



Community Perception of eVTOL Vertical Aviation Safety Team Global Conference

October 5, 2022



ULTRA-EFFICIENT TRANSPORT



FUTURE AIRSPACE



HIGH-SPEED COMMERCIAL FLIGHT



ADVANCED AIR MOBILITY

Four Transformations for Sustainability, Greater Mobility, and Economic Growth



Advanced Air Mobility is Emerging

REGIONAL
CARGO AND
PASSENGER
TRANSPORT



PUBLIC
GOOD



CONSUMER/
ENTERPRISE
GOODS AND
SERVICES



LOCAL
PASSENGER
TRANSPORT



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

AAM Maturity Levels (AML)

- AML-4 Medium Density/Complexity, Collaborative and responsible, automated systems
- AML-3 Low Density, Medium Complexity, Comprehensive safety assurance automation
- AML-2 Low Density/Complexity, Assistive automation
- AML-1 Mature Certification Projects

Advanced Air Mobility (AAM) Mission



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



NASA's Passenger Carrying Reference Vehicles

Tiltduct



Tiltwing



Tiltrotor



Quadrotor



Lift + Cruise



Side-by-Side



Quiet Single Main Rotor



Vertical Flight Society is tracking over 700 eVTOL designs



Current Challenges around Public Perception

From the perspective of the local decision maker

- Awareness
- Understanding
- Informational Resources





Awareness - Survey

Maven conducted a survey to effectively solicit the public to obtain inputs on potential Advanced Air Mobility (AAM) vertiport locations specifically:

- **Where they would like to see vertiports located, and**
- **How they would like to use this new mode of transport**

Survey Structure: 1500 people focused in Ohio and Los Angeles with respondents matching that area's demographics



Biggest Concerns



Approximately 75% had never heard of AAM or knew very little about it at the beginning of the survey



Understanding - Taxonomy



Currently 4 definitions of Advanced Air Mobility, and maybe more.



Understanding - Community Partnerships

- Enabling AAM is highly dependent upon close coordination
- Communications are critical
- Successful partnerships already exist
- Successful partnerships take effort



Potential Community Partners

- | | |
|---|---|
| • Visionary(s) | • Ground Transportation Providers |
| • Decision Maker(s)/Councils of Governments | • Businesses/Entrepreneurs/Chambers of Commerce |
| • State/Regional/Local Transportation Department(s) | • Aircraft Vehicle Manufactures/Operators |
| • Transportation Planning Organizations/MPOs | • Universities/Colleges |
| • Local Federal Officials/Agency(s) | • Workforce Development Organizations |
| • First Responders/Public Service Providers | • Utility Companies |
| • Airport Operator(s)/Port Authorities | • Real Estate Company(s) |
| • System Engineering Companies/Subject Matter Experts | • Infrastructure Providers |
| | • Supplemental Service Providers |
| | • Customer(s) |



**North Central Texas
Council of Governments**





Informational Resources - AEWG

AAM Ecosystem Working Groups - 4 Groups

98 Recorded meetings as of October 6, 2022

2000+ people registered

Upcoming Topics:

- Utah, Ohio and Orlando AAM Planning Updates – October 6th
- Urban Air Mobility Noise Working Group (UNWG) – October 20th



<https://nari.arc.nasa.gov/aam-portal/>

Accelerate the development of safe and scalable AAM flight operations by bringing together the broad and diverse ecosystem



Informational Resources – Vertiport Considerations

- Federal Regulatory
- Local Regulatory
- Physical – fixed
- Physical – mobile & temporary
- Vertiport configuration
- Surrounding uses
- Economic considerations
- Equity considerations
- Demand considerations
- Environmental considerations
- Airspace integration considerations
- Contingency considerations
- Utility considerations
- Communications/Data
- Security – Physical, Cyber and Airspace
- Safety
- Automation
- Others

- Federal funding used
- Public vs Private
- Airspace impact evaluation
- Design Circular(s)
- Maturing Design Circular(s)
- Maturing taxonomy
- Grant restrictions
- Occupational Safety and Health Administration (OSHA) and Americans with Disabilities Act (ADA) requirements
- Future climate requirements
- Leadership in Environmental and Energy Design (LEED) Goals/requirements
- Physical security (pax + cargo) regulations
- Applicable existing regulations
- Regs developed for AAM
- Environmental requirements e.g., National Environmental Protection Act (NEPA), FAA 1050.1
- Cross-border operations
- Governing regs e.g., Part 135
- FAA Regulatory Roles & Responsibilities (CAA)
- FAA Operational Roles & Responsibilities (ANSP)
- Federal vs Local Roles and Responsibilities
- Species protection regulations
- Registration in National Registry of Airports
- Airport Master Record e.g., 5010-1 forms
- Mitigation Programs e.g., noise abatement
- Interstate commerce regs
- Part 157 Forms 7480 & 7460 Notice of Construction
- 49 USC 5501 National Intermodal Transportation
- Data collection, retention and disposal policies and procedures (for audit and safety trend analysis)
- Federally provided vs commercially provided service
- Engage early with the FAA

