Federal Aviation Administration Research Program

Presented to: Air Transport Network (AirTN)
Work Package 4 - Competitiveness Workshop 2 - International Networking

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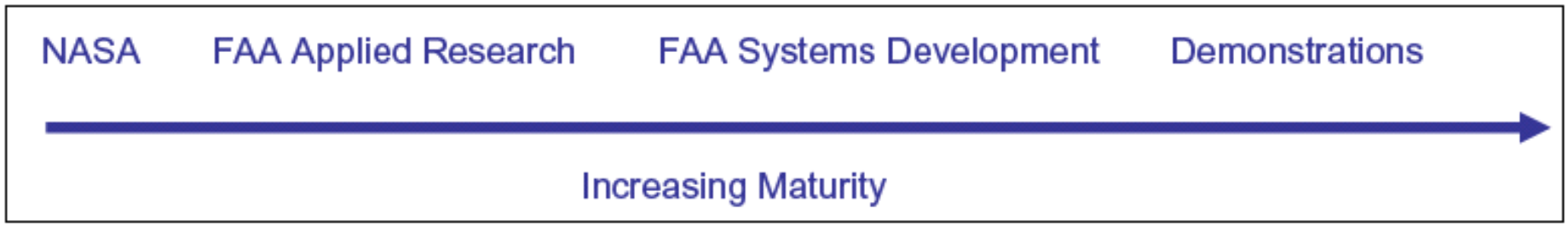
The National Aviation Research Plan (NARP)

A single, integrated and performance-based FAA R&D plan that focuses on the needs of the national air transportation system

- Spans a portfolio of legacy programs and new NextGen programs
- Mandated by Congress
- Encourages collaboration within FAA
- 2-year budget cycle
- Engages the Research, Engineering & Development Advisory Committee (REDAC)

Definition of Research and Development

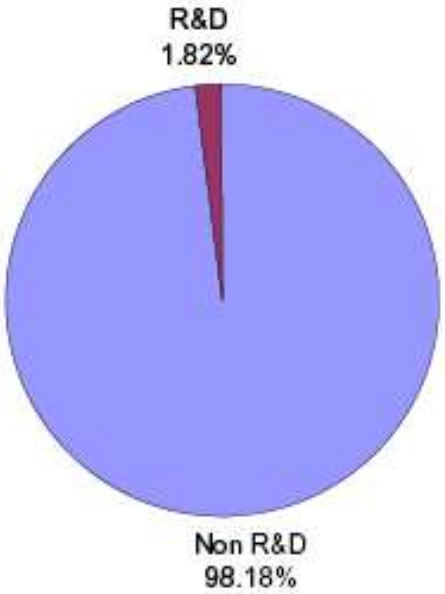
- **Applied Research** - systematic study to gain knowledge or understanding necessary to determine the means by which recognized and specific needs may be met.



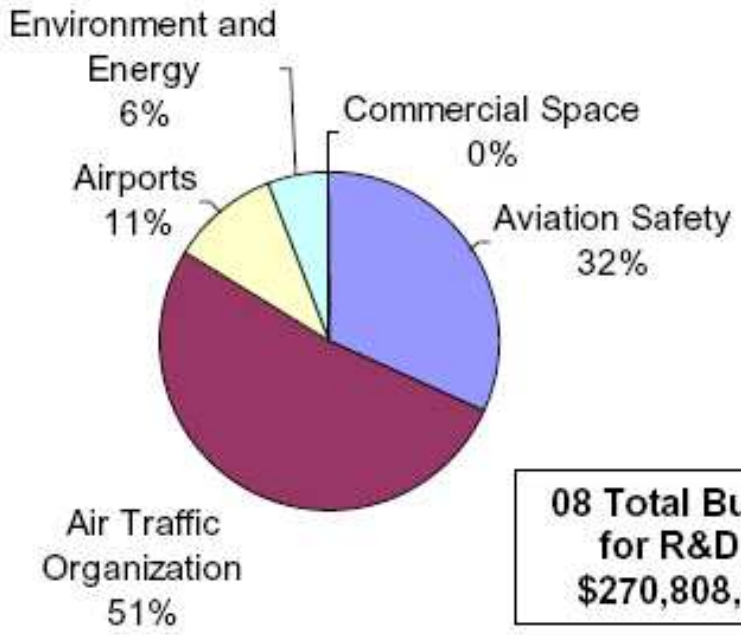
- **Development –** systematic application of knowledge or understanding directed toward production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

