

# National Plan for Aeronautics R&D and Related Infrastructure



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# Overview



- **Background and Review of *National Aeronautics R&D Policy* and Executive Order 13419 – *National Aeronautics R&D***
- **Development of the Plan**
- **Overview of the Plan**



# NSTC Aeronautics S&T Subcommittee



- **Created Sept. 2005**
- **Membership:**
  - **OSTP/NASA (Co-Chairs)**
  - **Department of Defense**
  - **Department of Transportation**
  - **Department of Commerce**
  - **Department of Energy**
  - **Department of Homeland Security**
  - **National Science Foundation**
  - **Department of State**
  - **US International Trade Commission**
  - **Executive Office of the President**
- **Outreach to Academia, Industry, and Aviation User Community in Spring 2006**
- **Final approval of Policy and EO December 20, 2006**



# Overview: National Aeronautics R&D Policy



- **Establishes Principles**
- **Sets Policy Goal and Objectives**
- **Creates General Guidelines for Federal Government**
- **Establishes Specific Guidelines**
- **Implementation Guidelines**



# Policy Goal



***“Advance U.S. technological leadership in aeronautics by fostering a vibrant and dynamic aeronautics R&D community that includes government, industry, and academia.”***



# Policy Principles

1. ***Mobility*** through the air is vital to economic stability, growth, and security as a nation
2. Aviation is vital to ***national security and homeland defense***
3. Aviation ***safety*** is paramount
4. ***Security*** of and within the aeronautics enterprise must be maintained
5. The US should continue to possess, rely on, and develop its world-class aeronautics ***workforce***
6. Assuring ***energy availability and efficiency*** is central to the growth of the aeronautics enterprise
7. The ***environment*** must be protected while sustaining growth in air transportation



# Policy Guidelines

- **General:**
  - Role of the Federal Gov. in Aeronautics R&D
  - Aeronautics Workforce
  - Academic Cooperation
  - Commercial Cooperation
  - International Relations
- **Specific:**
  - Stable and Long-term Foundational Research
  - Advanced Aircraft Systems Development
  - Air Transportation Management Systems
  - National RDT&E Infrastructure



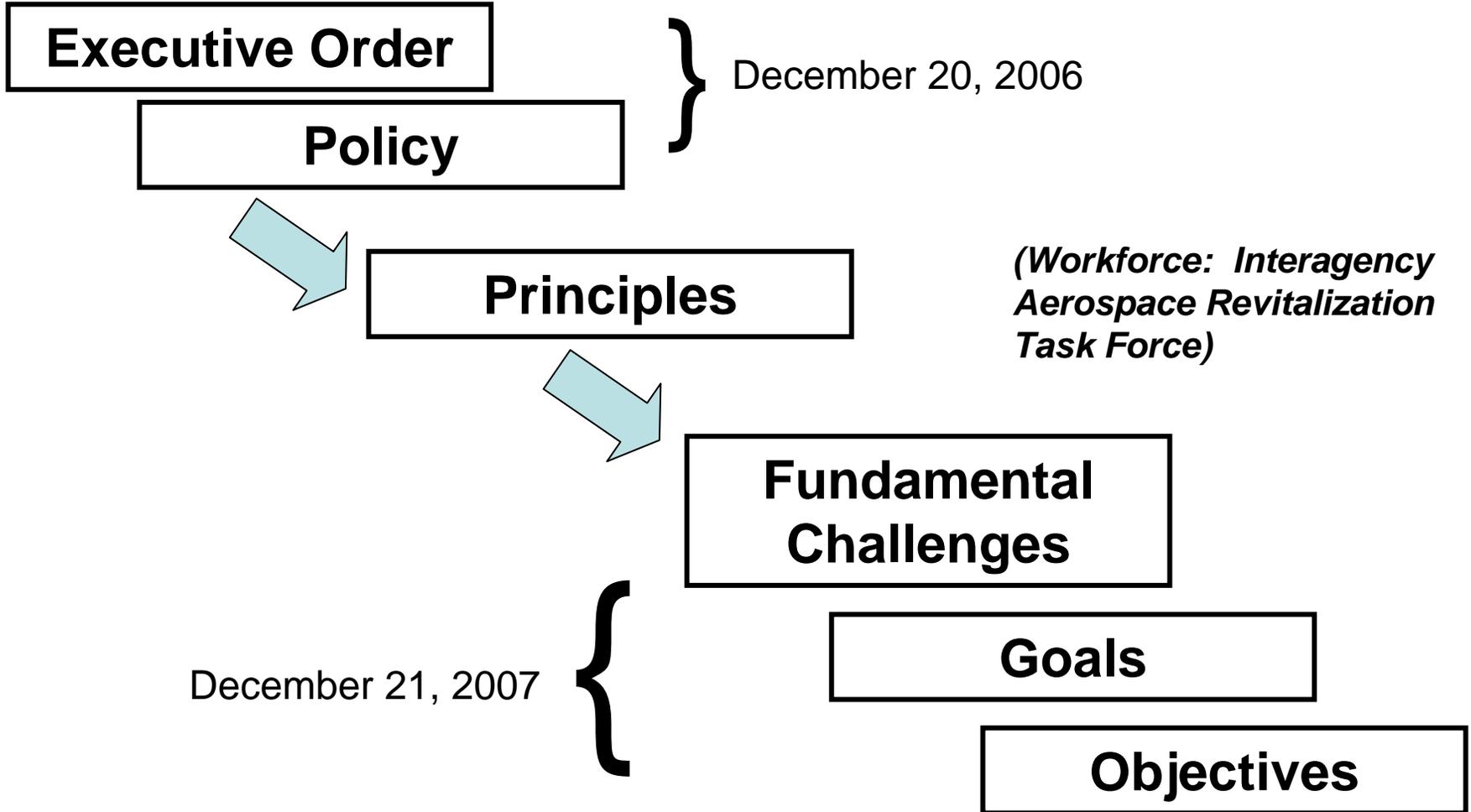
# Policy and EO Implementation Guidelines



