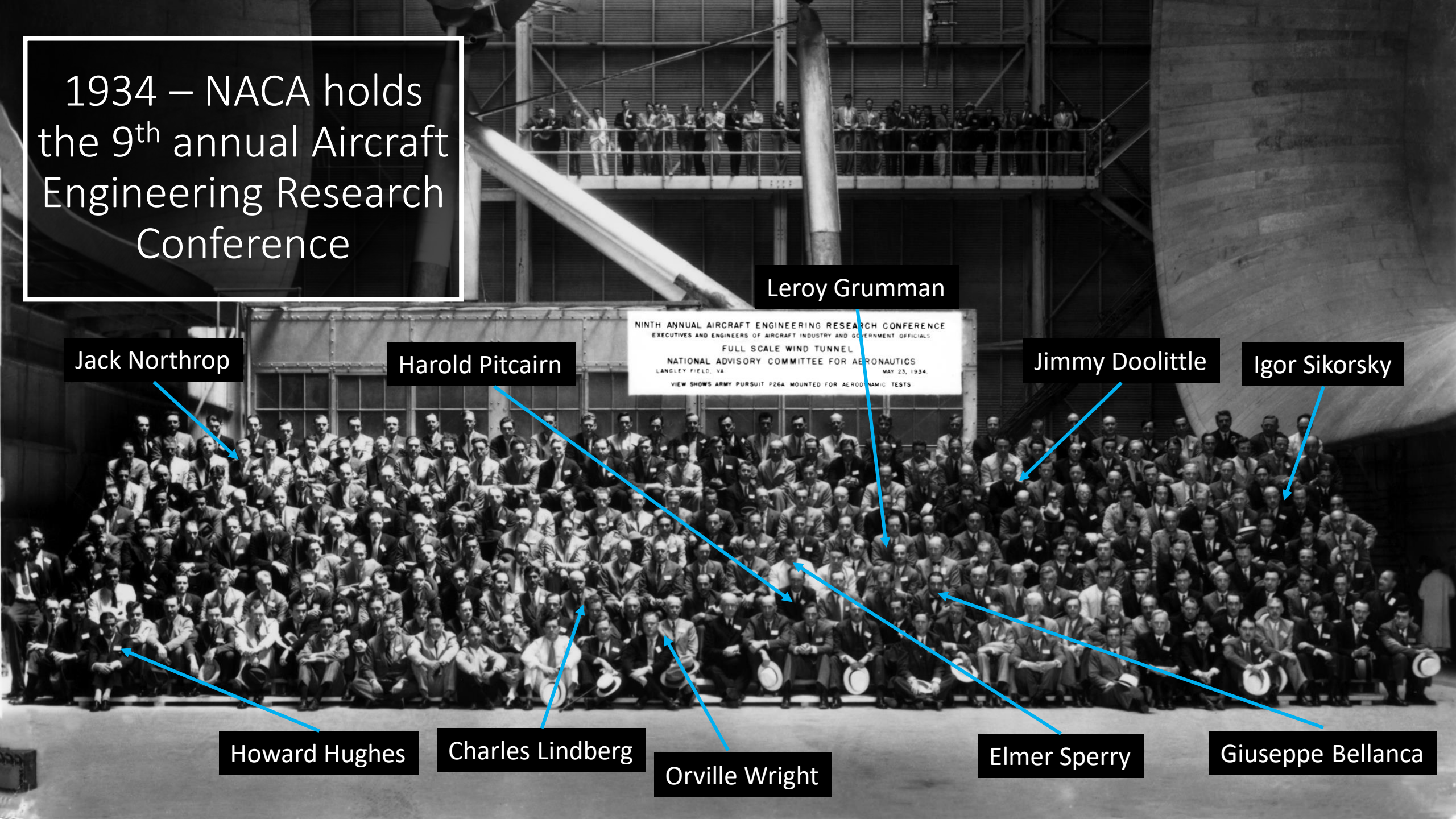
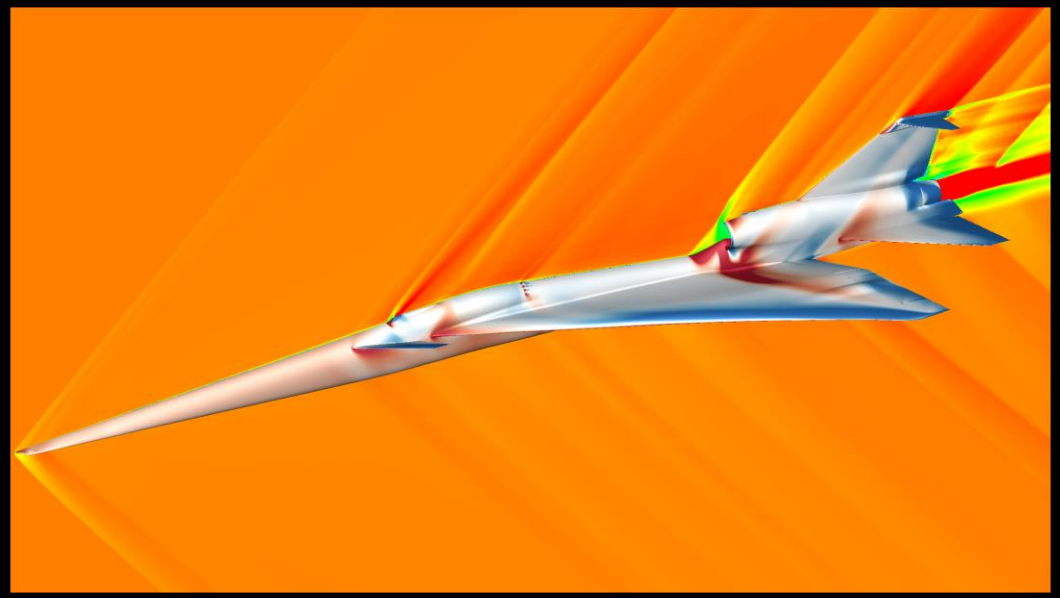
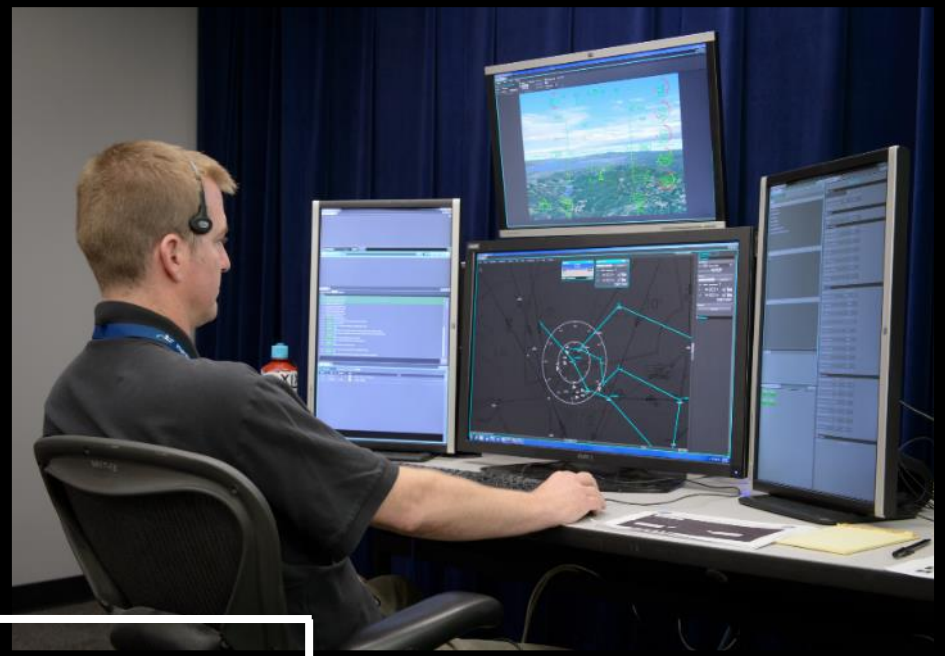
ADVANCED AIR MOBILITY
ACADEMY
NASA
www.nasa.gov

