



AVIATION TWIN TRANSITION CLUSTER

A EUROPEAN INITIATIVE FOR A SUSTAINABLE FUTURE

RefMap Clustering Event 2025

Advancing Sustainable Aviation & Urban Air Mobility

Progress and Challenges in Noise Modelling and Assessment of Innovative Air Mobility

Prof. Antonio J Torija, University of Salford



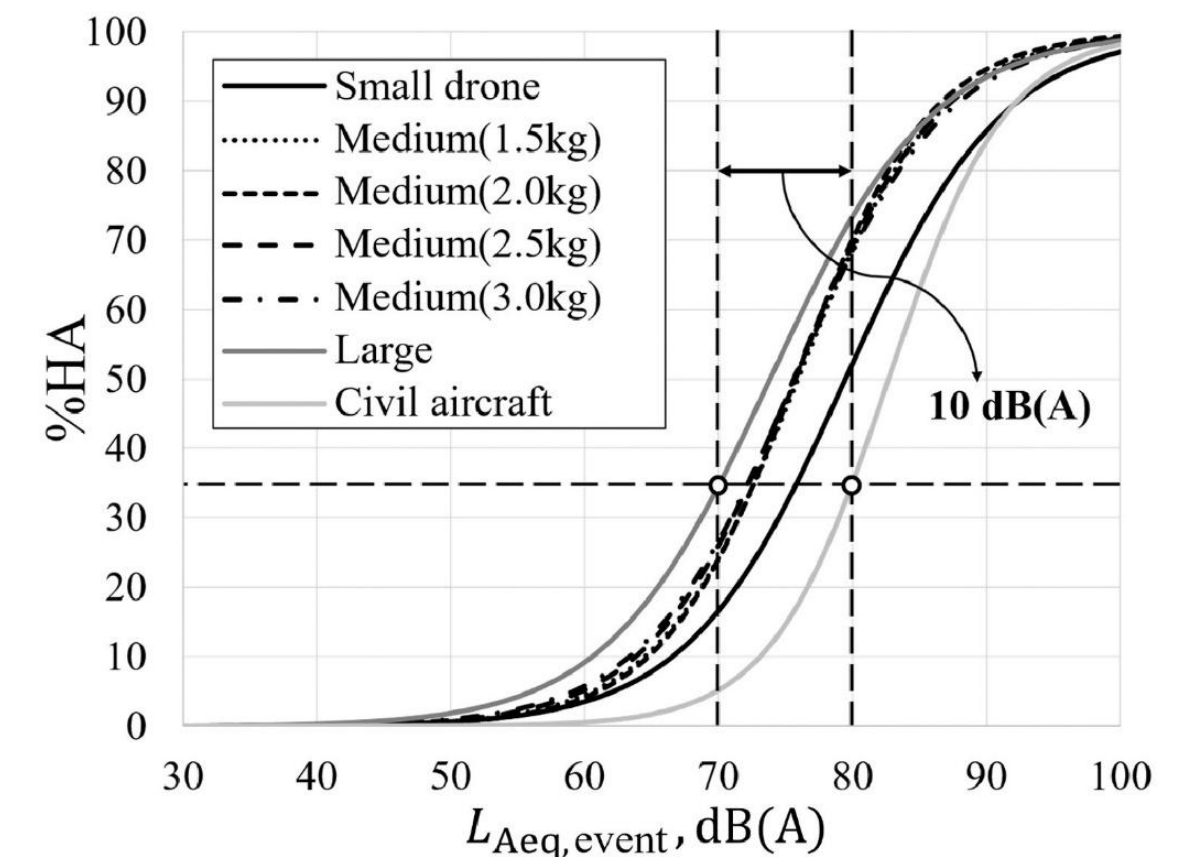
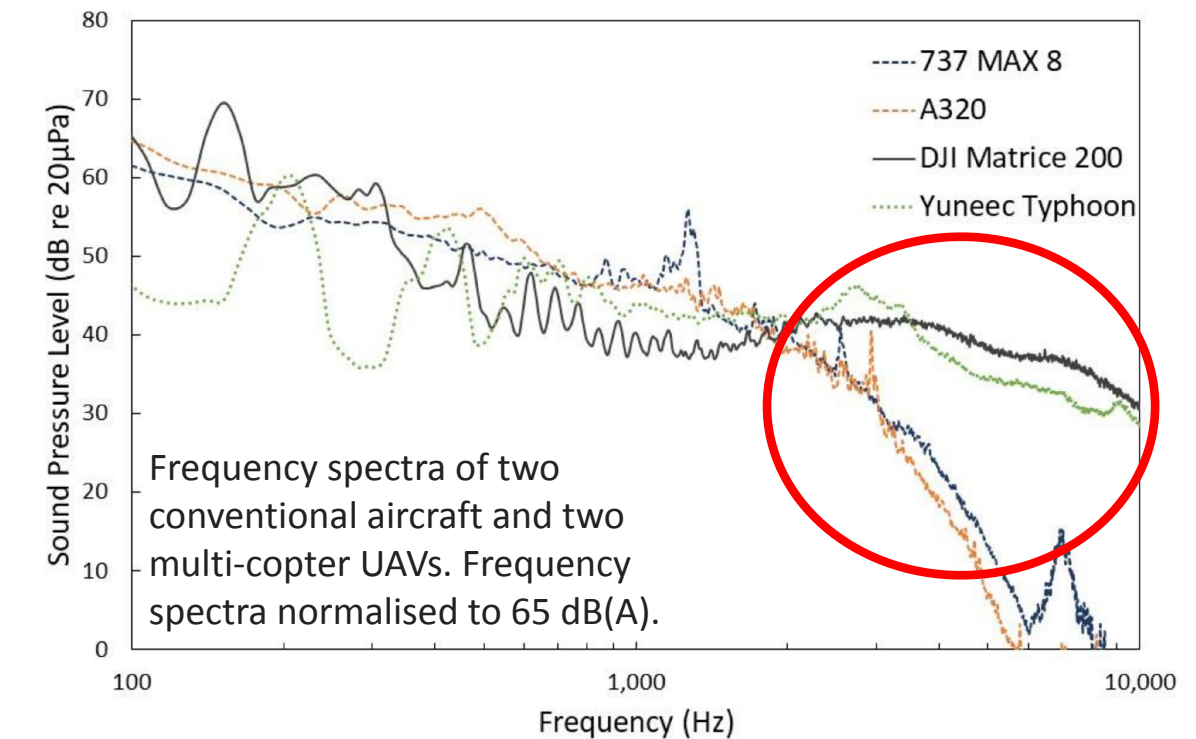
University of
Salford
MANCHESTER