- **National Aeronautics R&D and related Infrastructure Plan**
  - National Aeronautics R&D
    - Priorities and objectives, roadmaps, timelines
  - Aeronautics RDT&E Infrastructure
- Engagement with non-Federal stakeholders
- Dissemination of R&D results
- Other innovative policies and approaches that complement and enhance Federal activities
- Biennial review procedure



# Strategy for Development of Plan





# Establishment of Coordinating Groups

- **Mobility**
  - JPDO, NASA
- **National Security and Homeland Defense**
  - DOD
- **Aviation Safety**
  - FAA, NASA
- **Aviation Security**
  - DHS
- **Energy and Environment**
  - DOD, DOE, FAA
- **RDT&E Infrastructure**
  - DOD, NASA

*(Coordination with National Strategy for Aviation Security)*



# Public Outreach Strategy

- **3 NSTC-Sponsored Outreach Sessions:**
  - April 24, National Academy of Sciences, Wash., DC
  - July 11, Joint Propulsion Conference, Cincinnati, OH
  - July 30, NASA Ames Research Center
- **1-3 page White Paper Solicitations:**
  - Two solicitations – 1st due by May 11, 2nd by August 17, 2007
- **Public Comment on draft high-priority aero R&D fundamental challenges, goals and objectives**
  - Comment period: Oct. 22 - Nov. 7, 2007

[www.ostp.gov/nstc/aeroplans](http://www.ostp.gov/nstc/aeroplans)



# Structure of the Plan - R&D for each Principle



- Introduction
- State-of-the-art - *where we are as a Nation today*
- Fundamental Challenges to Overcome
- High priority national aeronautics R&D goals
- Supporting objectives (including numerical targets if appropriate) phased over three time periods - *where we want to go as a Nation*
  - Near term (<5 years)
  - Mid term (5-10 years)
  - Far term (>10 years)



# Structure of the Plan - RDT&E Infrastructure



- **Introduction**
- **Scope**
  - High-end computing
  - Simulation labs
  - Flight test facilities
  - Ground test facilities
- **Fundamental Challenges to Overcome**
- **Goals for follow-on activity**



# Aeronautics R&D Fundamental Challenges, Goals and Objectives



# Mobility

- Principle: ***MOBILITY THROUGH THE AIR IS VITAL TO ECONOMIC STABILITY, GROWTH, AND SECURITY AS A NATION***
- Fundamental Challenges:
  - Airspace
    - Reducing aircraft separation distances to increase traffic density
    - Dynamically balancing airspace capacity to demand
  - Weather
    - Developing more accurate and timely weather observations and forecasts
  - Airports
    - Increasing airport capacity
    - Developing airport terminal designs that facilitate passenger movement
  - Air Vehicles
    - Introducing new generations of air vehicles with vastly improved performance and revolutionary capabilities
    - Improving the efficiency and performance of all classes of aircraft to take advantage of increased performance available in the NAS
  - Cross-cutting
    - Defining appropriate roles for humans (controllers and pilots) in relation to automation
    - Understanding enterprise-level issues (e.g., environmental, organizational)



# Mobility R&D Goals

- **Airspace**
  - **Goal 1 – Develop reduced aircraft separation in trajectory- and performance-based operations**
  - **Goal 2 – Develop increased NAS capacity by managing NAS resources and traffic flow contingencies**
- **Weather**
  - **Goal 3 – Reduce the adverse impacts of weather on ATM decisions**
- **Airports**
  - **Goal 4 – Maximize arrivals and departures at airports and in metroplex areas**
- **Air Vehicles**
  - **Goal 5 – Develop expanded aircraft capabilities to take advantage of increased air transportation system performance**



