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# World Birdstrike Association Virtual Conference

Advanced Air Mobility and Wildlife Hazards:  
New Technology Meets a Persistent Challenge

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# Presentation Goals

## Let's Talk!

- Identify relationship between forthcoming AAM/UAM and wildlife
- Consider current, adaptative, and new approaches to manage wildlife in support of (AAM/UAM)

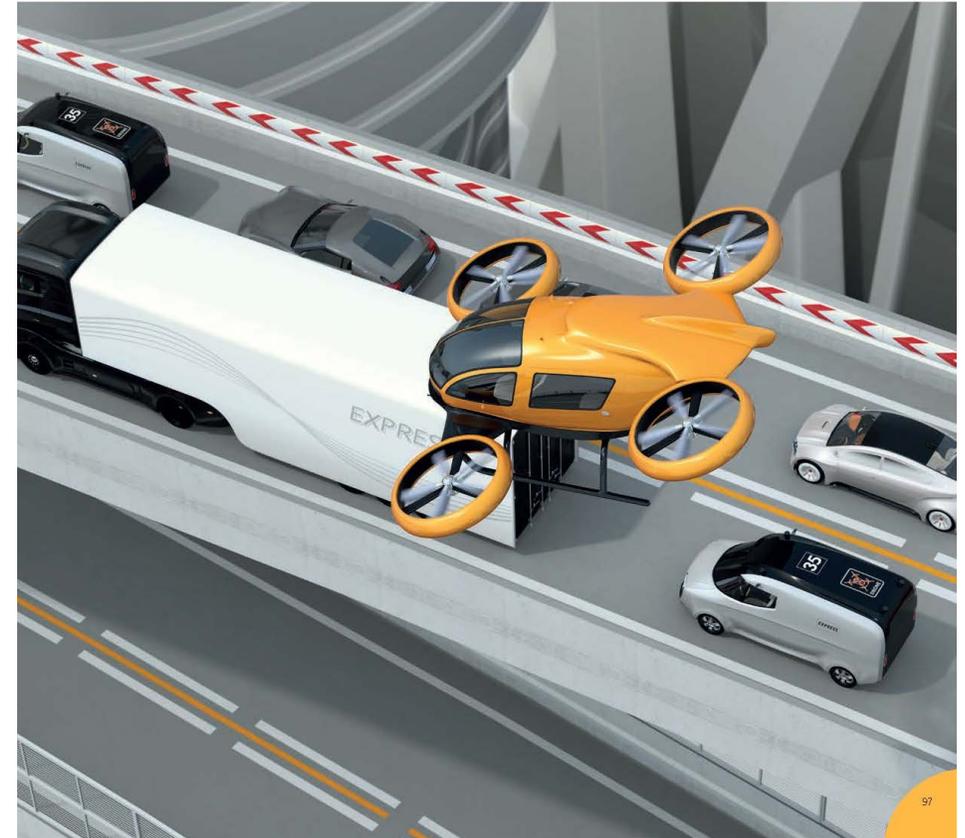


*Encourage dialogue across disciplines and stakeholders*

# Advanced Air Mobility (AAM) and Urban Air Mobility (UAM)

## General Characteristics

- Small passenger and cargo aircraft
  - Numerous, diverse designs
- Up to 8 passengers (generally)
- Urban operation - within/between urban areas/regions (50 miles)
- Quieter, clean electric aircraft engines (batteries/hydrogen)
- New transportation mode - defined corridors
- Operate at low altitudes - 400 to 4,000 feet AGL
- *Coming soon – Paris 2024 Olympics*



