# Revolutionary Vertical Lift Technology Project UAM Operational Fleet Noise Assessment Technical Challenge Overview

Stephen Rizzi
NASA Langley Research Center, Hampton, Virginia

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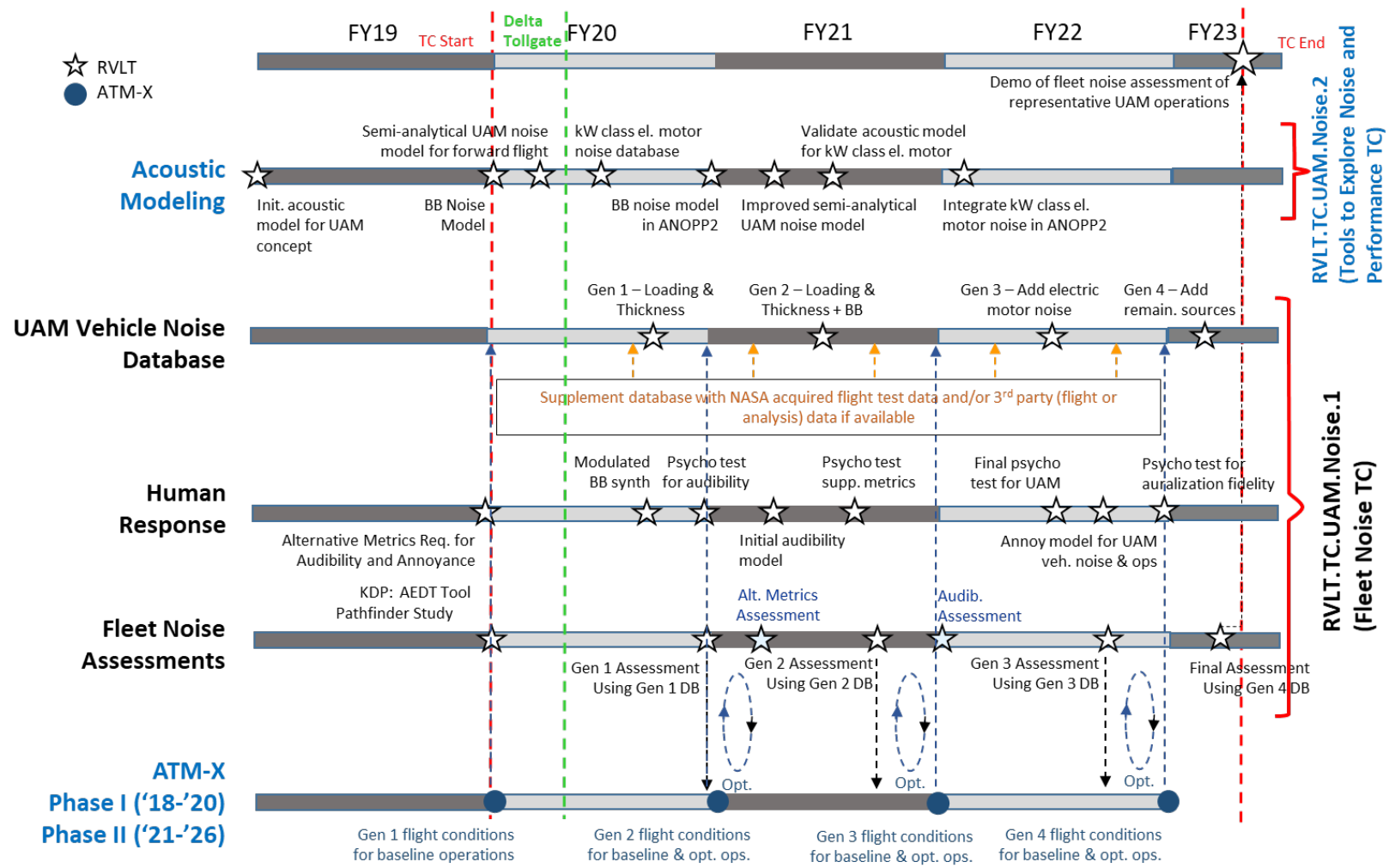
# Technical Challenge Statement

In order to address the need for a documented methodology for generating noise assessments of fleet operations of UAM eVTOL aircraft concepts, NASA will

- deliver validated tools and tool chain documentation at TRL=5,
- document best practices for fleet noise modeling, and
- demonstrate fleet noise assessments of representative UAM operations.


RVLT
ATM-X
FY19
TC Start
Delta Tollgate
FY20
FY21
FY22
FY23
TC End
Demo of fleet noise assessment of representative UAM operations
Acoustic Modeling
Semi-analytical UAM noise model for forward flight
kW class el. motor noise database
Validate acoustic model for kW class el. motor
Init. acoustic model for UAM concept
BB Noise Model
BB noise model in ANOPP2
Improved semi-analytical UAM noise model
Integrate kW class el. motor noise in ANOPP2
RVLT.TC.UAM.Noise.2 (Tools to Explore Noise and Performance TC)
UAM Vehicle Noise Database
Gen 1 – Loading & Thickness
Gen 2 – Loading & Thickness + BB
Gen 3 – Add electric motor noise
Gen 4 – Add remain. sources
Supplement database with NASA acquired flight test data and/or 3rd party (flight or analysis) data if available
Human Response
Modulated BB synth
Psycho test for audibility
Psycho test supp. metrics
Final psycho test for UAM
Psycho test for auralization fidelity
Alternative Metrics Req. for Audibility and Annoyance
Initial audibility model
Annoy model for UAM veh. noise & ops
KDP: AEDT Tool Pathfinder Study
Fleet Noise Assessments
Alt. Metrics Assessment
Audib. Assessment
Gen 1 Assessment Using Gen 1 DB
Gen 2 Assessment Using Gen 2 DB
Gen 3 Assessment Using Gen 3 DB
Final Assessment Using Gen 4 DB
Opt.
Opt.
Opt.
RVLT.TC.UAM.Noise.1 (Fleet Noise TC)
ATM-X
Phase I ('18-'20)
Phase II ('21-'26)
Gen 1 flight conditions for baseline operations
Gen 2 flight conditions for baseline & opt. ops.
Gen 3 flight conditions for baseline & opt. ops.
Gen 4 flight conditions for baseline & opt. ops.

# Afternoon Talks

UAM Vehicle Noise Database

- "Calculation of Gen-1 Noise-Power-Distance data of UAM vehicles for community noise assessments," Presenter - Doug Boyd

Fleet Noise Assessments

- "Gen-1 UAM fleet noise assessments using the FAA Aviation Environmental Design Tool (AEDT)," Presenter - Stephen Rizzi

Air Traffic Management – eXploration

- "The AIRNOISE-UAM tool and its use in the ATM-X project," Presenter – Jinhua Li

Human Response

- "Overview of Psychoacoustic Activities for UAM," Presenter – Andy Christian
- "Prediction-based auralization of the RVLT quadrotor reference vehicle," Presenter – Siddhartha Krishnamurthy
- "Further evaluation of the efficacy of SEL related to annoyance to helicopter maneuvers," Presenter – Matt Boucher