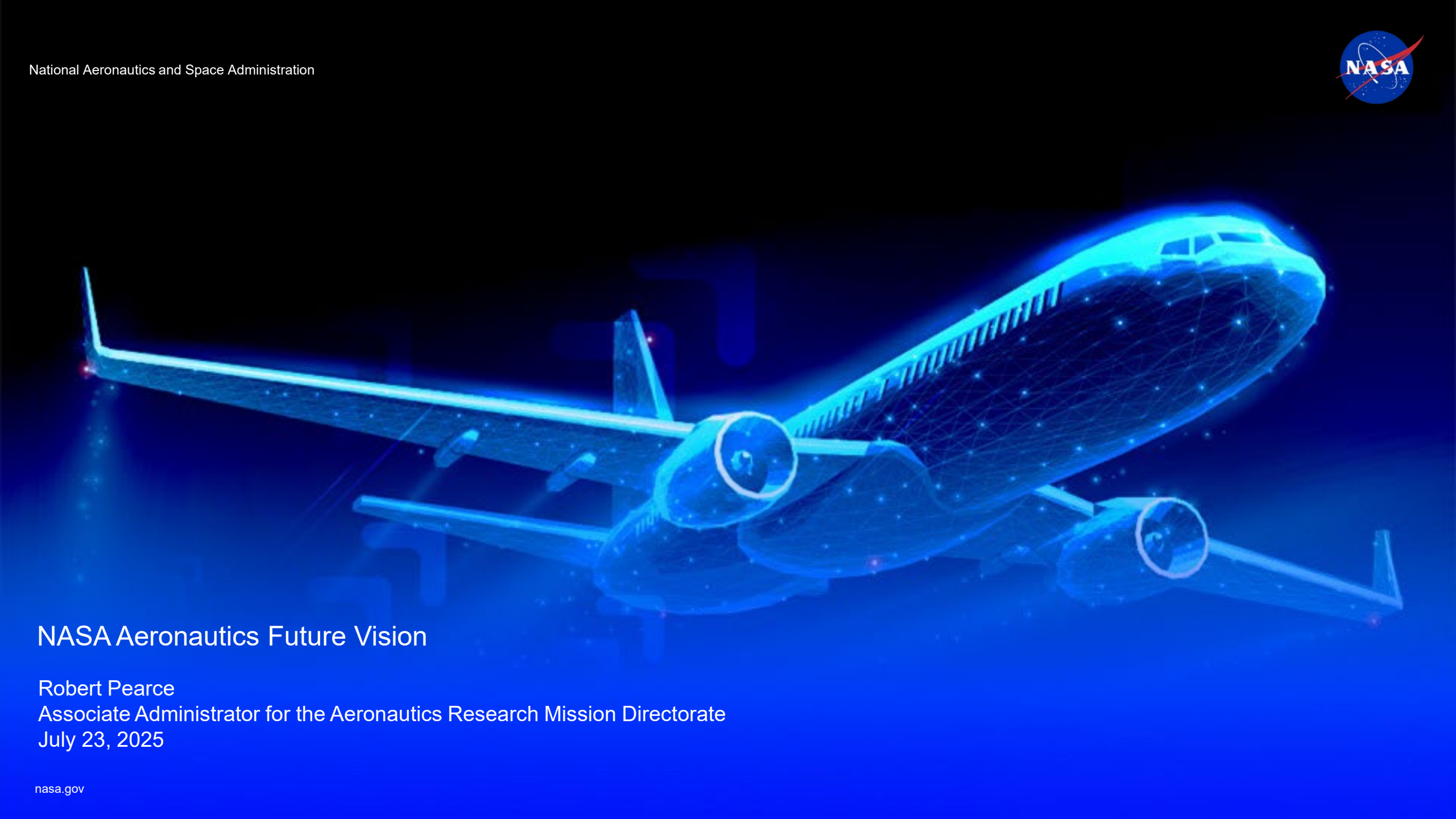
National Aeronautics and Space Administration



NASA Aeronautics Future Vision

Robert Pearce
Associate Administrator for the Aeronautics Research Mission Directorate
July 23, 2025