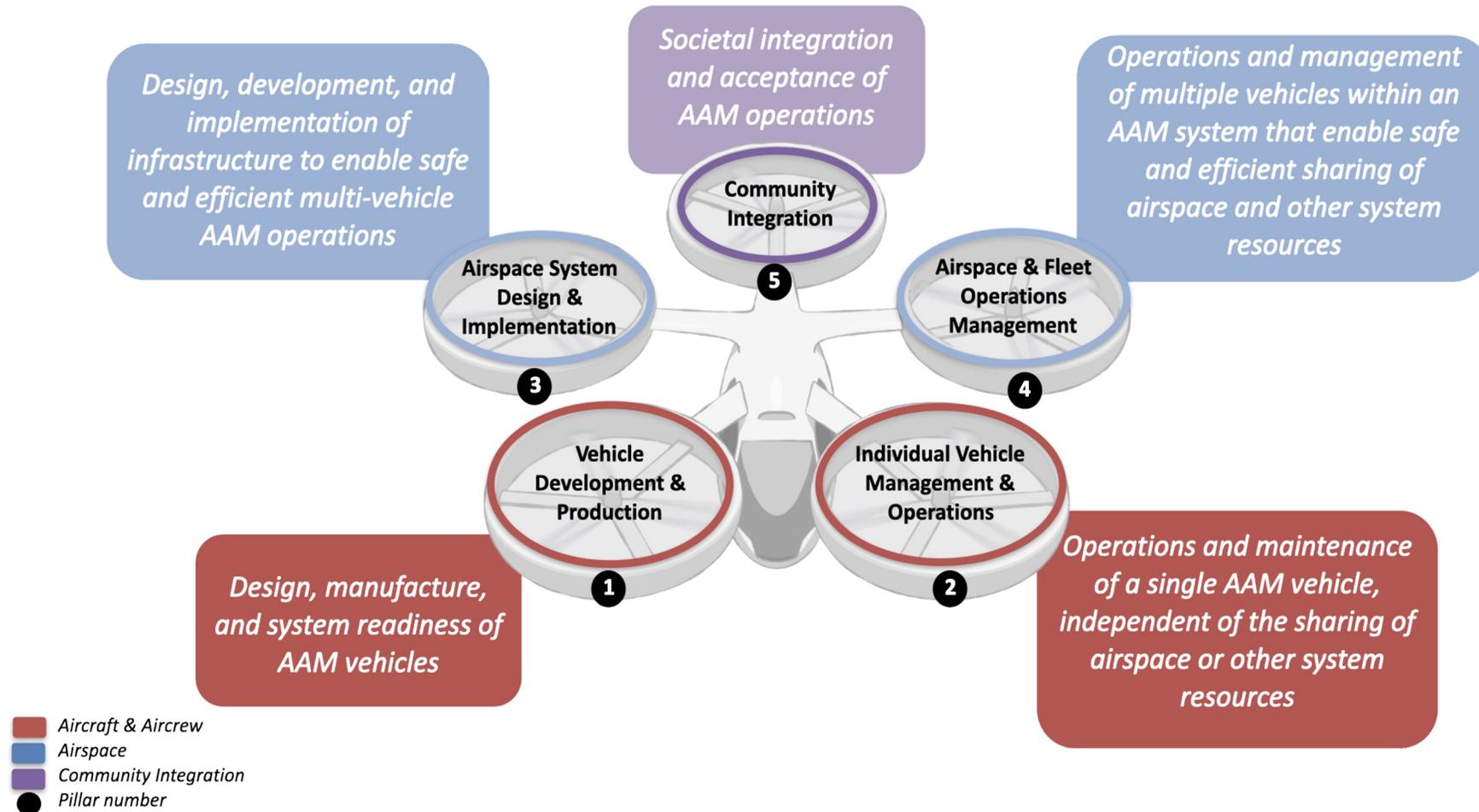
Source: EASA 2021

# AAM and Wildlife: Characteristics, Challenges, and