



Drone Enable 2023 Topic 2: Critical elements of AAM requiring global interoperability & harmonisation

Interoperability Considerations within the AAM Ecosystem

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ANRA Technologies

Providing solutions that enable enterprise operations for autonomous systems

- Founded in 2015
- Offices in USA, UK, Europe, and India
- Software company
- Digital Solutions
 - PSU, UTM, LAANC, USS, USSP, CISP, DSS
 - Vertiport Management
 - Fleet Management
 - Operation Centers
 - Surveillance Integration
 - Ongoing EASA USSP certification



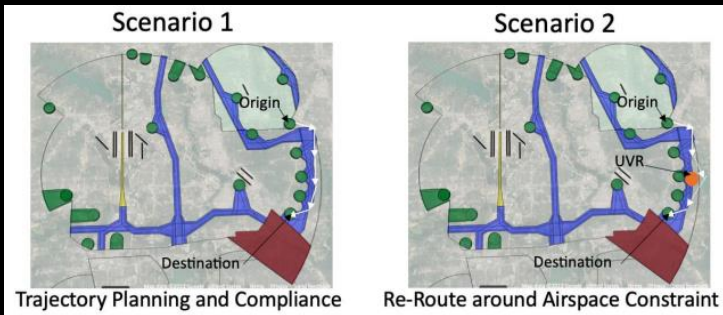
Europe SESAR JU: Very Large Demo for UAM (AMU-LED)



FAA UAM Airspace Demonstrator



NASA National Campaign X3 and 1



NASA Langley Vertiplex Operations Center



AAM Interoperability Foundational Airspace Management Services

- **Resource:** Authoritative source for shared, constrained resources within the operating environment, updates and disseminates constrained resource metadata.
- **Demand Capacity Balancing (DCB):** Ongoing record of constrained resource demand and capacity to facilitate strategic coordination of flights by the OIM service.
- **Operation Intent Management (OIM):** Provides operator interfaces for receiving flight planning requests/updates and exchanging operational alerts. Interfaces with DCB for flight planning/updates while adhering to constrained resource controls.
- **Conformance Monitoring (CM):** Monitors real-time operation conformance as compared to latest flight plan. Identifies off-nominal flight events and provides alerts.
- **Discovery and Synchronisation Service (DSS):** Means for airspace services to discover relevant operations and associated metadata for geographic region.
- **Vertiport Manager:** Encompasses the various functions associated with strategic and tactical management of the vertiport environment and physical infrastructure.

AAM Ecosystem

Resource Managers (Pvt., Pub., ANSP, etc.)

Resource Info, Status, Capacity

Resource Service

DSS

Capacity Information

Resource Conformance Criteria

Demand/Capacity Balancing Service

Operation Discovery

Resource Usage

Resource Demand/Capacity Information

Operation Intent Management

Vertiport Coordination

Vertiport Manager Service

Operation Planning Status Updates

Operator

Aircraft

Telemetry

Conformance Monitoring

Airspace Management Interoperability Network

- Procedural Interface - ANSPs
- Authorization Tokens - Centralized OAuth
- Supplemental Data - SDSPs
- Vertiport Environment Information - Vertiport Infrastructure, Personnel, etc.
- Aircraft, Pilot/Operator Data and Validations - Registries

↔ Globally Standardized Interfaces
- - - Regionally/Locally Standardized Interfaces

AAM Interoperability Local Considerations

- **ANSP Procedural Interfaces:** Some jurisdictions will not require/support such interfaces. Where they are required, they will be technically and procedurally unique.
- **Authorization/Authentication Mechanisms:** Some jurisdictions will have different requirements for how entities are credentialed and permissions/access controls.
- **Registration:** It is likely aircraft, operators, pilot registries will be required for operational flight approvals. Trends indicate local jurisdictions will manage their own.
- **Operator and Aircraft Interfaces:** Data exchanges between operators-aircraft (FMS or GCS) and airspace managers are likely to be unique will likely become a “value add” feature.
- **Vertiport Manager:** While interface between the Vertiport Managers and OIM services should be standardised, interfaces between the Vertiport Manager and its other data feeds will likely be unique to the given vertiport infrastructure and local environment.

Key Point

Technology

Standards

Regulations



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