29–30 July 2025, Athens, Greece

IAM Noise Signature

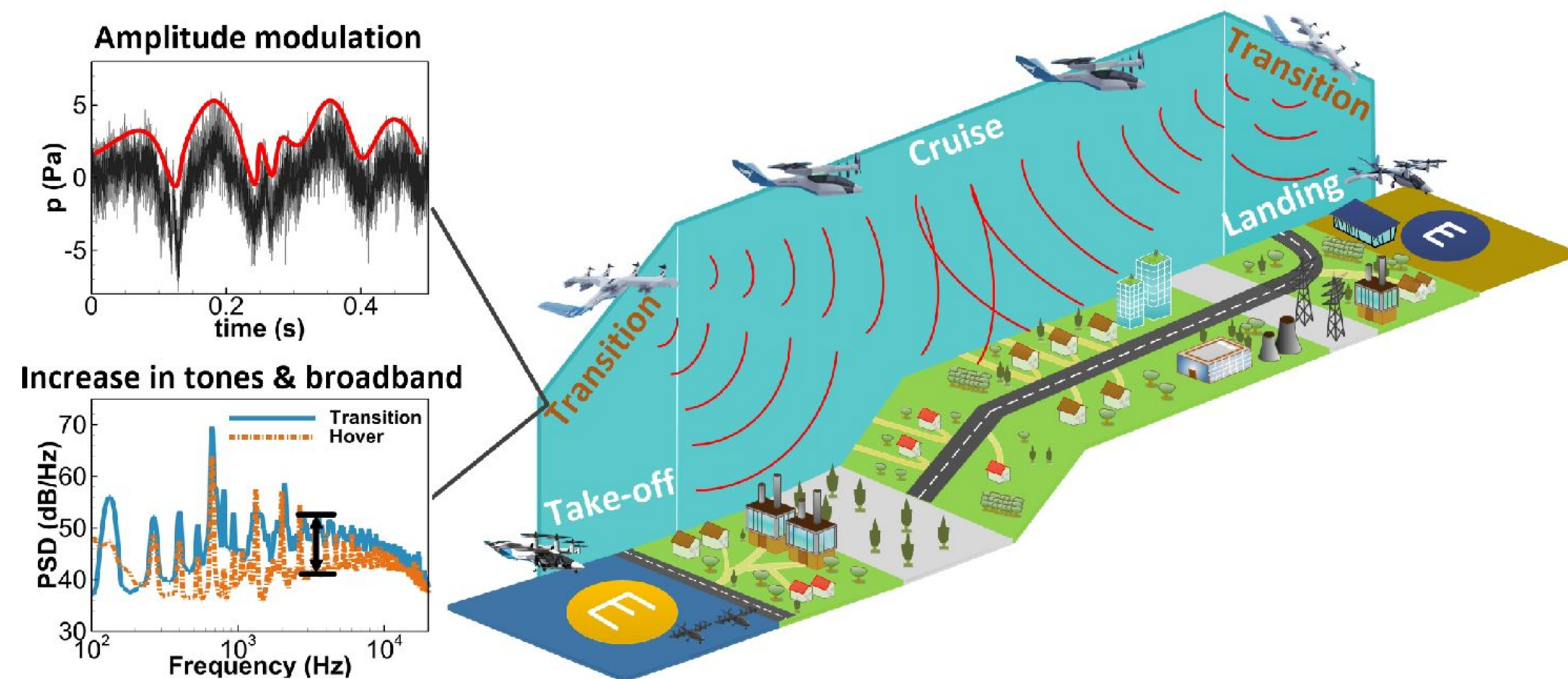
- IAM noise perceived as more annoying than conventional aircraft/rotorcraft (same sound levels)
- The noise signature if IAM is rather complex, and doesn't resemble conventional aircraft or rotorcraft
 - Highly tonal (and complex tonality)
 - Significant content in high frequencies
 - Unsteady noise emission (changes over time)



