Accelerating the future of aerospace

eVTOL noise assessment and public/passenger acceptability

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The challenge of acceptance

Conditions for successful introduction of Innovative Air Mobility (IAM)

- **Public acceptance**
  - Noise
  - Visual annoyance
  - Attitude towards drones
  - Safety risks
  - …
- **Passenger acceptance**
  - Willingness to use / to pay
  - Travel experience (cabin comfort)

Perception studies

How can you do a perception study for drones?

- Virtual Community Noise simulator (**VCNS**)

Show multiple environments

Test multiple people in a controlled environment

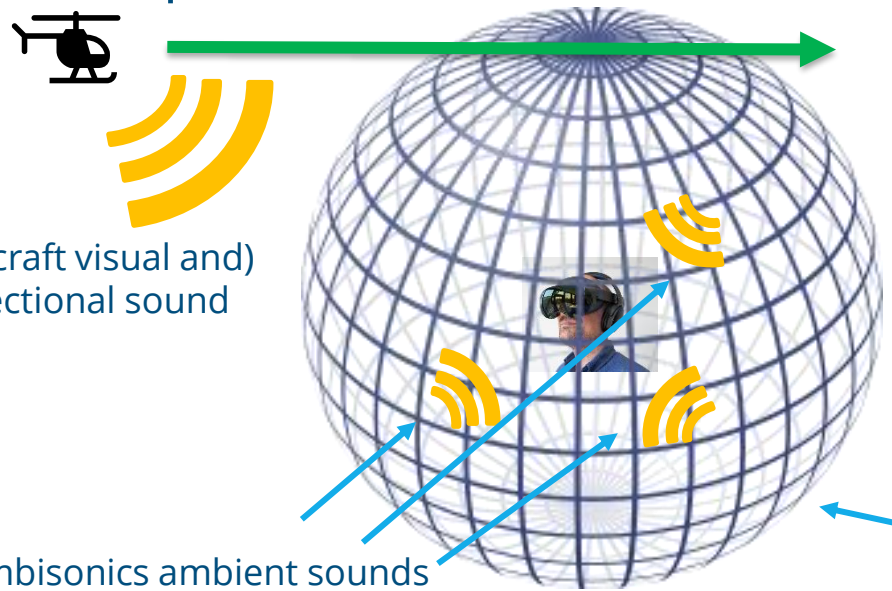
Offer a realistic setting without flying ‘real’ eVTOLs

The challenge of public acceptance

We use the VCNS to communicate changes in:

- air routes/procedures
- **new or other aircraft types**
- local changes to community infrastructure

The simulation of Urban Air Mobility concepts



(Aircraft visual and)
Directional sound

Ambisonics ambient sounds

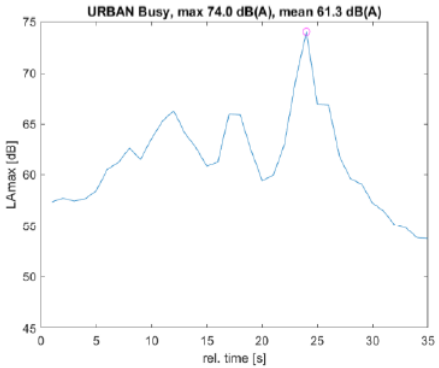
360 video projected on sphere

Factors influencing perception of aircraft sounds

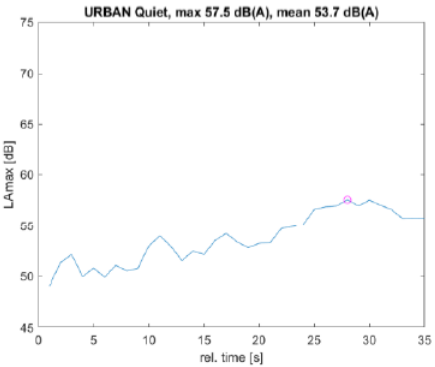
- Environment
- Visual presentation
- Different familiar vehicles
- Operation

