Transformative Aeronautics Concepts Program
Overview and CAS Project Details

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What is the Transformative Aeronautics Concept Program?

While mission programs focus on solving challenges, this program focuses on cultivating opportunities.

Seedling Program

Transformative Aeronautics Concept Program

Cultivates multi-disciplinary, revolutionary concepts to enable aviation transformation and harnesses convergence in aeronautics and non-aeronautics technologies to create new opportunities in aviation

Knocks down technical barriers and infuses internally and externally originated concepts into all six strategic thrusts identified by ARMD, creating innovation for tomorrow in the aviation system.

Provides flexibility for innovators to explore technology feasibility and provide the knowledge base for radical transformation.

Solicits and encourages revolutionary concepts

Creates the environment for researchers to become immersed in trying out new ideas

Performs ground and small-scale flight tests

Drives rapid turnover into new concepts

Projects

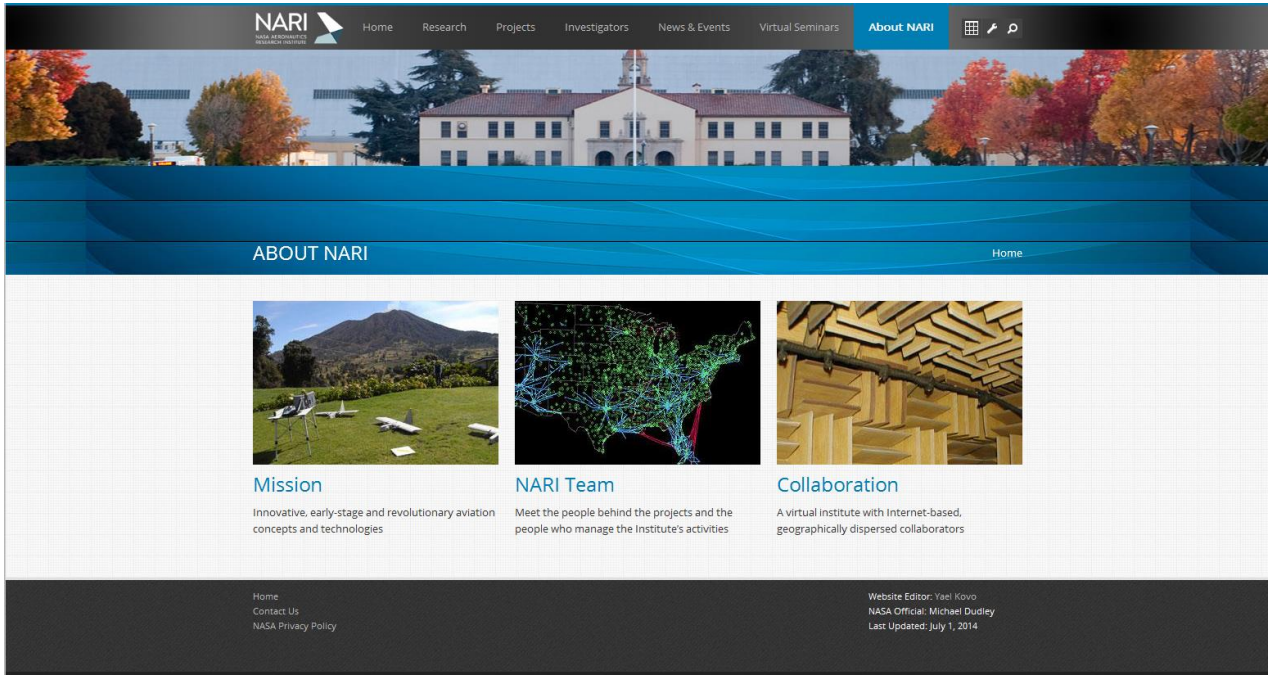
Leading Edge Aeronautics Research for NASA

Transformational Tools And Technologies

Convergent Aeronautics Solutions

Leading Edge Research for NASA (LEARN) Project

- External seedling project hosted by NASA Aeronautics Research Institute
  - Has transitioned to the “Big Question,” multi-disciplinary approach in call for proposals to challenge community to conceptualize solutions
  - Project will include challenge prizes



http://nari.arc.nasa.gov/

Transformational Tools & Technologies (TTT) Project

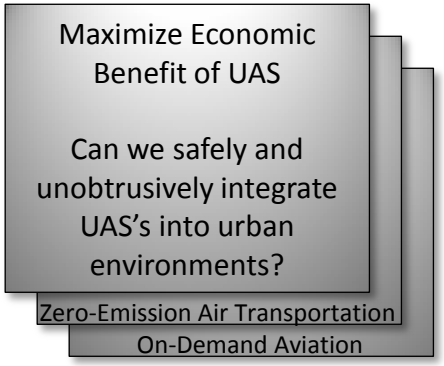
- Continues current path of emphasis on revolutionary tools & technologies from Aero Sciences Project roots
  - "Grand challenge" approach for focus on "revolution" & "transformation"
  - Tools and technologies have an enabling and seedling relationship with other ARMD Projects
- Revolutionary Computational Aerosciences
  - CFD Vision 2030, focus MDAO tools, combustion, acoustics
- Critical Aeronautical Technologies (broadly critical single disciplines)
  - Innovative Materials & Structures (current High Temp Ceramic Matrix Composites Tech Challenge thru FY17)
  - Innovative Measurement & Controls