Aeronautics Research Mission Directorate as of FY 2026

Aeronautics Research Mission Directorate

ADVANCED AIR VEHICLES PROGRAM

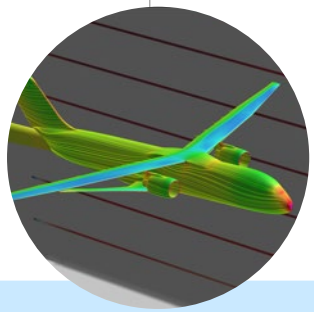
- Subsonic Vehicle Technologies and Tools
- Hi-Rate Composite Aircraft Manufacturing Project
- High-Speed Flight Project

AIRSPACE OPERATIONS AND SAFETY PROGRAM

- Air Traffic Management and Safety Project
- Advanced Air Mobility Pathfinders Project

INTEGRATED AVIATION SYSTEMS PROGRAM

- Flight Demonstrations and Capabilities Project
- Subsonic Flight Demonstrator Project
- Low-Boom Flight Demonstrator Project



TRANSFORMATIVE AERONAUTICS CONCEPTS PROGRAM

- Transformational Tools and Technologies Project
- University Innovation Project

AEROSCIENCES EVALUATION AND TEST CAPABILITIES PORTFOLIO

NASA Aeronautics Vision

NASA has developed a new vision to guide its aeronautics research portfolio toward a leaner and more cost-efficient organization that can still provide innovative technologies and concepts to revolutionize key parts of aviation.

NASA will demonstrate that its supersonic aircraft (X-59) can fly without generating loud sonic booms and expand its long-standing relationship with the Department of Defense to pioneer **high-speed flight** beyond Mach 5.

NASA will work with the Federal Aviation Administration and industry to automate **airspace and safety management capabilities** that safely accommodate new air vehicles performing new missions in more sections of U.S. airspace.

NASA will **revolutionize engineering methods** by using its existing suite of ground and flight test capabilities, high-end computing, and world-class computational expertise in partnership with industry and universities to generate the unique experimental databases that accelerate design cycles.

NASA will complete technology development for next generation aircraft such as advanced thin wing, hi-rate composites manufacturing, and hybrid thermally efficient engine core technologies, and **transform airframes and propulsion** by focusing long-term research on truly revolutionary propulsion capabilities for future generations of ultra-efficient airliners.

FY 2026 Budget Request

$ Millions	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030
Aeronautics	**$588.7**	**$588.7**	**$588.7**	**$588.7**	**$588.7**
Airspace Operations and Safety	88.1	96.4	112.4	115.0	117.0
Advanced Air Vehicles	133.4	163.3	161.2	154.9	162.8
Integrated Aviation Systems	167.2	161.3	115.4	110.0	70.0
Transformative Aeronautics Concepts	125.1	82.8	109.8	113.9	134.0
Aerosciences Evaluation and Test Capabilities	74.9	84.9	89.9	94.9	104.9

1/ - FY 2024 reflects amounts in Public Law 118-42, Consolidated Appropriations Act, 2024, adjusted by NASA's September 2024 Operating Plan, plus $2.5M for IT Modernization WCF and $4.5M for the GSA TMF.
2/ - FY 2025 reflects the funding amount specified in Public Law 119-4, Full-Year Continuing Appropriations and Extensions Act, 2025.