Gwak et al., 2020

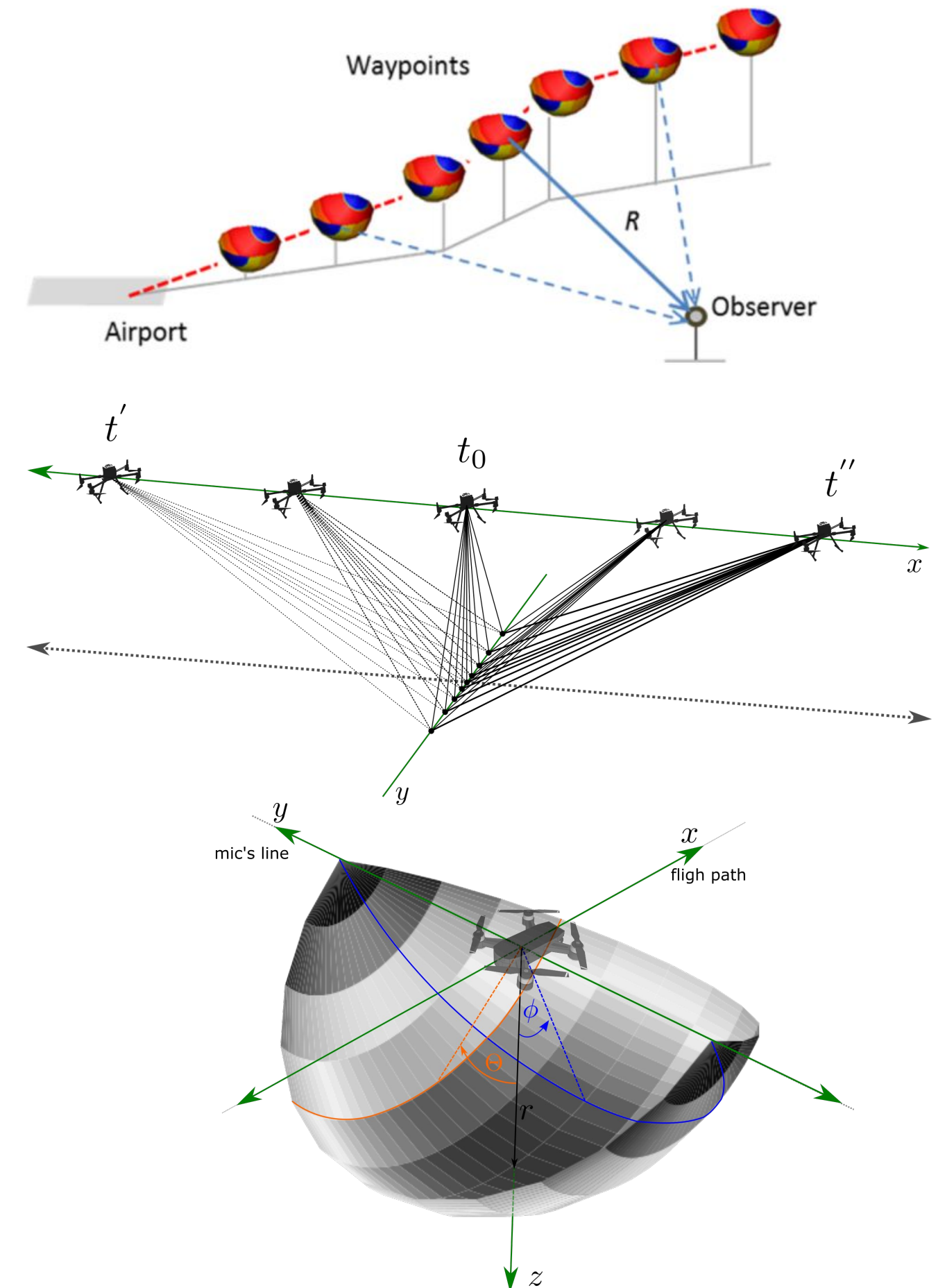
IAM Operating Conditions

- Unconventional operating conditions (e.g., hover-to-forward flight transition)
- Operating in urbanised environments, and closer to people
- Challenge of unsteady and loud operating conditions near ground.