Enable fast, efficient design & analysis of advanced aviation systems from first principles by developing physics-based tools/methods & cross-cutting technologies, provide new MDAO & systems analysis tools, & support exploratory research with the potential to result in breakthroughs

Convergent Aeronautics Solutions (CAS) Project

Focus on Big Questions

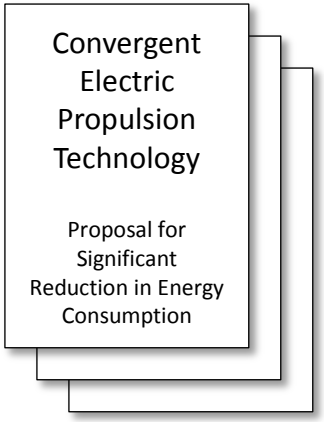
Focus on major system level questions and challenges that require NASA and the aviation community to think beyond current concepts, architectures and relationships



Develop Questions and Challenges with the Aviation Community

Conceive New Multi-Disciplinary Solutions

Multi-disciplinary NASA teams develop proposed new "convergent" solutions focused on proving feasibility and value of concepts



Proposed Convergent Solutions

Fund Rapid Feasibility

ARMD funds 1 – 3 year feasibility R&D for the most promising and innovative solutions that have the potential to be game-changers for the aviation community.

Partnerships, Experimentation & Analysis for Feasibility

Review with Aviation Community / Transfer or Terminate

Each project will be reviewed in depth and criteria for success will be established. Efforts are transferred into Mission Programs, out to the aviation community or are documented and terminated based on how well the criteria were met.

Demonstration, Dissemination and Transfer

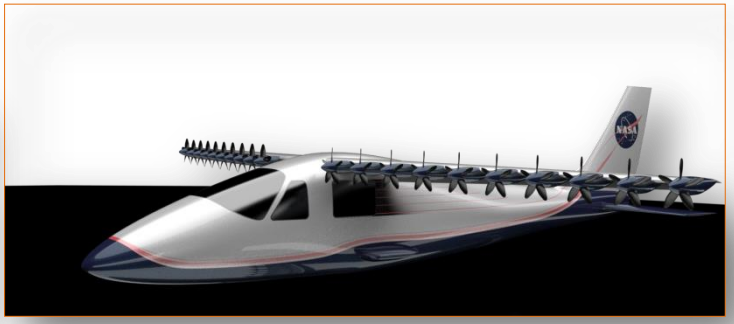
CAS Processes: Lifecycle of Sub-Project

Phase	Description	Details
Incubation	Project investment for idea, team, and proposal development	Cross-Center idea generation and maturation • Centers nurture teams and ideas • Centers' screening process to ensure quality of proposals
Activity Selection	TACP's "Shark Tank" for next step investment	Prompt and transparent determination based on proposal alignment with CAS objectives • (Specific criteria being developed)
Execution	Rapid assessment of concept feasibility	Multi-center, multi-disciplinary team • Teaming flexible and organic • "Lite" project management – simple progress checks to allow Project and Center a minimal level of visibility • Project and Center management ***support*** the teams
Transition	Document learning and establish path beyond CAS	Carry-through on advancing the concept and/or informing new ARMD research and development • Disseminate knowledge • Sub-Project documentation • If feasible, then: advocate further investment via ARMD strategic portfolio and project formulation processes – or – follow-up on external infusion of results

BACK-UP

Convergent/Distributed Electric Propulsion Technology Integration

- Research Need: Achieve significant reductions in energy consumption, carbon emissions and noise
- Objective: Determine if electric propulsion integration is an emerging disruptive technology
- Deliverables:
  - Analytical proof of scaling to commercial aircraft
  - Feasibility assessment of improving propulsive efficiency while reducing noise and emissions
  - Economic benefits study



Towed X-Plane

- Research Need: Obtain vehicle performance data and flying qualities for future ultra-efficient commercial vehicle configurations
- Objective: Explore viability of a large-scale towed X-Plane as a cost effective alternative to a fully functioning vehicle with its own propulsion system
- Deliverables:
  - Research requirements for large-scale ultra efficient commercial vehicle X-Plane
  - Refined cost and schedule for towed X-Plane project
  - X-Plane requirements and RFP
  - Concept of operations