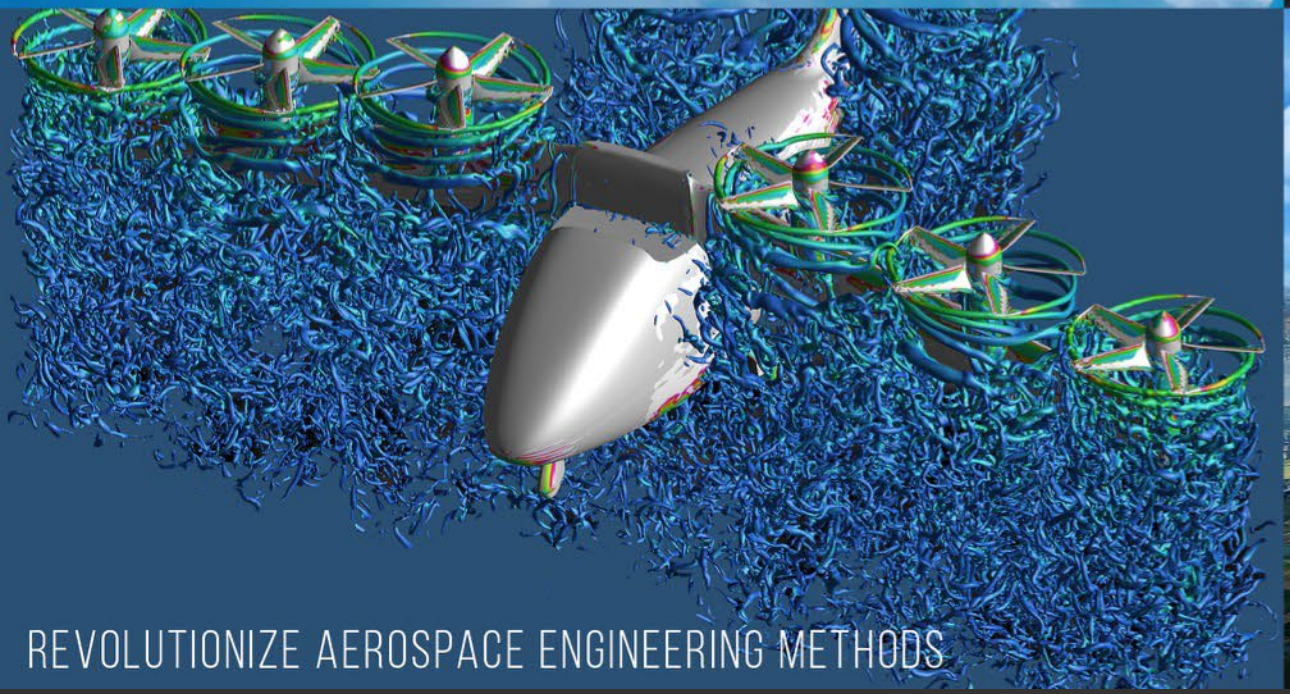
Strengthen U.S. technology leadership in aviation to ensure a competitive advantage over China and Europe

Chart a new path for NASA Aeronautics research

- **Transform Airframes and Propulsion** to advance technology needs of aircraft for the 2030s
  - Complete technology development to improve performance (thin wing, advanced composites, high efficiency small cores)-
  - Improve production rates for composite aircraft components by 4 to 6 times
  - Focus long-term research on truly revolutionary propulsion capabilities for future generations of ultra-efficient airliners.
- **Pioneer High-Speed Flight** to unlock new possibilities in aviation
  - Flight test the X-59 Low Boom Flight Demonstrator to prove airworthiness and noise signature.
  - Conduct hypersonic research for new commercial and DoD applications
- **Revolutionize Aerospace Engineering Methods** to enable faster, more precise testing methods
  - Accelerate the ability to perform rapid, high fidelity computation design and analysis
  - Utilize our university partners to advance all parts of the Aeronautics vision
- **Automate Airspace and Safety Management Capabilities** to ensure American skies are safe and efficient
  - Safely grow the capacity of the National Airspace System in partnership with the FAA
  - Integrate advanced air mobility in the airspace to ensure U.S. leadership in the emerging market

Maintain a well-rounded portfolio of Aerosciences testing facilities to ensure ready access for NASA and our industry partners

