National Aeronautics and Space Administration

Aeronautics Research at NASA

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Aviation's Economic Impact in the U.S.

The aviation industry is vital to the nation's economic well-being

- Aviation directly or indirectly provides 997,000 Americans with jobs
- In 2006, aviation manufacturing and services accounted for $445B in direct and indirect economic activity
- In 2008, aviation provided the nation with a trade surplus of $57.4B
- In the U.S., more than 60 certified domestic carriers operate every day
  - They operate more than 6500 aircraft
  - They service almost a million travelers daily on 28,000 flights
  - In 2008, they had an annual operating revenue for commercial flights of $168B

Sources: The International Trade Administration, U.S. Department of Commerce
U.S. DOT Bureau of Transportation Statistics Research and Innovative Technology Administration
"The Economic Impact of Civil Aviation on the U.S. Economy", October 2008, FAA Air Traffic Organization

Impacts of Aviation Challenges

In 2008, U.S. major commercial carriers burned 19.6B gallons of jet fuel, and DOD burned 4.6B gallons. At an average price of $3.00/gallon, fuel cost was $73B

U.S. commercial carriers and DoD release more than 250 million tons of CO_2 into the atmosphere each year

In 2007, aircraft in the U.S. spent 213 million minutes taxiing and in ground holds

Airline delays in the U.S. cost industry and passengers $32.9B in 2007

The high cost of certification for new or upgraded aviation systems is prohibitive

40 of the top 50 U.S. airports are in areas that do not meet EPA local air quality standards

Aircraft noise continues to be regarded as the most significant hindrance to system growth

FAA's attempt to reconfigure New York airspace resulted in 14 noise related lawsuits

Since 1980 FAA has invested over $5B in airport noise abatement programs in homes

National Calls for Aeronautics R&D

National Aeronautics Research and Development Policy

Executive Order signed by President Bush December 2006

National Plan for Aeronautics Research and Development and Related Infrastructure

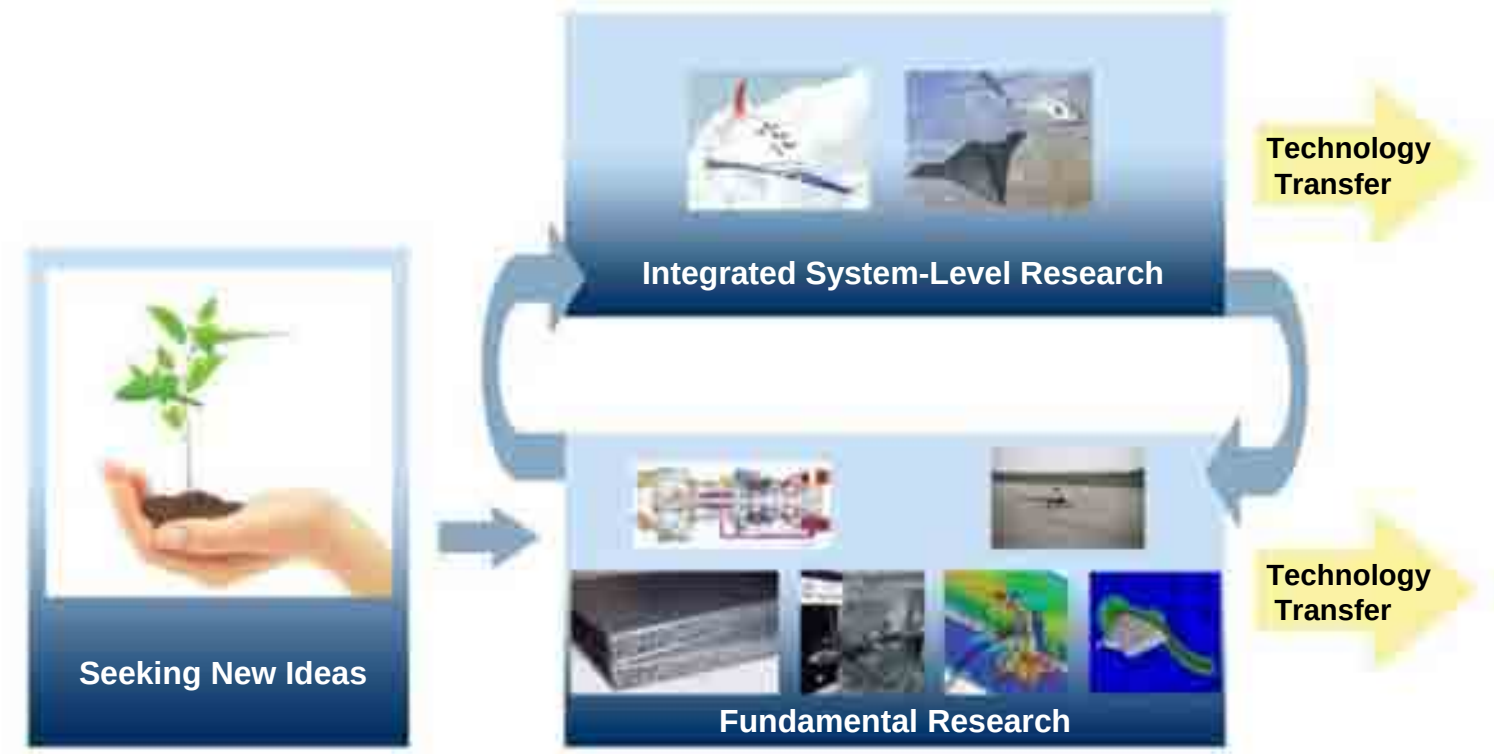
Original plan signed by White House December 2007;
Biennial update signed Feb 2010