Considerations



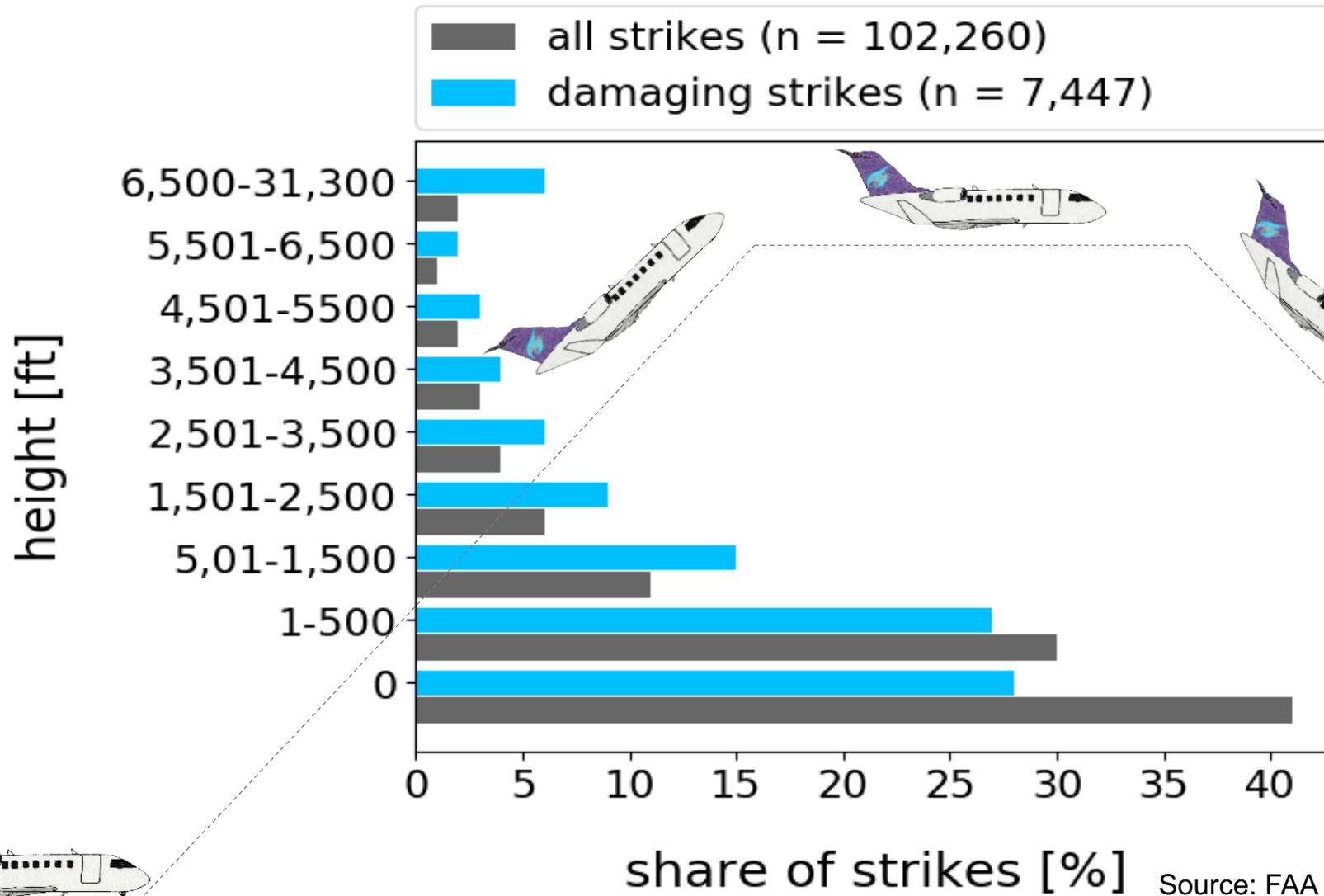
Source: Advanced Air Mobility Reality Index, 2022