Busy (urban) environment

Ambient sound level



Quiet (urban) environment

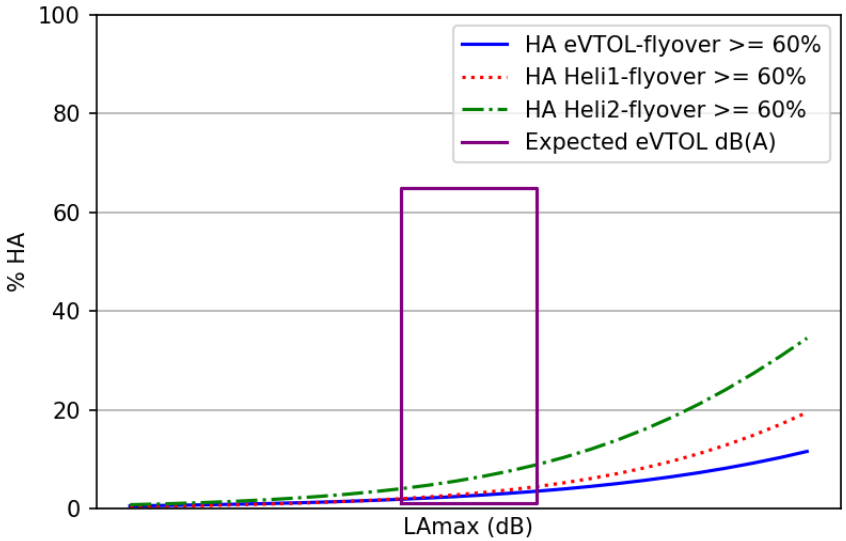


Case study – perception study in the USA

- Auralized and recorded sound from different aircraft (eVTOL, helicopter, Turboprop)
- Three cities each with quieter and busier locations (total 6 locations)
  - New York
  - Orlando
  - San Francisco
- Between 36 and 40 persons tested per city

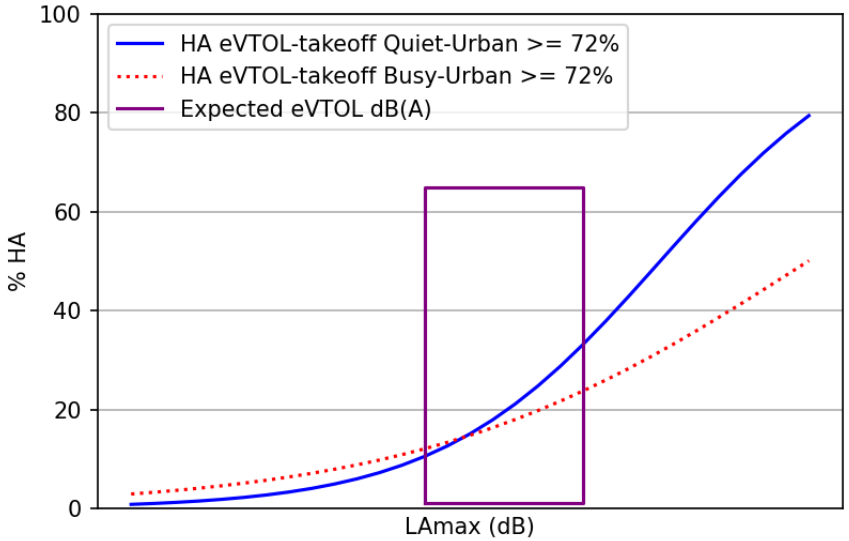
Case study – perception study in the USA

Flyover comparison between eVTOL and other vehicles at same sound level



Case study – perception study in the USA

Effect of quieter or busier urban environment on eVTOL take-offs

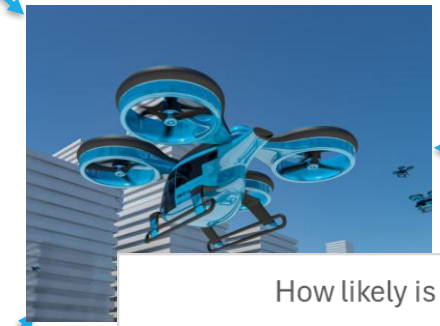


Willingness to use eVTOLs?

