
NASA's Quesst and Advanced Air Mobility Missions – Updates and Exploring Community Engagement Strategies

Session Co-chairs:

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Presenters:

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Matt Kamlet | NASA Armstrong Flight Research Center**

**ANE Symposium 2025
March 12, 2025**

Session Goals

- Provide updates on the NASA missions for the ANE audience, especially non-researchers
- Discuss “capturing the lived experience” from the perspective of grassroots community advocates
- Build relationships and create an opportunity for direct dialogue

Agenda

- Session Goals
- Foundational Information
- Context for NASA's Quesst Mission
- Context for NASA's Advanced Air Mobility Mission
- Panel Discussion
- Audience Q & A

Ideation

ANE

- Joint FAA and AICA Presentation – Webinar, Community Engagement Example
- NASA Presentations – AAM and Supersonic

Federal Register Comments

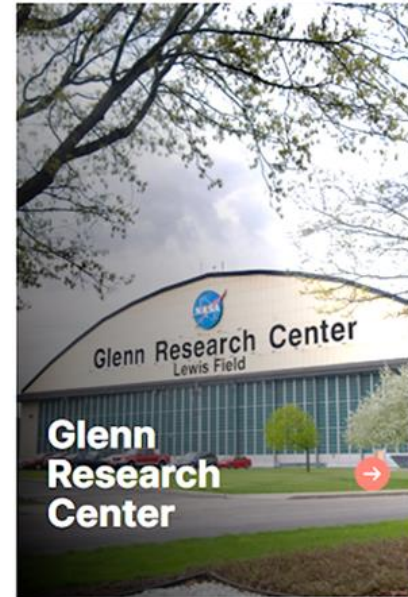
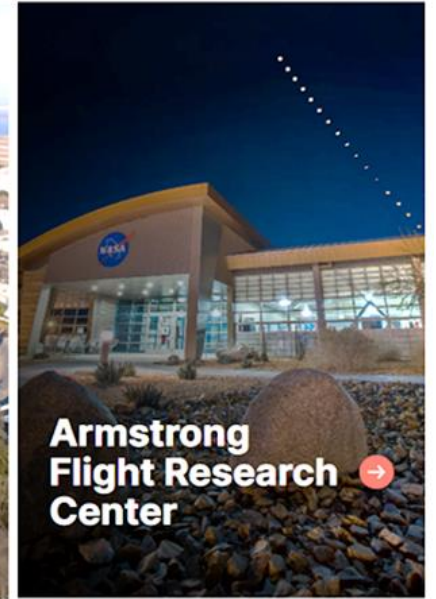
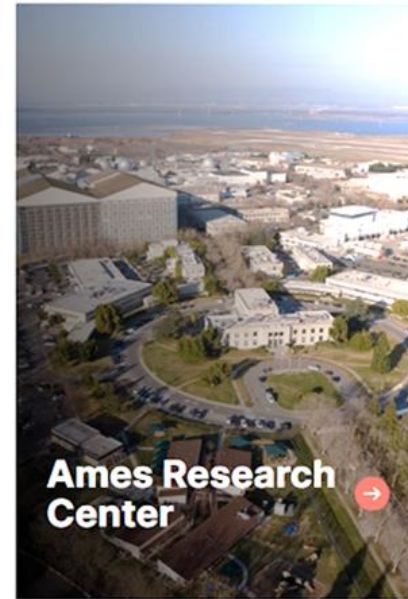
- AICA, Study City for Quiet Skies, and UproarLA: NASA's test on human response to Advance Air Mobility (AAM)/Urban Air Mobility (UAM) vehicle noise, Comment ID No. DOT-OST-2023-0079-0104
- AICA: FAA Noise Policy Review, Comment ID FAA-2023-0855-2206
- Santa Clara/Santa Cruz Airport Roundtable: Noise Certification of Supersonic Airplanes, 14 CFR Parts 21 and 36, Comment ID No. FAA-2020-0316-0019

NASA Advanced Air Mobility, Integration Working Group Events

AICA Perspective - Community Experience and NASA's Noise Research

- **Studies must be well-designed** with a scope and factors that accurately reflect communities' lived experiences, ensuring that generalizations are not made from an overly narrow scope or unrepresentative samples.
- **Noise policy must address distinct noise environments**—while recognizing that ASNA (1979) allows a system of metrics, not just a single metric like DNL.
- **Metrics must fully capture the count and frequency of disruptive events**, as these are the primary sources of annoyance to communities.

NASA Aeronautics Research, one of five NASA Mission Directorates, is conducted at four NASA field centers.



NASA Aeronautics focuses on four transformations below for sustainability, greater mobility, and economic growth:



The human noise response research is at different stages in NASA's Quesst and AAM missions.



