



UNWG Subgroup 3 (Metrics) Status Report

UAM Noise Working Group Meeting
NASA Langley
April 11, 2019



Subgroup 3: Metrics

Leads: Stephen Rizzi (NASA LaRC) and David Josephson (Josephson Engineering/Uber)

Membership: 28

Activities since October 2018 meeting:

- Telecon November 16, 2018
 - Primary activity – Refine scope
 - 18 participants
- Telecon February 13, 2019
 - Primary activity – Scope distillation
 - 21 participants
- Telecon March 20, 2019
 - Primary activity – Mapping plans to high level goals
 - 18 participants



Recap of Oct 18 Meeting

Identified 11 scope areas:

1. Certification (Part 36) metrics
2. Community noise (Part 150) type metrics
3. Supplemental metrics (annoyance/acceptability, audibility, temporal/spectral variations, loudness, ambients)
4. Vibrations
5. Indoor vs outdoor
6. Health effects – sleep disturbance, cardiovascular health
7. Operations & vertiport placement – fleet noise
8. Engineering use for design – sound quality
9. Selection criteria & justification
10. Bridging the gap between single event and longer term or multi-event exposure.
11. Evaluation of equal energy principle – how do they sum



Scope Areas (more detail)

1. Certification (Part 36) metrics
 - Pertains to both current and future noise certification metrics, e.g., L_{AMax} , EPNL. Expect to work closely with Regulation & Policy Subgroup (#4)
2. Community noise (Part 150) type metrics
 - Pertains to both current and future community noise metrics, e.g., DNL. Expect to work closely with Regulation & Policy Subgroup (#4)
3. Supplemental metrics (annoyance/acceptability, audibility, temporal/spectral variations, loudness, ambient)
 - Any metric that supplements the noise impact information disclosed by the DNL metric. Presented with objective of enhancing public understanding and acceptance of impact analysis (From FICAN 2018 Research Review)
4. Vibrations
 - Noise transmission into a building structure (home, vertiport), and its effect on humans, e.g., rattle.
5. Indoor vs outdoor
 - Difference between indoor and outdoor response, typically associated with annoyance
6. Health effects – sleep disturbance, cardiovascular health
 - Effects of short and long term noise exposure on human health



Scope Areas (more detail)

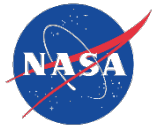
7. Operations & vertiport placement – fleet noise
 - Understanding of noise impact of a fleet of vehicles operating in vicinity of a vertiport. Consideration of DNL and other metrics.
8. Engineering use for design – sound quality
 - Perception-influenced design/Perception-based engineering. The idea of incorporating metrics, e.g., SQ metrics, or models of human response, e.g., annoyance, in design of vehicle and/or operation
9. Selection criteria & justification
 - The process by which a metric is selected for a particular purpose, and the justification for doing so.
10. Bridging the gap between single event and longer term or multi-event exposure.
 - We can conduct psychoacoustic tests in the lab for single/few events, but longer term multi-event response must be in real communities with real aircraft. This addresses how we might bridge that gap.
11. Evaluation of equal energy principle – how do they sum
 - Does the equal energy hypothesis, as found in DNL, apply to these vehicles?



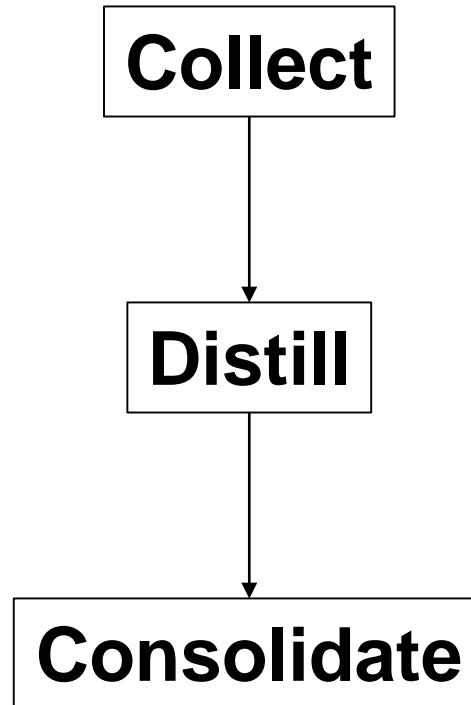
Recap of Oct 18 Meeting

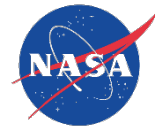
Goals:

