A Proposed Taxonomy for Advanced Air Mobility

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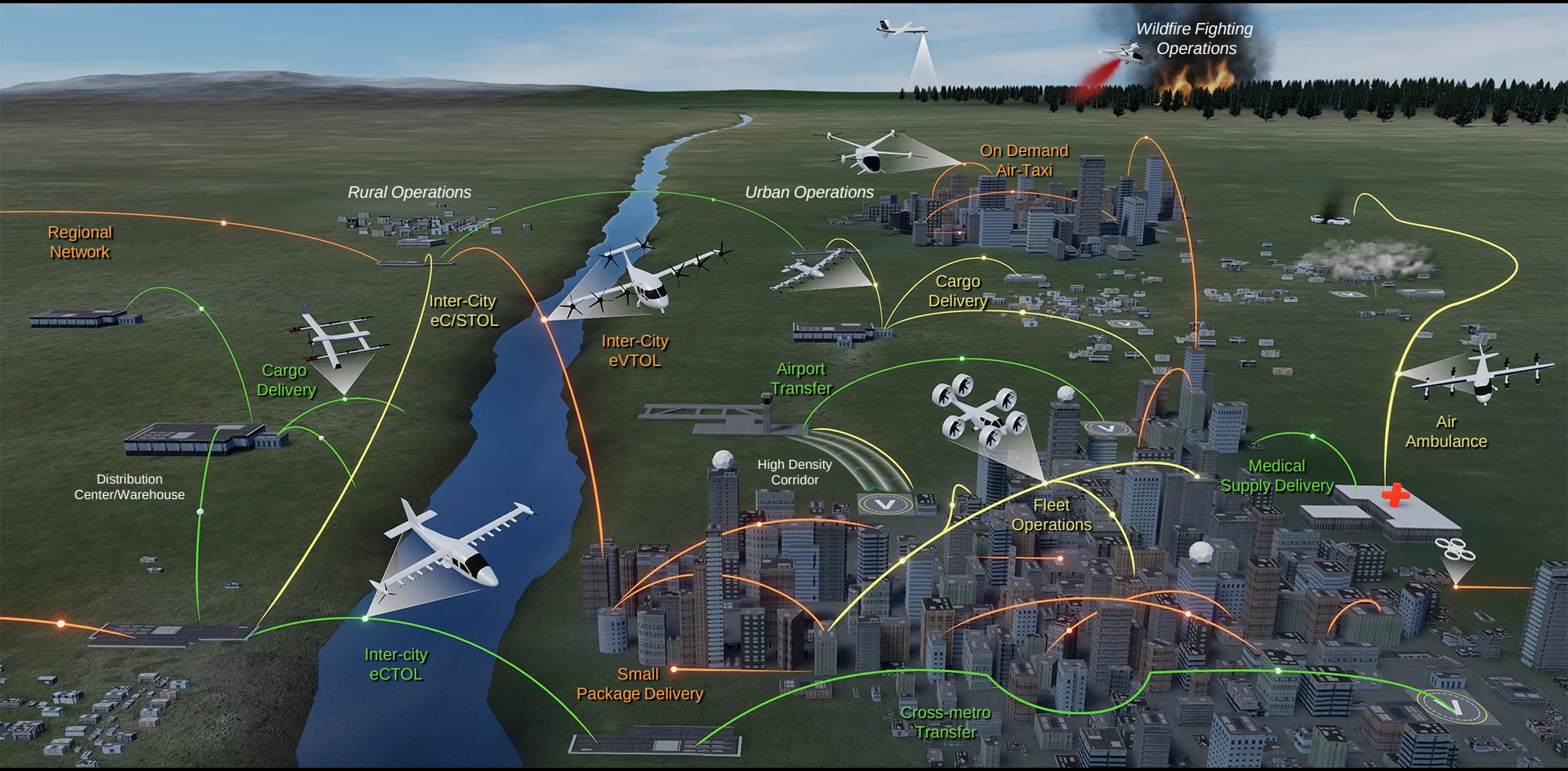
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Advanced Air Mobility (AAM) ref: [1]



