Regional Modeling and Simulation for Vertiport Location Assessment

Dr. Kapil Sheth
NASA Ames Research Center

Presentation to Community Integration Working Group
March 4, 2021
Motivation

Where can a vertiport be placed near Downtown Los Angeles?
Motivation

Can we assess the suitability of a vertiport near Los Angeles Mayor’s Office?
Advanced/Regional/Urban Air Mobility

- Research - safety and convenience, viability, infrastructure, scalability, traffic management, and public acceptance

- Benefits - mobility, commutes and deliveries, and decreased emissions and noise, and perhaps congestion

NASA

- ATM-X and AAM Project, AMIO*

- ConOps, Technical Challenges, Reference Implementations, Interoperability

- Series of simulations for UAM airspace management, high-tempo information exchange, connecting partners, and preparation for flight tests

*ATM=Air Traffic Management, AAM=Advanced Air Mobility, AMIO=AAM Mission Integration Office
Current Interest

- Three types of motivated entities
  - Regional
  - Vertiport developers
  - Vehicle manufacturers

- Researchers
  - Noise modeling
  - Surface mobility data
  - Ground congestion information
  - Vehicle flight route structure
Regional Modeling Tool
Vertiport Suitability

- Region/city parameters
- Zoning, environmental impact, intermodal systems, etc.
- Importance of attributes (rewards and penalties)
- Algorithmic aggregation and thresholding
- Location suggestions and vertiport selection
- Open architecture
Los Angeles Region
Zoning Attribute
Intermodal Systems

Grid (7x7 miles), each cell (~55 meters or ~185 ft)
Intermodal Systems
Composite Suitability

Los Angeles, CA
Composite Suitability

Columbus, Ohio
Regional Simulation Tool

Vertiport Assessment and Mobility Operations System (VAMOS!)
Flight of UAM Vehicles

• Selected vertiport locations

• Route structure between locations

• Simulation of vehicle flight (models, winds, etc.)

• Impact on environment (noise, etc.)

• Assess frequency and density

• Reiterate, as necessary!
Final Result

Multiple Vertiport Locations and Vehicle Flight in Los Angeles

Modeling with WorldWind; Simulation can connect to TestBed
Ongoing work…

• CONUS-based experience
  - Go anywhere within the US
  - On-Demand data availability

• Temporal data handling
  - Specific data sets: congestion, demand, etc.
  - Display and compute capability

• Iterative intelligence
  - Integration of modeling and simulation tools
  - User in the loop

• Patent pending…
Questions?

(Kapil.Sheth@nasa.gov)