Fiscal Year 2008 Budget

Fiscal Year 2008 Research&Development (R&D)
As Part of FAA Total Budget of 14.9 billion



Budget By Sponsor



08 Total Budget for R&D is $270,808,000

Program Budget by Sponsoring Organization

Aviation Safety (AVS)	FY 08	FY 09
Fire Research and Safety	7,350,000	6,650,000
Propulsion and Fuel Systems	4,086,000	3,669,000
Advanced Materials/Structural Safety	7,083,000	2,920,000
Atmospheric Hazards/Digital System Safety	3,574,000	4,838,000
Aging Aircraft/Continued Airworthiness	15,945,000	14,589,000
Aircraft Catastrophic Failure Prevention Research	2,202,000	436,000
Flightdeck/Maintenance/System Integration Human Factors	9,200,000	7,465,000
Aviation Safety Risk Analysis/System Safety Management	9,517,000	12,488,000
Aeromedical Research	7,760,000	8,395,000
Weather Program	16,888,000	16,968,000
Unmanned Aircraft Systems Research	2,920,000	1,876,000
NextGen - Air Ground Integration	0	2,554,000
NextGen - Self Separation	0	8,025,000
NextGen - Weather Technology in the Cockpit	0	8,049,000
NextGen - System Safety Management Transformation	0	16,300,000
Aviation Safety Total	**$86,525,000**	**$115,222,000**

Program Budget by Sponsoring Organization

Air Traffic Organization (ATO)	FY 08	FY 09
Air Traffic Control/Technical Operations Human Factors	10,000,000	10,469,000
Joint Planning and Development Office	14,321,000	14,494,000
Wake Turbulence	12,813,000	10,132,000
GPS Civil Requirements	3,100,000	0
System Planning and Resource Management	1,184,000	1,817,000
William J. Hughes Technical Center Laboratory Facility	3,415,000	3,536,000
Runway Incursion Reduction	8,000,000	10,000,000
System Capacity, Planning and Improvement	6,500,000	6,500,000
Operations Concept Validation	3,000,000	7,400,000
NAS Weather Requirements	1,000,000	1,000,000
Airspace Management Lab	4,000,000	4,000,000
Airspace Redesign	5,000,000	3,000,000
Wind Profiling and Weather Research Juneau	4,000,000	1,100,000
Wake Turbulence	3,000,000	0
Local Area Augmentation System (LAAS)	1,000,000	0
Safe Flight 21 - Alaska Capstone	15,000,000	0
NextGen Demonstration	20,000,000	28,000,000
NextGen - ATC/Tech Ops Human Factors (Controller Efficiency)	0	6,700,000
NextGen - New ATM Requirement	0	5,400,000
NextGen - Ops Concept Development (Validation Modeling)	0	4,000,000
NextGen - Wake Turbulence (Re-categorization)	0	2,000,000
MITRE Center for Advanced Aviation System Development	24,640,000	28,728,000
Air Traffic Organization Total	**$139,973,000**	**$148,276,000**

Program Budget by Sponsoring Organization

Airports	FY 08	FY 09
Airports Technology Research - Capacity	8,907,000	9,109,000
Airports Technology Research - Safety	9,805,000	10,239,000
Airport Cooperative Research Program - Capacity	2,000,000	5,000,000
Airport Cooperative Research Program - Environment	3,000,000	5,000,000
Airport Cooperative Research Program - Safety	5,000,000	5,000,000
Airports Total	**$28,712,000**	**$34,348,000**

Environment and Energy	FY 08	FY 09
Environment and Energy	15,469,000	15,608,000
NextGen - Environ Research-Aircraft Technology, Fuels, Metrics	0	16,050,000
NextGen - E & E (Noise/Emissions Reduction)	0	2,500,000
NextGen - E & E (Validation Modeling)	0	4,500,000
Environment and Energy Total	**$15,469,000**	**$38,658,000**