Safe, sustainable, affordable, and accessible aviation for transformational local and intraregional missions

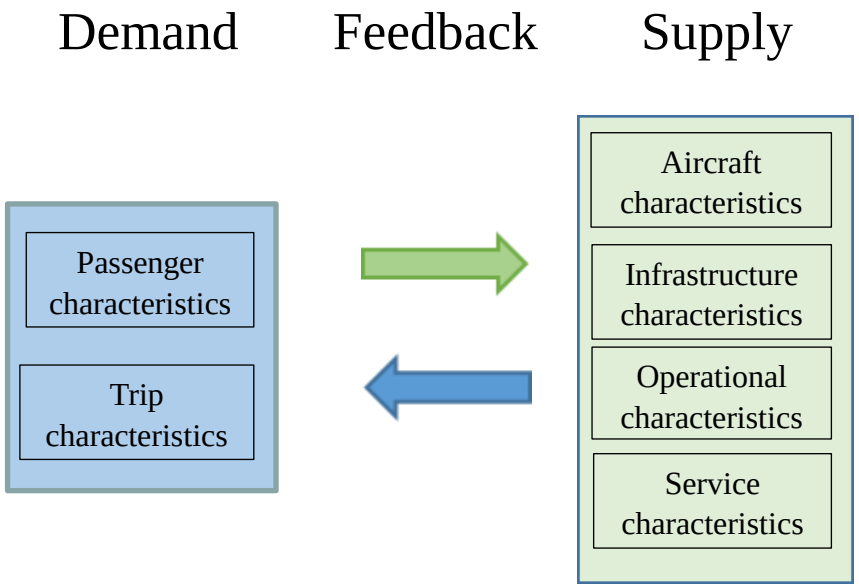
Characteristics of Advanced Aerial Mobility (AAM)

- Substantive change to aviation's current state and practice
- Missions cover short ranges compared to traditional aviation
- Journeys have multimodality, integration with ground transportation
- Purposes include passenger transport, cargo movement, aerial work
- Capabilities include CTOL, STOL, VTOL, etc.

Basis for Proposed Taxonomy

- AAM is fast growing
- Different visions, dimensions being explored
- 2 primary pitfalls across AAM scholarly literature:
  - Different terminologies are describing similar concepts
  - The same terminologies are used in different contexts, different assumptions
- A consistent taxonomy will foster and enable better coordination between disparate AAM research and development
- A credible taxonomy captures nuance and maintains relevance over time

Conceptual Framework for Taxonomy



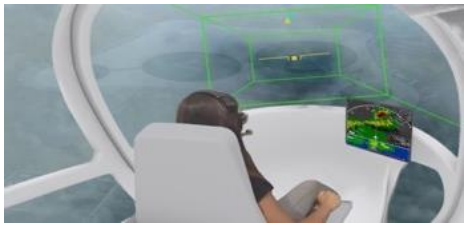
Trip Characteristics Example – On Demand

- "On Demand Aviation" is a common term across AAM literature that has nuanced differences from ground transportation literature
  - **On-demand** is "the ability to reserve or dispatch a service upon request by users" [2]
  - **A Per-seat On-demand** service is one in which passengers reserve and pay for individual seats on an aircraft
  - **Per-vehicle On-demand** service occurs when an individual reserves and pays for all seats on an aircraft
  - **Per-vehicle On-demand with Resale** is a service in which a passenger reserves and pays for all seats on an aircraft but retains the right to resell the extra seats that the passenger does not intend to use or to allow the AAM operator to attempt to resell the extra seats

Operational Characteristic Example – Autonomy

- Different technologies for aircraft piloting enable AAM concepts
  - **Simplified Vehicle Operations (SVO)** is "the use of automation coupled with human factors best practices to reduce the quantity of trained skills and knowledge that the pilot or operator of an aircraft must acquire to operate the system at the required level of operational safety" [3].
  - **An Aircraft Operator** is a human, who may be onboard or offboard the aircraft, that is partially responsible for the safe flight of a single aircraft, sharing this responsibility with automated systems.
  - **A Fully Autonomous Aircraft** is an aircraft that can perform all necessary piloting functions, which includes determining a new course of action in the absence of a predefined plan, while operating independently of any external control, including control from a human pilot, aircraft operator, and/or multi-aircraft supervisor (adapted from [4,5]).
  - **A Multi-Aircraft Supervisor** is a remotely located human that is partially responsible for the safe flight of multiple aircraft, sharing this responsibility with automated systems and potentially also other multi-aircraft supervisors.
  - **Remote Supervisory Operations (RSO)** is an operational paradigm in which one or multiple remote multi-aircraft supervisors oversee(s) the operations of multiple, highly automated aircraft.

