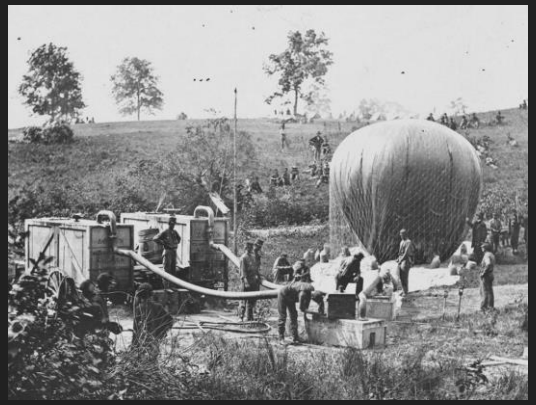
eVTOL Analysis Tools & Frameworks

January 19, 2018

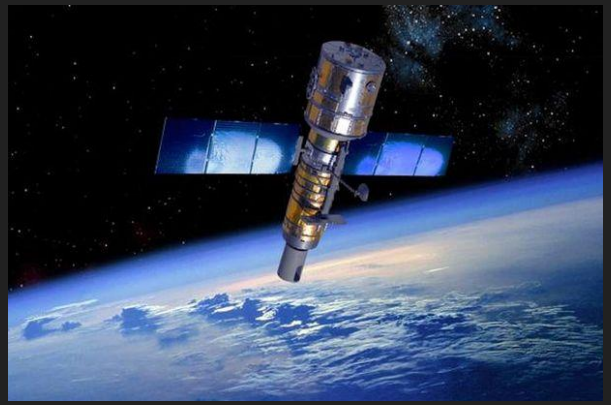
Rob McDonald, Ph.D.
Head of Vehicle Engineering

What is Transformational Flight?

The use of flight to accomplish missions not previously possible.




