



NASA AERONAUTICS AND THE NASA ADVANCED AIR TRANSPORT TECHNOLOGY PROJECT

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Opening Remarks
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NASA Aeronautics Vision for the 21st Century



**A revolution in
sustainable
global air
mobility**



Safe, Efficient Growth in Global Operations

- Enable full NextGen and develop technologies to substantially reduce aircraft safety risks



Innovation in Commercial Supersonic Aircraft

- Achieve a low-boom standard



Ultra-Efficient Commercial Vehicles

- Pioneer technologies for big leaps in efficiency and environmental performance



Transition to Low-Carbon Propulsion

- Characterize drop-in alternative fuels and pioneer low-carbon propulsion technology



Real-Time System-Wide Safety Assurance

- Develop an integrated prototype of a real-time safety monitoring and assurance system



Assured Autonomy for Aviation Transformation

- Develop high impact aviation autonomy applications

NASA Aeronautics Programs



MISSION PROGRAMS

Airspace Operations and Safety Program



AOSP

Safe, Efficient
Growth in Global
Operations

Real-Time System-
Wide Safety
Assurance

Assured Autonomy
for Aviation
Transformation

Advanced Air Vehicles Program



AAVP

Ultra-Efficient
Commercial Vehicles

Innovation in
Commercial
Supersonic Aircraft

Transition to Low-
Carbon Propulsion

Assured Autonomy for
Aviation Transformation

Integrated Aviation Systems Program



IASP

Flight research-
oriented, integrated,
system-level R&T
that supports all
six thrusts

X-planes/
test environment

SEEDLING PROGRAM

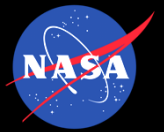
Transformative Aeronautics Concepts Program



TACP

High-risk, leap-frog
ideas that support all
six thrusts

Critical cross-cutting
tool development



Advanced Air Transport Technology Project

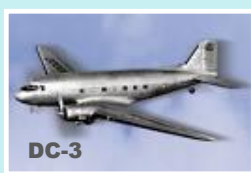
Explore and Develop Technologies and Concepts for Improved Energy Efficiency and Environmental Compatibility for Fixed Wing Subsonic Transports

- Early stage exploration and initial development of game-changing technologies and concepts
- Commercial focus, but dual use with military
- Gen N+3 time horizon
- Research aligned with two NASA Aeronautics strategic R&T thrusts
- Research vision guided by vehicle performance metrics developed for reducing noise, emissions, and fuel burn

Evolution of Subsonic Transports



1903



1930s



1950s



2000s



N+3 Advanced Vehicle Concept Studies



Boeing, GE,
GA Tech



Advanced concept studies for commercial subsonic transport aircraft for 2030-35 Entry into Service (EIS)

NG, RR, Tufts,
Sensis, Spirit



GE, Cessna,
GA Tech



Trends:

- Tailored/multifunctional structures
- High aspect ratio/laminar/active structural control
- Highly integrated propulsion systems
- Ultra-high bypass ratio (20+ with small cores)
- Alternative fuels and emerging hybrid electric concepts
- Noise reduction by component, configuration, and operations improvements

MIT, Aurora,
P&W, Aerodyne



NASA,
VA Tech, GT



NASA



Advances required on multiple fronts...

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AATT Project Technical Investment Areas

Based on Goal-Driven Advanced Concept Studies

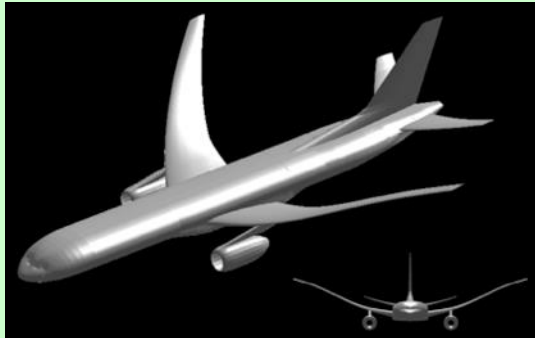


Goals Metrics (N+3)	Noise Stage 4 – 52 dB cum	Emissions (LTO) CAEP6 – 80%	Emissions (cruise) 2005 best – 80%	Energy Consumption 2005 best – 60%
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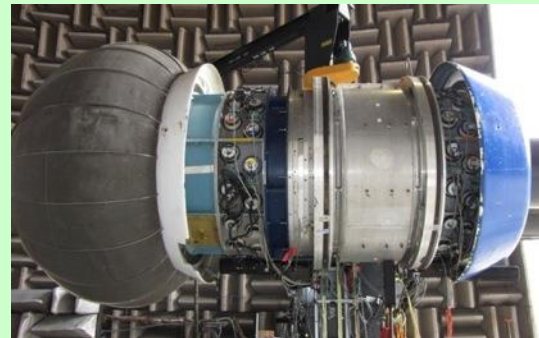
Goal-Driven
Advanced
Concepts (N+3)



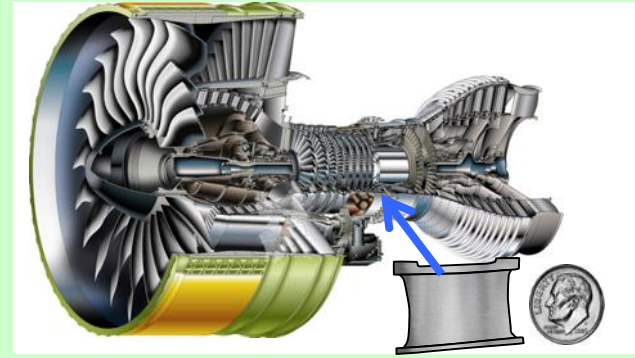
Investments in both Near-Term Tech Challenges and Long-Term (2030) Vision



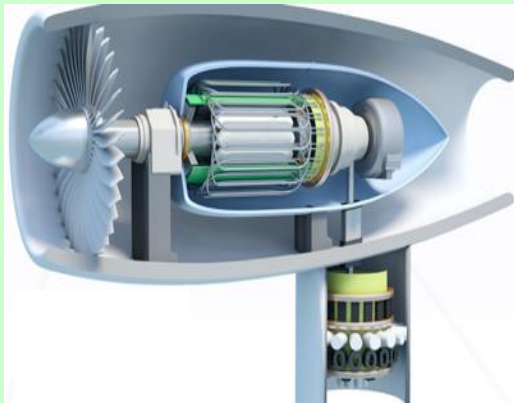
Higher Aspect Ratio Optimal Wing



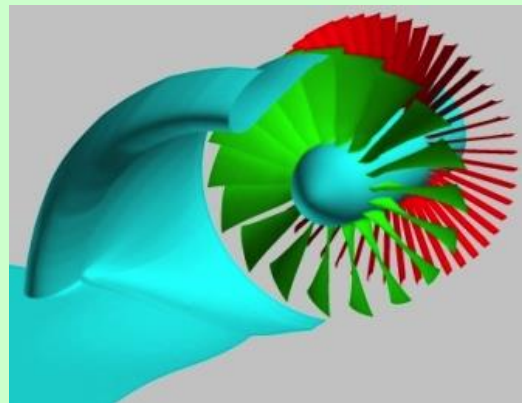
Quieter Low-Speed Performance



Cleaner, Compact Higher BPR Propulsion



Hybrid Gas Electric Propulsion



Unconventional Propulsion
Airframe Integration



Alternative Fuel Emissions