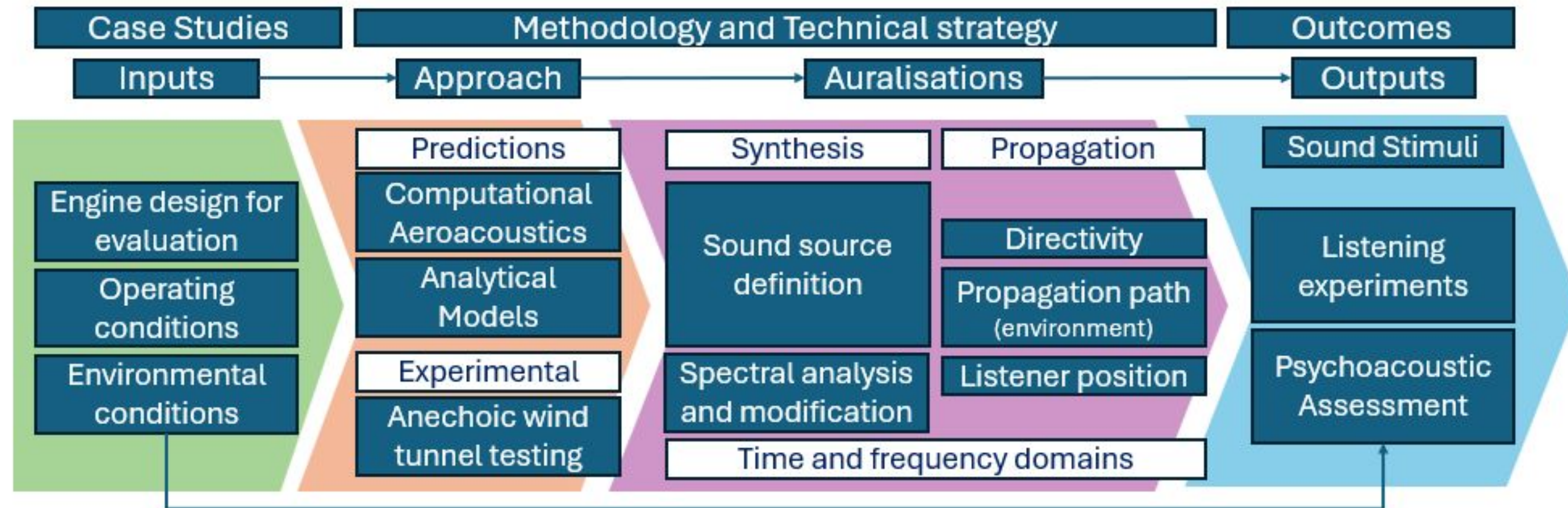


IAM Noise Hemispheres

- Noise hemispheres needed to capture amplitude, frequency and directionality information.
- Aligned to EASA NORA2 model
- Challenge:
 - Complex noise field measurements
 - Noise prediction (models yet to be developed or highly complex)

