The Aeronautics Research Mission Directorate - the First “A” in NASA

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June 10, 2016
NASA Mission Directorates

Aeronautics Research (ARMD)

Human Exploration and Operations (HEOMD)

Space Technology (STMD)

Science (SMD)

Mission Support (MSD)
NASA Aeronautics
NASA Aeronautics Vision for Aviation in the 21st Century

U.S. leadership for a new era of flight
1. **Safe, Efficient Growth in Global Operations**  
   - Enable full NextGen and develop technologies to substantially reduce aircraft safety risks

2. **Innovation in Commercial Supersonic Aircraft**  
   - Achieve a low-boom standard

3. **Ultra-Efficient Commercial Vehicles**  
   - Pioneer technologies for big leaps in efficiency and environmental performance

4. **Transition to Low-Carbon Propulsion**  
   - Characterize drop-in alternative fuels and pioneer low-carbon propulsion technology

5. **Real-Time System-Wide Safety Assurance**  
   - Develop an integrated prototype of a real-time safety monitoring and assurance system

6. **Assured Autonomy for Aviation Transformation**  
   - Develop high impact aviation autonomy applications
AOSP – Airspace Operations & Safety Program

ATD - Airspace Technology Demonstrations

SMART-NAS - Shadow Mode Assessment Using Realistic Technologies for the National Airspace System

SASO – Safe Autonomous Systems Operations
IASP – Integrated Aviation Systems Program

ERA – Environmentally Responsible Aircraft

UAS in the NAS – Unmanned Aircraft Systems Integration in the National Airspace System

FDC – Flight Demonstrations and Capabilities

Coming in FY17 - New Aviation Horizons (NAH)
AAVP – Advanced Air Vehicles Program

AETC – Aeronautics Evaluation and Test Capabilities

AATT – Advanced Air Transport Technology

AC – Advanced Composites

CST – Commercial Supersonic Technology

RVLT – Revolutionary Vertical Lift Technology
NASA Centers - ARMD
NASA Centers - ARMD

Armstrong Flight Research Center (AFRC)
Edwards, CA
NASA Centers - ARMD

Langley Research Center (LaRC)
Hampton, VA
New Aviation Horizons - Flight Demo Plan

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

**Total Demonstration Cost:** $700M

**Life Cycle Cost:** $430M - $850M

- **Potential Candidates**
- **Ground Test Risk Reduction**
- **Preliminary Design**
- **Design & Build**
- **Flight Test**

**Life Cycle Cost:** $400-500M

- **Fully integrated UEST Demonstrator**

**Life Cycle Cost:** $430M

**FY17** - **FY26**
Ultra-Efficient Subsonic Demonstrators

**D-8**
- Potential Purpose Built X-Plane
- Propulsion-Airframe Integration enables reduced aircraft drag

**HWB**
- Multiple Integrated Technologies
- Non-circular composite fuselage
- Aerodynamically efficient fuselage shape
- Top mounted engines enable Ultra-High Bypass Engines

**Truss-Braced Wing**
- Potential Purpose Built X-Plane
- Very High Aspect Ratio wings substantially increases wing efficiency
- Highly-efficient wing of conventional aspect ratio
- Very-High Bypass Engines, reaching physical installation limits

Composite fuselage of conventional shape
More electric sub-systems

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Closing Thoughts...

- Great deal of new work on the near horizon
- A Career at NASA...
- Questions?