Commercial Space	FY 08	FY 09
Commercial Space Transportation Safety	128,000	125,000
Commercial Space Transportation Total	**$128,000**	**$125,000**

R&D Budget for NextGen

Program	2008	2009	Focus
Human Factors	0	6,700,000	Controller efficiency
Environment & Energy	0	2,500,000	Noise and emission reduction
Environment & Energy	0	4,500,000	Validation modeling
New ATM Requirements	0	5,400,000	Supports 3 times capacity
Operations Concept Development	0	4,000,000	Validation modeling
System Safety Management Trans	0	16,300,000	Supports JPDO Safety IPT goals
Wake Turbulence (Re-categorization)	0	2,000,000	Technology and standards
Wake Turbulence	8,000,000	7,370,000	Separation standards and technologies
Air Ground Integration	0	2,554,000	Air/ground Integration & error management
Self Separation	0	8,025,000	Supports standards, procedures, training
Weather Technology in the Cockpit	0	8,049,000	Weather-in-the-cockpit procedures
Environmental Research – (Aircraft Technologies Fuels and Metrics)	0	16,050,000	Noise and emission reduction
NextGen Total	**$8,000,000**	**$83,448,000**	

FAA Partnerships

- **Federal Government**
  - Joint Planning Development Office (JPDO): FAA, Department of Defense, Department of Transportation, Department of Homeland Security, Department of Commerce, National Aeronautics and Space Administration (NASA), White House Office of Science and Technology
  - Memorandum Of Understanding, Memorandum Of Agreement: NASA, Department of Defense
  - Field Offices at NASA facilities (Ames, Langley)
- **Industry**
  - Contracts
  - Cooperative Research and Development Agreements
- **Academia**
  - Air Transportation Centers of Excellence
  - Aviation Research Grants
  - Joint Universities Program

International Partnerships

- **Transport Canada** joined with the FAA and NASA in sponsoring the Partnership for Air Transportation Noise and Emission Reduction (PARTNER) Center of Excellence.
- **EUROCONTROL** and FAA along with their respective partners cooperate through a MOC in the areas of ATM research as well as strategic ATM analysis, technical harmonization, operational harmonization, and harmonization of safety and environmental factors.

Photo courtesy of DLR

FAA/EUROCONTROL Joint Projects

Action Plan 14: Wake Vortex

- Reduction in aircraft to aircraft wake separation standards through:
  - Application of technologies such as crosswind reduced separation for departure operations
  - Procedures such as closely spaces parallel runways, wake separation standards for new aircraft, and re-categorization.

Action Plan 21: Surface Operation Research

- Advanced Surface Movement Guidance and Control System and Collaborative Decision Making (A-SMGCS and CDM)

Action Plan 23: Advanced Automatic Dependent Surveillance Broadcast (ADS-B) and Airborne Separation Assurance System Applications (ASAS)

- Longer term research on applications that transfer separation responsibilities from the ground to the flight deck.

Aircraft Safety Research

Fire Safety: Prevent in-flight fires and improve postcrash fire survivability

- Develop an analytical model to predict the flammability in fuel wing tanks

Aging Aircraft / Continued Airworthiness: Reduce the number of accidents associated with failure of aircraft structure, engines and systems

- Assess performance of advanced inspection systems to determine strength of bonded aircraft structure

Unmanned Aircraft Systems (UAS): Provide technical information necessary to implement new UAS certification procedures, airworthiness standards, and operational requirements

- Complete technology survey on UAS designs and operations

Airport Safety Research

Improve lighting and markings, reduce wildlife hazards, improve aircraft and firefighting capability, and reduce surface accidents.

- Complete study of Next Generation High Reach Extendable Turret
- Complete validation of commercial avian radars
- Complete evaluation of alternative runway groove shape on asphalt and concrete runway surfaces
- Complete evaluation of camera based foreign object debris (FOD) detection systems at Boston Logan and Chicago O'Hare

Environment and Energy Research

Develop and mature cleaner, quieter, more energy efficient aircraft and engine technologies: advance alternative fuels that reduce air quality and climatic impacts; reduce scientific uncertainties of aviation's effect on climate and develop metrics.