Bottom Right Aircraft Image Credit: University of Illinois / Phillip Ansell

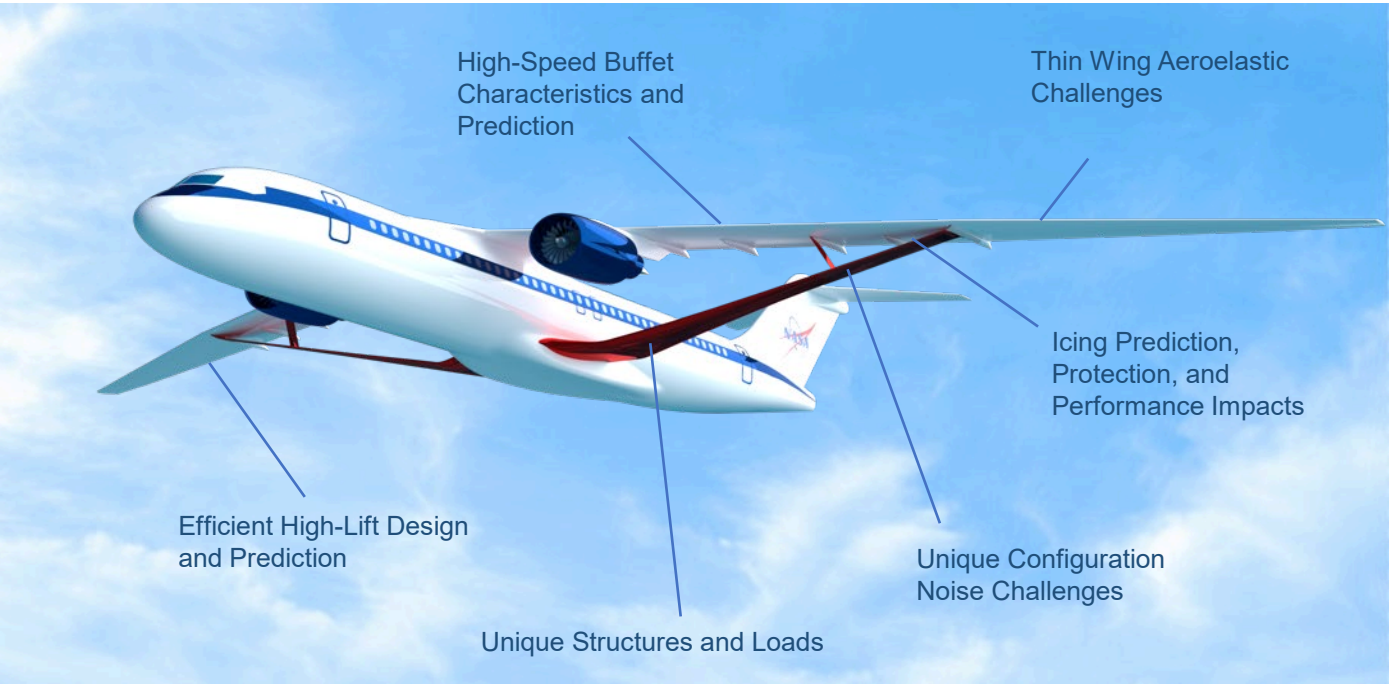


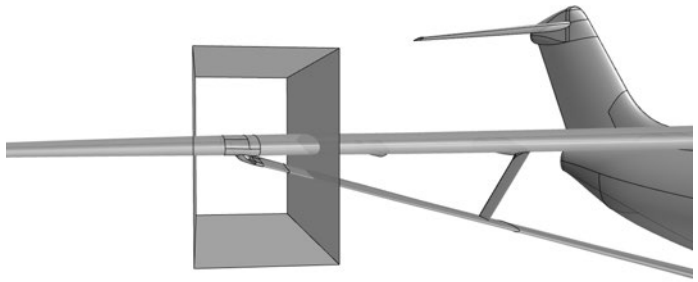
Four Transformations to Advance U.S. Technological Leadership

TRANSFORM AIRFRAMES AND PROPULSION

Bottom Right Aircraft Image Credit: University of Illinois / Phillip Ansell

Demonstrate Advanced Configurations for Next Generation Aircraft





Research Focus

- Develop and test an advanced airframe configuration and related technologies to dramatically reduce aircraft fuel burn to help enable next-generation single-aisle aircraft in the 2030s

Thin Wing Technology

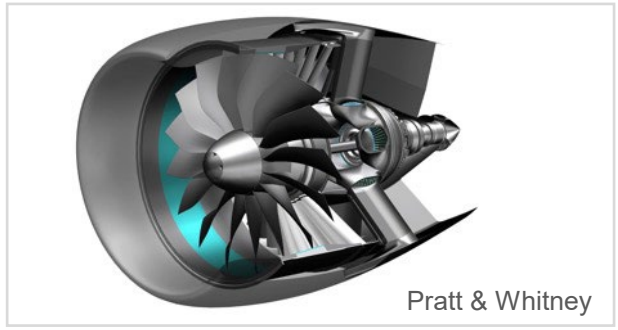
- Conduct ground-based demonstration of thin wing architecture and associated technologies
- Assess icing effects on thin wing design

