National Aeronautics and Space Administration

NASA Aeronautics Research
Then and Now

N+2 Advanced Vehicle Concepts &
Quick-Starts NRA Pre-Proposal Meeting
February 19, 2010

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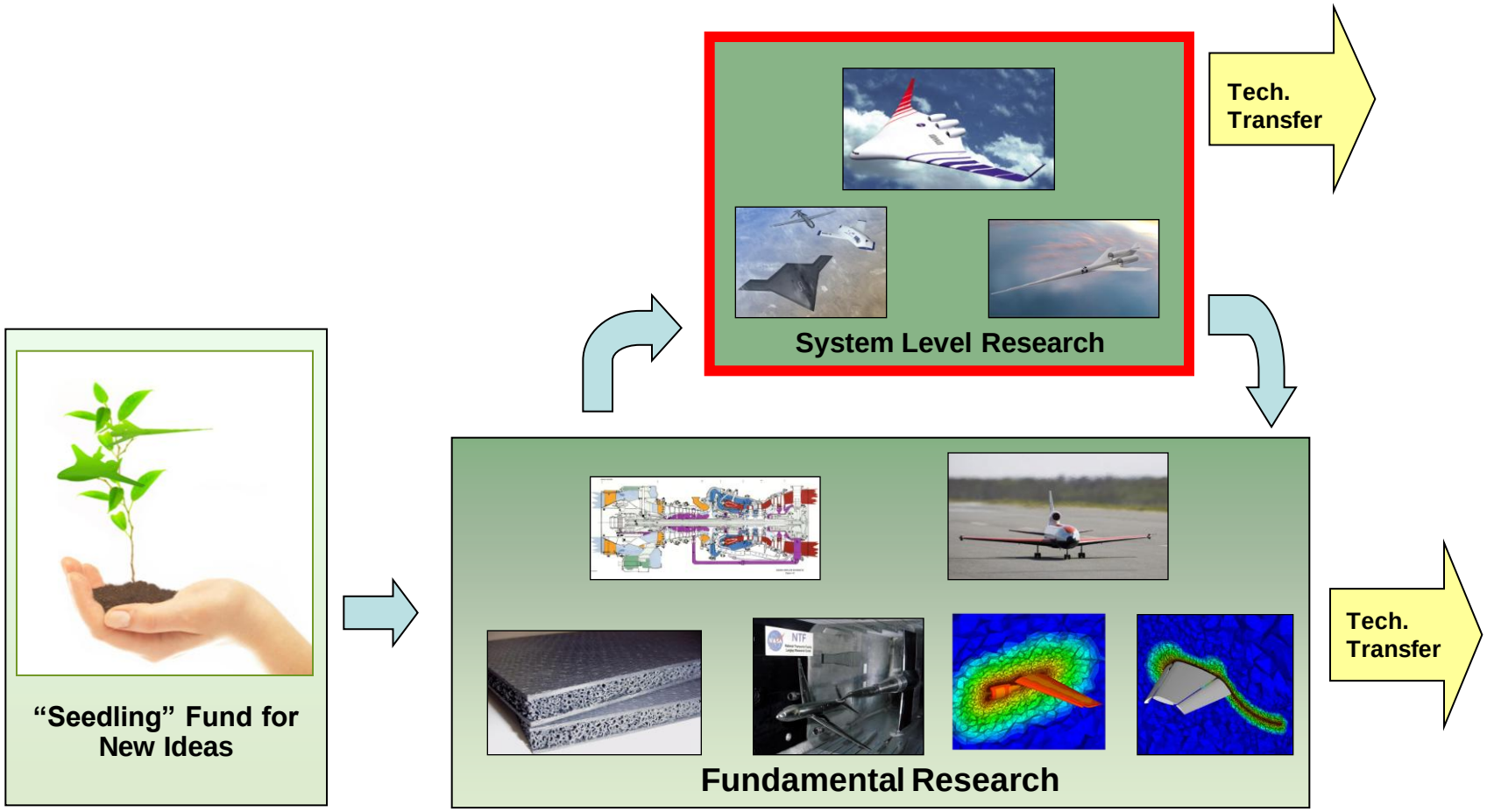
Major Aeronautics Challenges & Opportunities

- **Environmental Compatibility**
  - Emissions - CO_2 and NOx
    - **Aviation creates 2% of worldwide emissions**
  - Noise
    - **Airport community noise reduction**
      - > Increased access to 5,221 US public use airports
      - > FAA attempt to reconfigure New York airspace resulted in 14 lawsuits
      - > Since 1980 the FAA has invested over $5 billion in airport noise reduction programs
      - > Noise insulation of 6000 Chicago homes cost over $18M and $285M allocated for schools
    - **Sonic Boom over land**
      - > Enhance Supersonic Transport economic viability
- **Economic Efficiencies**
  - Airspace System Capacity
    - **$5.9B economic impact of airline delays in 2005**
  - Fuel Consumption
    - **Exceeded 26% of airline operating cost in 2006**

The National and NASA Contexts

- National Aeronautics R&D Policy (Dec 2006), Plan (Dec 2007) and Technical Appendix (Dec 2008)
  - “Mobility through the air is vital…”
  - “Aviation is vital to national security and homeland defense”
  - “Assuring energy availability and efficiency …” and “The environment must be protected…”
- NextGen: The Next Generation Air Transportation System
  - Joint Planning Development Office (JPDO), Vision 100 (2003)
  - Revolutionary transformation of the airspace, the vehicles that fly in it, and their operations, safety, and environmental impact
- NASA Strategic Plan
  - Sub-Goal 3E: “Advance knowledge in the fundamental disciplines of aeronautics, and develop technologies for safer aircraft and higher capacity airspace systems.”