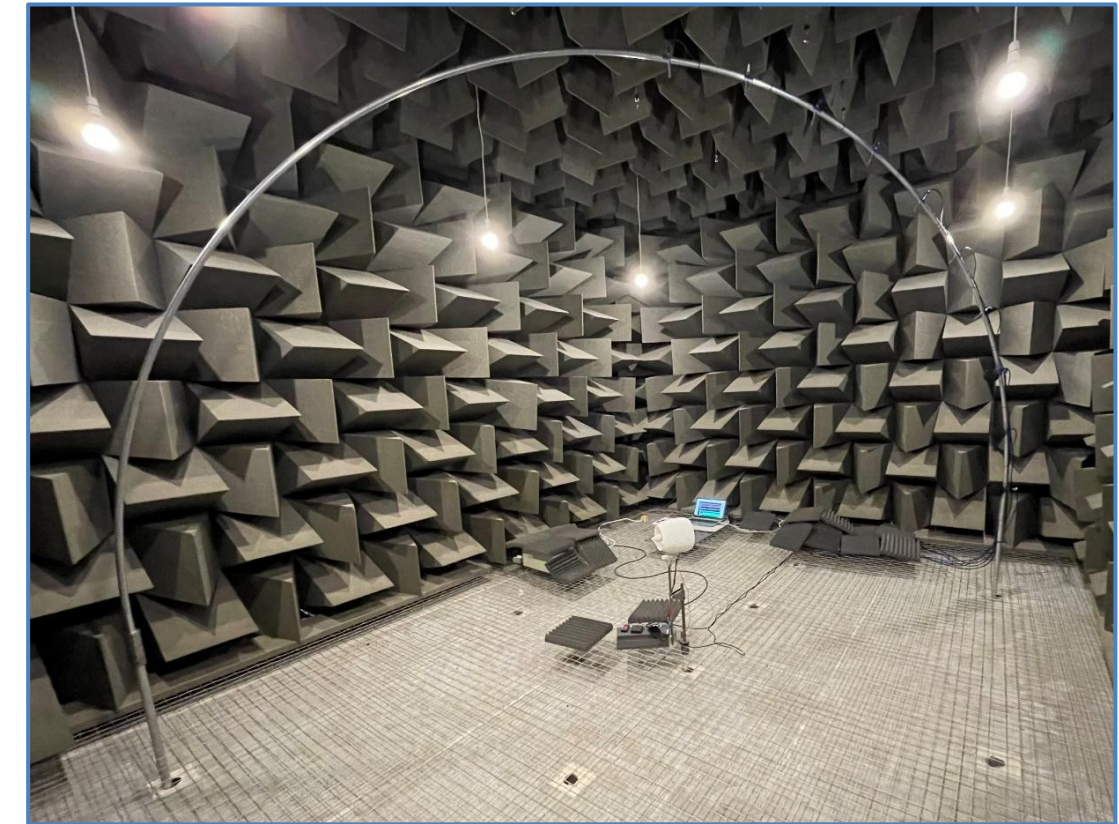


Salford's IAM Noise Framework

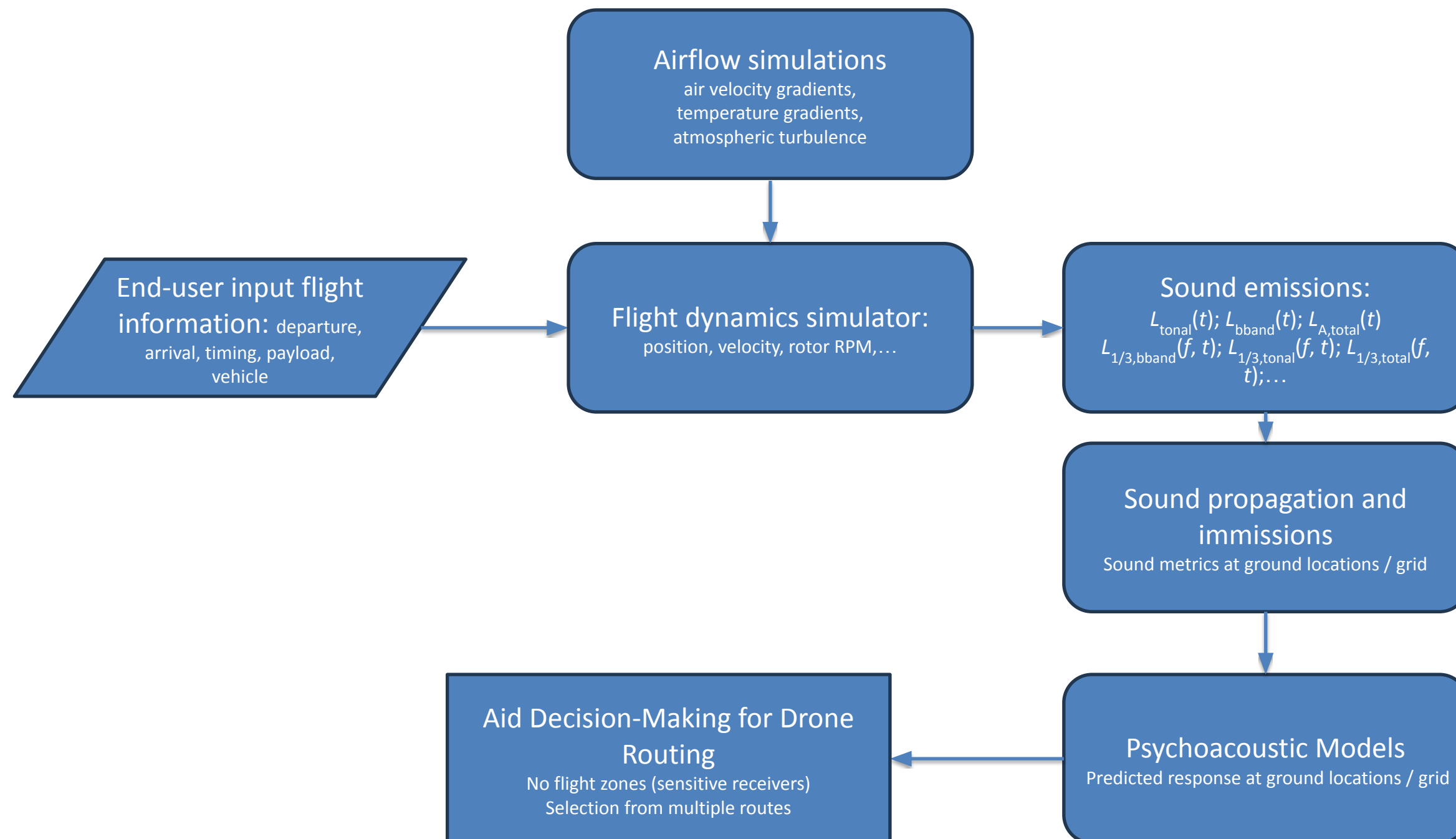


Salford's Acoustic Laboratories

