Airservices & EmbraerX Collaboration
Urban Air Traffic Management (UATM) Concept of Operations
Project Briefing
Airservices Australia – Civil ANSP

**Our mandate**

- **Safe**
  - Ensure the safety of all those that use airspace

- **Efficient**
  - Deliver value to all those that use airspace

- **Reliable**
  - Be effective in our services and operations

**Our responsibilities**

Airservices manages...

- 11% of world’s airspace

...which represents...

- +4m Aircraft movements
- +160m Passenger movements

...and encompasses...

- Continue to assure safety and efficiency of airspace use for Australian airspace - including new types of users such UAVs and aerial taxis
- Authority to manage interests of all airspace stakeholders and effectively bridge the gaps as an ‘honest broker’ between industry imperatives, government, the regulator and the community
- Ability to shape the regulatory environment and form effective partnerships with industry players
Integrated Airspace Program

Aerodrome Boundary Management

**Objective** – Protecting traditional air traffic from wayward or malicious drone operations and coordinating boundary Low Level Airspace traffic

**Approach** – Pilot surveillance technologies, develop procedures for managing emergency scenarios, define concepts for transitioning between controlled and low level airspace, pilot prototype Flight Information Management System (FIMS) services for boundary management

UTM/CTMS Information Flow and Management

**Objective** – Establish standardised means of transferring critical airspace information amongst UTM and CTMS airspace users and the ATM

**Approach** – Develop a prototype FIMS to explore how a centralised data platform could provide data services to various UTM and CTMS users and external parties

Low Level Airspace Structure

**Objective** – Propose airspace models to ensure fair, equitable, safe, and efficient use of low level airspace and approaches for authorising operations within that airspace

**Approach** – Explore low level airspace concepts with key stakeholders and piloting prototype FIMS services to enable operation of those concepts

What services should Airservices provide in low level airspace?
To build and develop **disruptive new businesses** that transform how people engage with the world.
Transforming Urban Mobility
EmbraerX Urban Air Traffic Management Video
Eve’s Focus – Enabling a UAM Ecosystem

**UATM**
Developing a next-generation Urban Air Traffic Management solution that provides shared situational awareness and enables equitable airspace access

**eVTOL Development**
Designing, developing and certifying an electric vertical take-off and landing (eVTOL) vehicle

**UAM Services**

**Fleet Operations:**
Providing UAM capacity-on-demand through a network of eVTOLs and partners

**Service and Support:**
Providing maintenance, support and training services to Eve and third-party aircraft
Introduction to Collaboration

- Research project to prepare the Australian airspace and aviation industry for the growth of the UAM industry
- Goal: Develop a **globally applicable** concept for **UAM traffic management**, allowing for **practical implementation today** and allowing for **scalability into the near future**
- Australian operational context:
  - A strong aviation safety record, mature approaches to safety management and an advanced regulatory framework;
  - A strong requirement for community engagement on matters to do with aircraft noise;
  - Host to the international Uber Air launch city; and
  - A growing unmanned aircraft system (UAS) and UAS traffic management (UTM) community.
Research Plan and Objectives

- Propose a framework for the UAM industry to scale safely in Melbourne; and
- Ensure stakeholder alignment between industry, government, and community leaders
The need for UATM

• Initially UAM operations are expected to be able to operate (in the majority) within the requirements of the current ATM operating environment:
  • In accordance with existing procedures and/or concessions that can easily be accommodated.

• Over time, changes in demand will include:
  • An increase in the number of vehicles operating simultaneously in a region of low-level airspace; and
  • the potential need to operate in Instrument Meteorological Conditions.
The need for UATM

- As the UAM industry evolves, the automation capabilities of UAM vehicles will advance
  - leading to a low-level airspace environment that will likely include a mix of piloted, partially autonomous and fully autonomous operations, possibly at the same time.
- As operational demand increases, the requirements of conventional ATM will become insufficient to provide acceptably safe capacity in low-level airspace.
UATM Concept of Operations

- UATM is the collection of systems and services (including organisations, airspace structures and procedures, environment and technologies) that support the integrated operation of UAM vehicles in low-level Airspace.

- UATM will provide defined services to enable the integration of UAM operations in the low-level airspace.

- The CONOPS is ‘implementation agnostic’ but necessitates a reliance on ATM services for initial operations, while quickly moving toward more modern and advanced services (UTM or UTM-inspired).

- It will ensure that key performance attributes of the UAM environment are assured and maximised.
There will be variety in the types of vehicles, operators and missions in the UAM operating environment.

Vehicles in the UAM operating environment will include traditional aircraft that operate today.

To ensure equitable access to airspace, no single UAM vehicle operator will have exclusive use or control of low-level Airspace.
ICAO Key Performance Areas
UATM Horizons

**HORIZON 1**
Low-density initial operations with piloted UAM vehicles using conventional ATM procedures and technologies.

**HORIZON 2**
Medium-density UAM operations where current ATM procedures and technologies are insufficient to support the demand for operations.

**HORIZON 3**
High-density UAM operations with piloted and autonomous UAM vehicles supported by UATM Services.
Simulation Results

- Human-in-the-loop and fast-time simulations undertaken
  - to begin validation of the concepts
  - Current ATM will only be able to facilitate 4 concurrent UAM traversing Essendon airspace (10 movements/hour)
  - This limit will be experienced quickly

- Analysis of these simulations has identified that:
  - in some locations, current ATM concepts will quickly become insufficient for managing new UAM operations
  - Results indicate that UATM Services have safety, flight efficiency, capacity and predictability benefits.
Initial Operations

Initial Operations are expected to:

- Involve limited eVTOLs in addition to existing UAM Vehicles operating in the same urban environment.
- Involve piloted UAM Vehicles

However, human-in-the-loop simulation suggests that current ATM in Melbourne will not manage many simultaneous eVTOL operations (particularly over Essendon)
UATM Implementation

- Traffic management systems for UAM, UASs and traditional aircraft will need to interact with one another, or be integrated, to support deconfliction, shared situation awareness and collaborative decision making.
- The UATM concept has been created to address the unique needs of UAM traffic management
- As complexity increases, digitised and automated services will be necessary for some, if not all, elements of UATM Services.
- Provision of these digitised services will be achieved through:
  - UTM services (e.g. for Information Exchange)
  - Bespoke UATM Services (e.g. for Airspace and Procedures Design)
Q&A