

An aerial view of a city skyline at dusk or dawn, with a futuristic aircraft and a drone flying in the sky. The aircraft is a sleek, white, multi-engine plane with a high-wing configuration. The drone is a quadcopter with four rotors. The city below is densely packed with buildings, and a highway with multiple lanes is visible in the foreground. The sky is filled with soft, golden light from the setting or rising sun, with some clouds. The overall scene is futuristic and urban.

Advanced Air Mobility (AAM)

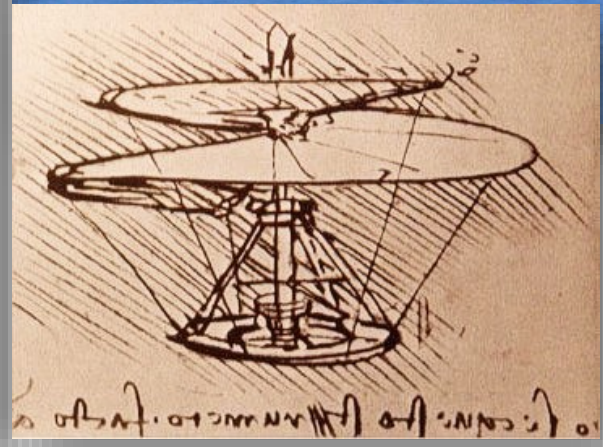
Community Acceptance & Noise Considerations

Los Angeles International Airport (LAX)/Community Noise Roundtable
Regular Meeting of the Roundtable, November 15, 2023
Timothy Middleton, C.M. – Principal Consultant, HMMH

"History doesn't repeat itself,
but it often rhymes."



Photo by Jay Pankowski



Noise & Operational Considerations

- NASA & FAA working with manufacturers to gather data to be used for certification and policy decision making
- Elements of sound include pitch, tone, harmony, etc.
- Noise metrics for Environmental and Land Use planning defined in FAA Order 1050.1F
- Community annoyance to noise of aircraft operations has changed over time; FAA has acknowledged:
 - FAA Neighborhood Environmental Survey
 - FAA Noise Policy Review
- Manufacturers are designing 'low-noise' aircraft
 - Rotor speed, location, airframe interaction, angle of flight all influence the 'quality' of the noise



Noise Estimation Framework for Advanced Air Mobility

Joseph Czech^{1*}

Mihir Rimjha¹

Timothy Middleton¹

Daniel Cuppoletti²

Peter Sorensen²

Paul Cobb³

¹ Harris Miller Miller & Hanson, Inc., Anaheim, CA, USA

² University of Cincinnati, Cincinnati, OH, USA

³ Crown Consulting Inc., Arlington, VA, USA

Advanced Air Mobility – Community Integration Platform AAM-CIP

- A noise estimation framework for AAM vehicles has been built for the AAM CIP tool.
- The framework leverages the credible computing capabilities of the Advanced Acoustics Model, which allows for proper acoustic characterization of AAM vehicles as sound sources via sets of spectral hemispheres.
- The framework allows for the estimation of noise exposure from AAM operations