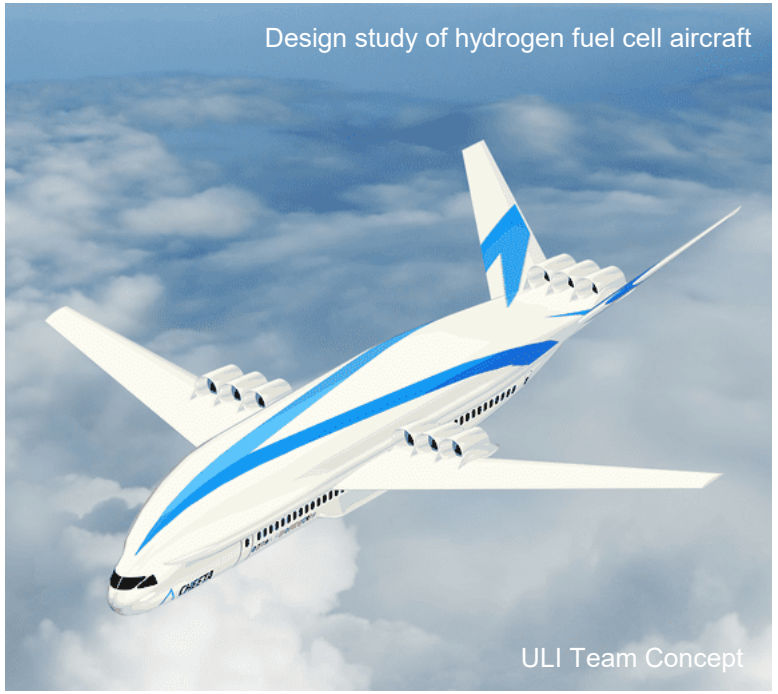
Truss-Braced Wing Studies

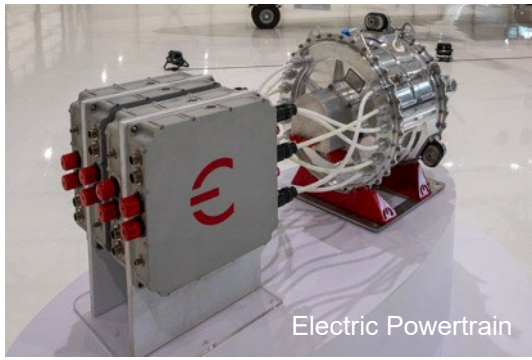
- Conduct ground-based tests of truss-braced wing configurations and explore methods for integrating propulsion technologies with the new design
- Assess progress to inform the X-66 flight demonstrator test campaign

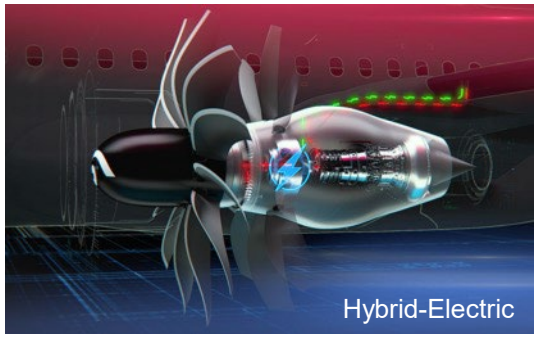
Solving risks associated with thin wing and truss-braced design can yield 5-10% reduction in fuel burn

Pursue Revolutionary Propulsion Options for 2040+









Design: Bring Together the Best Ideas

- Studies on advanced concept designs delivered to NASA for potential investment
- Results inform promising technologies and architectures
- Opportunities for new industry partnerships

Energy Innovation: Lower Cost Propulsion Cycles

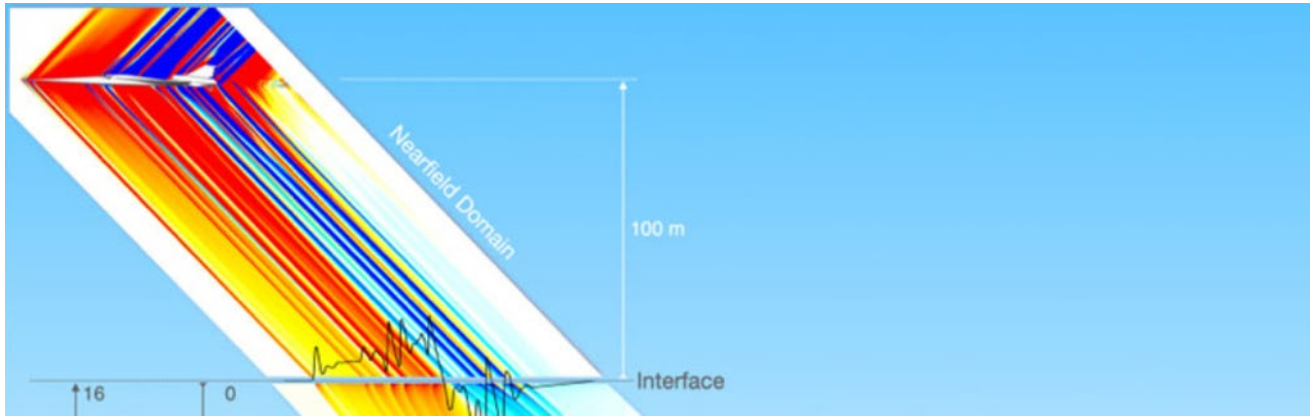
- Jet fuel is the biggest cost to airlines, and new, potentially lower-cost energy sources are available to supplement or replace it
- NASA tests/evaluates the overlap of technology and energy
- Accelerate research into hybrid-electric, hydrogen fuel cells, cryogenic fuels, methane combustion