Community Noise Surveys



Preliminary Field Studies



Laboratory Tests



NASA's primary mission is research, while FAA's primary mission is regulation.



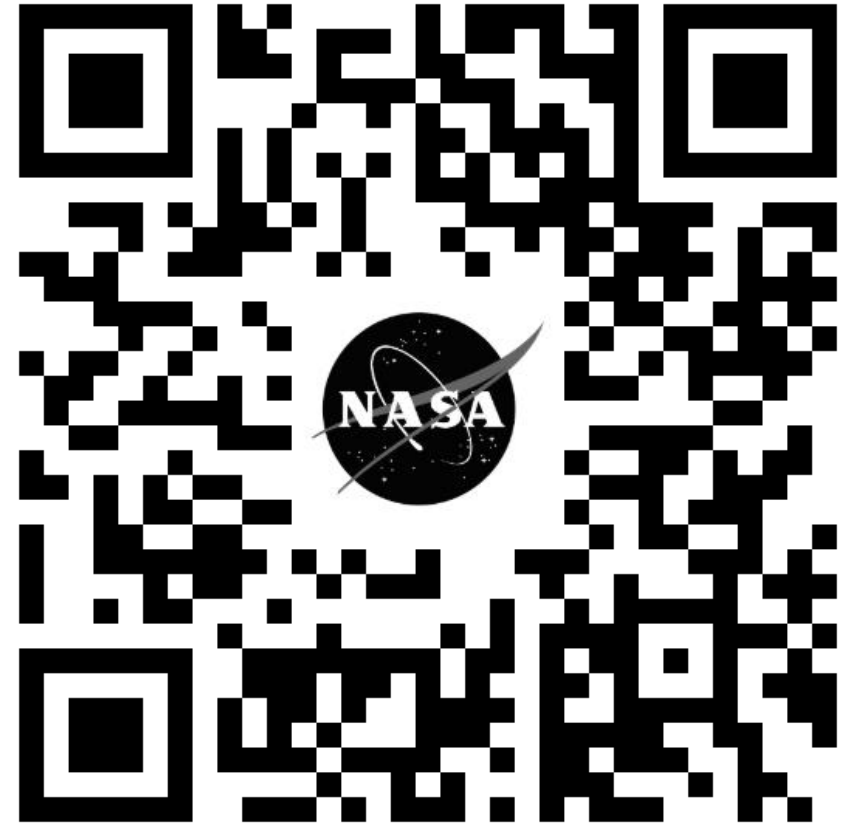
- Independent U.S. federal government agency
- Conducts research and technology development in aeronautics, space, and science
- Produces data, models, and information used by others to guide U.S. policy



- Federal government agency within U.S. Department of Transportation
- Regulates U.S. civil aviation
- Develops and carries out programs to control aircraft noise and other environmental effects of civil aviation

Engaging with NASA Human Noise Response Research

- ANE Symposium and research presentations at technical conferences
- Federal Register Notice review and comments
- NASA human noise response research papers with downloadable content available on QR code (right) and at the NASA Technical Reports Server ntrs.nasa.gov



<https://stabserv.larc.nasa.gov/flyover/>

Speed Limit Or Noise Limit?

[14 C.F.R. §91.817](#) Civil Aircraft Sonic Boom

- (a) No person may operate a civil aircraft in the United States at a true flight Mach number greater than 1...
- (b) In addition, no person may operate a civil aircraft for which the maximum operating limit M_{M0} exceeds a Mach number of 1, to or from an airport in the United States...

The Quesst mission will collect data to inform regulation of civil supersonic flight over land.

The Quesst Mission

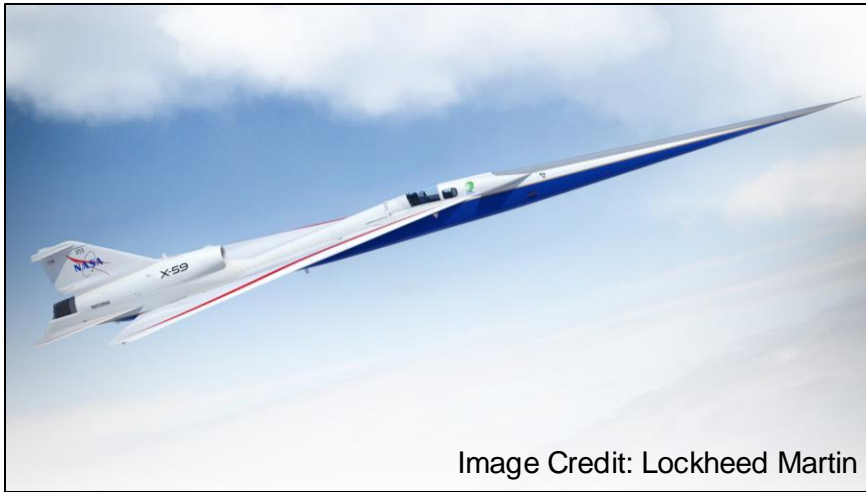


Image Credit: Lockheed Martin



Phase 1—X-59 Aircraft Development

- Detailed design
- Fabrication, integration, ground test
- Checkout flights
- Subsonic envelope expansion
- Supersonic envelope expansion