# NASA: Five Pillars of AAM Development / Implementation

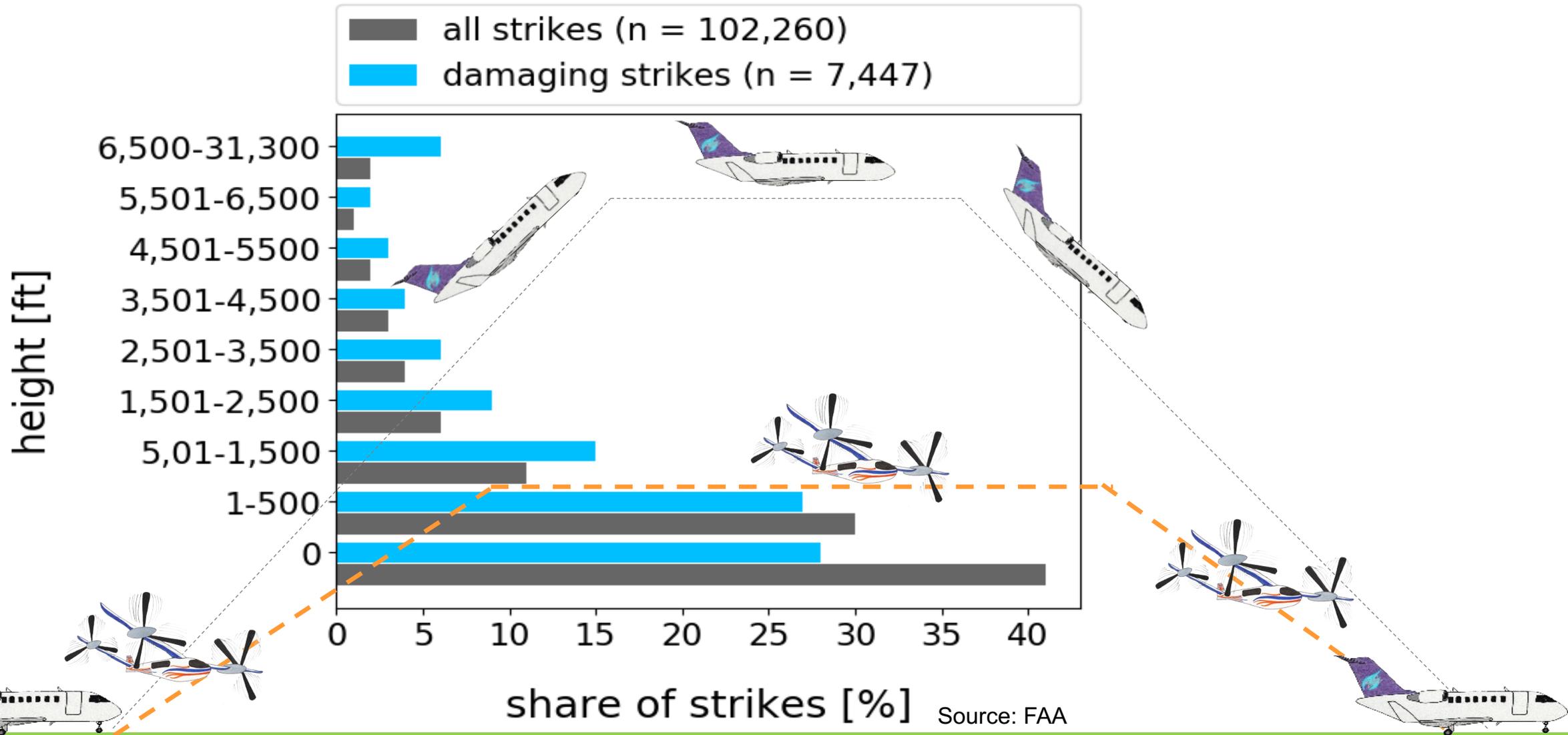


Source: NASA/NAR 2020I

# Wildlife Hazards and Risk Assessment – Where Strikes Occur



# Wildlife Hazards and Risk Assessment – Where Strikes Occur



# New Technology and Potential Solutions

## Lessons Learned/New Applications

### Facility Planning/ and Management

- Siting and Design Guidance
- On-Site Controls
- Corridor Management
- Land Use/Zoning
- Community Outreach and Education

### Airframe/Certification Requirements

- Revised Certification Requirements
- Aircraft Adaptations for Increased Perceptibility

### Operational Solutions

- Pre-flight Procedures
- In-flight Technology and Procedures

***(We've got this!)***

# AAM and Wildlife: Characteristics, Challenges, and Considerations

## New Technology/Diverse Design

- **Characteristics and Challenges**

- Technology push, expedited schedule
- Numerous, diverse designs (hundreds!)
- Proprietary concerns

- **Considerations**

- No “one size fits all” solution
- Provide industry outreach to OEMS (BSC-USA, WBA, VFS)
- Provide input to revised Certification Standards and guidance to reflect design variations



# AAM and Wildlife: Characteristics, Challenges, and Considerations

## Operational Considerations

- **Characteristics**
  - Comparatively quieter engines
  - Comparatively fast operating speeds (200 mph)
  - Low-altitude operations (in the “Strike Zone!”)
- **Tactical Challenges**
  - Reduced time for conflict recognition (operator/wildlife)
  - Reduced time for evasive action (operator/wildlife)
  - Reduced recovery time (operator)
- **Considerations**
  - Increased use of avian radar (strategic and tactical)
  - Increased operator training (tactical response)
  - Systematic controls for autonomous aircraft (eventually)



# AAM and Wildlife: Characteristics, Challenges, and Considerations

## Urban Operations

- **Characteristics and Challenges**

- Limited space for emergency/controlled landings
- Existing incompatible land uses
- Urban environments include hazardous wildlife!