- Immediate (1-2 yr): Evaluation of existing metrics & recommendation of which might be useful for design (based on current knowledge)
- Near-term (5 yr): Assess metrics effectiveness for community noise
- Mid-term (10 yr): Research on supplemental metrics
- Far-term (15 yr): Perform community noise studies



Approach to White Paper Development





November 16, 2018 Telecon

Objective: Refine scope areas

Approach:

- Developed template for input
- Each member asked to identify ~ 4 scope areas of interest
- Homework Assignment #1 – fill out template (1 for each scope area)

Result:

- ~ 60 pages of input received



The Template

Your Name:

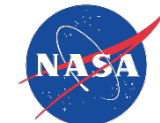
Scope Element: *Choose 1 from the 11 elements identified*

Scope Definition: *Revise the provided scope definition as you feel necessary*

State-Of-The-Art: *Describe the SOTA for this element to the best of your ability. References to supplemental materials would be helpful going forward.*

Gaps/Deficiencies/Barriers: *Identify missing capabilities and/or knowledge needed to raise SOTA to required level for addressing the subgroup goals. As these goals are still being defined, please provide some indication of what goal(s) you are addressing. References to supplemental materials would be helpful going forward.*

Plan to address gaps: *Identify actions required to close gaps including timeframe for doing so. (Immediate < 2 yrs, near-term 5 yr, mid-term 10 yr, far-term 15 yr)*



The Matrix

Member \ Scope	1. Cert Metrics	2. Community Noise	3. Supplemental	4. Vibrations	5. Indoor/Outdoor	6. Health Effects	7. Fleet Noise	8. Eng. Design - SQ	9. Selection criteria	10. Single v multi-event	11. Equal Energy
Bain, Jeremy	x	x					x	x			
Bea, Ray	x	x	x				x				
Begault, Durand		x		m	x	x					x
Boucher, Matt	x		x		x	x					
Christian, Andy								x	x	x	x
Czech, Joe			x		x	x				x	
Davies, Patricia			x			m		x		x	x
Dietrich, Anna											
Downing, Micah	x	x	x						x		
Goldman, Ben	x		x			x	x	m			m
Hastings, Arron		x	x							x	x
Hodgdon, Kathy											
Ilario, Carlos											
Josephson, David	x	x					x			x	x
Kirby, Michelle											
Krishnamurthy, Sidd											
Maldonado, Ana Luisa	x	x				x					
Martinez, Antonio		x	x				x			x	
Miller, Chris											
Morris, Steve	x				x	x		x			
Rafaelof, Menachem								x	x	x	x
Rizzi, Steve		x					x	x		x	
Schlittenlacher, Josef											
Sizov, Natalia		x				x					
Vigeant, Michelle					x	x				x	x
Woodcock, Roland	x	x		x	x						

Key

x = agreed to do

m = will possibly do



February 13, 2019 Telecon

Objective: Distill scope areas into 1-2 pages each

Approach:

- Asked members for preferences (1, 2, 3) for scope area
- Assigned two members (distillers) to each scope area based on background, preferences, and balancing the workload
- Homework #2 – Distill by next telecon. Distillers encouraged to reach out to contributors in their area as needed.

Result:

- ~ 30 pages of distilled input received



March 20, 2019 Telecon

Objective: Map each scope area plans to UNWG high level goals

Approach:

- Each member to review distillation – minimally in areas they contributed to. Reclama as needed.
- Homework #3 – Distillers map scope area plans to high level goals. Objective here is to identify disconnects between subgroup activity and those of UNWG as a whole. (Due April 5)
- Homework #4 – All members review entire HW #3 submission by April 11 meeting. Identify possible overlap between scope areas.

Result of HW #3:

- ~ 30 pages of distilled input received with map to high level goals



This Meeting

Objectives:

- Consolidation of 11 scope areas into a fewer number (3-4 TBD)
 - Should serve as basis for subgroup 3 white paper input
- Identify activities in immediate term (< 2 yrs) that subgroup can start working.
 - Separate activity from white paper. This begins the doing part.

A big thank you to subgroup 3 members for your continued interest and participation in subgroup 3 activities.