Phase 2—Acoustic Validation

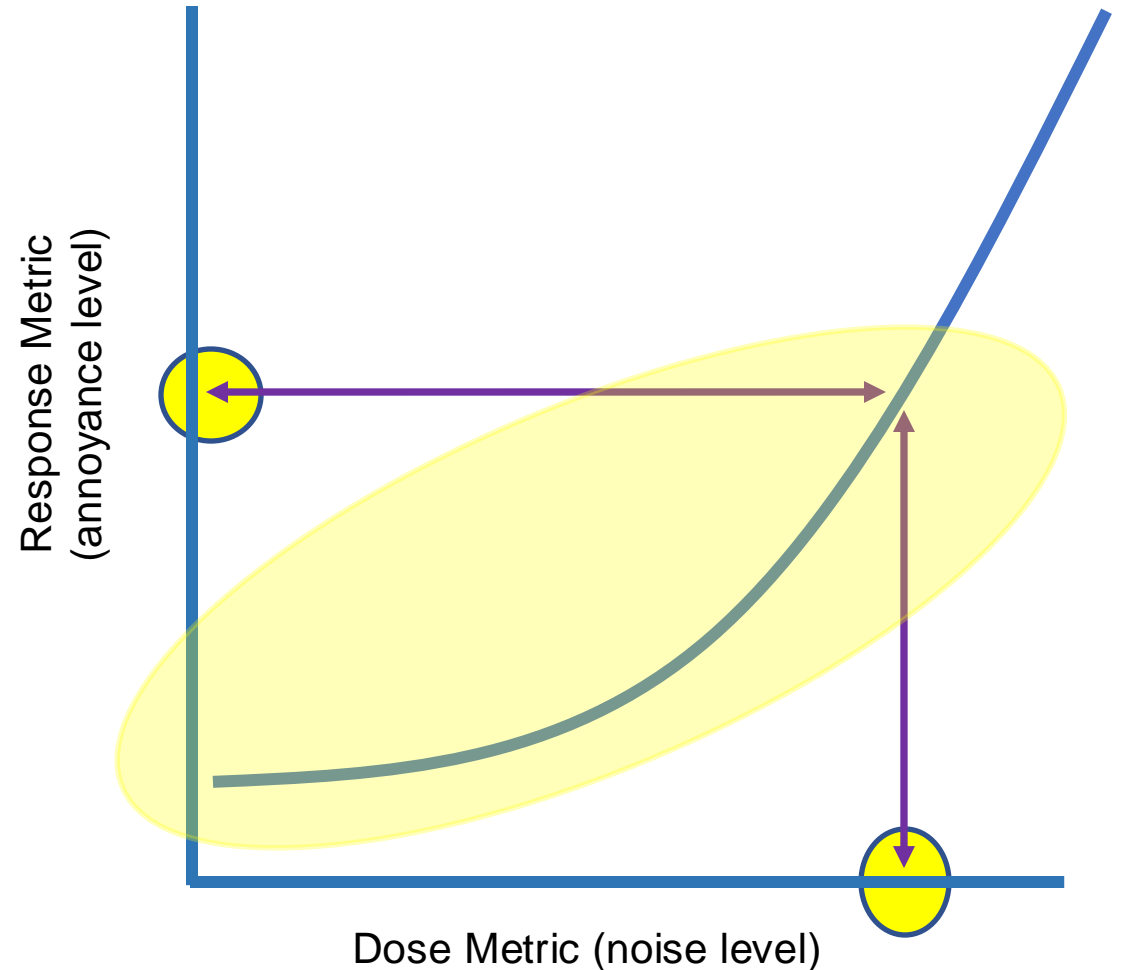
- In-flight and ground measurements
- Validation of X-59 signature and prediction tools
- Development of acoustic prediction tools for Phase 3

Phase 3—Community Response

- Multiple campaigns across U.S.
- Community response surveys
- Ground measurements in communities
- Data analysis
- **Database delivery for regulators**

Community Testing Research Questions and Products

- Produce dose-response models
 - Single flyover events
 - Cumulative dose
- Assess effects on annoyance
 - Rattle, vibration, startle
 - Listening environment, time of day
 - Flights will take place in nominally daytime hours, not late-night or overnight.
- Outside of mission scope
 - Sleep disturbance
 - Takeoff/landing noise, emissions