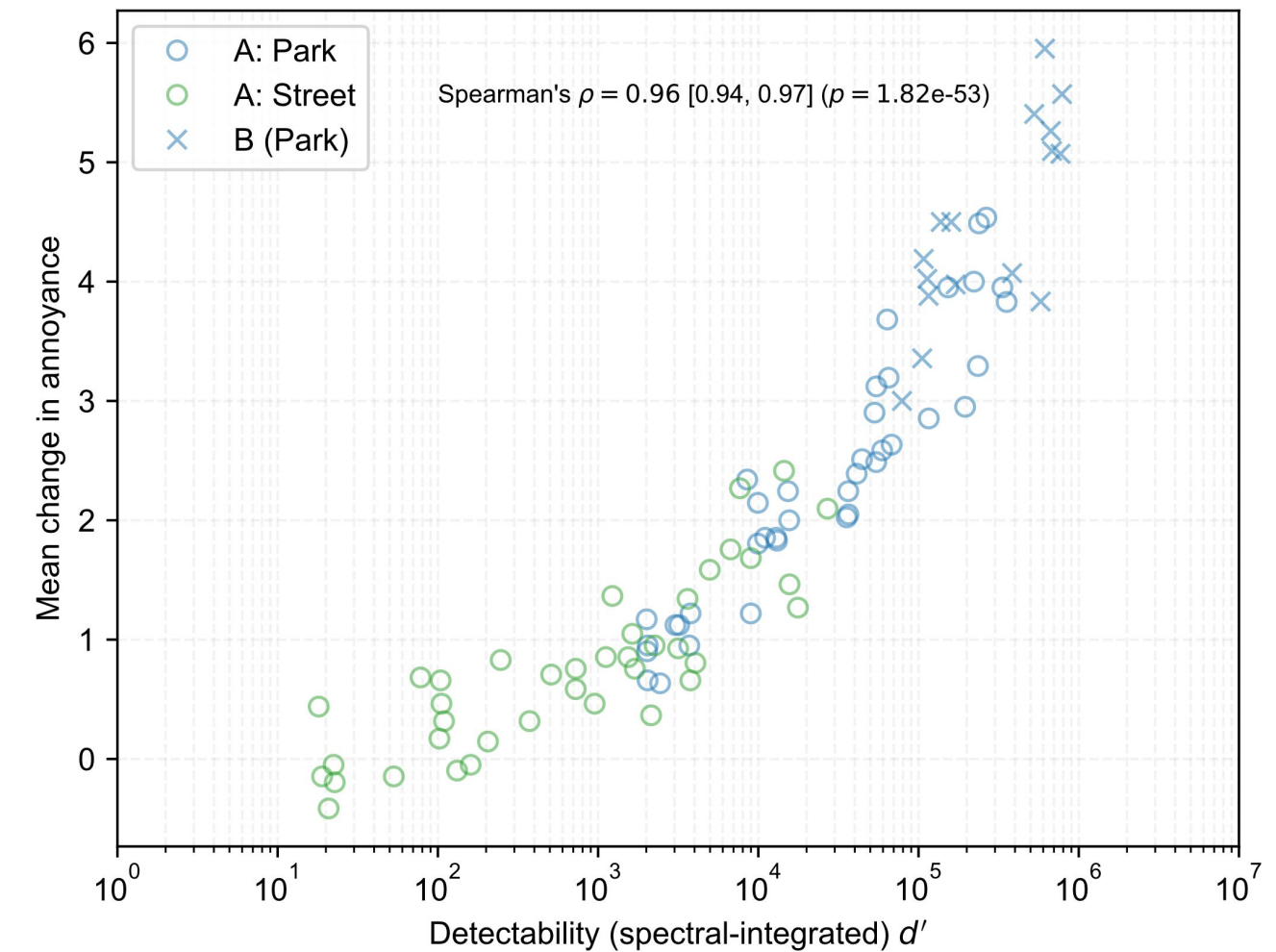
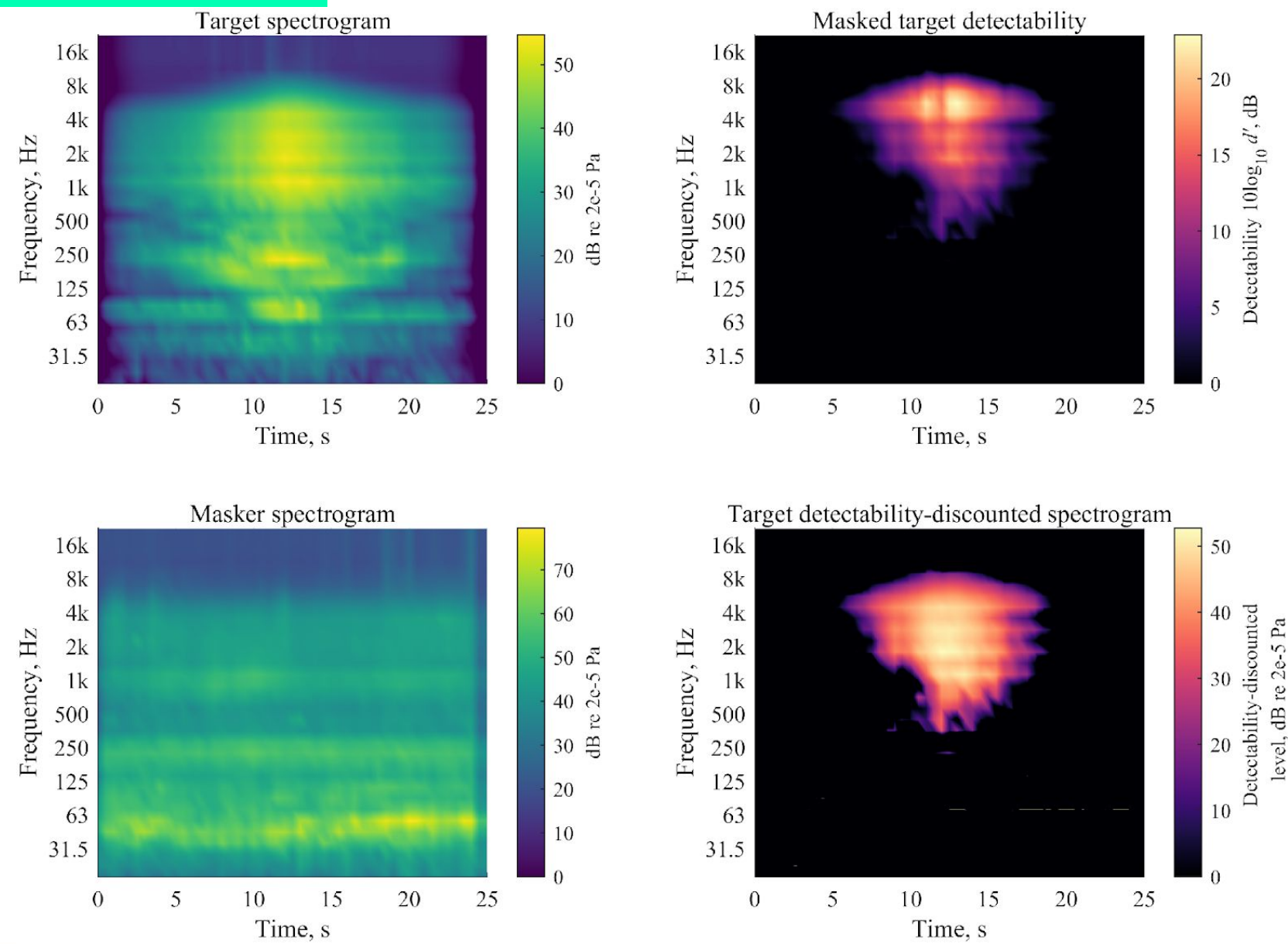
- Leading research on IAM noise
 - Aeroacoustics / Noise Modelling
 - Psychoacoustics