- Establish consortium for Continuous Low Emissions, Energy and Noise (CLEEN) technologies
- Assess and advance the development of "drop in" gas turbine alternative fuels
- Identify promising noise, local air quality and greenhouse gas, and fuel burn reduction technologies for maturation
- Develop tools to aid in demonstrating continuous descent arrival procedures in high density environment

Capacity Research

Human Factors for Controller Efficiency

- Demonstrate a 166% air traffic controller efficiency using an advanced workstation integrating NextGen concepts, capabilities, and procedures.

- Assessing controller procedures for weather and wake separation addressing interoperability of decision support tools and mitigation of human error risks using full mission demonstrations.

Trajectory Based Operations

- Develop procedures, technologies, and tools to support trajectory based operations in transitional airspace, such as between oceanic and domestic en route

Operations Concept Validation Modeling

- Expands the NextGen Operational Concept into an integrated and detailed end-to-end concept of operations for the mid-term (2017) for each phase of flight.

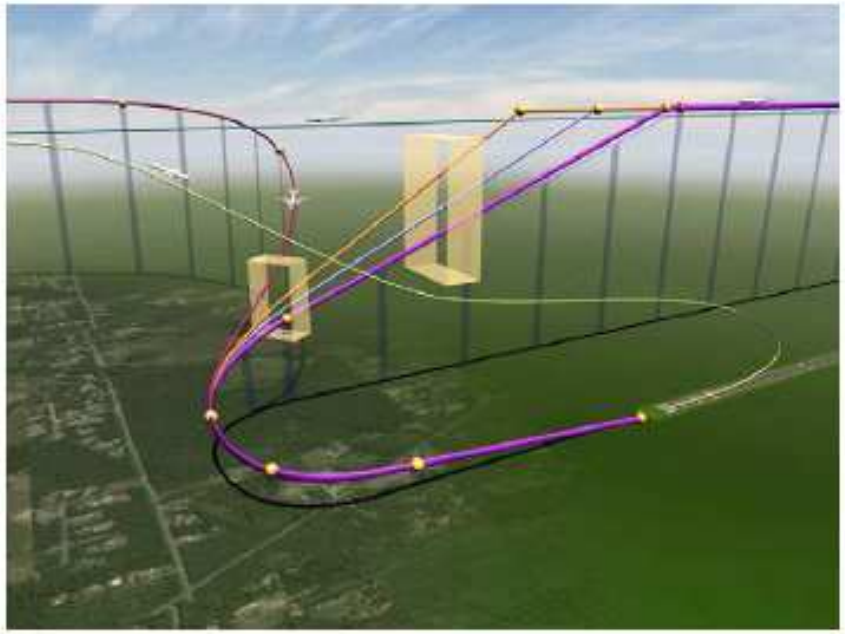
Atlantic Interoperability Initiative to Reduce Emissions

Objectives

- Hasten development of operational procedures to reduce aviation's environmental footprint for all phases of flight
- Accelerate world-wide interoperability of environmentally friendly procedures and standards
- Capitalize on existing technology and best practices

Partners

- Airbus
- Boeing
- DGAC
- Irish Aviation Authority
- Swedish Civil Aviation Administration
- NAV Portugal
- Several commercial carriers



Planned Demonstrations

- 2008
  - Continuous Descent Arrival at Miami and Atlanta
  - Oceanic optimization
  - Surface Operations at Memphis
  - Tailored Arrival at Miami
- 2009
  - CDA at Charles de Gaulle (CDG)
  - Gate to Gate between CDG, and Miami or Atlanta

Future Direction

National Aviation Research Plan (NARP)

http://nas-architecture.faa.gov/nas/downloads/home.cfm

Operational Evolution Plan (OEP)

http://www.faa.gov/about/office_org/headquarters_offices/ato/publications/oep/

Joint Planning and Development Office

http://www.jpdo.gov

National Plan for Aeronautics Research and Development and Related Infrastructure

http://www.ostp.gov/cs/issues/space_aeronautics