NASA has trust of the aviation community to explore “what’s next?”

PIONEER HIGH-SPEED FLIGHT

X-59 Quiet Supersonic Flight: Phase 1 to Phase 2 in FY26

Maximum afterburner tests.
Credit: Lockheed Martin Corp. / EMI Test



Phase 1: Deliver X-59 and Demonstrate Safe to Fly

- Demonstrate X-59 is safe to fly through series of flight tests of increasing complexity

Phase 2: Acoustic Validation

- Validate that X-59 performs to design requirements for quiet supersonic flight
- Prove acoustic and design tools needed by U.S. Industry

Phase 3: Community Response Tests

- Collect data through community response overflight tests to inform domestic and international regulatory bodies
- Data will bring about internationally accepted rule change and enable U.S. competitiveness in the emerging supersonic market

AUTOMATE AIRSPACE AND SAFETY MANAGEMENT CAPABILITIES

Work with FAA and Industry for Safety, Scalability, Efficiency

Demonstrate Future Concepts that Transform and Modernize the National Air Traffic Management System

- Enable increasingly automated operations such as automated trajectory negotiation and mitigation of safety events
- Introduce third-party services in a federated architecture that enables rapid deployment and scalable growth without over burdening air traffic control
- Contribute technologies to FAA modernization efforts

Demonstrate Efficiency and Scalability through Use of Digital Services

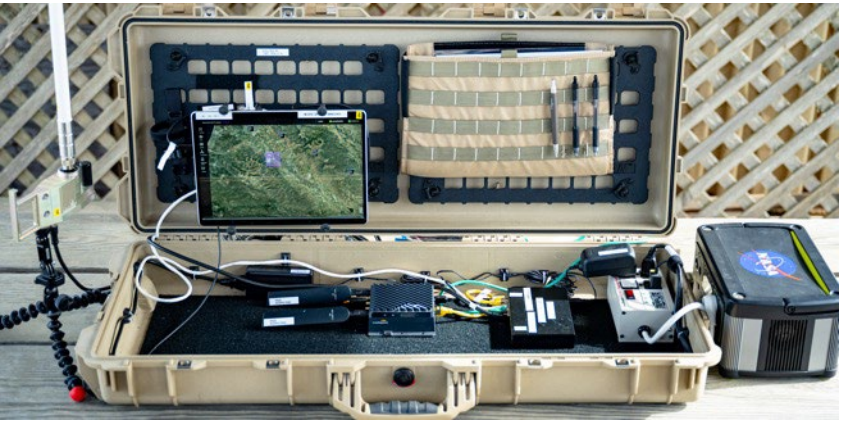
- Establish vision and requirements for an integrated digital information environment for common operating picture and third-party services
- Provide tools for the integration and analysis of data

Demonstrate Integrated System-Wide Safety Assurance

- Establish requirements for data, integration, and ML/AI based data mining technologies for future Aviation Safety Information Analysis and Sharing (ASAIAS 3.0)
- Explore advanced trajectory management services and advanced flight deck capabilities to enable safe, efficient operations

Future airspace and safety transformation will be enabled through novel airspace concepts, digitization of data, and system-wide safety assurance.

