AAM Ecosystem Airspace WG: Initial UAM Concept of Operations V1.0
# Airspace WG: FAA UAM CONOPS V1.0 - Agenda

**August 4, 2020**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Speaker</th>
<th>Time (EDT)</th>
<th>Description</th>
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<tbody>
<tr>
<td>Welcome</td>
<td>Parimal Kopardekar (PK)</td>
<td>1:00PM - 1:15PM</td>
<td>Introductions Brief review</td>
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<tr>
<td>Initial FAA UAM CONOPS V.1</td>
<td>Steve Bradford (FAA)</td>
<td>1:15PM - 1:45PM</td>
<td>Presentation: Initial FAA UAM ConOps document</td>
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<tr>
<td>Feedback from the Audience</td>
<td>Ian Levitt and PK</td>
<td>1:45PM - 2:45PM</td>
<td>Open mic Questions from chat Questions regarding the FAA UAM ConOps document</td>
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Airspace system should be ready when vehicles are ready
Platform and Discussion

• **Active Participants**
  – Platform: MS Teams
  – Discussion: MS Teams microphone and chat functions
    • Leave your cameras/webcams off to preserve WiFi bandwidth
    • Use your mute/unmute button (e.g. remain on mute unless you are speaking)
    • Enter comments/questions in the chat
    • Raise your hand if you wish to speak
    • Say your name and affiliation before you begin speaking

• **Listen Only Participants**
  – Platform: YouTube Live Stream (go to https://nari.arc.nasa.gov/aamecosystem for the link!)
  – Discussion: Conferences.io
    • Enter https://arc.cnf.io/ into your browser
    • Select the Airspace Working Group: UAM Concept of Operation (UML 1-2) session
    • Questions will be addressed *at the facilitator’s discretion*
Meet Steve Bradford

Steve Bradford
FAA NextGen
Chief Scientist
UAM Concept *Drivers for Change*

- Increased ground traffic, resulting in longer trip times and significant economic costs
- Technological advances
  - Improved electrical energy storage and capacity
  - Distributed electric propulsion
  - Increased automation (operational control and networking capabilities)
- Industry business models
  - Leveraging economies of scale
UAM Concept Overview

- UAM leverages a common shared environment for UAS Traffic Management (UTM)
- A community-based traffic management system in which the operators are responsible for coordination, execution, and management of their operations
  - Community rules approved by the FAA
- Operations between known locations in volumes of airspace (UAM Corridor) with specified performance requirements
- Cooperative Separation Environment when within UAM Corridor
  - Operators will be responsible for maintaining proper separation when transiting a UAM Route and staying within the bounds of the UAM Corridor
  - Operations must meet the airspace & performance requirements when not operating within UAM Corridor
UAM Concepts - Corridor
• Leveraging the current model of UTMs UAS Service supplier (USS) a similar model will be needed to provide services for UAM operations.

• A Provider of Services for UAM (PSU) assists UAM Operators with meeting UAM operational requirements that enable safe and efficient use of airspace and UAM Routes
  – Shared network environment
    • Same federated UAM/UTM environment
  – Provide operator with information along the route
    • Based on shared intent data
  – Share operator intent with others via a shared network environment
UAM Operations Evolution

Initial Operations
• Will occur within the bounds of current ATM environment
  – Operations will be piloted and under ATC
  – UAM vehicles will have required equipage and meet performance requirements to operate in the current airspace
• No changes to rules and regulations
• Existing routes and procedures
  – Follow sectional and helicopter route charts
  – Possibility of new procedures and/or LOAs and helicopter routes
• New vehicles will be certified to operate in the environment

As tempo increases …
• More structure will be required
  – Shared intent
• Performance requirements will increase
• Increased levels of automation
• Increased vehicle capabilities
• Additional routes will need to be mapped out and charted
• Increase in aerodromes (charted/known)
UAM Concept Assumptions

- UAM Routes will be publicly known and can have multiple tracks within that volume of airspace/Route
- The performance requirements to operate within a specific UAM Route will be consistent throughout, but may differ from another UAM Route
- Capacity of the route and its associated tracks are determined by the performance requirement imposed on the UAM route
- Cooperative separation will be applied once a vehicle enters a UAM Route
- If a UAM route is crossing through controlled airspace, vehicles inside the route need to be compliant and have the capability to operate in that controlled airspace
- Providers of Services UAM (PSU) will be utilized by operators to receive/exchange information when operating in a UAM Route
- PSUs will provide the route/track availability to the operators for their flight
- PSUs will be able to obtain small unmanned aircraft systems (sUAS) flight information from the USS Network
- USSs will be able to obtain UAM flight intent from the PSU Network
- UAM operators must maintain conformance to their shared intent; operators, via their PSUs, are aware of intent of others on the UAM Route
- When demand exceeds capacity on a UAM Route, Demand Capacity Balancing (DCB) rules may apply
- Flow management will be utilized within a UAM Route
- As levels of autonomy increase, performance requirements on a UAM Route may change
As automation matures, human engagement evolves from human-within-the-loop (HWTL) with information and decision support provided to the human for virtually all decisions/actions.

In the second “step”, humans increasingly exercise supervisory control of the automated systems (HOTL).

HOTL then progresses to being informed or engaged by automation either to take actions or before actions are taken (HOVTL) consistent with a defined rule set governing the interactions.
Focus on Community Based Rule (CBR) for 1st six months

- Sept 1, 2020: CBR – Topic 1: Enter/exit into corridor
- Dec 1, 2020: CBR – Topic 4: Equitable Access to Airspace
- Jan 5, 2021: CBR – Topic 5: Security

Feedback: arc-cal-nari@mail.nasa.gov
Embracing innovation while maintaining safety of operations
Airspace Workgroup Points of Contacts

• Coordinator: Cecelia Town (Cecelia.S.Town@nasa.gov)
• Technical POCs
  • Ian Levitt (Ian.M.Levitt@nasa.gov)
  • PK (Parimal.H.Kopardekar@nas.agov)

Comments on Con Ops, suggestions for future topics, and other workgroup information:

arc-cal-nari@mail.nasa.gov

See you at next meeting on Sept 1st.