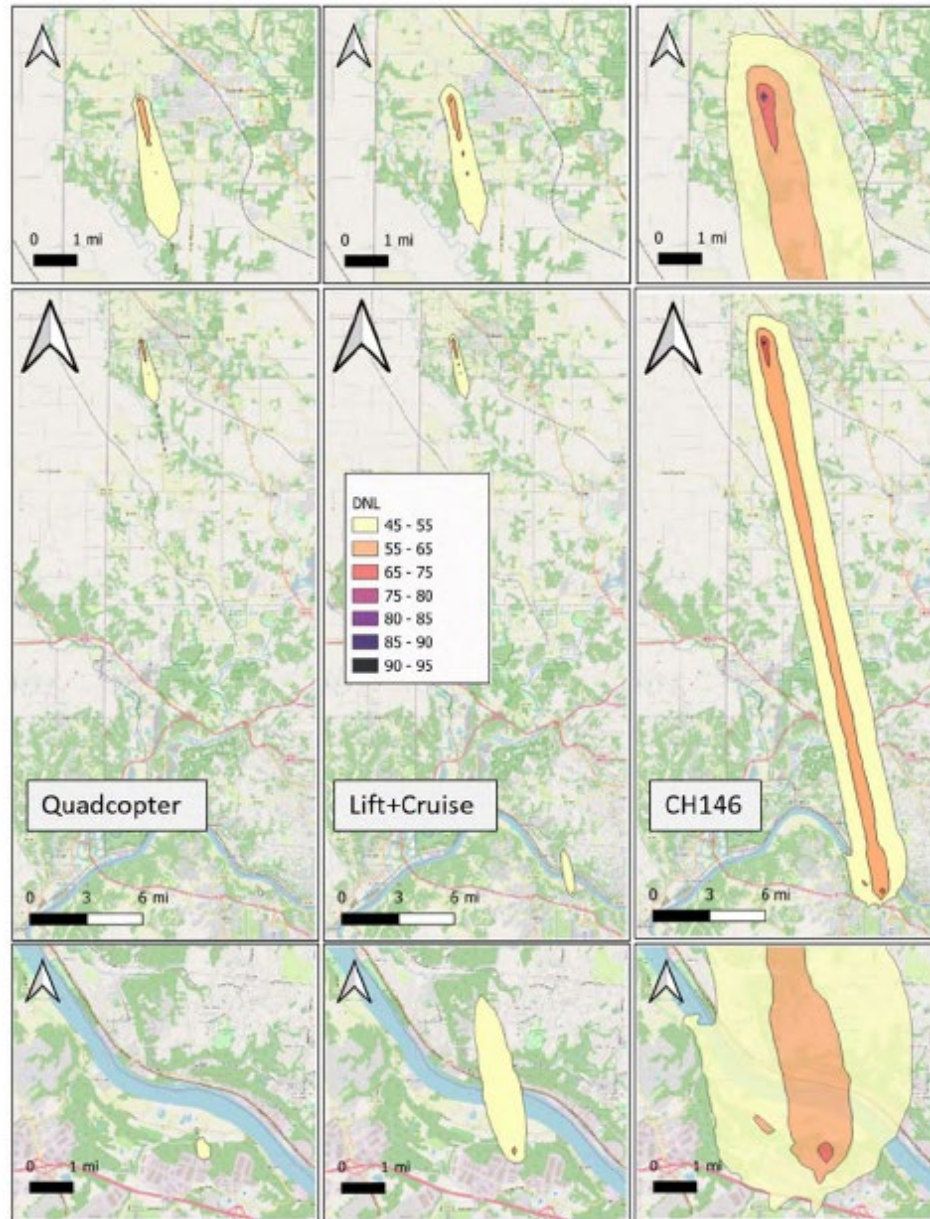
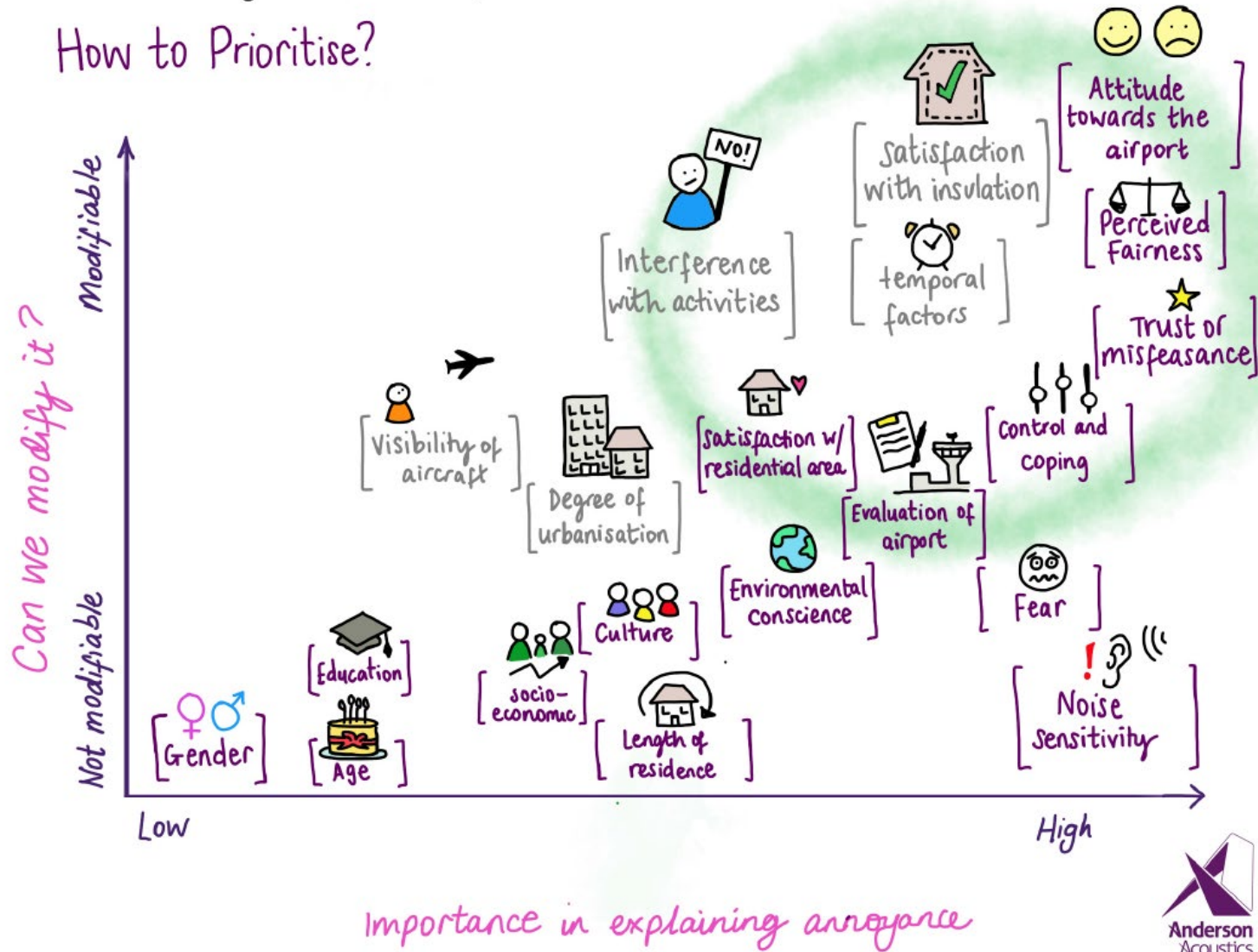


Figure 4. DNL Bands for AAM vehicles (Quadrotor and L+C), compared to Bell CH-146 Griffon Helicopter. The top and bottom panels zoom-in on Descent and Climb phase, respectively. The middle panels capture the entire flight's noise exposure.

Non-Acoustic Factors

Non-Acoustic Factors in Noise Management Strategy

How to Prioritise?



Challenges, or Opportunities?

- Balancing operational considerations with noise abatement
 - Flight paths optimized for efficiency of power (i.e., slower battery drain), are not conducive to noise abatement paths (i.e., up and out quick)
- Development of noise abatement flight routes within existing airspace guidance
 - FAA Innovate28;
<https://www.faa.gov/air-taxis/implementation-plan>
 - *FAA Could Improve Outreach through Enhanced Noise Metrics, Communication, and Support to Communities*
 - GAO Report:
<https://www.gao.gov/assets/gao-21-103933.pdf>



Thank You.

Timothy Middleton, C.M.

339.234.2816

tmiddleton@hmmh.com