- Zoning of site
- Zoning of surrounding area
- Local/state funding
- Noise ordinances
- Operating hours
- Economic Development Plan
- Building, plumbing code(s)
- Lack of building codes
- Local data requirements
- Adopted fire codes
- Incorporate & adhere to local master and transportation plans
- Support local planning goals
- Current or future land use plans
- Environmental requirements. e.g., Special purpose state/local laws, California Environmental, Quality Act Coastal Commission
- Long term local goals and plans
- Long term transportation integration planning
- Stakeholder groups assembled
- Processes in place to obtain stakeholder input
- Understanding public opinion
- Federal vs Local Roles and Responsibilities
- Digital Policy (flexible & rapid policy implementation tools)
- Information publicly fund
- Local mandate requirement
- Differences in
- Local airport
- State Aviation

- Temporary vertiport (1 year, disaster recovery, special event)
- Building cranes
- Blowing debris
- Construction staging
- Noise
- Lightning protection equipment
- Non-acoustic annoyance factors e.g., visual
- Static discharge
- Urban wind shadows
- Future local land use
- Impacted by surrounding area
- Critical infrastructure nearby
- Local Fire station
- Metro/bus/train stop
- Building security
- Local land use
- Maturing vegetation
- Compatibility - Business/industrial vs residential
- Connectivity to existing transportation networks
- Distance to Maintenance or Repair Facility (MRO)
- Down wind of wind farm
- Noise sensitive area
- Visual distractions e.g., solar panel reflectivity, ambient or artificial lighting, both on ground in and air
- Nearby animals (zoo, domestic)
- Protected wildlife habitats
- Future property values
- Impact on local community, environment or surrounding land use considerations impacts from increased traffic accessing vertiport
- Follow-on development compatibility
- Hazards from specific land uses e.g., birds at landfills, ash from burning, weather radar around wind farms
- Privacy of vertiport neighbors
- Operations distracting other activities e.g., drivers on a freeway
- Affect surrounding area
- School in vicinity
- Property under approach and departure paths

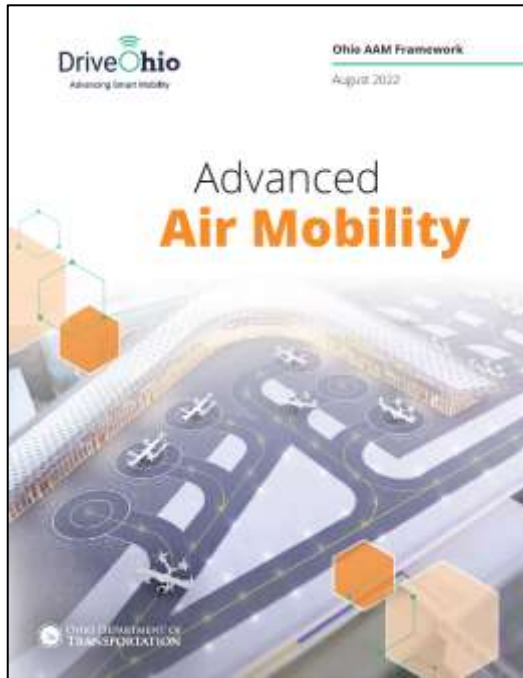
- Near-by buildings (e.g., high rises)
- Antennas
- Towers (cell & water)
- Trees
- Power and other lines
- Power poles
- Billboards
- Land use designation of vertiport site
- Compatible with existing airports & their future plans
- Compatible with other transportation infrastructure and plans
- Property owner(s) rights
- Time/ease for multi-modal transportation changes
- Terminal Instrument Procedures (TERPS) evaluation



Over 450 considerations collected covering the siting, design and operations of vertiports



Informational Resources – Community Documents



Welcome to the Orlando Advanced Air Mobility Plan!