Build Systems to Safely Maximize Potential of New Vehicles



Tech Transfer to Support Wildland Firefighting

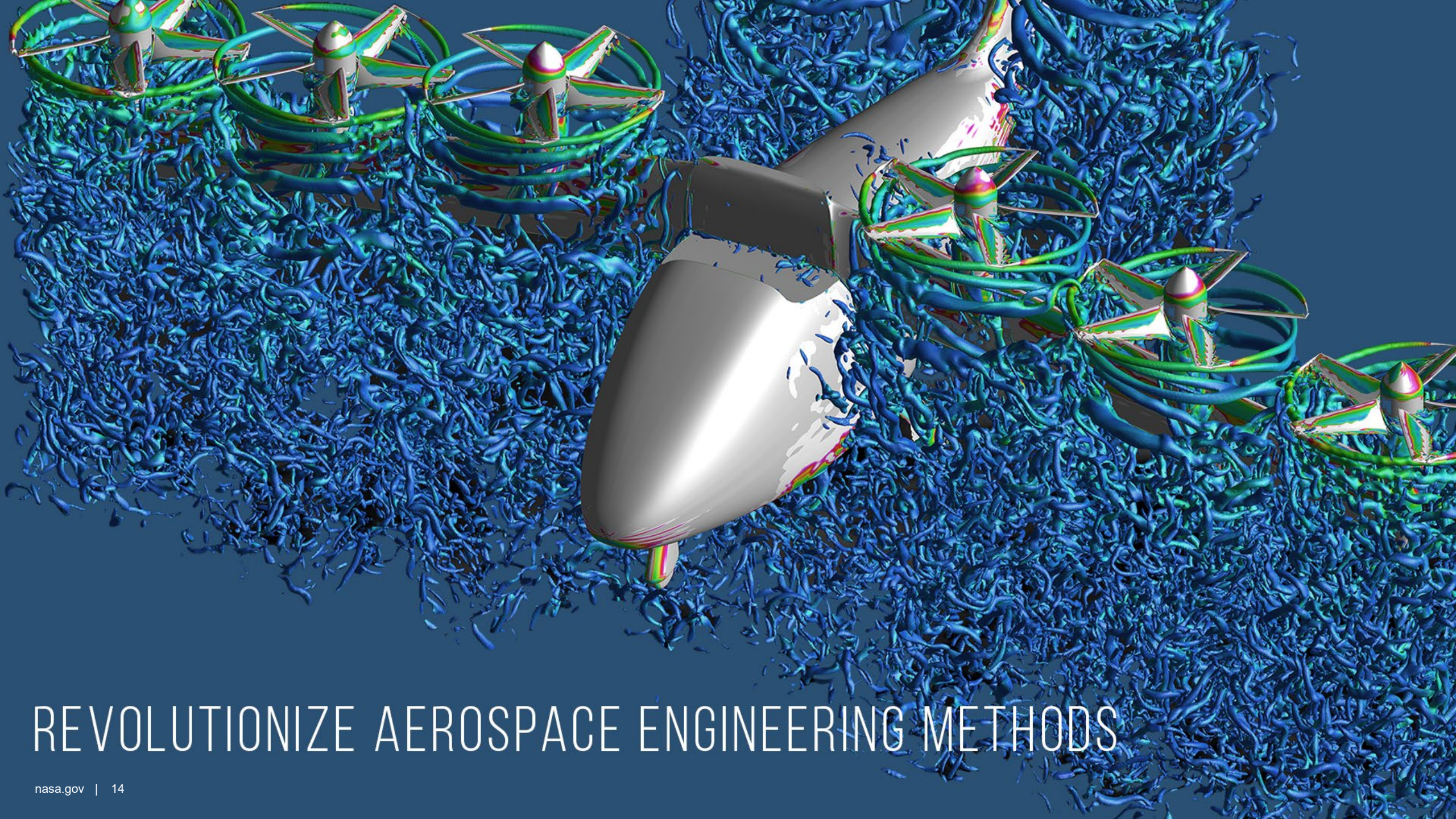
- Transfer techniques using Unmanned Aerial Systems to monitor wildland fires to FAA, industry, and wildland fire management federal and state agencies
- Enable ongoing development of a portable airspace management system for enhanced coordination of wildland fire aerial response

UTM Beyond-Visual-Line-of-Sight

- Demonstrate safe operation of multiple delivery drones in a shared airspace using NASA-developed uncrewed aircraft traffic management system
- Deliver data to FAA and industry to support widespread commercial adoption