Salford's Contributions – RefMap



Salford's Contributions – RefMap

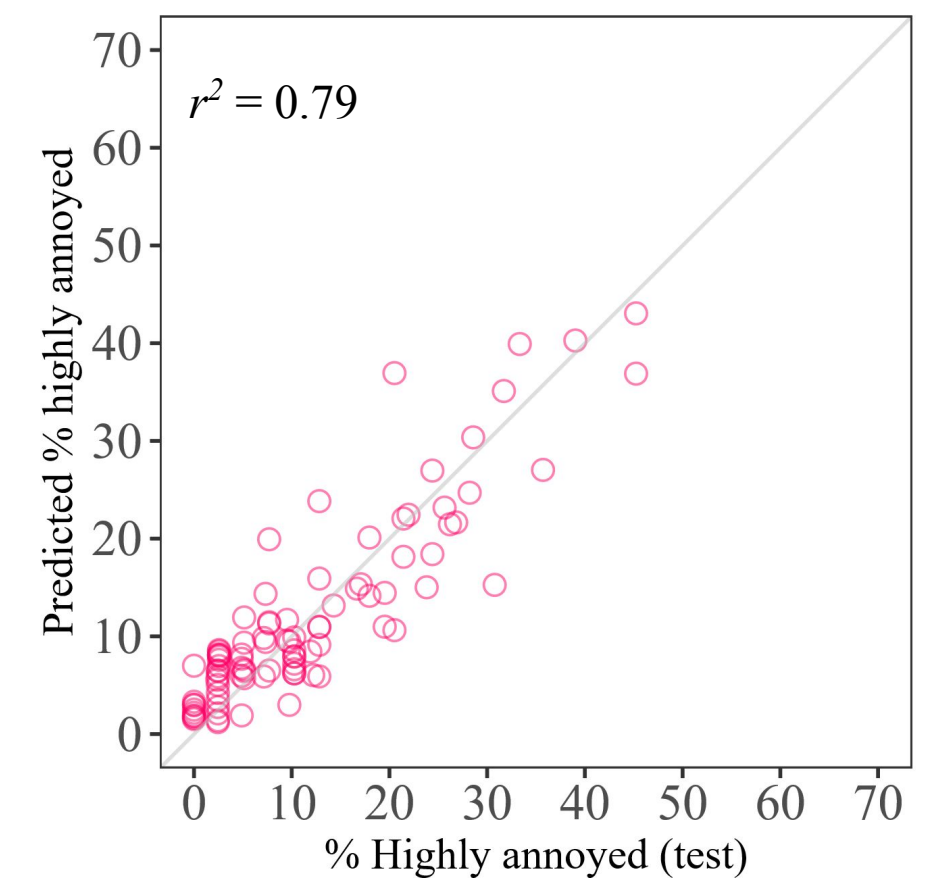
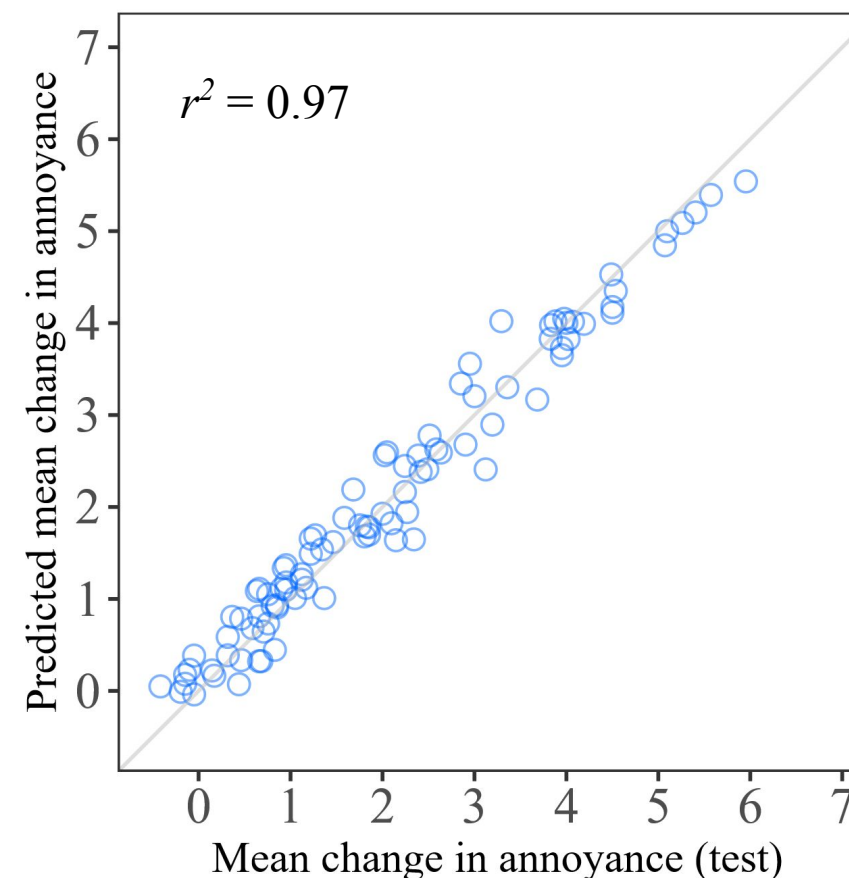


Salford's Contributions – RefMap

Statistical models* for change in annoyance (with UAS vs without), and %highly annoyed based on key variables:

