



Advanced Air Mobility 101

Joseph Block | Advanced Air Mobility Program Manager



mndot.gov

AAM Program Manager: Background and Scope

Advanced Air Mobility (AAM)

- **Lead engagement and collaboration** with Federal, State, and Local organizations (e.g., NASA) and industry
- **Coordinate within MnDOT Aero Sections & Staff** for AAM projects, studies, and implementation
- **Support MnDOT policy, grant, regulation, and infrastructure development** related to AAM
- **Conduct AAM outreach & education** to MN stakeholders
- **Support economic and workforce development** initiatives for AAM
- **Support local and regional transportation planners** seeking to integrate AAM

Other Advanced Aviation Technologies

- Stay up-to-date on new and emerging aviation technologies
- Research and educate MnDOT, airports, and MN aviation stakeholders, and MnDOT staff on new aviation technologies
- Support studies, evaluation, and implementation of new aviation technology initiatives

Advanced Air Mobility Misconceptions



You are talking about
The Jetsons, right?



Are "flying cars"
included in AAM1?



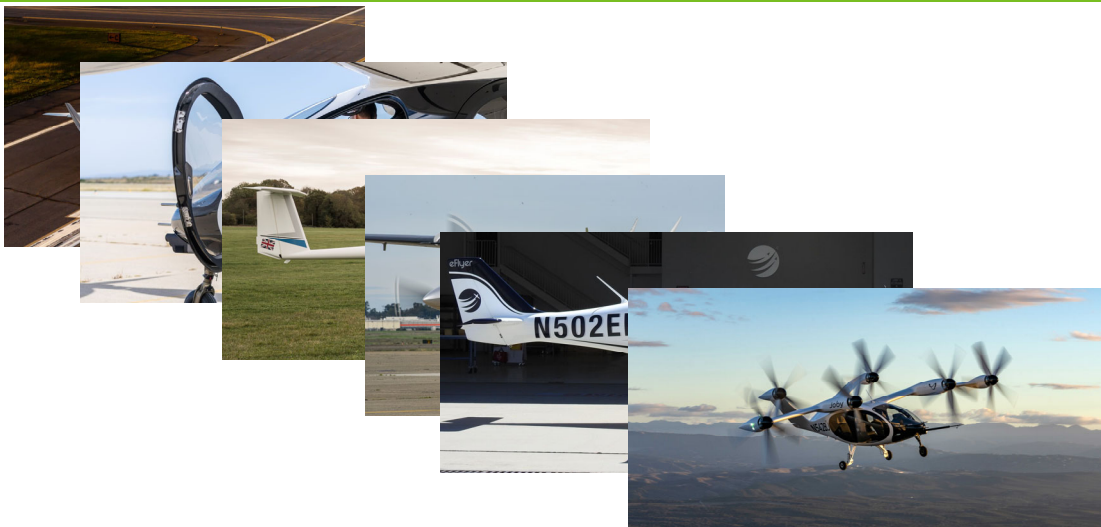
Is this the same thing as
small drones?



These aircraft will land at
vertiports, right?

4/29/2024

What Advanced Air Mobility Looks Like

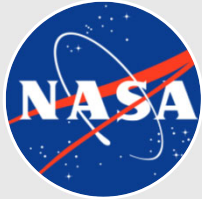


4/29/2024

mndot.gov

4

Definitions of Advanced Air Mobility



“An air transportation system that **moves people and cargo** between places **previously not served or underserved by aviation** – local, regional, intraregional, urban – using **revolutionary new aircraft** that are only just now becoming possible.”



“...a transportation system that **transports people and property** by air between two points in the United States using **aircraft with advanced technologies**, including **electric aircraft or electric vertical take-off and landing aircraft**, in both controlled and uncontrolled airspace.”



“a rapidly-emerging, new sector of the aerospace industry which aims to safely and efficiently **integrate highly automated aircraft** into the NAS. **AAM is not a single technology**, but rather a **collection of new and emerging technologies** being applied to the aviation transportation system, particularly in new aircraft types.”



“...an air transportation system primarily utilizing **electric aircraft**, including eVTOL and eCTOL aircraft to **carry passengers, cargo, or provide services** in an urban or regional setting, with a gross takeoff **weight of 300 lbs or more.**”

4/29/2024

mndot.gov

5

Proposed Definition

An air transportation system that efficiently moves passengers and cargo using sustainably-powered aircraft featuring innovative propulsion systems or highly automated aircraft, each with a gross takeoff weight of 300 pounds or greater.