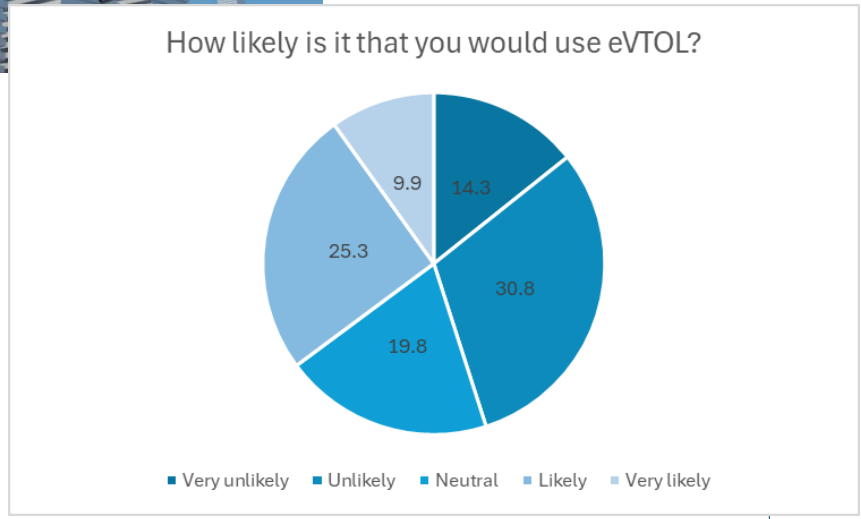
Unified Theory of Acceptance and Use of Technology

Questionnaire

- Performance expectancy
- Effort expectancy
- Hedonic motivation
- Price expectation
- Perceived unsafety
- Social image



Willingness to use



N=63

WTU eVTOL

Fast travelling
Comfort
Sustainability
0.22
0.4
0.66
Performance expectancy

Waiting times
Flexible travel times
0.93
0.12
Effort expectancy

Excitement
Enjoyment
0.04
1.03
Hedonic motivation

Comparable prices
1.00
Price expectation

Speed
Technology failure
Absence of staff
Weather complications
Error
0.79
-0.84
0.52
-0.84
0.29
Perceived unsafety

Admiration by peers
1.00
Social image

0.34*
0.14
0.30**
0.13
-0.17
-0.06

Behavioral intention

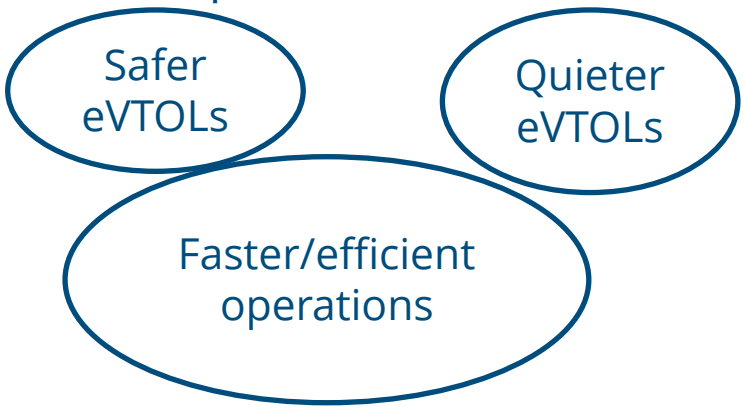
Willingness to use

R^2 = 60.4%

** p< .01
* p<.05

Future steps in the implementation of IAM

- Successful engineering is important



- But there is always a human in the loop that needs to accept IAM in their environment

Thank you for your attention!

Accelerating the future of aerospace

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A taste of the VCNS experience