ATC Scalability as a Constraint for Urban Air Mobility Operations

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Challenges of Urban Air Mobility Airspace Panel
AHS Transformative Vertical Flight Workshop
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Case Study Approach to Identify Constraints in UAM System Operations (LAX, BOS, DFW)

1. Identified Promising Markets
   - Current helicopter charter services
   - US census and commuting data
   - Housing market data

2. Defined Reference Missions

3. Applied Notional ConOps* to Each Mission

4. Identified Operational Challenges in Missions

*ConOps assessed conventional technologies as well as electric propulsion and pilot automation
Boston and Los Angeles Reference Missions
Focus on Constraints with Highest System Risk (Probability and Impact)

<table>
<thead>
<tr>
<th>Constraints</th>
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<tbody>
<tr>
<td>1. Aircraft Noise and Community Acceptance</td>
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<tr>
<td>2. Availability of Takeoff and Landing Areas (TOLAs)</td>
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<td>3. Scalability of Air Traffic Control (ATC)</td>
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<td>4. Safety and Certification of Electric Aircraft Operations</td>
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<td>5. Logistics of Network Operations (deadhead, charging, etc.)</td>
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<td>6. Pilot Availability</td>
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<td>7. All-Weather Operation</td>
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High Level Interactions and Influence of UAM Operational Constraints

UAM Throughput Capacity
(vehicles/TOLA/time)

- Airspace Capacity
- Airfield Capacity
- Terminal Capacity
- Ground Access Capacity

- Air Traffic Control
- Ground Infrastructure

Community Acceptance

(Images and diagrams are not transcribed into natural text representation.)
Key Mechanisms Impacting Airspace Sector Capacity

Airspace and Route Design

Separation Standards

<table>
<thead>
<tr>
<th>Aircraft Involved</th>
<th>Lateral Separation Req.</th>
<th>Vertical Separation Req.</th>
<th>Longitudinal Separation Req.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IFR to IFR&lt;br&gt; All classes</td>
<td>3 NM</td>
<td>1000 ft</td>
<td>up to 8 NM</td>
</tr>
<tr>
<td>IFR to VFR&lt;br&gt; Class: B,C</td>
<td></td>
<td>Radar Target Resolution</td>
<td>up to 8 NM</td>
</tr>
<tr>
<td>IFR to Obstruction</td>
<td></td>
<td>1000 ft</td>
<td>-</td>
</tr>
<tr>
<td>IFR to Edge of Adjacent Airspace</td>
<td>1.5 3 NM</td>
<td></td>
<td></td>
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Controller and Pilot Workload

Michael Dwyer/Associated Press

James De Boer
ATC Scalability Influence Diagram

- **Sector Capacity**
  - **Structural Factors**
    - Airspace and Route Design
    - Separation Standards
    - Special Use Airspace
    - Airspace Geometry
    - Community Acceptance
  - **Human Factors**
    - Controller and Pilot Workload
    - Traffic Mix & Sequencing
    - Weather
    - Staffing
    - Decision Support (automation)
  - CNS Capabilities
  - ATC ConOps Procedures
  - ODM Aircraft Noise
Thank You

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