- **Considerations**

- Identify on-site/available open near vertiports and throughout the operational corridor!
- Identify/address urban wildlife habitats/hazards during infrastructure and route planning

**Bottom Line:** Greater exposure throughout operation

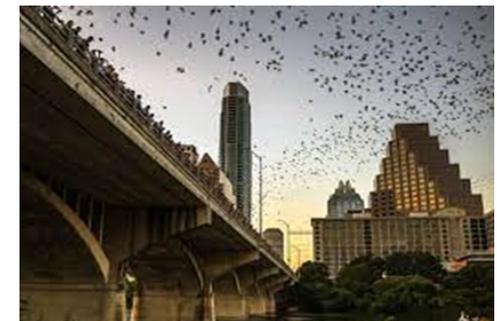
***Consider the Corridor!***



Source: NASA/NARI



Source: NPS.gov



Source: Austinculturemap.com

# AAM and Wildlife: Characteristics, Challenges, and Considerations

## Facility Operation and Administration

- **Vertiport Development and Operation Characteristics and Challenges**

- Non-airport locations
- New and diverse operators (FBOs, cities, transportation agencies, others)
- Site-selection criteria and local policies/ordinances may be silent/inconsistent with wildlife management

- **Considerations**

- Provide outreach/guidance to vertiport operators
- Identify/cross-reference WHM guidance in forthcoming FAA Vertiport Design guidance
- Adapt and incorporate WHM programs (similar to airports)



Source: Florida Air Mobility Network

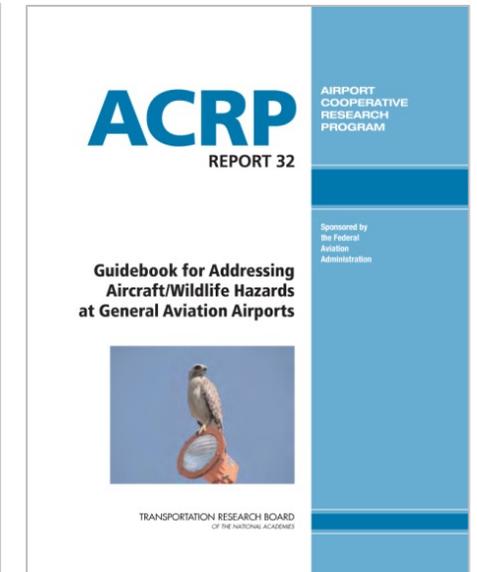
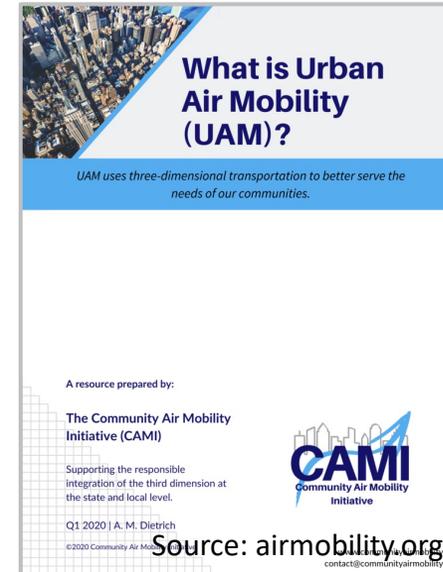


Source: Aviationtoday.com

# Facility Planning and Management

## Potential Solution: Adapt and Apply Existing Tools

- Use and build on available data!
- Adapt WHM regulations and guidance to consider both vertiports and corridors
- Identify and manage wildlife hazards during site-selection, local decision-making, and operation (active and passive controls).
- “Consider the Corridor!” (zoning, land use)
- Undertake community education/outreach



# Potential Solutions – Airframe: Certification Requirements

Impact Resistance for Certification Requirements proposed by EASA

- 1 kg/2.2 lb. for single bird
- 0.45 kg/1 lb. for flocking birds  
at critical cruise speed of UAM vehicle



<https://www.arkwildlife.co.uk>

**European Starling**  
2 to 3.6 oz (0.7kg)  
29 mph (22 m/s)



[Allaboutbirds.org](https://www.allaboutbirds.org)