- relative sound level ΔL_{AE} or detectability d'
- Sharpness S (high frequency balance)
- Tonal loudness T_N (hum / whine / buzz)
- (interaction $S \times T_N$)
- Flight events quantity

*Generalised estimating equations solution for generalised linear models



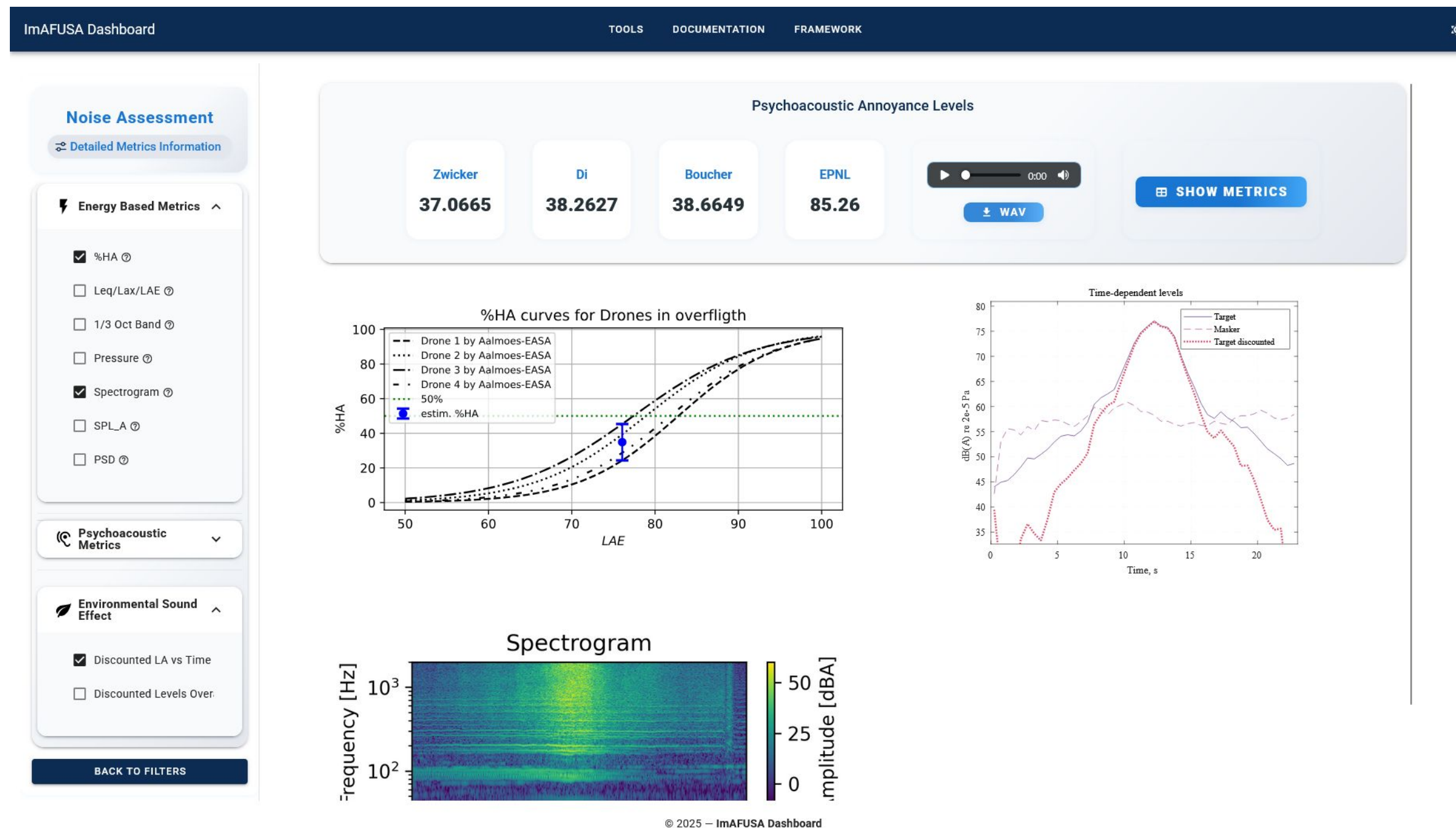
Salford's Contributions – ImAFUSA

Athens - Egaleo Park

- 110 participants (5x groups)
 - 3x altitudes (10 m / 20 m / 30 m)
- DJI Mavic 3 drone (1 kg)
- 2x soundscape 'zones'
 - CityTraffic
 - GreenSpace
- Take-off / flyby / landing
- Soundwalk route reversed for two groups



Salford's Contributions – ImAFUSA



**thank you
for your attention!**

Prof. Antonio J Torija Martinez
A.J.TorijaMartinez@salford.ac.uk

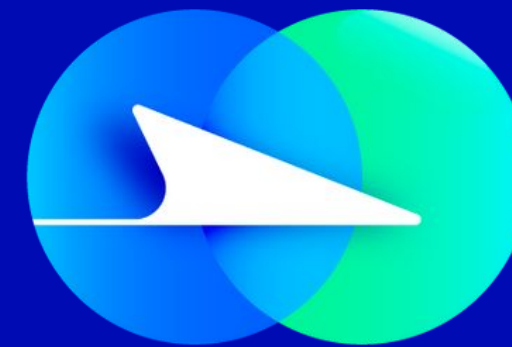


University of
Salford
MANCHESTER

ImAFUSA

For more information:
www.refmap.eu

**Q&A /
Closing**





AVIATION TWIN TRANSITION CLUSTER