1934 – NACA holds the 9th annual Aircraft Engineering Research Conference



The First “A” in NASA is
AERONAUTICS





X-1E

Michael Vincent

ASSOCIATE PROJECT MANAGER—
SYSTEM WIDE SAFETY PROJECT

The Associate Project Manager's job is to manage, plan, and advocate for the technical work of the researchers.

Education

Wichita State University

- Bachelor of Arts in Psychology

Embry-Riddle Aeronautical University

- Master of Science in Human Factors and Systems

Personal

Hometown: Wichita, Kansas

Interests: Aviation, photography, kayaking

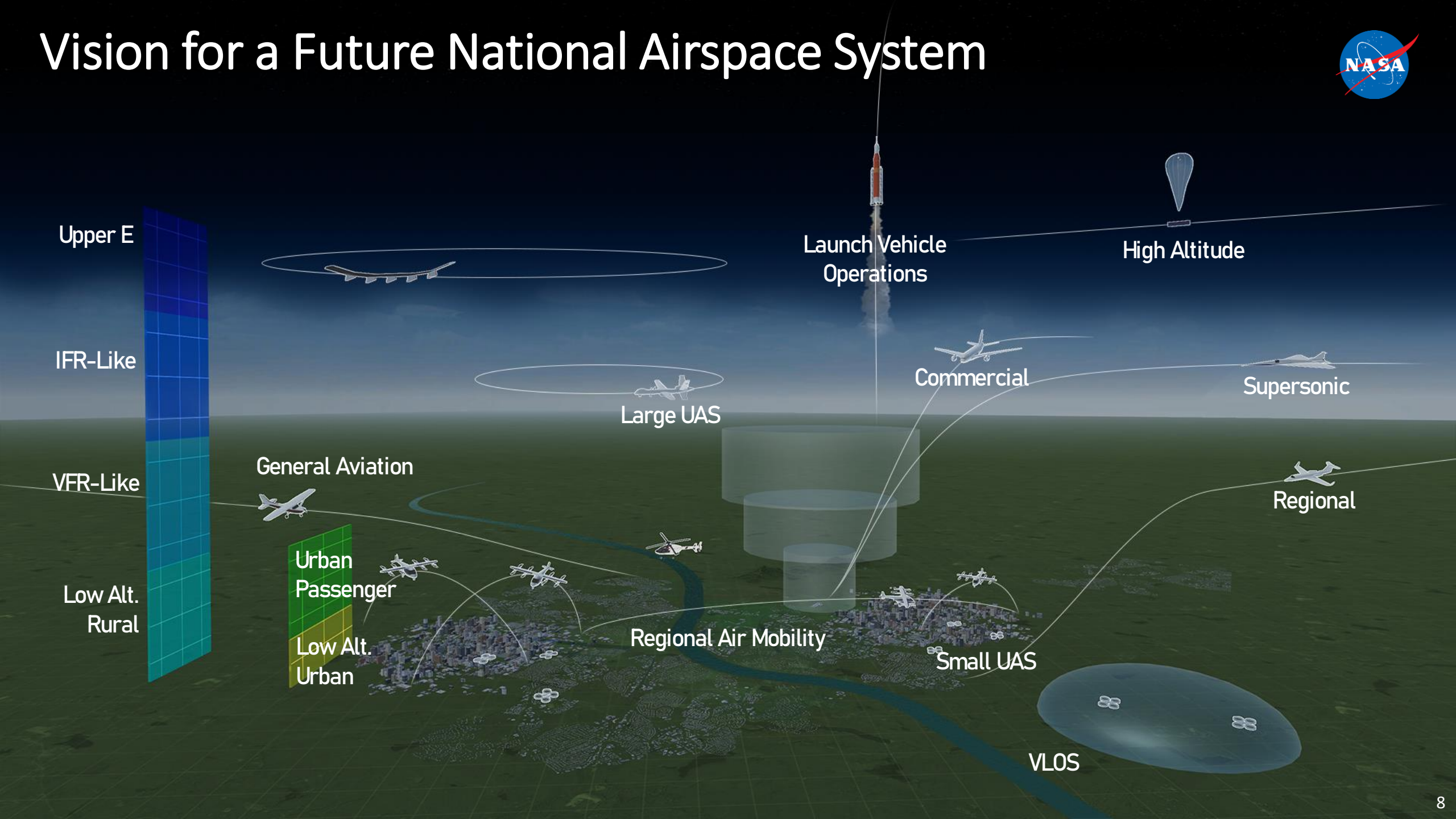
Fun Fact

As an intern I lived and worked in the Czech Republic.

Block 50 Ground Control St
Demonstrator Version
NASA
FLYING T (Pvt)
Westminster
Valdasta
See NOTAMs/Directory
for Class D eff hrs
Merit
SHORT STOP
Kingston
Farmersville
LAVON

Advanced Air Mobility

Vision for a Future National Airspace System



Advanced Air Mobility (AAM) Mission

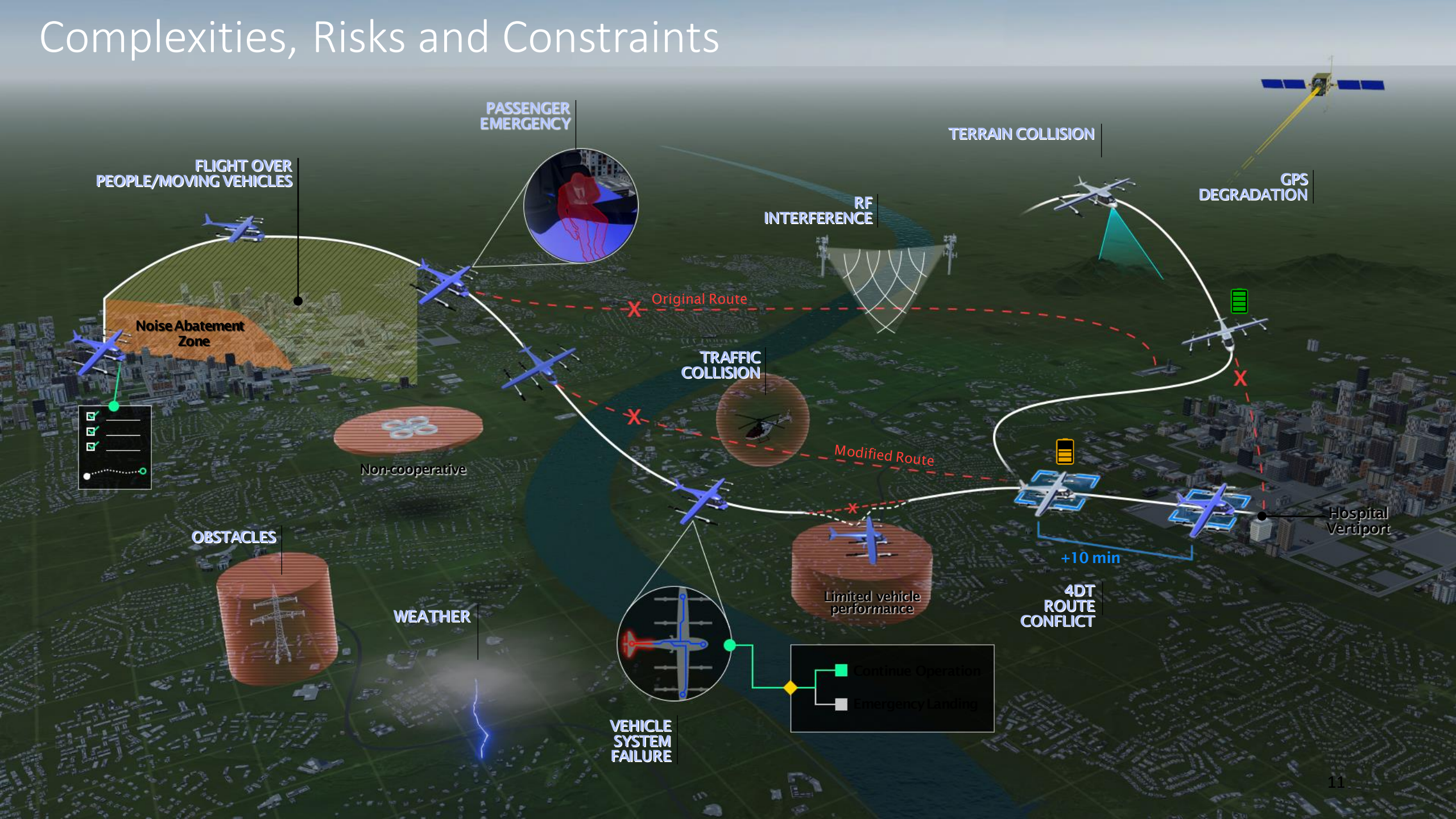
UAM Maturity Levels (UML)