Advanced Air Mobility (AAM) Mission at NASA



- NASA produces data (including effects from noise) and tools to:
 - Guide industry's development of electric air taxis and drones
 - Assist Federal Aviation Administration in safely integrating these vehicles into the national airspace.
- Urban Air Mobility (UAM) is a use case within AAM for transporting cargo and passengers in urban environments

NASA Research Areas in AAM/UAM



COMMUNITY INTEGRATION

- How these aircraft will fly routinely in cities and rural areas
- Integration with already established transportation systems, buildings, and city policy



AIRSPACE

- Communication between aircraft and air traffic control
- Location of aircraft in the airspace while flying
- Automation of air traffic control systems for unexpected events



INFRASTRUCTURE

- Vertiport research, where the aircraft will take off and land
- Power research, how the aircraft will be powered
- Digital support for aircraft and operators



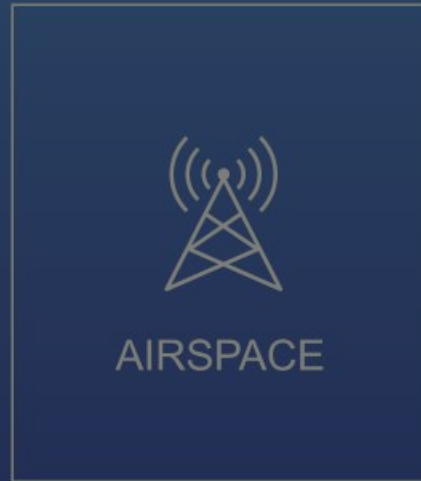
AIRCRAFT

- Safety of the aircraft design materials
- Noise of the aircraft, minimizing its impact
- Ride quality for passengers
- Aircraft automation – software and hardware for self flying aircraft

NASA Research Areas in AAM/UAM



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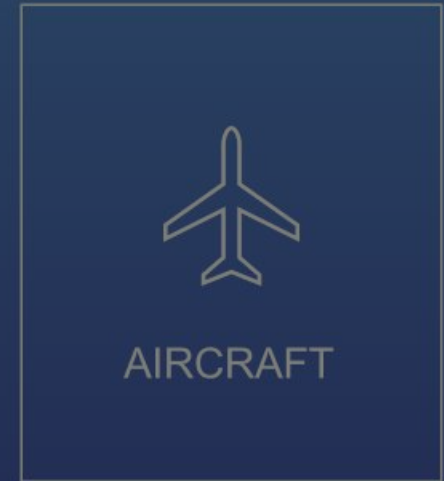
- Communication between aircraft and air traffic control
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- Vertiport research,

- **Understanding and Predicting**
 - **Source noise**
 - **Human Noise Response (Psychoacoustics)**