Advanced Air Mobility

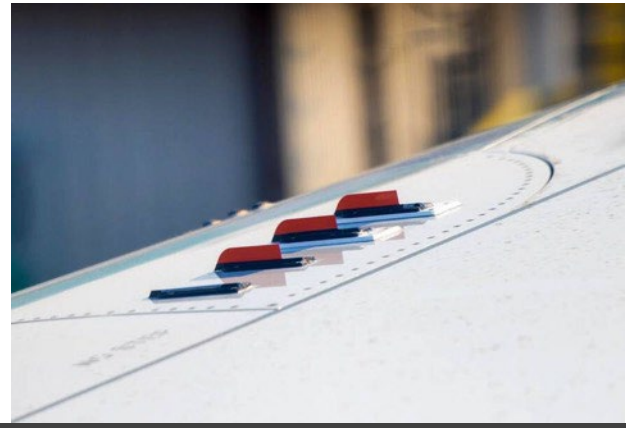
- Evaluate NASA-developed tools and technologies for strategic deconfliction and scalable AAM operations
- Develop federated airspace management technologies for industry operators of AAM
- Deliver data to inform FAA processes and procedures for safe and scalable integration of AAM vehicles



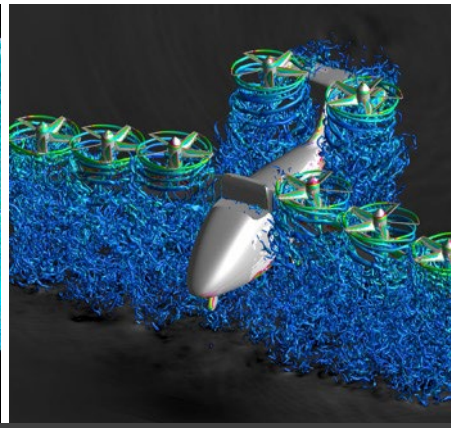
REVOLUTIONIZE AEROSPACE ENGINEERING METHODS

NASA is Uniquely Positioned to Advance State of the Art

GRX-810 Superalloy for Aviation and Space



Shape Memory Alloys as Smart Vortex Generators



High Fidelity, High Resolution Computational Fluid Dynamics

MATERIALS & STRUCTURES

Materials & Structures

- Use of computational materials & structures and additive manufacturing to innovate new materials (e.g. GRX-810)
- Entirely new material properties that create new functionality (e.g. Shape Memory Alloys)

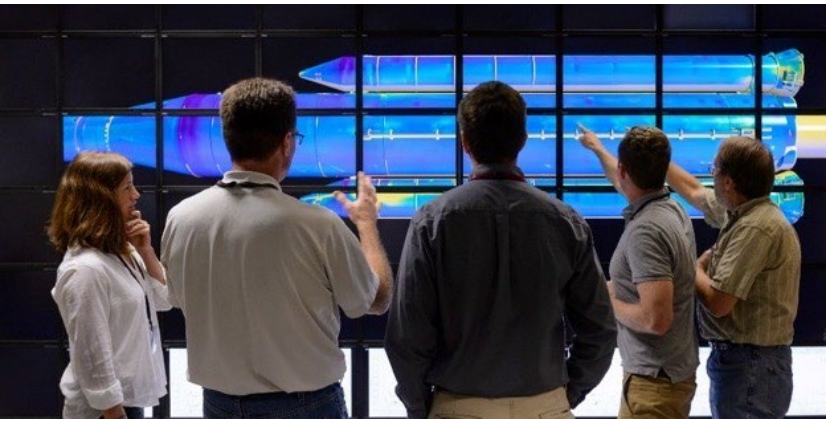
AEROSCIENCES MODELING

Aerosciences

- Accelerated ability to perform rapid, high fidelity computational design and analysis of complex aerospace systems to analyze, understand and predict performance.
- Validate computational tools to predict complex turbulent airflow around vehicles and within propulsion systems. (e.g. juncture flow experimentation and analysis)

AEROSCIENCES EVALUATION AND TEST CAPABILITIES

Large-Scale Ground Test Capabilities for the Nation



Aerosciences Validation

- Combine simulation tools with ground test capabilities to advance the state of the art
- Accelerate operational data portal to make unique experimental databases more accessible to assist in revealing complex physics and drive next generations of computational methods

Ground Tests

- Support vital test campaigns for NASA Missions, Department of Defense, and commercial partners for aeronautic and space missions
- Digitally transform wind tunnel operations and management, using real-time performance and value metrics to enhance decision-making and align with Federal Data Strategy

Management Model

- Focus resources on supporting seven priority large wind tunnels (up to five wind tunnels will be put on standby)
- Execute new operational model featuring a more flexible, re-deployable workforce aligned with test demand, and the capability to reactivate facilities from standby mode when needed
- Begin operations at new Flight Dynamics Research Facility to replace 83-year-old Vertical Spin Tunnel