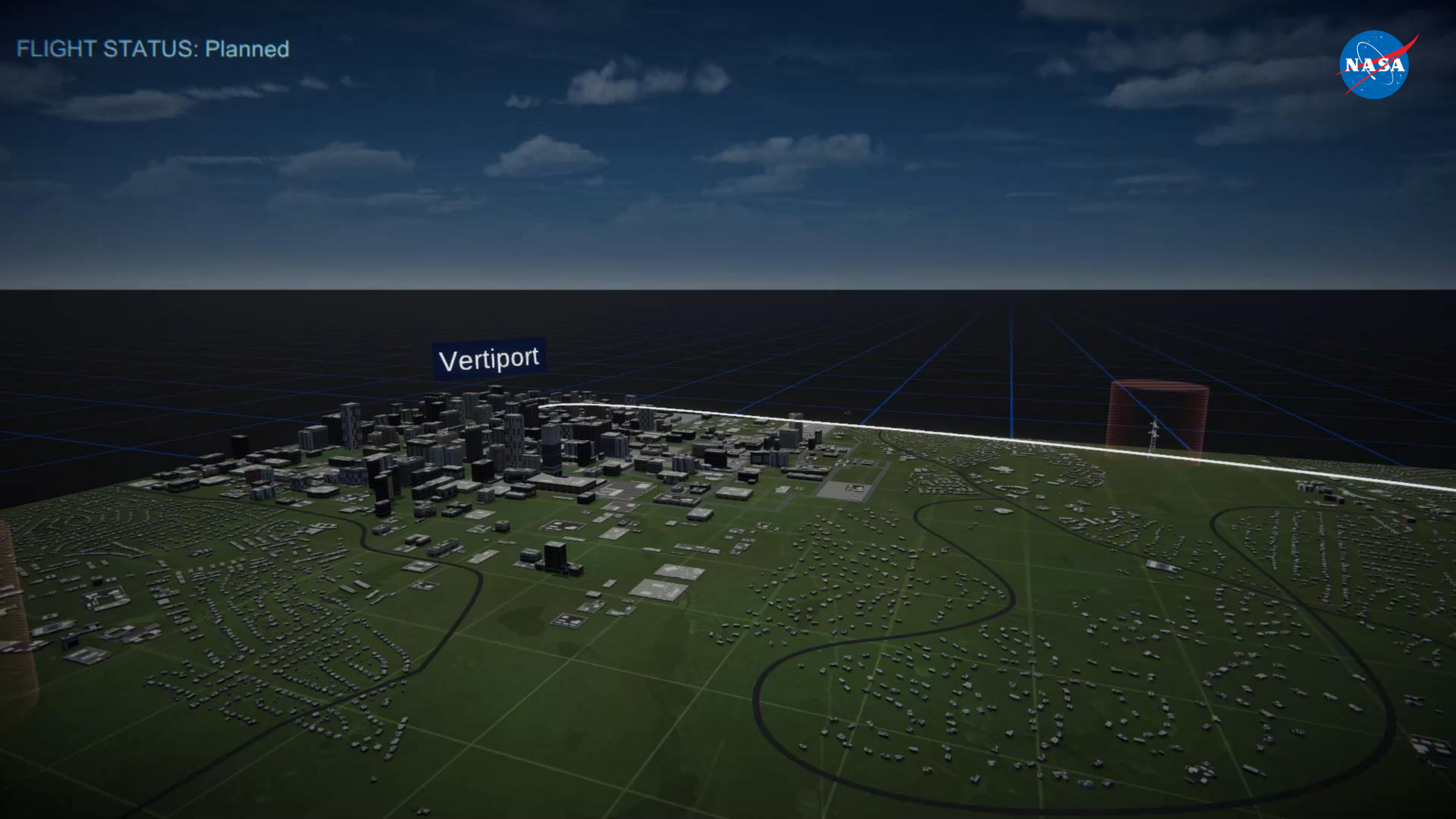
- UML-4 Medium Density/Complexity, Collaborative and responsible, automated systems
- UML-3 Low Density, Medium Complexity, Comprehensive safety assurance automation
- UML-2 Low Density/Complexity, Assistive automation
- UML-1 Conforming prototypes

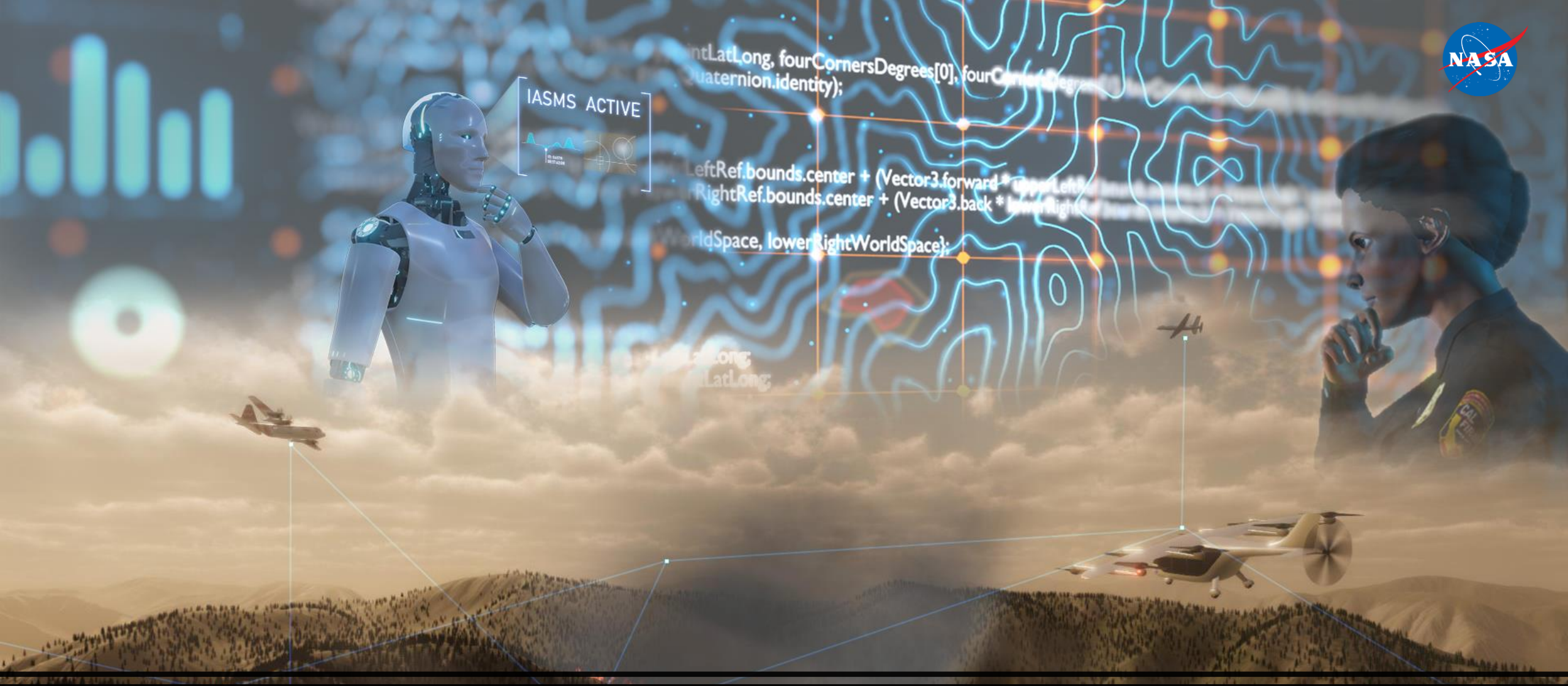
Safe, sustainable, affordable, and accessible aviation for transformational local and intraregional missions

