## **Aviation R&D Landscapes**

REDAC

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## What is a Landscape?

A Landscape is a collection of research drivers that provides information about their potential impacts to the industry.

- Research Drivers
  - A force or motivation that stimulates R&D investment
- Impacts
  - Industry Objectives
  - Emerging Technologies
  - Envisioned Operations





### **Developing the R&D Landscapes**

- Research drivers and their impacts will be described within the context of each of the 6 research domain areas.
- A document will be produced to effectively communicate Aviation Industry Landscape.







# **R&D Landscape Process**

- Team composed of FAA research domain leads, MITRE, ANG-E4 and senior management
  - R&D Landscape team formed and initiated on October 31, 2018.
  - Bi-weekly team meetings, with additional research domain specific meetings as needed.

### Tasks involved:

- Develop structure for data collection
- Ensure traceability of research drivers to source documentation





### **Research Landscapes and Planning**



### **R&D Landscape Schedule**

- ✓ Develop plan for Landscape development
- ✓ Deliver Landscape to REDAC for input
- Produce Landscape Document

Completed November 2018 Completed Spring 2019 June 2019



### **Subcommittee Scope**

- Help FAA understand the aviation industry's strategic focus
  - Review the driver list and identify any missing items.
  - Identify the characteristics or individual components of each driver and the timeframe to maturity.
  - Identify if the driver presents challenges that the FAA should pay attention to.
  - Identify entities (academia, government, or industry) that are currently conducting work related to this driver.
- Separate from F&Rs, provide subcommittee Workbook input to the DFO's prior to the full REDAC meeting on 4/11.
- Be prepared to summarize during the full REDAC meeting on 4/11.

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### **Research Driver List**

- Supersonic Flight
- Urban Air Mobility
- Growth of Mixed Operations (Piloted, Autonomous, Unmanned
- New Mission Types
- Non-Traditional NAS Access Points
- Space Operations
- Enable Routine Small UAS Operations Beyond Visual Line of Sight (BVLOS)
- Autonomous ground service equipment at airports
- Aircraft Command and Control Using Automation and Remote Sensing Technology
- New Vehicles or their Components Which Make Use of New Technologies, Software, or Materials
- Certification using New Technologies, Standards, or Processes
- Remote/Virtual Technologies
- Advances in Electric or Hybrid Electric Propulsion

- Future Fuel Technologies
- New Technologies to Airport Pavement Infrastructure
   and Design
- Information Assurance and Security for All Operations (cyber-security)
- Big Data Analytics and Techniques
- Human-Machine Teaming and New Technology
  Interfaces
- Artificial Intelligence
- Increased Connectivity by Cyber-Physical Systems (Internet of Things Technologies)
- Crowd Sourcing Weather Data
- Advancement in Position, Navigation, & Timing Technology
- Risk-Based Decision-Making techniques and analytics
- Infrastructure Resiliency and Continuity of Operations
- New Medical Technologies and New Substances
   (Medications, Drugs, Etc.)



## **Subcommittee Roundtable Discussion**

- Impressions
- Approach
- Summary of comments



# **Backups**



### **Subcommittee Approaches**

#### Airports

- •Evaluated each driver based on importance (1-5)
- Identified any links between drivers
- •Discussed concerns/issues at a high level
- Identified subcommittee members to develop workbook response for each of the drivers

#### Aircraft Safety

- •Went through full list of drivers as a group
- •Identified major issues concerning each driver
- •Identified some additional source documentation
- •Captured notes and planned for additional coordination among members.

#### **Human Factors**

- Struggled with the overall intent of the exercise and how FAA planned to utilize inputs
- Reviewed the drivers and had discussion as to definitions of each to ensure full understanding
- Discussion about how their present emerging issues document mapped to these drivers.

#### **Environment and Energy**

- •Struggled with the overall intent of the exercise and how FAA planned to utilize inputs
- Identified top five drivers related to E&E
- •Identified subcommittee members to develop workbook response for each of these 5.

#### NAS Operations

- •Reviewed full list of drivers, identifying ones that pertained to their subcommittee and grouped them as:
- Emergent Operations
- Infrastructure
- Data
- •Assigned all subcommittee members task of filling out workbook and providing back to the chair for consolidation



### Subcommittee Driver Changes/Additions – Initial Feedback

#### Airports

- Added Drivers:
  - Aviation System Sustainability
  - Aviation System Capacity
  - Future Security Technologies

#### **Aircraft Safety**

- <u>Changed Drivers:</u>
  - Enable Routine Small UAS
     Operations BVLOS
- Added Drivers:
- In-Time System-Wide Safety assurance (e.g. Digital Twinning)
- Runway Friction & Braking

#### **Human Factors**

- •Changed Drivers:
- •Human-machine Teaming & New Technology Interfaces – Split into two separate drivers
- •Artificial Intelligence Category needs to be broadened or reframed
- •Added Drivers:
- Training
- Pilot Demographics
- Larger UAS Integration

#### **Environment and Energy**

- <u>Changed Drivers:</u>
  - New Vehicles or their Components Which Make Use of New Tech, Software or Matls → Sustainable Growth of Subsonic Transports Through Novel Vehicle Configurations, Operational Concepts and New Technologies

#### **NAS Operations**

- <u>Changed Drivers</u>
- Increased Connectivity by Cyber-Physical Systems (Internet of Things Technologies) & Spectrum (4G/5G)