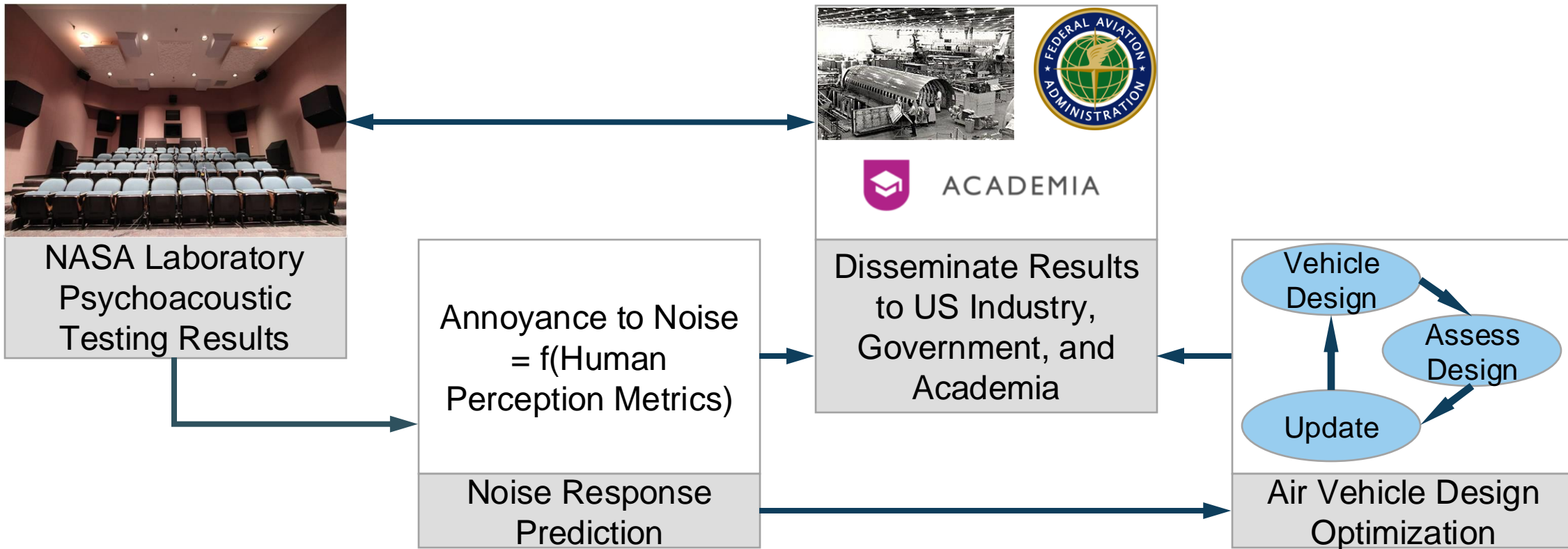
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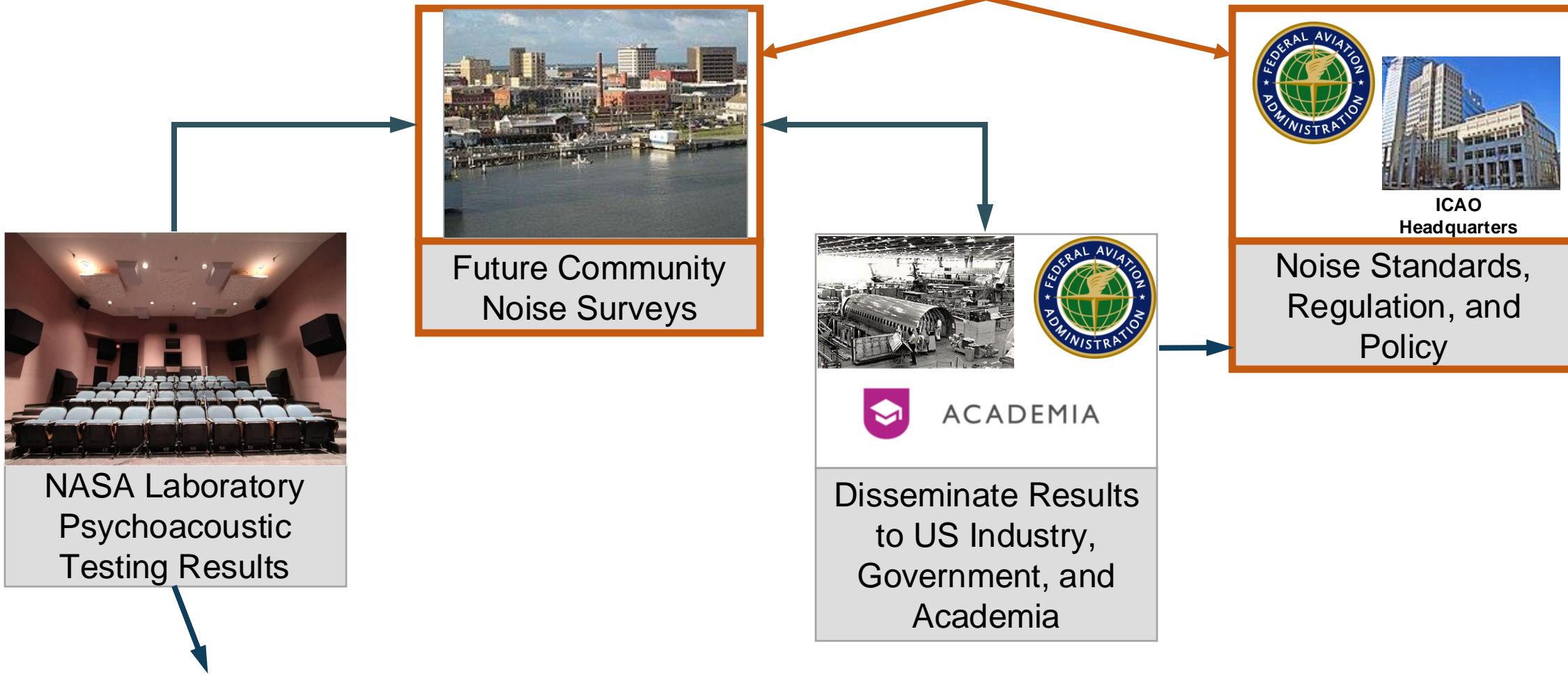
Psychoacoustic testing helps understand human noise response

