



# NASA Welcome

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

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# NASA Aeronautics

NASA Aeronautics Vision for Aviation in the 21<sup>st</sup> Century



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

U.S. leadership for a new era of flight



# 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

**Major New Initiative within IASP\***



## 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

**Increases to AAVP\* and TACP\***



## Revolutionizing Operational Efficiency

Accelerate demonstration of full gate-to-gate Trajectory Based Operations

**Increase to AOSP\***



## 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

**Increase to TACP\***



## 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

**Increases to IASP\* and AAVP\***

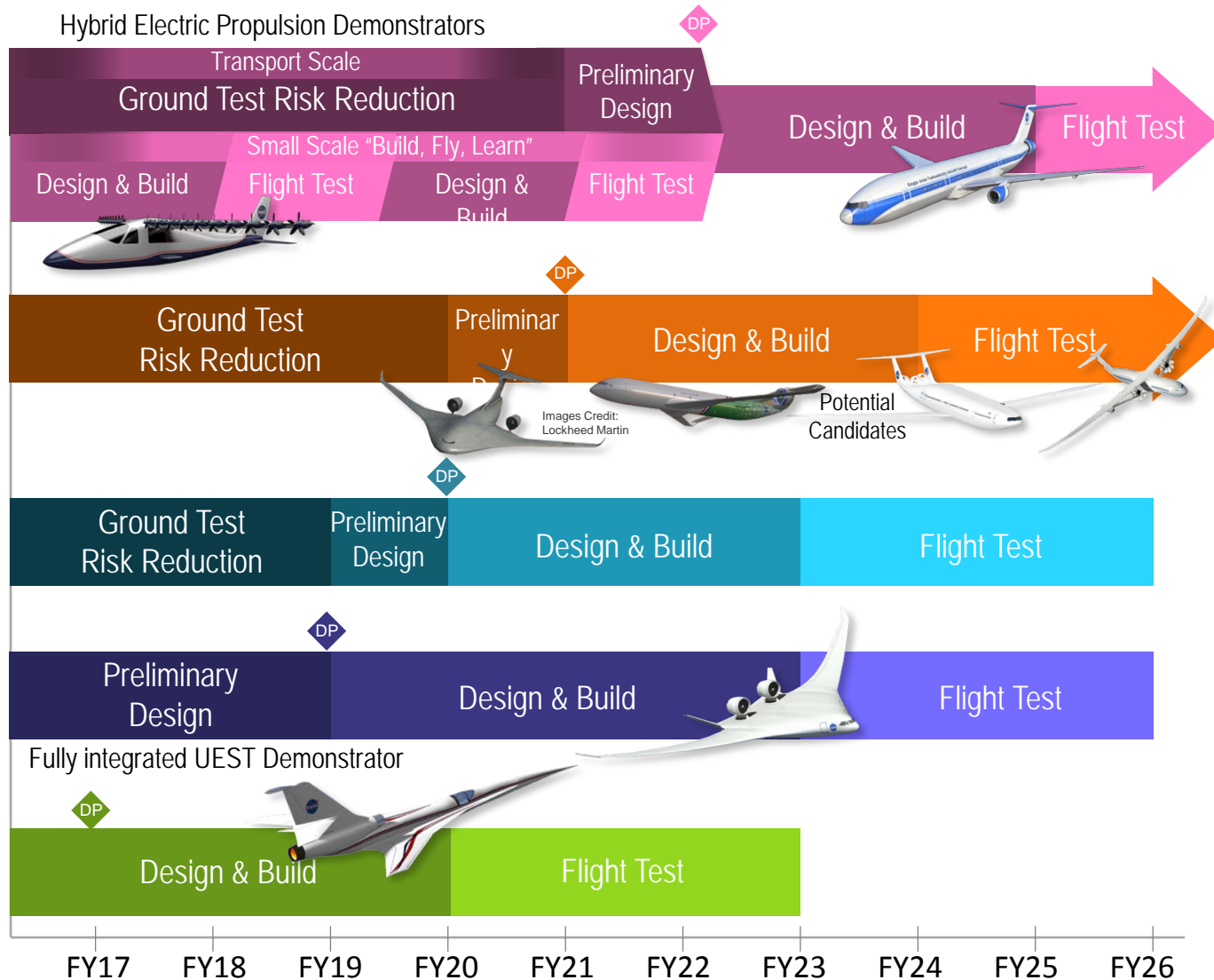
Build off of major current developments and accomplishments

Continue to incentivize new innovation

# New Aviation Horizons Flight Demo Plan



“Purpose-Built” UEST Demonstrators



Validated HEP Concepts, Technologies And Integration for U.S. Industry to Lead the Clean Propulsion Revolution



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



# Hybrid Electric Propulsion

Prove Out Transformational Potential



Environmental Benefit

Explore and demonstrate vehicle integration synergies enabled by hybrid electric propulsion

Work toward full PAI and HEP

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

**Modeling**  
**Explore Architectures**  
**Test Beds**  
**Component Improvements**

Certify, Operate

Build, learn, demonstrate



Single Aisle Transport

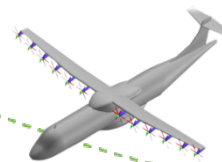
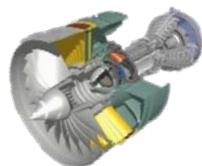


Image Credit: Joby



Image Credit: Yamaha

Small Aircraft



2040

2030

2020

Gain experience through integration and demonstration on progressively larger platforms

Knowledge through Integration & Demonstration





- 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*

*LM Global Vision Center, Arlington VA*

# **2<sup>nd</sup> NASA-FAA On-Demand Mobility and**

# **Emerging Aviation Technologies Roadmapping Workshop**

*March 8 & 9 2016*

