NASA Welcome
2nd NASA-FAA On-Demand Mobility and Emerging Aviation Technologies Roadmapping Workshop

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U.S. leadership for a new era of flight

NASA Aeronautics
NASA Aeronautics Vision for Aviation in the 21st Century

Global

Sustainable

Transformative

6 Strategic Thrusts

Safe, Efficient Growth in Global Operations
Innovation in Commercial Supersonic Aircraft
Ultra-Efficient Commercial Vehicles
Transition to Low-Carbon Propulsion
Real-Time System-Wide Safety Assurance
Assured Autonomy for Aviation Transformation

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Ten Year Investment Plan—FY 2017 Budget Accelerates Key Components of NASA Aeronautics Plan

Fund the Next Major Steps to Efficient, Clean and Fast Air Transportation Mobility

**New Aviation Horizons**
Start a continuing series of experimental aircraft to demonstrate and validate high impact concepts and technologies. Five major demonstrations over the next 10+ years in the areas of Ultra-Efficiency, Hybrid-Electric Propulsion, and Low Noise Supersonic Flight

**Enabling Tools & Technologies**
Major series of ground experiments to ready key technologies for flight

- Research and ground demonstration for an advanced small engine core for very high bypass engines and as a hybrid-electric propulsion enabler
- Development of next generation physics-based models needed to design advanced configurations

**Revolutionizing Operational Efficiency**
Accelerate demonstration of full gate-to-gate Trajectory Based Operations

**Fostering Advanced Concepts & Future Workforce**
Increased investment in new innovation through the NASA workforce and Universities

- Leverage Non-Traditional Technology Advances
  - Pursue challenge prizes in areas such as energy storage, high power electric motors, advanced networking and autonomy

**UAS**
Strong continued research leadership in enabling UAS integration into the National Airspace. Extending the UAS in the NAS project for an additional 4 years

**Hypersonics**
Increased investment to ensure a strong National fundamental research capability

**Build off of major current developments and accomplishments**

**Continue to incentivize new innovation**

* Denote NASA Aeronautics Research Program names
New Aviation Horizons Flight Demo Plan

- **Purpose-Built** UEST Demonstrators
- Hybrid Electric Propulsion Demonstrators
  - Transport Scale
  - Ground Test Risk Reduction
  - Preliminary Design
  - Design & Build
  - Flight Test
- Small Scale “Build, Fly, Learn”
- “Build, Fly, Learn” Demonstrators
- Preliminary Design
- Design & Build
- Flight Test

- Ground Test Risk Reduction
- Preliminary Design
- Design & Build
- Flight Test

- Ground Test Risk Reduction
- Preliminary Design
- Design & Build
- Flight Test

- Preliminary Design
- Design & Build
- Flight Test

- Fully integrated UEST Demonstrator
- Design & Build
- Flight Test

**Timeline**:
- FY17
- FY18
- FY19
- FY20
- FY21
- FY22
- FY23
- FY24
- FY25
- FY26

**Additional Text**:
- Validated ability for U.S. Industry to build transformative aircraft that use 50% less energy and produce over 40dB less noise.
- Enables Low Boom Regulatory Standard and validated ability for industry to produce and operate commercial low noise supersonic aircraft.
- Validated HEP Concepts, Technologies And Integration for U.S. Industry to lead the Clean Propulsion Revolution.
Hybrid Electric Propulsion
Prove Out Transformational Potential

Explore and demonstrate vehicle integration synergies enabled by hybrid electric propulsion

Increasingly electric aircraft propulsion with minimal change to aircraft outer mold lines

Work toward full PAI and HEP

Certify, Operate

Build learn, demonstrate

Modeling
Explore Architectures
Test Beds
Component Improvements

Knowledge through Integration & Demonstration

Gain experience through integration and demonstration on progressively larger platforms

2020

2030

2040

Environmental Benefit

www.nasa.gov
On-Demand Mobility and Emerging Aviation Technologies

• NASA’s interest
  – Enable solutions to technical barriers in safety, cost, efficiency, noise
  – Leverage early adopters of transformational technologies to prove out transformational potential
  – Establish applicability to larger-scale commercial transportation

• NASA’s involvement
  – Identify the feasibility of advanced concepts
    • e.g.: distributed electric propulsion in SCEPTOR
  – Understand the breadth of the challenges
    • e.g.: this roadmapping workshop

➤ Investing In Our Future – investments in cutting edge aeronautics research today are investments in a cleaner, safer, quieter and faster tomorrow
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March 8 & 9 2016

LM Global Vision Center, Arlington VA