**American Crow**  
0.7 to 1.4 lbs.  
(0.3 to 0.7 kg)  
67 mph (30 m/s)



<https://pacificbirdandsupplyco.com>

**Canada Goose**  
5.5 to 14 lbs.  
(2.5 to 6.3 kg)  
49mph (22m/s)



enhance critical masses



include buffer to consider bird speed

# Potential Solutions – Airframe: Conspicuity

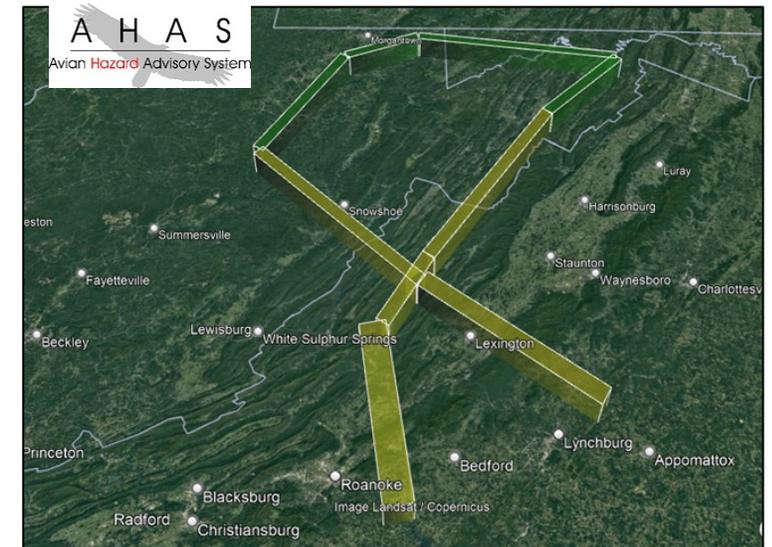
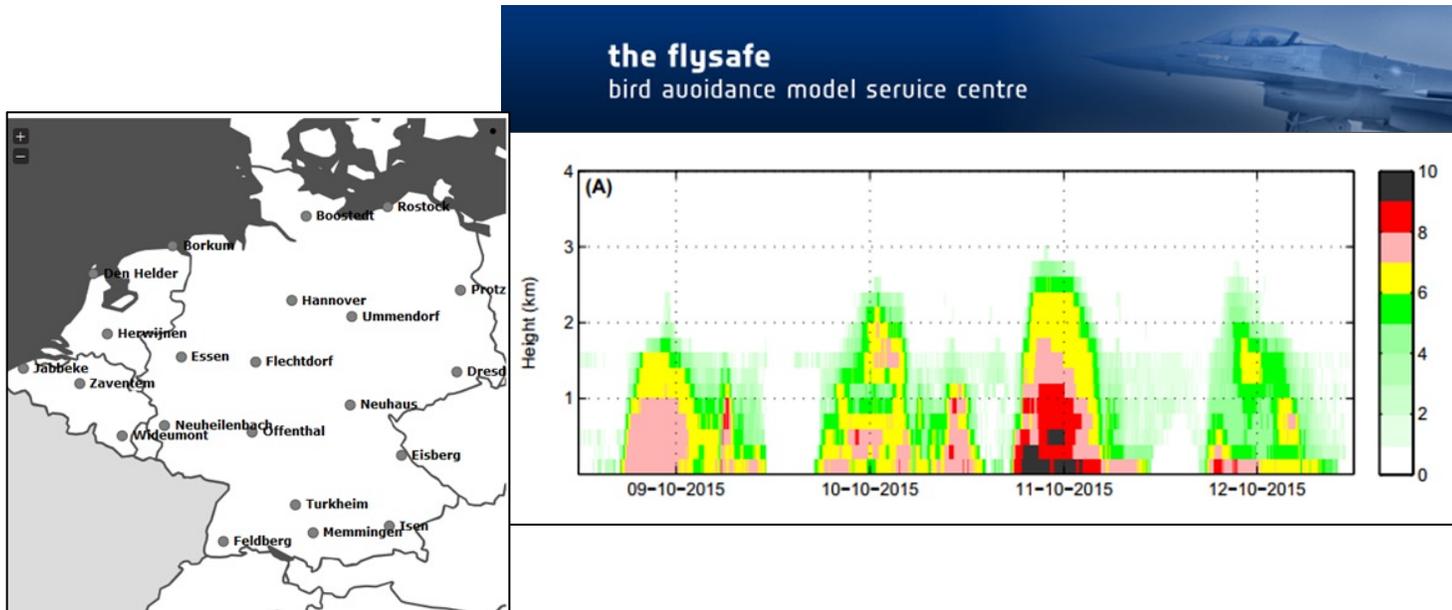


+ Directed laser & directed distress calls?

