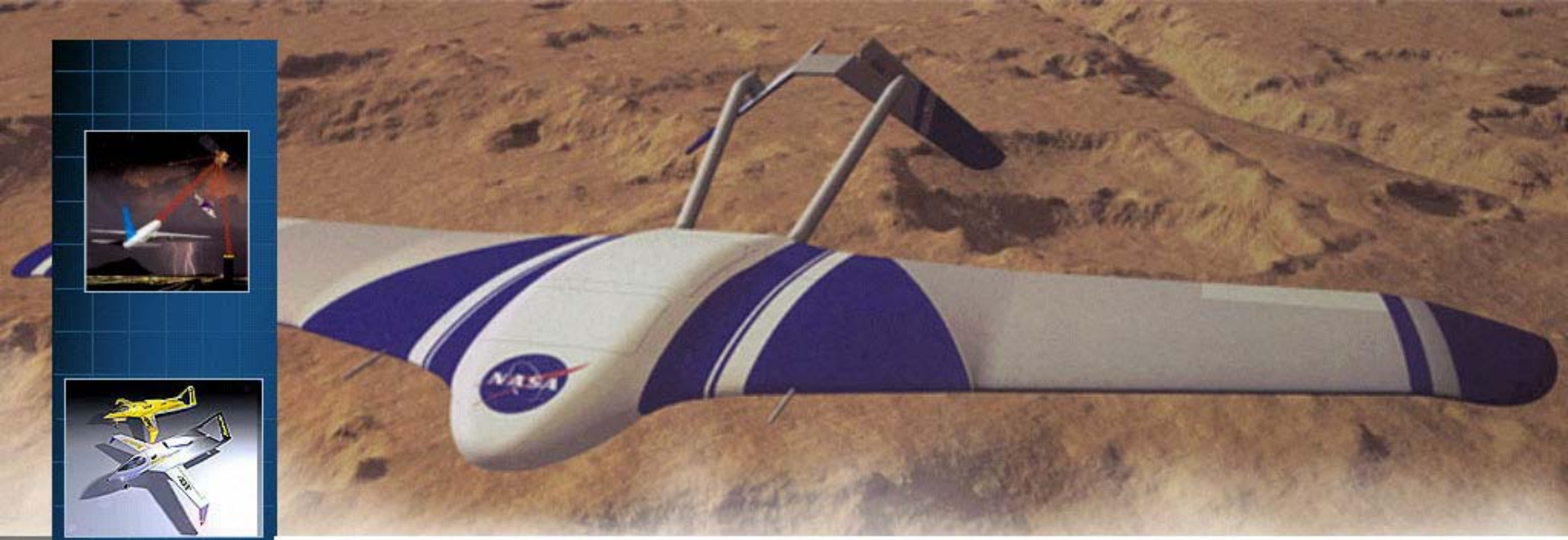


NASA AERONAUTICS enterprise

- Dr. J. Victor Lebacqz
- Associate Administrator

Integrated Communications, Navigation and Surveillance Technologies Keynote Address

April 27, 2004

Outline

- **NASA Vision**
- National Space Exploration Initiative
- Current Mars Exploration
- Aeronautics Exploration

NASA's Vision & Mission

NASA'S Vision

- To improve life here
- To extend life to there
- To find life beyond

NASA's Mission

- To understand and protect our home planet
- To explore the universe and search for life
- To inspire the next generation of explorers

…as only NASA can

Outline

- NASA Vision
- **National Space Exploration Initiative**
- Current Mars Exploration
- Aeronautics Exploration

President's Vision for U.S. Space Exploration

New Space Exploration Vision

"This cause of exploration and discovery is not an option we choose; it is a desire written in the human heart." – President Bush

January 14, 2004

President's Vision for U.S. Space Exploration

- On January 14, the President announced a new space exploration vision for NASA
  - Implement a sustained and affordable human and robotic program to explore the solar system and beyond;
  - Extend human presence across the solar system, starting with a human return to the Moon by the year 2020, in preparation for human exploration of Mars and other destinations;
  - Develop the innovative technologies, knowledge, and infrastructures both to explore and to support decisions about the destinations for human exploration; and
  - Promote international and commercial participation in exploration to further U.S. scientific, security, and economic interests.

Outline

- NASA Vision
- National Space Exploration Initiative
- **Current Mars Exploration**
- Aeronautics Exploration

Sleepy Hollow Depression
(Day 1 from Spirit)