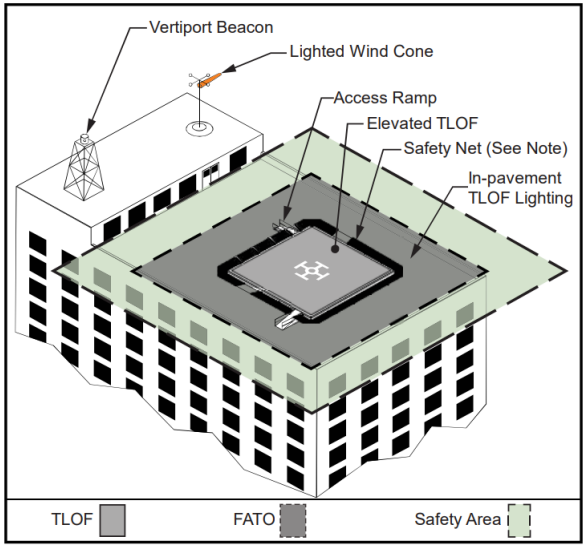






Infrastructure Characteristic Example – Vertiport

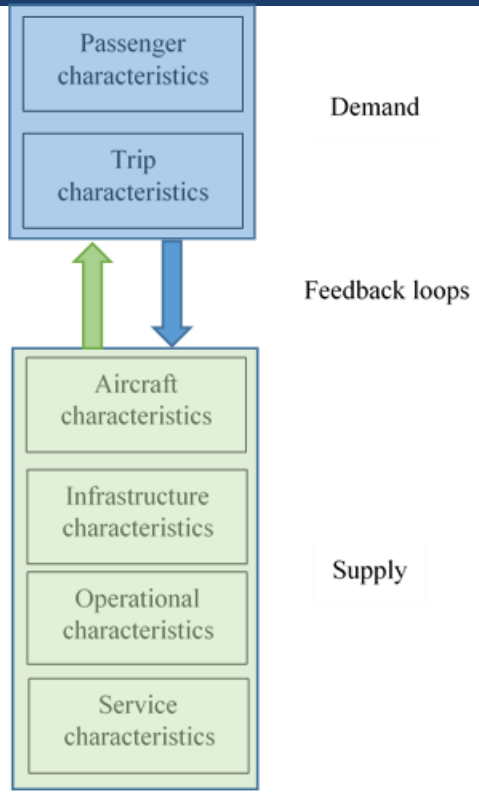
- **Vertiport** is “an area of land or a structure, used or intended to be used, for” vertical takeoffs and landings or super short takeoffs and landings in all-electric, hybrid-electric, turboelectric, and hydrogen-fueled aircraft “and includes associated buildings and facilities” (adapted from [6]).
- **Vertistop** is “an area similar to a vertiport, except that no charging, fueling, defueling, maintenance, repairs, or storage of aircraft are permitted” [6].
- **Vertiplex** refers to multiple vertiports within a geographic area whose arrival and departure operations are highly interdependent (adapted from [7]).



Ref: [6]

Feedback Loops

- Consumer preferences influence service characteristics and service characteristics influence future demand
  - Preference for advance reservations and reliability varies by trip purpose
  - Reliability influences long-term customer retention
- Introduction of new AAM aircraft in the market may facilitate residential location changes and increase commute distances



Conclusions

- There is need for coordination across the disparate AAM stakeholders/visionaries
- A common terminology will synergize research and development efforts
- We addressed some of the less-developed AAM attributes
- This is a starting point and a basis for future work

Acknowledgements and References

Acknowledgements

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