# Potential Solutions – Operational

## Incorporate Weather Radar

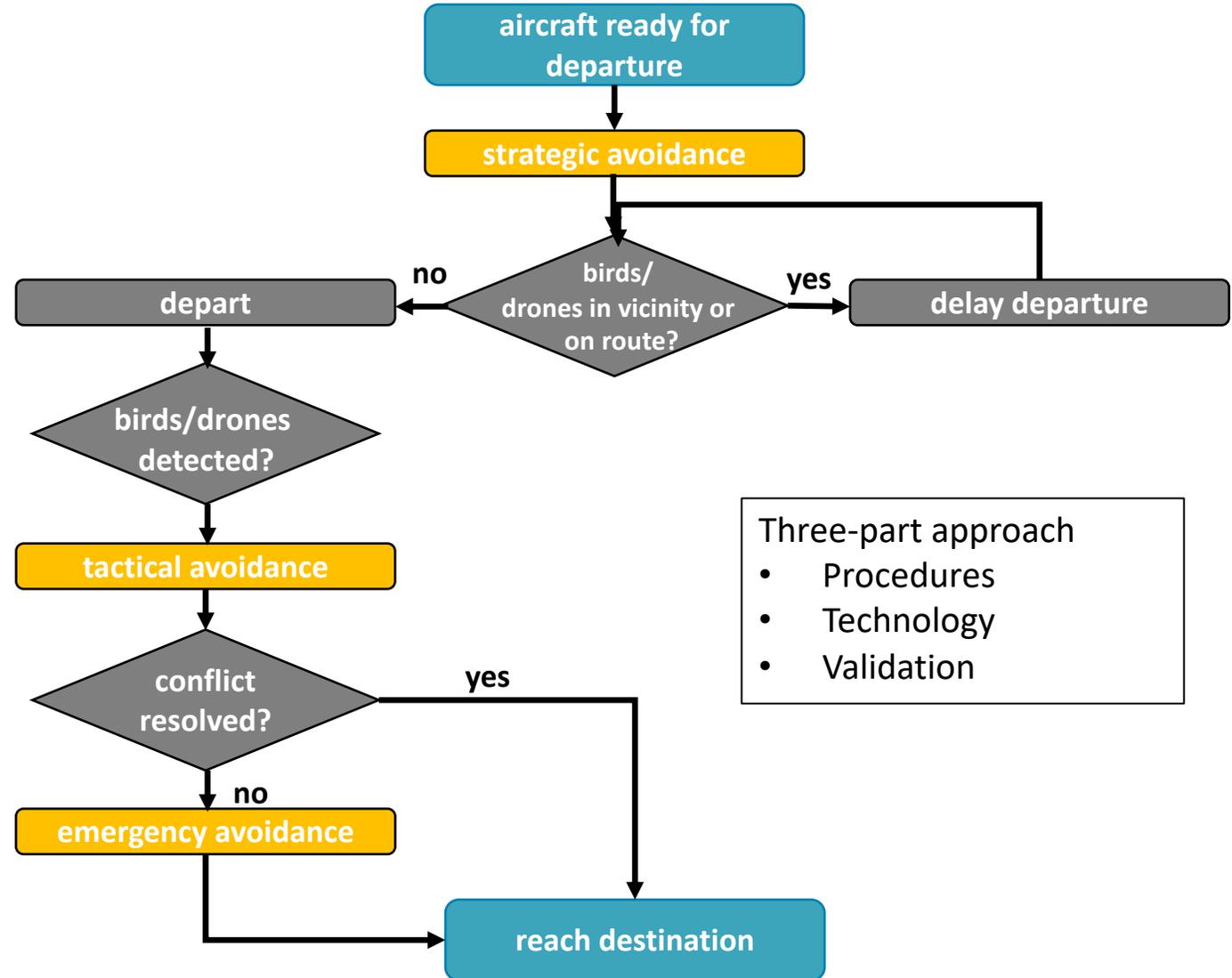
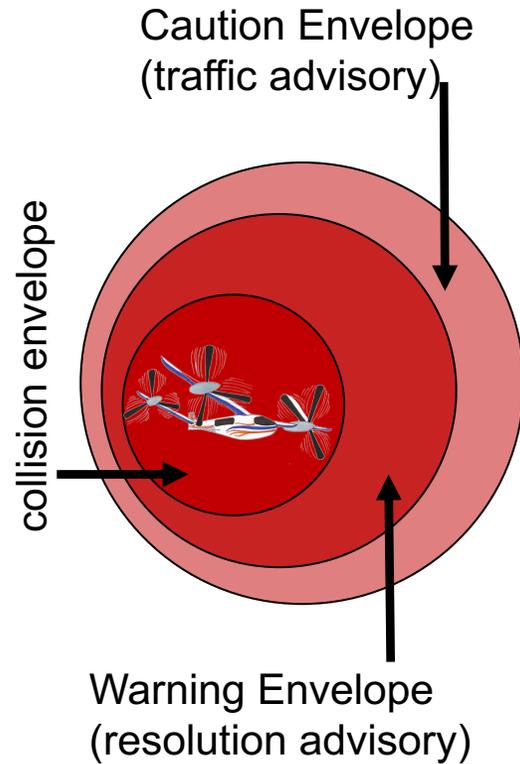
- Existing air force flight planning systems  
→ Available for civil use!