U.S. AIR FORCE

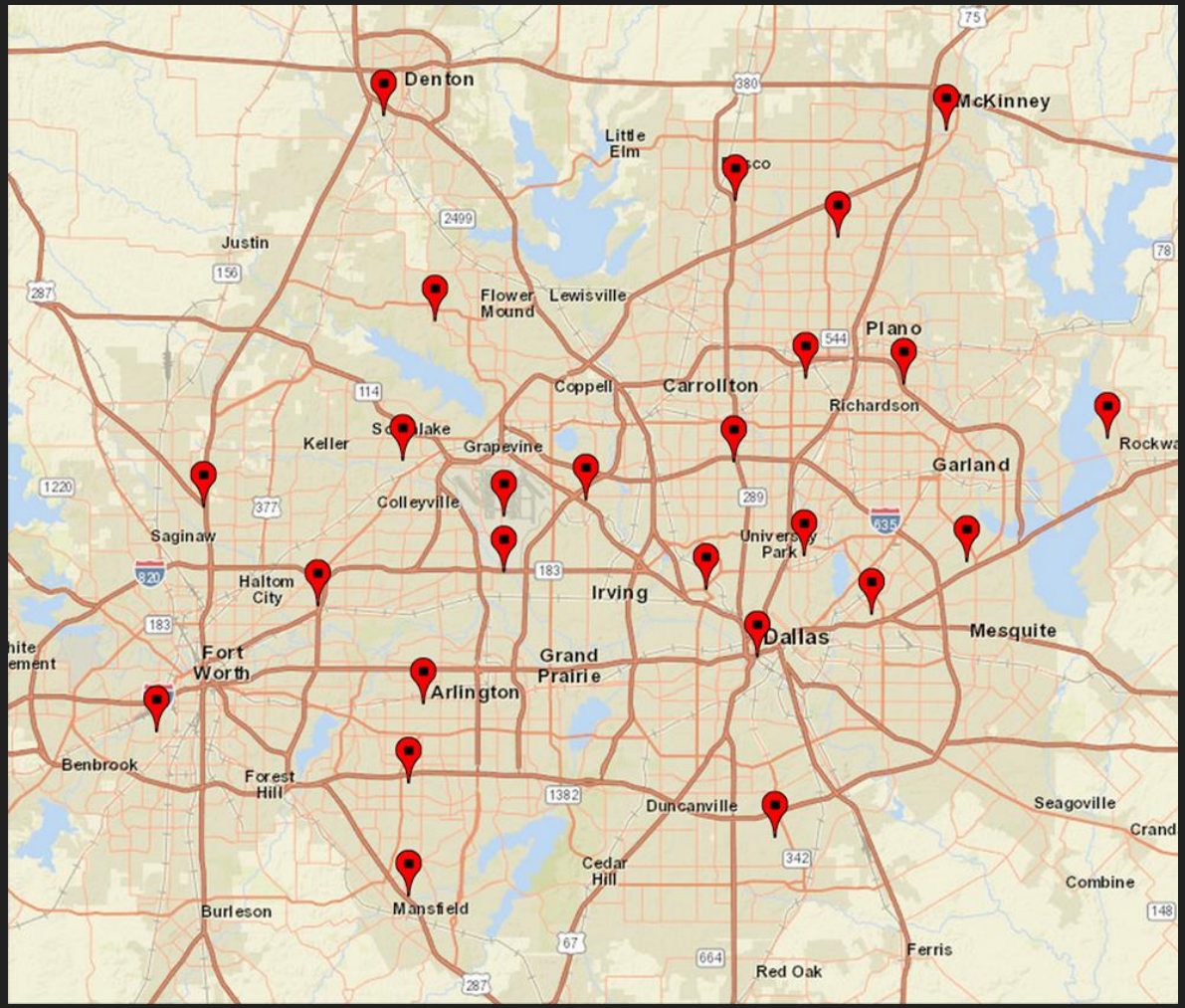


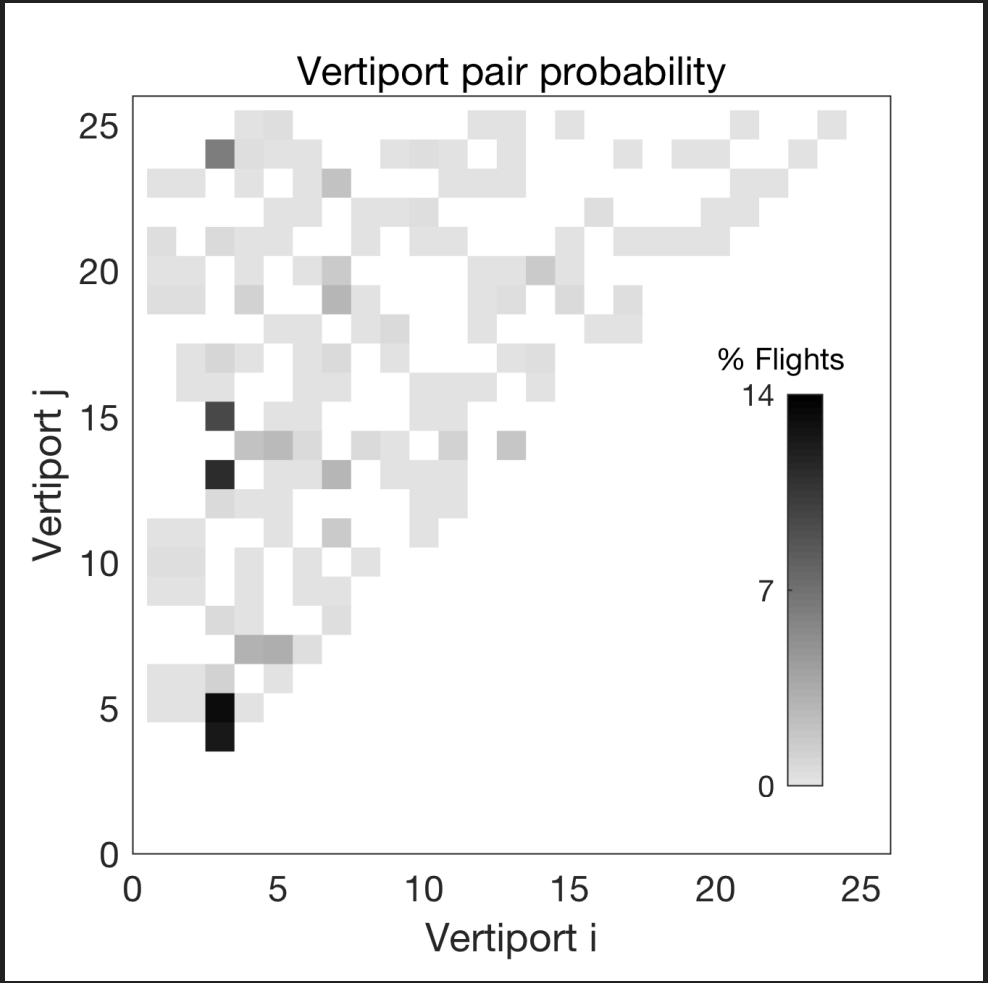

N432TV

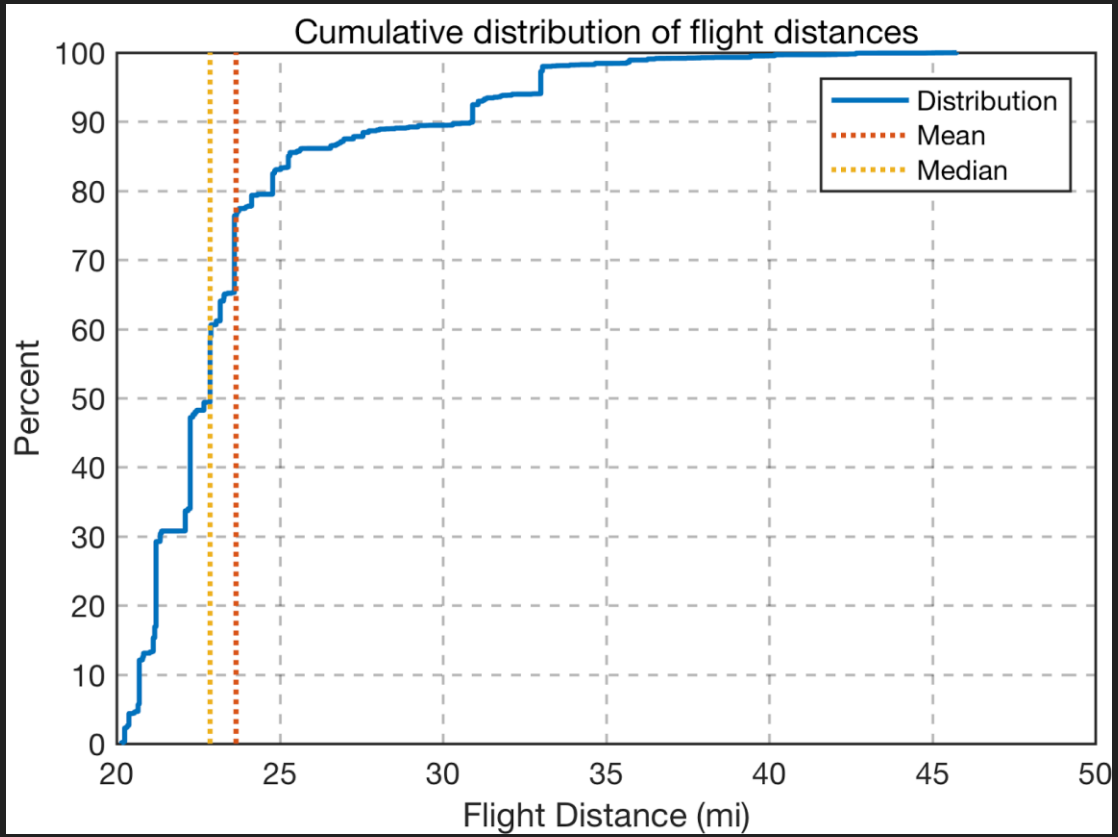

G
ZM

What Technology Enabled These Transformational Vehicles?

Electrification.


Denton
McKinney
Little Elm
Justin
Flower Mound
Lewisville
Plano
Coppell
Carrollton
Richardson
Keller
Grapevine
Garland
Colleyville
Saginaw
Haltom City
Irving
Dallas
Mesquite
Fort Worth
Grand Prairie
Arlington
Benbrook
Forest Hill
Duncanville
Seagoville
Cedar Hill
Combine
Burleson
Mansfield
Ferris
Red Oak
75
380
2499
78
287
156
544
114
1220
377
289
820
183
1382
342
67
664
148


Vertiport pair probability
Vertiport j
Vertiport i
0
5
10
15
20
25
% Flights
14
7
0


Cumulative distribution of flight distances
Distribution
Mean
Median
Percent
Flight Distance (mi)
0
10
20
30
40
50
60
70
80
90
100
20
25
30
35
40
45
50