Public Good

Complexities, Risks and Constraints




FLIGHT STATUS: Planned
Vertiport

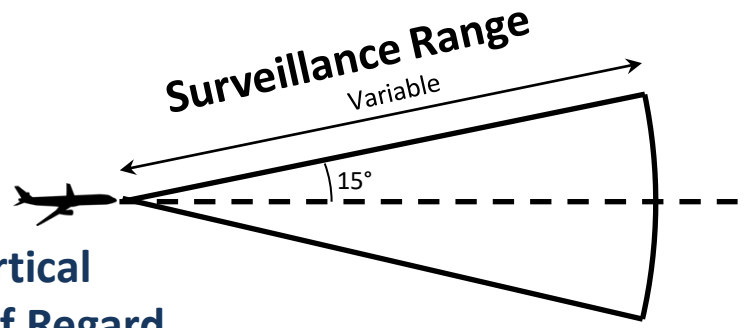


System Wide Safety

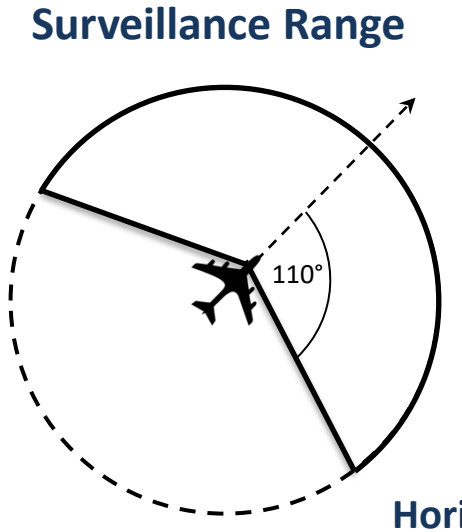
Detect and Avoid

Detect and Avoid (DAA)

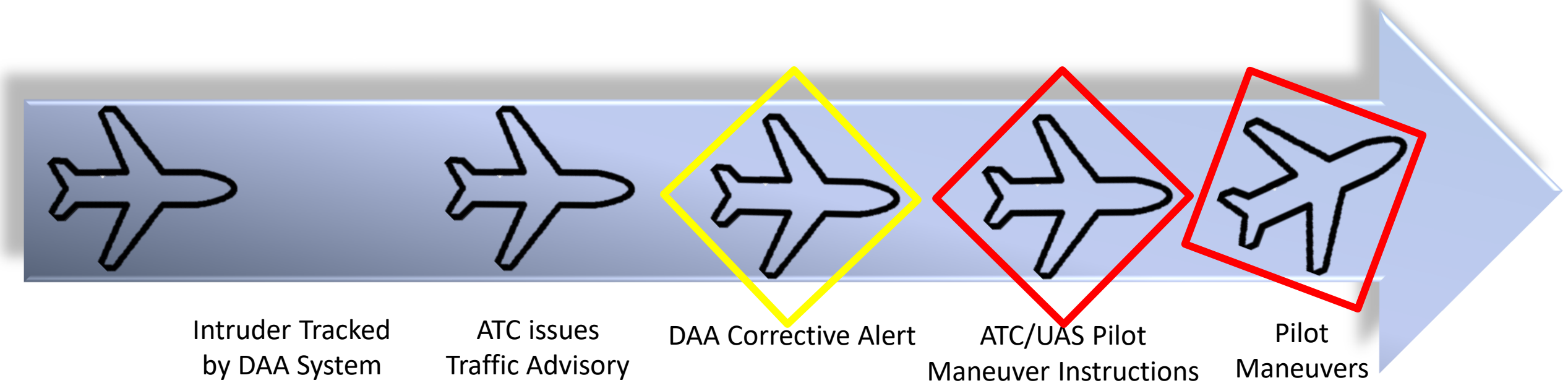
- DAA Well-Clear (DWC) is a mathematical expression of safe separation between aircraft
  - Replaces the “Out-the-Window” view
  - DWC has 3 primary dimensions:
    - Vertical Threshold (*h**)
    - Horizontal Threshold (*HMD**)
    - Time Modification (τ^*_{mod})
- An alert time to DWC is also calculated to allow the human pilot to maneuver
  - Corrective Alert: Pilot has time to contact ATC to negotiate DAA maneuver
  - Warning Alert: Pilot must maneuver immediately to avoid losing well-clear
- A display provides the pilot with maneuver guidance in the form of heading and altitude “bands”
  - Pilot maneuvers so that the UAS heading or altitude is outside the bands