Cross-pollination supports a harmonized national implementation



Informational Resources – Small Business Innovation Research (SBIR)

2022 Phase Is - Start Jul 25th

- All Azimuth Solutions - [Electronic Community AAM Toolkit](#)
- Architecture Technology Corp- [Developing Local Knowledge for Advanced Air Mobility \(DLK\)](#)
- Circle Optics - [Enhanced Detect and Avoid Optical Sensing for Urban Air Mobility](#)
- Greensight Agronomics - [Automated Machine Learning Prediction of Motor Degradation \(AMP MD\) for eVTOLs](#)
- Krause and Associates - [Electric Motor Fault Resilience](#)
- System Technologies - [Verification and Validation Software for Autonomous UAS Certification](#)
- TruWeather - [Multipurpose Doppler Lidar Measurements](#)
- Ultramarin - [Single Fluid Tuned Winding Induction Motors](#)
- Vismo - [Verification and Validation Software for Autonomous UAS Certification](#)

2020 Phase IIs

- Continuum Dynamics - [Comprehensive Acoustic Analysis for Urban Air Mobility Vehicles](#)
- Cornerstone Research Group - [Urban Air Mobility Passenger Ride Quality](#)
- Innovative Dynamics - [Low Power Rechargeable Anti-Icing System for Urban Air Mobility Vehicles](#)
- Mosaic - [Small UAS Collision Avoidance System](#)
- ResilienX - [Weather Sensor and Data Monitoring \(WSDM\) Service](#)
- Systems Technology - [A Portable Flight Test Display for UAM Means of Compliance Testings](#)

2021 Phase IIs – Starting now

- Aeris - [Microscale Weather Based Unmanned Aircraft Systems Traffic Management Optimization System](#)
- Barron Associates - [LiDAR-Supported Emergency Landing System for AAM Vehicles \(LELSA\)](#)
- Crown - [AAM Community Integration Platform](#)
- Greensight - [Autonomous Decision Support System for Sense and Avoid \(ADeSSA\)](#)
- Hinetics - [Integrated magnetics, insulation, and cooling architecture for robust eVTOL motors](#)
- Systems Technology - [A Certification Means of Compliance Process for Advanced Air Mobility with Increasing Autonomy](#)
- TruWeather - [Urban Weather Sensing Infrastructure Testbed](#)
- ANT - [ANTCity a PaaS for AAM and Urban Planning](#)



Take aways

Safety is Imperative

While AAM is “local” it’s also “national”

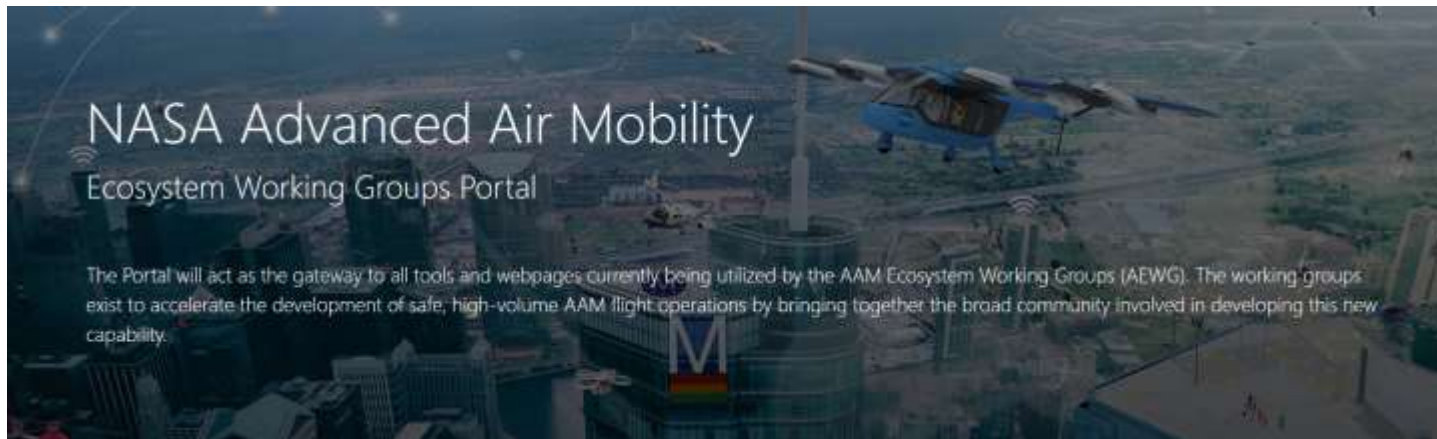
AAM is “tailorable”

Public Perception is challenging



<https://asrs.arc.nasa.gov/uassafety.html>

(Aviation Safety Reporting System (ASRS))



<https://nari.arc.nasa.gov/aam-portal/>



<https://www.nasa.gov/aeroresearch/aam/aam-safety-poster-contest>