NextGen

Vision100: Public Law 108-176, December 2003

- Established the Joint Planning and Development Office (JPDO) to enlarge multiple agencies that would collaborate to plan, develop and implement the Next Generation Air Transportation System (NextGen)

NASA Aeronautics Investment Strategy



Enabling “Game Changing” concepts and technologies from advancing fundamental research ultimately to understand the feasibility of advanced systems

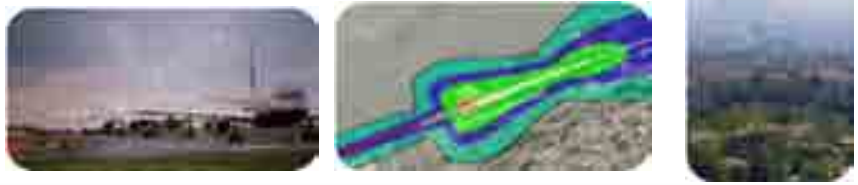
NASA Aeronautics Programs in FY2011

Fundamental Aeronautics Program

Enable revolutionary changes for vehicles that fly in all speed regimes.

Integrated Systems Research Program

Research at an integrated system-level on promising concepts and technologies and explore/assess/demonstrate the benefits in a relevant environment



Airspace Systems Program

Concepts, capabilities, and technologies that will enable significant increases in the capacity, efficiency and flexibility of the NAS.

Aviation Safety Program

Enable innovative concepts, tools, and technologies to improve the intrinsic safety attributes of current and future aircraft.

Aeronautics Test Program

Preserve and promote the testing capabilities of a comprehensive set of flight and ground-based research facilities.

FY2010 Accomplishments




Fundamental Aeronautics Program

- N+3 advanced concept studies of 2035 subsonic & supersonic aircraft - guidance for future NASA technology development
- Full-scale UH-60 rotor test - unprecedented set of code validation data
- Significant progress in validating NASA air-breathing propulsion CFD codes and boundary layer transition/aeroheating models using X-51 ground/flight test data & Shuttle flight data

Integrated Systems Research Program

- X-48B Low Speed Flight Controls Flight Test
- GE Open Rotor Wind Tunnel Test
- HWB/Advanced Tube and Wing System Study Completed



Airspace Systems Program

- Investigate allocation of traffic management functions between human and automation and between ground and the flight deck
- Partner with FAA and industry to developfuel and noise efficient arrival operations


Aviation Safety Program

- Enhanced durability of high-temperature engine disks
- Flight deck decision support concepts for terminal area ops
- On-board fault detection for improved health management
- Fast, reliable, non-destructive wire crimp test tool


Aeronautics Test Program

- Completed Facility Aerodynamics Validation and Operations Research model testing (FAVOR), a cross-agency technology development project
- Held National Force Measurement Technology Capability International Symposium, international forum for technical exchange among wind tunnel technology specialists and strain gage balance experts

FY2011 Budget Highlights

The 2011 Budget for NASA Aeronautics provides continued emphasis on NASA's contributions to the NextGen and Green Aviation.

- Two **new initiatives** ($50M per year) will enhance our contributions to NextGen
  - The **Unmanned Aircraft System (UAS)** integration into the NAS is a five year focused program of systems-level research and demonstration of concepts and technologies that will enable the development and certification of safe, routine operation of unmanned systems in the national airspace.
  - The **V&V of Aviation Flight Critical Systems** initiative will enable research of V&V methodologies and concepts to test, validate, and certify complex hardware and software systems that will perform reliably, securely, and safely as intended.
- Augmenting research to mitigate environmental impacts with $20M/yr

Collaboration with External Partners

Other Government Agencies

U.S. Industry

NORTHROP GRUMMAN
LOCKHEED MARTIN
Gulfstream
Raytheon
BOEING
United Technologies Research Center

Aeronautics

Academia

International Organizations

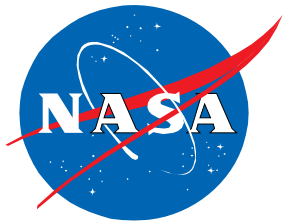
JAXA
NRC·CNRC Canada
DLR
NLR
ONERA

Summary

NASA Aeronautics has experienced tremendous success through the past years by valuing innovation and technical excellence.

We continue to provide valuable benefit to the aviation community and the Nation by remaining committed to the following core principles:

- Aligning our research to ensure a strong relevance to national needs
- Transferring technology in a timely and robust manner
- Maintaining and facilitating strong partnerships with other government agencies, industry and academia
- Inspiring the next generation of engineers and researchers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