# National Security

- Principle: ***AVIATION IS VITAL TO NATIONAL SECURITY AND HOMELAND DEFENSE***
- Fundamental Challenges:
  - Improved aerodynamics and innovative airframe structural concepts for high-efficiency fixed- and rotary-wing aircraft
  - Quiet, efficient rotorcraft
  - Highly efficient propulsion systems
  - Integrated thermal and energy management on aircraft
  - High-speed and hypersonic flight
  - Airspace integration and de-confliction, especially as UAS become ubiquitous to aviation operations



# National Security R&D Goals



- **Goal 1 – Demonstrate increased cruise lift to drag and innovative airframe structural concepts for highly efficient high altitude flight and for mobility aircraft**
- **Goal 2 – Develop improved lift, range, and mission capability for rotorcraft**
- **Goal 3 – Demonstrate reduced gas turbine specific fuel consumption**
- **Goal 4 – Demonstrate increased power generation and thermal management capacity for aircraft**
- **Goal 5 – Demonstrate sustained, controlled, hypersonic flight**



# Safety

- Principle: ***AVIATION SAFETY IS PARAMOUNT***
- Fundamental Challenges:
  - Air Vehicle:
    - Monitoring and assessing aircraft health
    - Rapidly and safely incorporating advances in avionics
    - Stabilizing and maneuvering next-generation aircraft in response to safety issues in the NextGen airspace
  - Airspace and Airport Operations:
    - Understanding and predicting system-wide safety concerns of the airspace system and the vehicles envisioned by NextGen
    - Understanding the key parameters of human performance in aviation
    - Ensuring safe operations for the complex mix of vehicles anticipated within the next-generation airspace
  - Personnel:
    - Enhancing the probability of passengers and crew to survive crash impact and escape safely when accidents do occur



# Safety R&D Goals

- **Air Vehicle:**
  - **Goal 1 – Develop technologies to reduce accidents and incidents through enhanced vehicle design, structure, and subsystems**
- **Airspace and Airport Operations:**
  - **Goal 2 – Develop technologies to reduce accidents and incidents through enhanced aerospace vehicle operations on the ground and in the air**
- **Personnel:**
  - **Goal 3 – Demonstrate enhanced passenger and crew survivability in the event of an accident**



# Energy and Environment

- Principle: ***ASSURING ENERGY AVAILABILITY AND EFFICIENCY IS CENTRAL TO THE GROWTH OF THE AERONAUTICS ENTERPRISE, AND THE ENVIRONMENT MUST BE PROTECTED WHILE SUSTAINING GROWTH IN AIR TRANSPORTATION***
- **Fundamental Challenges:**
  - Development of alternative aviation fuels and energy
  - A more complete understanding of the complex interdependencies that exist between aircraft noise, emissions, and fuel burn
  - Improvement in the capability to optimize aircraft noise, fuel efficiency, and emissions impacts
  - Scientific uncertainties relating to a spectrum of environmental interactions must be reduced to levels that enable appropriate action
  - Improvement in the modeling of pollutant concentrations around airports and throughout the atmosphere



# Energy and Environment R&D Goals



- **Goal 1 – Enable new aviation fuels derived from diverse and domestic resources to improve fuel supply security and price stability**
- **Goal 2 – Advance development of technologies and operations to enable significant increases in the energy efficiency of the aviation system**
- **Goal 3 – Advance development of technologies and operational procedures to decrease the significant environmental impacts of the aviation system**



# RDT&E Infrastructure

- **Fundamental Challenges:**
  - A coordinated management structure that cuts across individual Federal agencies
  - Clear identification of critical assets to support goals and objectives of the Plan
  - A cyber-infrastructure integrating physical hardware with simulations
- **Goal 1 – Determine the national RDT&E infrastructure that satisfies national aeronautics R&D goals and objectives**
- **Goal 2 – Establish a coordinated management approach for Federal RDT&E infrastructure that is based upon a national perspective and interagency cooperation**



# Future Implementation

- **A supplemental report to the Plan**
  - Additional technical content on R&D goals and objectives
  - Preliminary assessment of areas of opportunity for potential increased emphasis, as well as potential areas of unnecessary redundancy
- **RDT&E Infrastructure Interagency Working Group**
  - Assessment of necessary RDT&E capabilities for R&D goals and objectives
  - Assessment of current RDT&E capabilities
  - Comparative analysis for identification of potential shortfalls and redundancies
  - Initiate development of a strategy to provide all necessary RDT&E capabilities and terminate those not necessary
  - Establish mechanisms to coordinate and engage with non-Federal stakeholders
  - Recommend interagency cooperative management approaches for RDT&E infrastructure



**Questions?**