Current state of NASA AAM research is laboratory-based



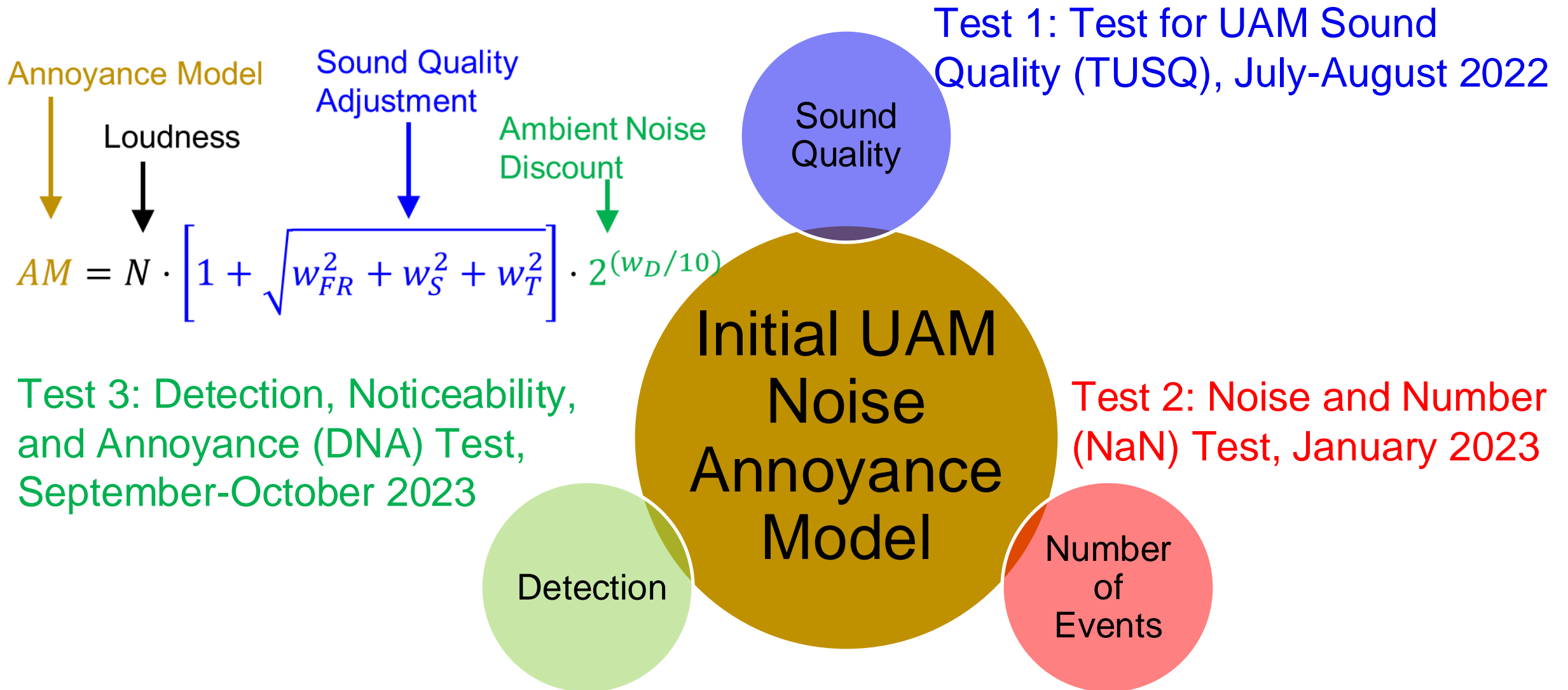
Community noise surveys provide data to support policy/regulations

Agencies other than NASA will be leading these efforts for AAM noise



Laboratory testing provides data for subsequent investigations that may affect AAM noise operations/policies

Initial testing done on AAM noise response



Initial testing done on AAM noise response



Simulated NASA AAM
Quadrotor concept flown
multiple times

Test 1: Test for UAM Sound
Quality (TUSQ), July-August 2022

Sound
Quality

If number of AAM vehicle flyovers is
between 0.5-2/min, there is annoyance
penalty to number of flights

Test 3: Detection, Noticeability,
and Annoyance (DNA) Test,
September-October 2023