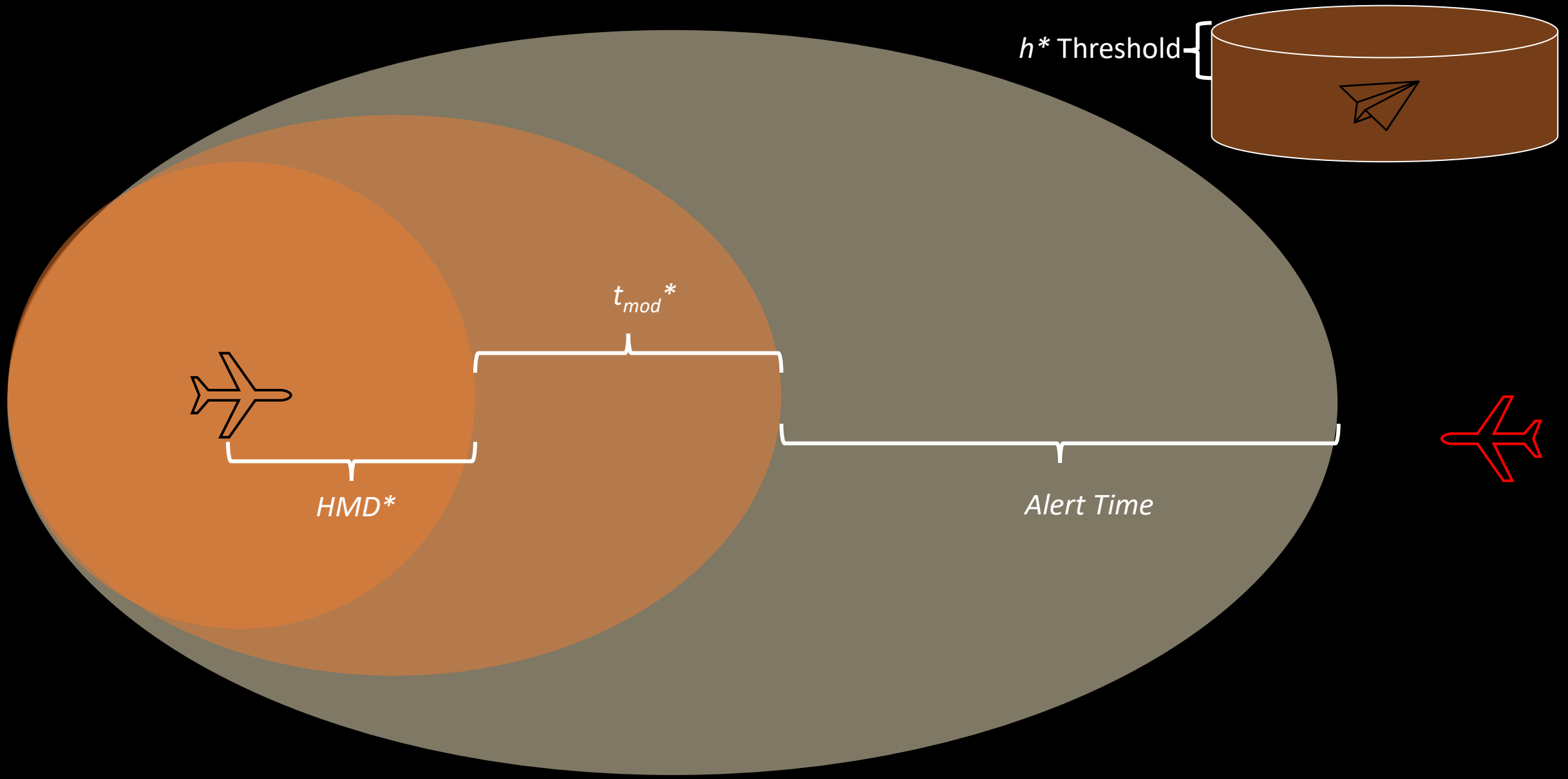
Vertical Field of Regard (Elevation Angle)



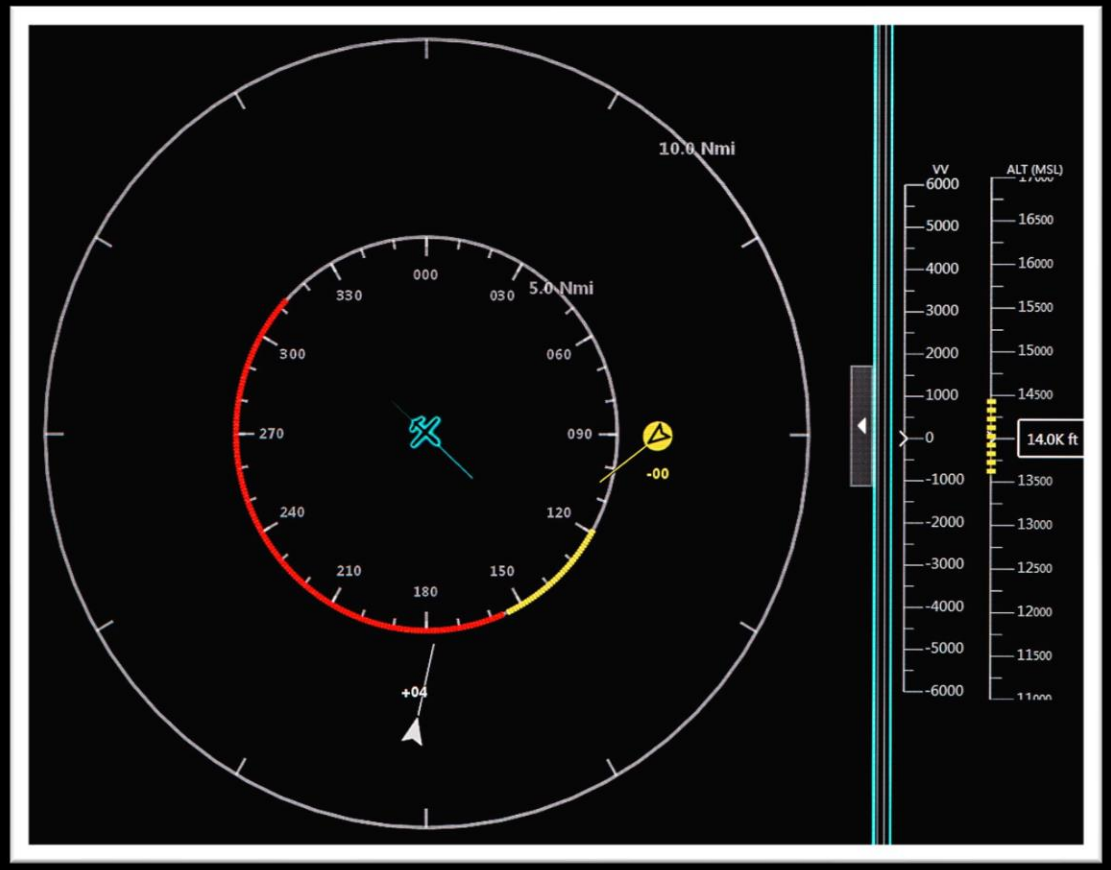
Horizontal Field of Regard (Azimuth Angle)