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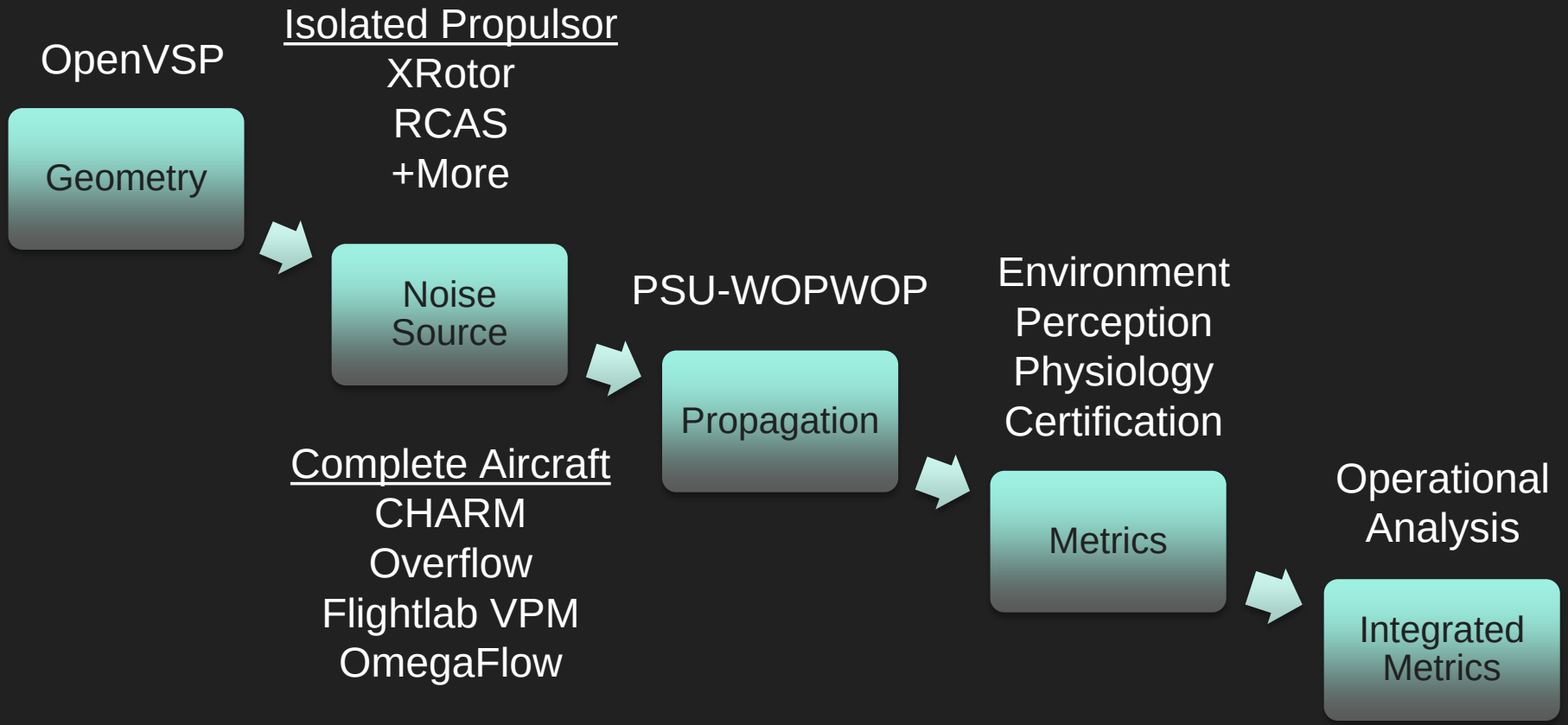
UBER Vehicle Engineering Role

- Requirements
- Assess Vehicle Concepts
- Propose Vehicle Concepts
- Tech Development
- Tool Development

Identified eVTOL Analysis Tool Gaps

- Energetics Mission- & Point- Performance
  - Improved component/subsystem models for NDARC
  - Provide performance/acoustic models UBER’s Network Simulation
- Early design aero & acoustics
  - Appropriate noise metrics
  - Propulsor design for performance and noise
  - Configuration aerodynamics and noise
- Configuration suitability
  - Transition, Control, Balance & Redundancy
- Weights & Structures
  - Conceptual design appropriate weight models
  - Many rotors, Articulation, Composites, Small scale

Variable Fidelity Acoustic Modeling



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