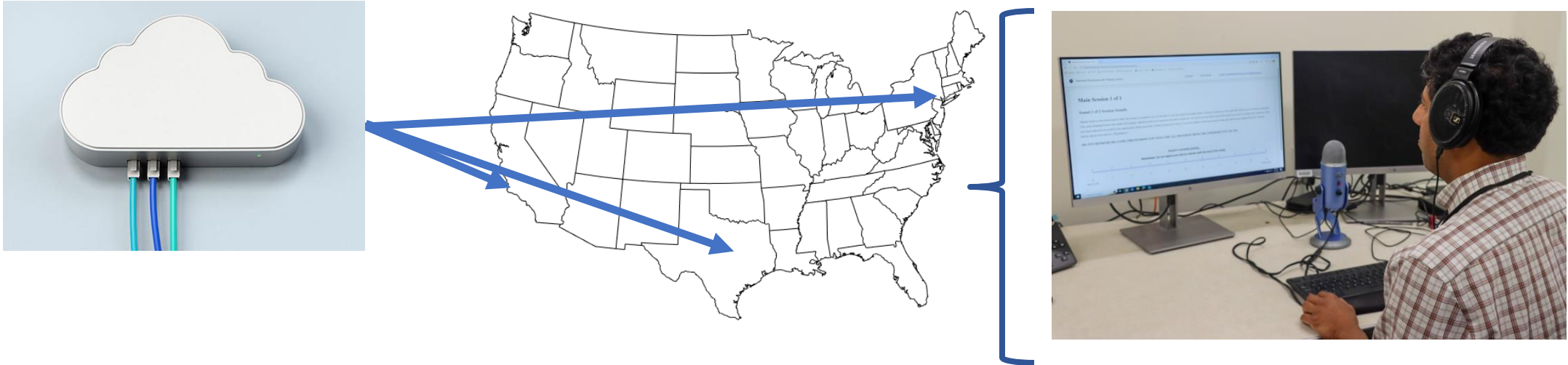
Detection

Initial UAM
Noise
Annoyance
Model

**Test 2: Noise and Number
(NaN) Test, January 2023**

Number
of
Events

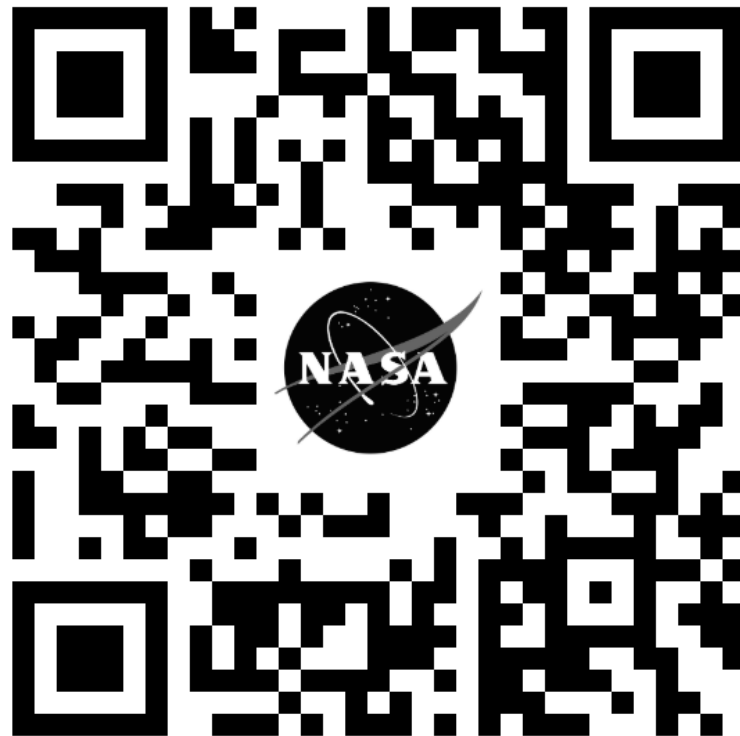
More laboratory testing on AAM/UAM noise response planned



- **Online Varied AAM Noise and Geographic Area Response Difference (VANGARD) Test: Response to variety of single AAM/UAM flyovers**
- **Other laboratory tests being planned:**
 - **AAM/UAM aircraft vs. Helicopters**
 - **More testing on effects of ambient noise**
 - **More testing on effects of number of events**