**Next step: tailor to AAM needs**

# Potential Solutions – Operational

## In-flight: Sense and Avoid



Three-part approach

- Procedures
- Technology
- Validation

# Time for Action -- at every stage of AAM development!

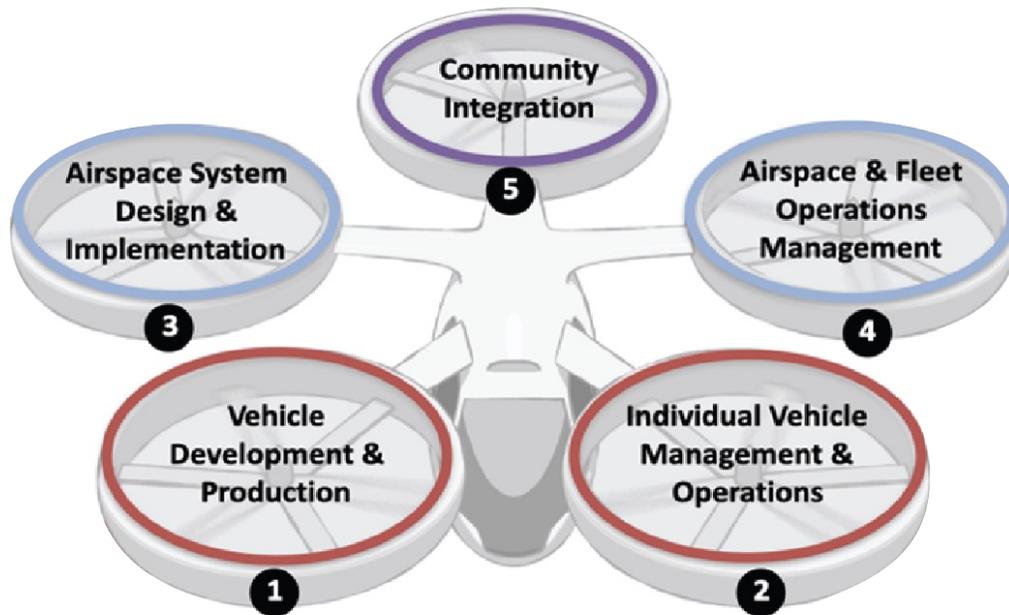


Figure Source: NASA 2020

1. **Reconsider Airframe and Certification.** Consider guidance and requirements for new vehicles.
2. **Incorporate strategic avoidance equipment/systems into individual vehicle design and operation.** Formulate guidance and procedures for strategic and tactical response.
3. **Consider WHM in forthcoming vertiport siting guidance.** Develop guidance and BMPS for vertiport operators and host communities.
4. **Consider WHM during corridor/route planning.** Reconsider WHM regulations and guidance, land use policies and zoning ordinances to support vertiports *and* the flight corridor).
5. **Conduct community outreach and education about forthcoming AAM operations and wildlife.**

# Thank you.

Thoughts or comments?

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