NASA Aeronautics Investment Strategy



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

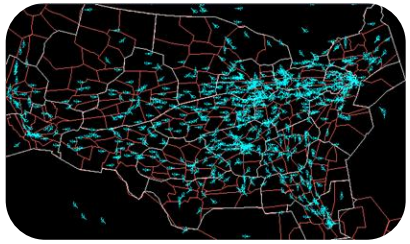
NASA Aeronautics Portfolio in FY2010

Fundamental Aeronautics Program

Conduct cutting-edge research that will produce innovative concepts, tools, and technologies to enable revolutionary changes for vehicles that fly in all speed regimes.

Integrated Systems Research Program

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



Airspace Systems Program

Directly address the fundamental ATM research needs for NextGen by developing revolutionary concepts, capabilities, and technologies that will enable significant increases in the capacity, efficiency and flexibility of the NAS.

Aviation Safety Program

Conduct cutting-edge research that will produce 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 one of the United States' largest, most versatile and comprehensive set of flight and ground-based research facilities.

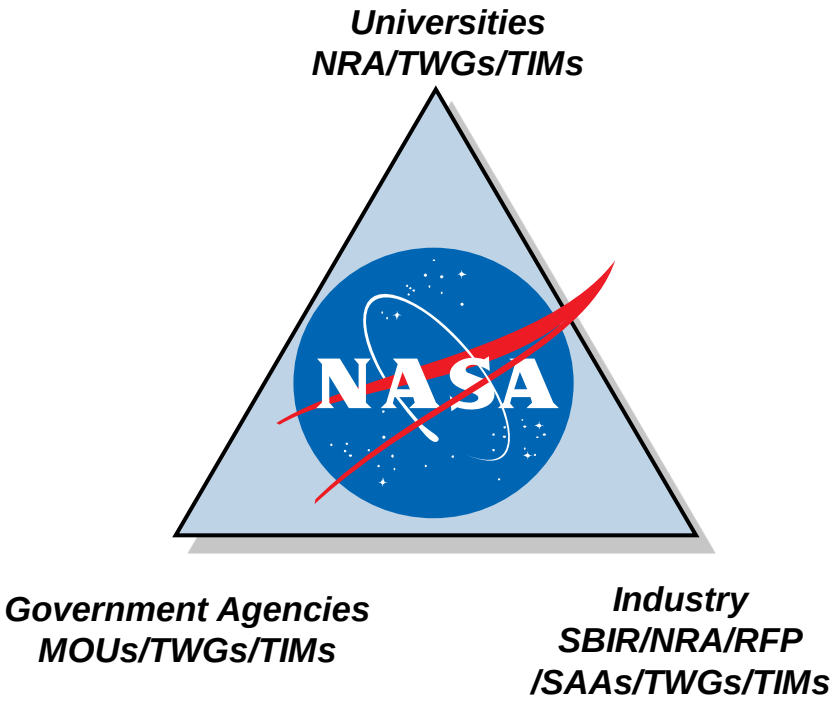
Other Similar Agency Efforts in Green Aircraft

The ERA Project complements other government research programs

Agency	Project or Activity	Funded Years	Vehicle Focus	Proposed TRL	Goal: Major Reduction/ *Minor Reduction*
FAA	**CLEEN**	**FY10-FY14**	**N+1**	**6-7**	**Noise** **Emissions** **Fuel burn**
DoD	ADVENT/ HEETE/ AD-HEETE	FY10-FY14	N+2	>6	Fuel burn *Noise* *Emissions*
NASA	ERA	FY10-FY14	N+2	4-6	<u>Simultaneous</u> Noise Emissions Fuel Burn
NASA	SFW & SUP	FY10-FY14	N+3	2-4	Noise Emissions Fuel Burn
DoD	RCEE	FY10-FY14	Beyond N+3	2-6	Fuel Burn *Emissions* *Noise*

Partnership Philosophy

- Help foster a collaborative research environment in which ideas and knowledge are exchanged across all communities.
- Maximize the return on investment to the taxpayer (our main stakeholder).
- In accordance with NASA's Space Act (as amended) and the National Aeronautics R&D Policy, we will provide for the widest practical and appropriate dissemination of our research results (consistent with national security and foreign policy).
- ARMD works under the umbrella of NASA's broad acquisition strategy that utilizes procurement mechanisms such as NASA Research Announcements (NRAs), Request For Proposals (RFPs), SBIR calls, and Space Act Agreements (SAAs).
- ARMD shares technical results and solicits partner insight through annual Technical Interchange meetings (TIMs) and Technical Working Groups (TWGs), journal articles and presentations at technical conferences.



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