Advanced Air Traffic Management System Concepts

Lead Center: ARC

Participating Center(s): LaRC

Scope Title:

Advanced Air Traffic Management System Concepts

Scope Description:

This subtopic addresses contributions towards Air Traffic Management (ATM) systems and concepts with potential application in the near-future (2025-2030) National Airspace System (NAS). The subtopic seeks proposals that can apply novel and innovative technologies and concepts towards addressing established ATM challenges of improving efficiency, capacity, and throughput while minimizing negative environmental impact, maintaining or improving safety, and/or accelerating the implementation of NASA technologies in the current and future NAS.

Given the recent coronavirus pandemic, and the dramatic impact to the airlines and U.S. aviation industry as a whole, this solicitation also seeks proposals that can apply novel and innovative concepts, technologies, and capabilities towards enabling the U.S. air transportation system to recover from the recent negative impacts of reduced traffic demand.

The NASA technologies that are being researched and developed for the future NAS include, but are not limited to: Integrated Arrival, Departure, and Surface (IADS) capabilities, routing and rerouting around weather from ground-based and cockpit-based systems, tools enabling trajectory-based operations (TBO), and capabilities that can be integrated with a fully-realized Unmanned Aircraft Systems Traffic Management (UTM) system for a wide range of commercial and public use.

Technologies, concepts, models, algorithms, architectures and tools are sought in this solicitation to bridge the gap from NASA’s research and development (R&D) to operational implementation, and should address such nearer-term ATM challenges as:

- Safe, end-to-end TBO.
- Enabling and integrating existing independent systems and domains, and increasingly diverse and unconventional operations (gradually enabling the future integration of large unmanned vehicles, unconventional commercial airline business models, space traffic management, and subsonic and supersonic
vehicles).

- Applying elements of the service-based architecture concept being pioneered in the UTM domain.

**Expected TRL or TRL Range at completion of the Project:** 1 to 4

**Primary Technology Taxonomy:**
- Level 1: TX 16 Air Traffic Management and Range Tracking Systems
- Level 2: TX 16.3 Traffic Management Concepts

**Desired Deliverables of Phase I and Phase II:**

- Research
- Analysis
- Prototype
- Software

**Desired Deliverables Description:**

Technologies that can advance safe and efficient growth in global operations [Aeronautics Research Mission Directorate (ARMD) Thrust 1 Goal] that can be incorporated into existing and future NASA concepts.

Phase I deliverables may take the form of a prototype/proof-of-concept decision support tool, automation and/or service, a proof-of-concept demonstration of the underlying architecture, and/or validation of the approach taken, which shows focus on a particular aspect or use case of the R&D challenge being investigated. Phase II deliverables would presumably take the form of higher TRL tools/decision support services that convincingly demonstrate a solution to the proposed R&D challenge.

**State of the Art and Critical Gaps:**

State of the Art: NASA has been researching advanced air transportation concepts and technologies to improve commercial operations in the NAS.

Critical Gaps: Significant challenges remain in integrating air transportation technologies across different domains and operators (e.g., airport surface and terminal area; airport authority and air navigation service providers; etc.), providing comprehensive, strategic scheduling and traffic management technologies, enabling concepts that will allow for increased demand and complexity of operations, and enabling recovery from the global pandemic-induced air transportation system impacts.

**Relevance / Science Traceability:**

Airspace Operations and Safety Program (AOSP) within ARMD.

Successful technologies in this subtopic have helped to advance the air traffic management/airspace operations objectives of the Program, and enable successful technology transfer to external stakeholders (including the Federal Aviation Administration and the air transportation industry).

**References:**

https://www.nasa.gov/aeroresearch/programs/aosp