols and standards for enterprise information use both internally and with external agency partners.
- Standards for collision avoidance systems for new user classes.
- Weather data integrated into air traffic management systems.
- Requirements for exchange and synchronization of trajectory information between aircraft and ATM systems.
- Advanced communications technologies for data exchange between air and ground systems.
- Evaluation of cloud architecture to provide command and control services in the future.
- Transition strategy for the possible use of COTS displays as Common Displays in the NAS.
- Enterprise solution to next generation input devices for automation systems in the NAS.
- Requirements for traffic management, communications, and surveillance in upper Class E airspace.

FY 2021 Planned Research

- Develop System Requirements Specification (SRS) document for ACAS Xp (rotorcraft).
- Conduct trajectory synchronization shadow evaluation, and complete and document analysis.
- Develop prototype command and control instance in the cloud for a selected demonstrator system.
- Build prototype common display and complete report on shadow-mode testing of prototype display at an operational facility.
- Identify gaps in current input device capabilities for automation systems in the NAS and complete report.
- Develop surveillance requirements document, complete analysis of current surveillance capabilities and standards against requirements for upper Class E airspace operations to identify shortfalls

Out Year Funding Requirements

	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
Funding Target ($M)	9.0	7.5	9.0	7.5	7.5