Key Attributes:

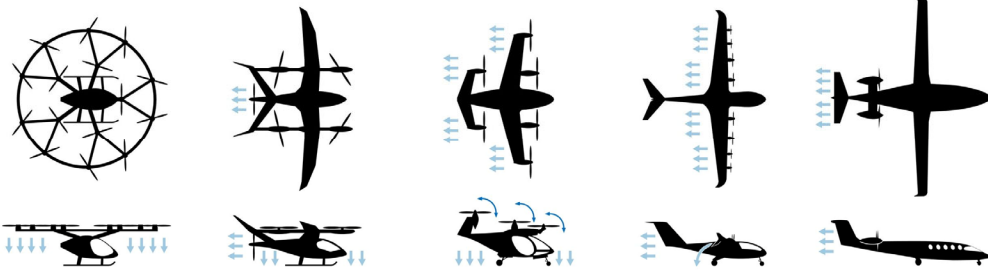
- Transports people and property (cargo)
- Aircraft that either fit as: 1.) Sustainably-Powered with Innovative Propulsion Systems, or 2.) Highly Automated
- 300 lbs. Gross Takeoff Weight – excludes sUAS (< 55 pounds)

4/29/2024

mndot.gov

6

Types of Advanced Air Mobility Aircraft Designs



Multicopter

Lift + Cruise

Vectored Thrust

Augmented Lift

Conventional

4/29/2024

mndot.gov

7

Types of Advanced Air Mobility Aircraft Designs



Multicopter	4
Augmented Lift	2
Vectored Thrust	10
Lift + Cruise	12
Conventional	3

© SMG CONSULTING 2023 - All rights reserved

4/29/2024

mndot.gov

8

Leading U.S. Original Equipment Manufacturers



Joby Aviation S-4
Vecored Thrust
eVTOL



Archer Aviation Midnight
Vecored Thrust
eVTOL



Beta Technologies CX300
Conventional
eCTOL

Parameter	Joby Aviation S4	Archer Midnight	Beta CX300
Est. Range	100 miles	100 miles	300 miles
Est. Speed	174 kts	130 kts	120 kts
PAX Seats / Cargo	4	4	5 / 1,000 lbs. payload

4/29/2024

mndot.gov

9

What Problems are AAM OEMs Trying to Solve?



Lower Emissions

Most AAM aircraft nearing type certification feature fully electric propulsion systems, with some OEMs focused on hybrid-electric and hydrogen fuel cell electric.



Lower Noise

Noise is a big problem for aviation. These aircraft hope to significantly reduce the noise per aircraft.



More Efficient VTOL

Helicopters today are incredibly inefficient and costly to operate. Many AAM aircraft are designed to augment vertical lift driven by rotors with wing-generated lift in cruise.



Improved Transportation

We are fairly limited in modes to transport people and goods today. AAM seeks to leverage the third dimension to move goods and passengers to their destinations.



Strengthen Regional Airports

Regional airports are local economic engines. AAM seeks to strengthen existing aviation infrastructure and generate increased utilization, as well as demand.

4/29/2024

mndot.gov

10

Key Technological Drivers

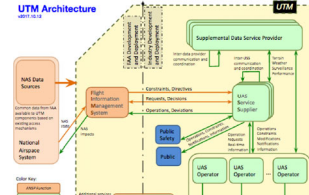
Distributed Electric



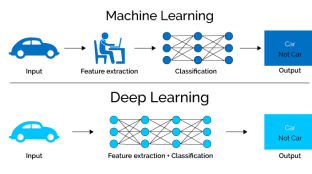
High Rate Composite Manufacturing



New Traffic Management Paradigms



Deep Learning (Machine Learning)



Remote Pilot and Highly Automated



Matured Battery Technology



4/29/2024

mndot.gov

11

Initial Considerations for Minnesota Airports

1. **Electrification** is a core focus area for airports right now – most chargers used CCS1 standard (*multimodal EV charging*)
2. Evaluate AAM in your **Master Plan** update processes – what could it look like at your airport?
3. AAM aircraft can, and often prefer, to **land CTOL** rather than VTOL to conserve energy and extend battery
4. Leverage AAM as a potential to improve relationships with local community (*noise and emissions*)
5. Discuss **electric aircraft flight training** as those aircraft are TC'd and produced

4/29/2024

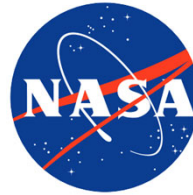
mndot.gov

12

Moving Forward



MnDOT Aeronautics to updated Air Mobility Strategic Plan published in 2022



MnDOT Aeronautics to engage in national working groups around AAM (e.g., NASAO, NASA, FAA)



MnDOT Aeronautics to conduct further AAM "deep dives" with MN airports seeking additional information on a particular topic



MnDOT Aeronautics to begin coordination with additional State Agencies for AAM (e.g., DEED)



Want to Chat More about AAM? Come find me!

Joseph Block

Advanced Air Mobility Program Manager

Joseph.block@state.mn.us

651-392-3920