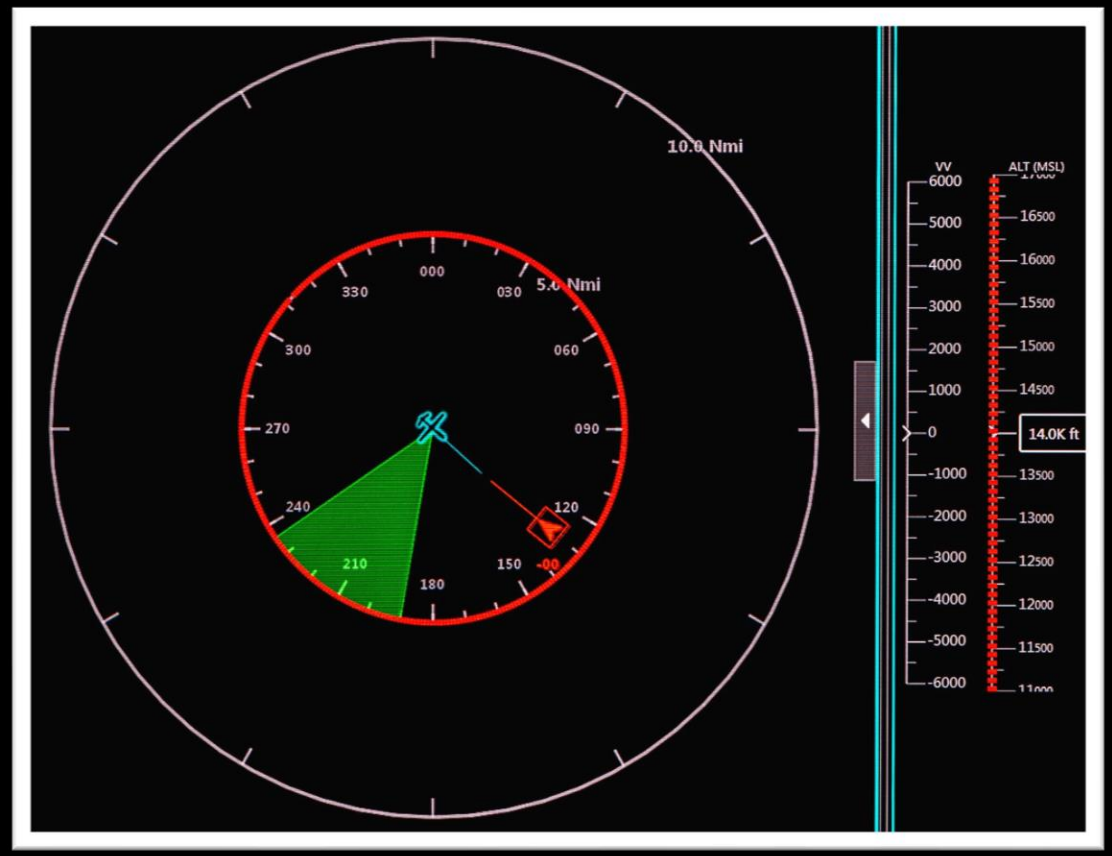


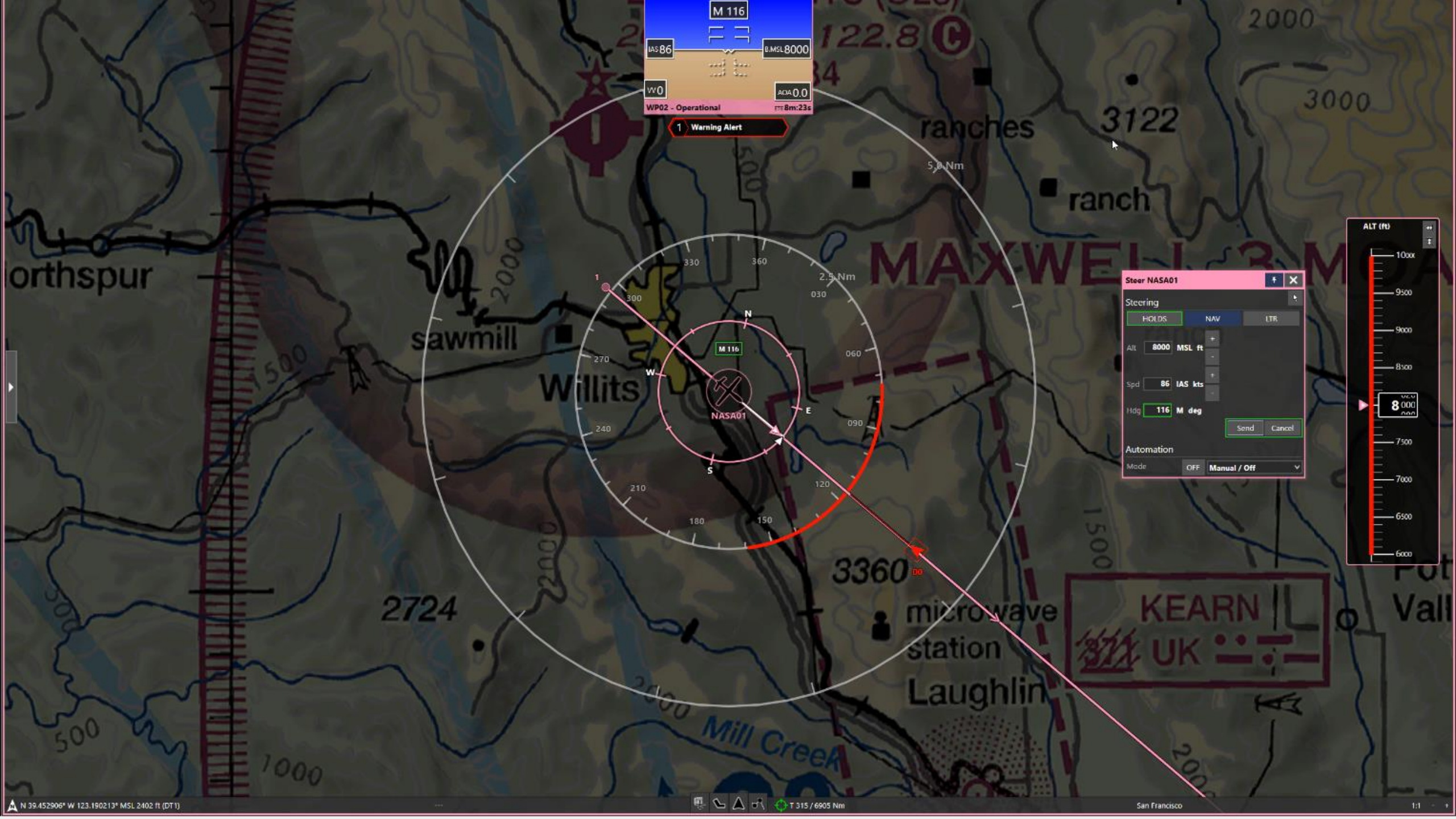
Visualizing Detect and Avoid Well-Clear



DAA Alerting Display Examples






M 116
IAS 86
B.MSL 8000
W 0
AOA 0.0
WP02 - Operational
ETE 8m:23s
1 Warning Alert
Steer NASA01
Steering
HOLDS
NAV
LTR
Alt 8000 MSL ft
Spd 86 IAS kts
Hdg 116 M deg
Send
Cancel
Automation
Mode
OFF
Manual / Off
ALT (ft)
10000
9500
9000
8500
8000
7500
7000
6500
6000
2.5 Nm
5.0 Nm
NASA01
M 116
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ranch
3122
3360
2724
sawmill
Willits
orthspur
microwave
station
Laughlin
KEARN
UK
Mill Creek
MAXWELL
N 39.452906° W 123.190213° MSL 2402 ft (DT1)
T 315 / 6905 Nm
San Francisco

EXPERIMENTAL

N175OX

N175OX

Future Workforce

AAF SPEC. PROJ NO. 39015R
U.S. ARMY P-51D-25 NA
SERIAL NO AAF 4473264
CY

Legend

- Aviation Domain Knowledge
- Human Factors Knowledge
- Engineering Skills
- Communication Skills
- People Skills

K-12

- Civil Air Patrol
- "Starbase" Camp
- Airshows
- Books
- Documentary Films

Wichita State University

- Psychology
- Human Factors
- Writing/Speaking
- Meteorology
- Algebra/Calculus
- Statistics
- People Skills

Flight Line Technician - KAAO

- Flight Lessons
- "First-Hand" Aviation Knowledge
- "First-Hand" Weather Knowledge
- Human Capabilities (and limitations)
- "Difficult People" Skills

Case Manager

- People Skills
- Writing

Legend

- Aviation Domain Knowledge
- Human Factors Knowledge
