Air Traffic Management eXploration (ATM-X) Project

Shivanjli Sharma

Vision

An aviation ecosystem that can adaptively integrate new concepts, operations, and technologies at the pace of innovation to improve mobility and benefit humanity

Mission

Research innovative technologies and solutions to trailblaze a path toward an aviation ecosystem that integrates airspace, aircraft, and infrastructure systems to support future operations

Strategy

Catalyze the aviation community by developing innovative solutions and conducting research, informed by a system integration approach, to systematically identify and address barriers

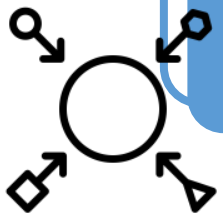
ATM-X Goals

Goal

Develop a common framework for harmonization across airspace, aircraft, and infrastructure systems

Goal

Improve access to digital information across the NAS and for integration with other transportation modes



Goal

Enable integration of diverse aircraft and operations in the NAS while improving safety and efficiency

Goal

Improve sustainability and efficiency of aviation operations

Supporting Multiple Use Cases

Sustainable Conventional Operations

Remotely Supervised Operations

Routine sUAS Operations

xTM Operations

Evolving ATM Technology for the existing NAS and Developing Disruptive Capabilities for the Future NAS

- Digital Services and Information Sharing
- Novel Airspace Design and Frameworks
- Communication Links & Information Protocols
- Separation and Flow Management Algorithms

Pathfinding for Airspace with Autonomous Vehicles (PAAV)

Enable scalable airspace integration of routine remotely piloted operations under Instrument Flight Rules

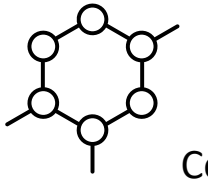
Concept and Architecture
Develop Concept of use and an integrated vehicle, airspace, and infrastructure automation architecture

Conflict and Contingency Management Automation and Interoperability
Develop and test robust contingency and conflict management systems that include interoperable strategic and tactical technologies to enable routine, scalable operations for large UAS

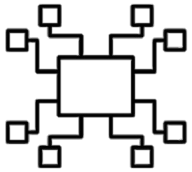
Integrated Ecosystem Flight Tests
Catalyze an ecosystem for routine large UAS operations by testing the integration of surveillance and communication services with UAS automation

Pathfinding for Airspace with Autonomous Vehicles (PAAV) Research Areas

Concept and Architecture



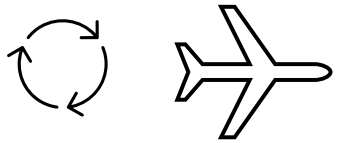
Concept



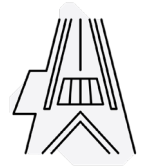
Integrated Air Ground Architecture

Ecosystem Assessment

Infrastructure as a service

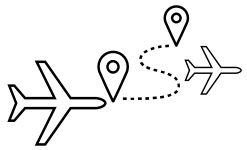


Industry UAS automation

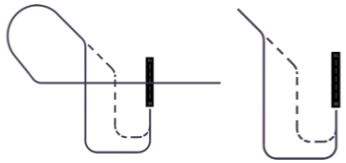


Surface Operations & Autonomous Capabilities

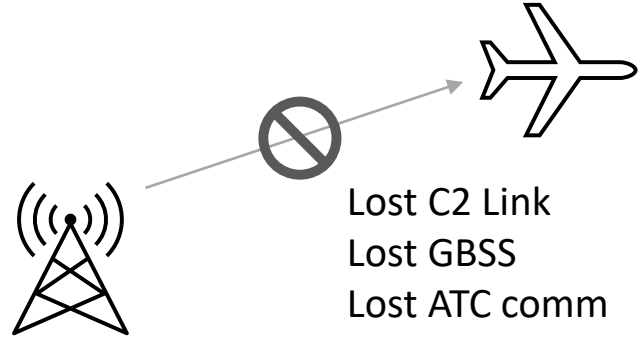
Conflict and Contingency Management Automation and Interoperability



Automated DAA and return to course



Terminal area merging and spacing



Lost C2 Link
Lost GBSS
Lost ATC comm

ATM-X Contributions to NASA Aeronautics

Digital Service Oriented Framework for Conventional Ops

Performance requirements to enable routine BVLOS sUAS ops

Ecosystem approach for remotely supervised IFR ops

Sky for All Concept and Vision

Novel approaches for managing a diverse set of xTMs

Pathway to extensible autonomous ops

Deliverables

SFNP operational demos data and prototype services & platform

Performance requirements and data collection for sUAS and remotely supervised ops

Data exchange and associated performance requirements for xTM operations

Future architecture requirements for the NAS based on Sky for All attributes

Stakeholder Benefits

FAA / OGA / Standards Orgs.

Data and capabilities will support development of means-of-compliance, recommendations, and decisions

US Industry

Airspace simulations and ecosystem testing will accelerate development and operational timelines

Academia

Open source services and ULI initiatives to support fundamental research in airspace integration modeling and development