Engaging with NASA AAM Human Noise Response Research

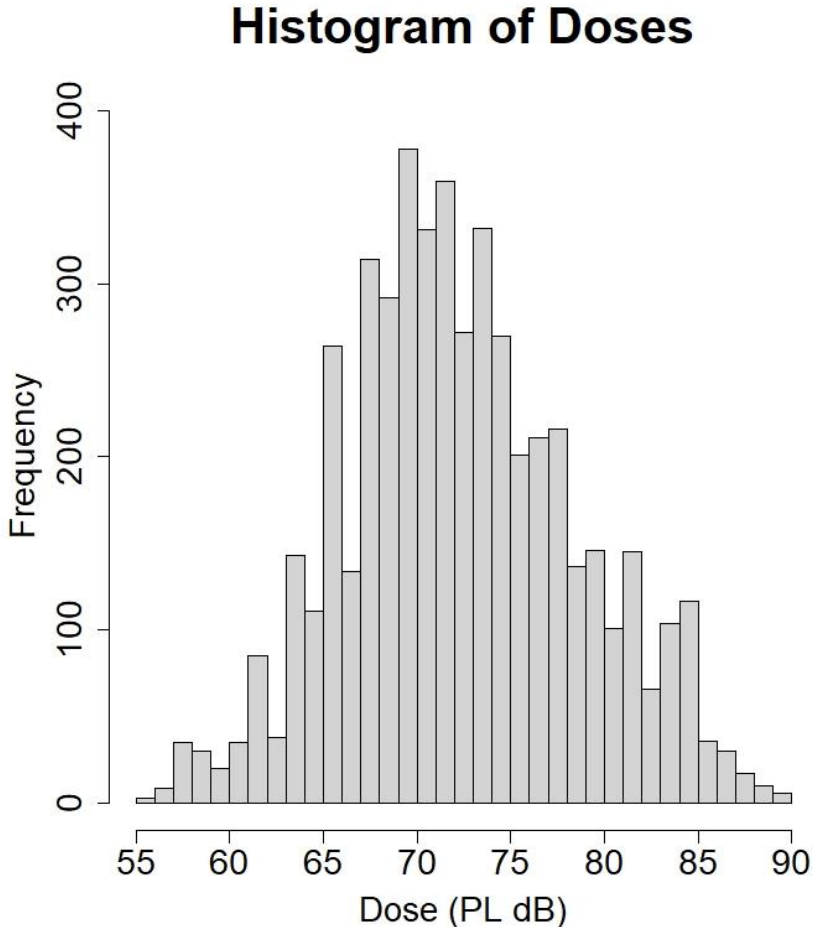
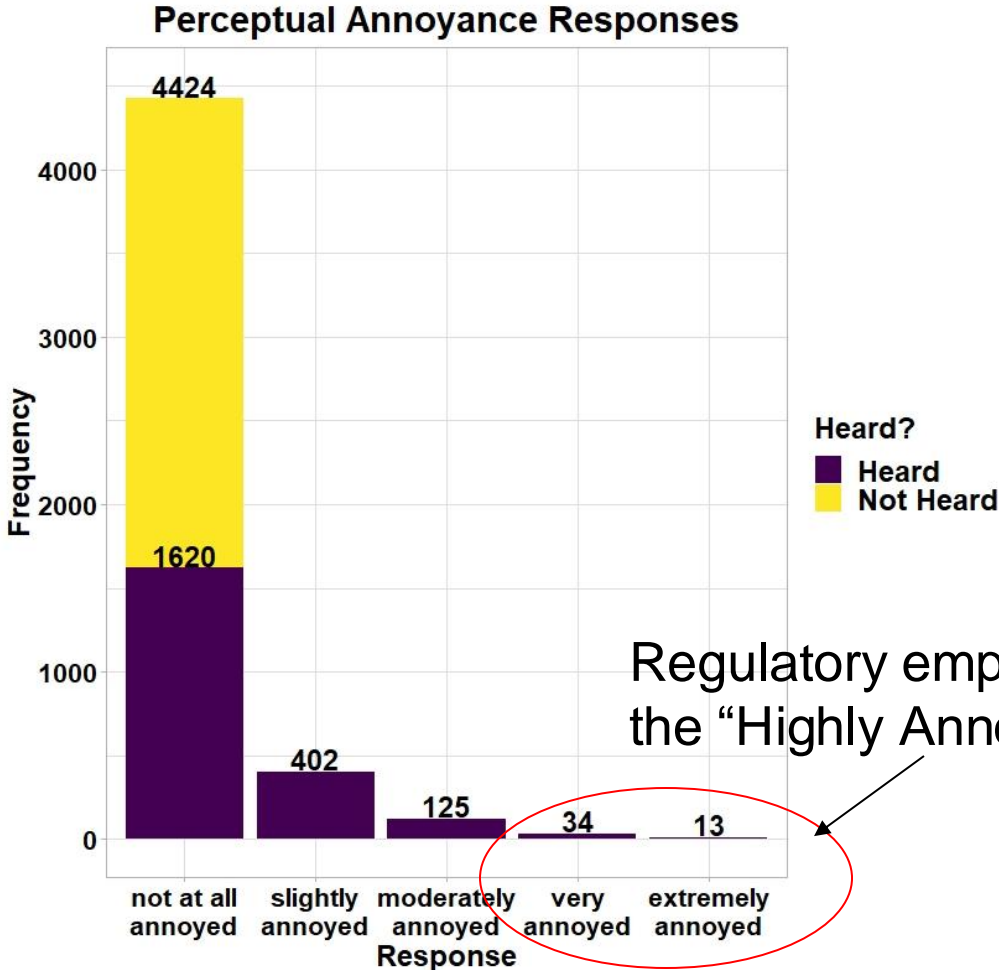
- **VANGARD Federal Register Notice review and comments**
- **NASA psychoacoustics research papers and data available through QR code (bottom)**



<https://stabserv.larc.nasa.gov/flyover/>

Backup Slides

What Might We See in Collected Data?



- Quiet Supersonic Flights 2018 Study (QSF18) in Galveston, TX
 - Page et al. (2020a,b), Lee et al. (2020)

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