- Engineering Skills
- Communication Skills
- People Skills

WSU/NIAR

- Interface/Display Design
- User Testing
- Weather Displays
- Unmanned Systems
- "Real" Engineering Process
- Interpreting Requirements
- People Skills

ERAU - HF

- Research Design
- Data Analysis
- Perception/Cognition
- Mishap Analysis
- Unmanned Systems
- Systems Engineering
- Writing/Presenting
- People Skills

ERAU – FAA WTIC

- Training/Testing
- Data Analysis
- User Testing
- Weather Displays
- Writing/Presenting
- Planning/Organization
- People Skills
- Mind Numbing Data Entry

Honeywell Advanced Technology Europe

- Simulation
- Testing
- Requirements -> Design
- Agile Development
- Writing
- People Skills

Legend
- Aviation Domain Knowledge
- Human Factors Knowledge
- Engineering Skills
- Communication Skills
- People Skills

NASA Langley Research Center
- Simulation/Testing
- Unmanned Systems
- Flight Testing
- Requirements Elicitation
- Mishap Investigation
- Data Analysis
- Systems Engineering
- Software Development
- Writing/Presenting
- People Skills

Takeaways

- **Career paths are not always straight (embrace unexpected opportunities)**
- **Take every opportunity to learn in every situation**
- **Core STEM skills and domain knowledge are important, but communication and interpersonal skills can accelerate careers**
- **Maintain relationships with educators and mentors**
- **Ask questions!**

Questions