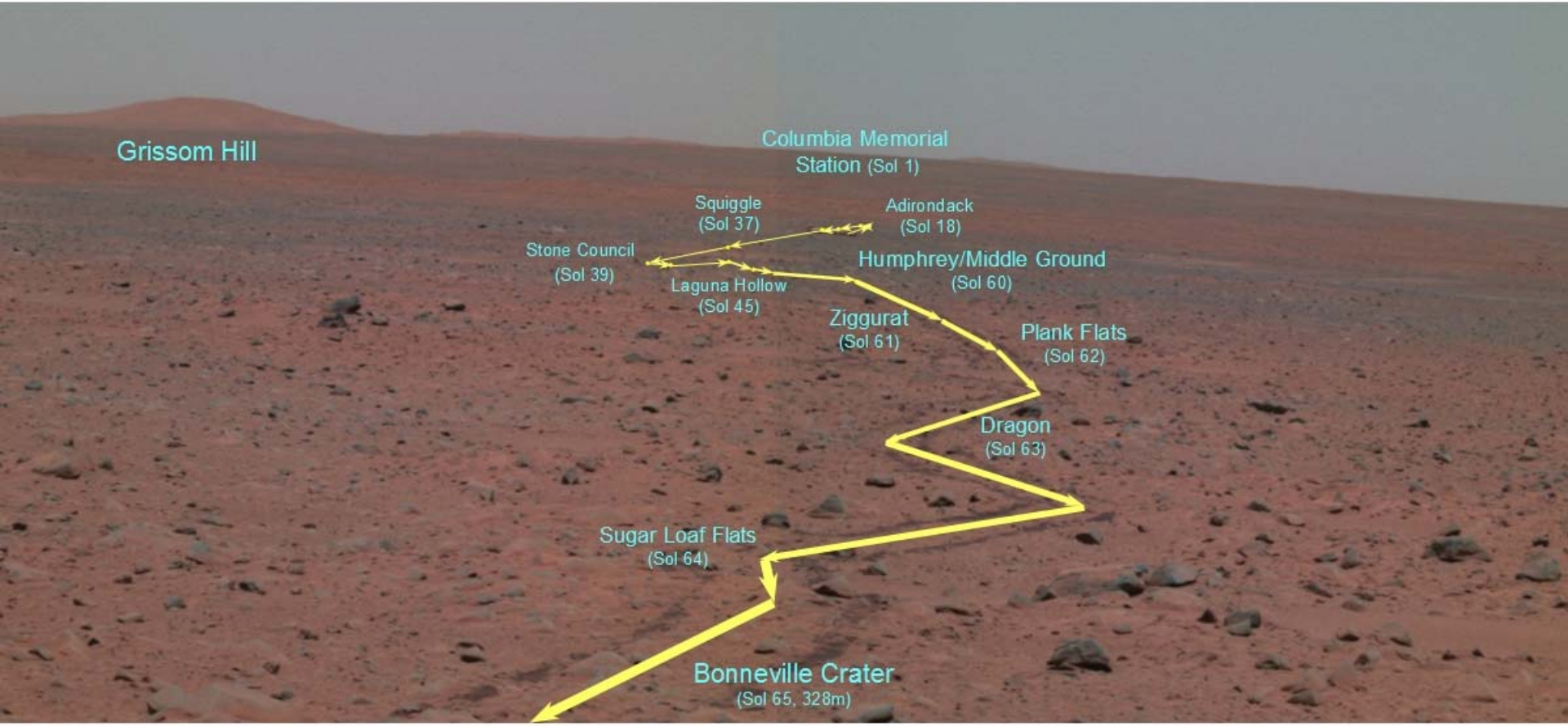
Dark marks are where airbags bounced on the soil during landing.

Our Deepest Hole on Mars!

Meridiani Plains

Opportunity
Dug this
6 inch deep
Trench
On Mars.
White is
compacted
soil

Spirit Rover Traverse – Bonneville Crater (Sol 65)



Mapping and GIS Laboratory, OSU

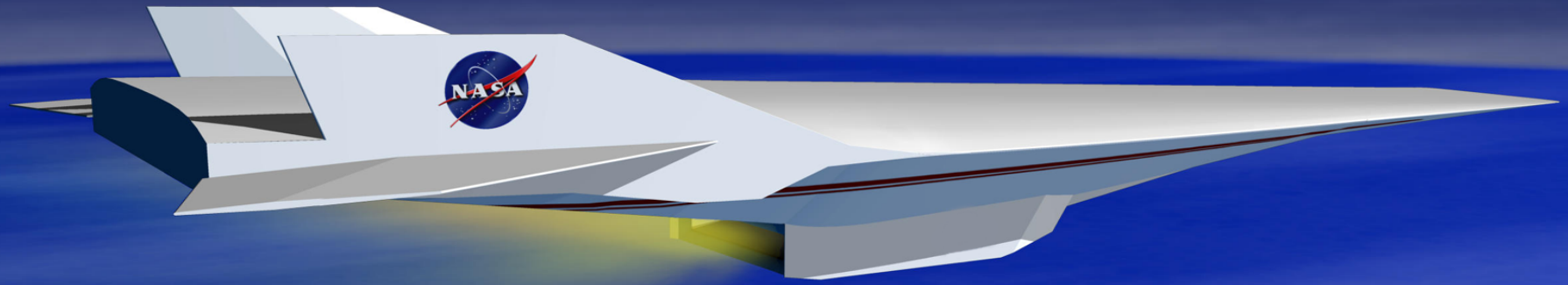
Outline

- NASA Vision
- National Space Exploration Initiative
- Current Mars Exploration
- **Aeronautics Exploration**

Aeronautics Exploration

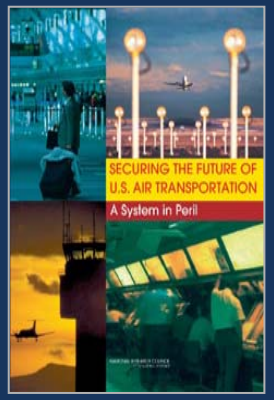
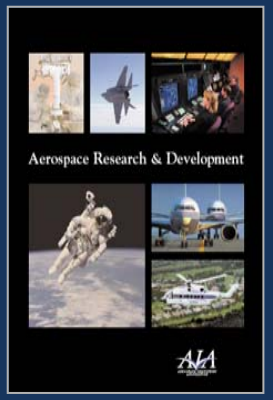
To pioneer and validate high-payoff aeronautical technologies

To improve the quality of life
To enable exploration and discovery
To extend the benefits of our innovation throughout society.



Our success is measured by the extent to which our results are used by others to improve the quality of life and enable exploration and scientific knowledge

Recommendations Matrix

Recommendations				
National Aerospace Vision	X	X	X	X
National Aerospace Leadership	X	X	X	X
Fund Long Term Basic R&D	X	X	X	X
National R&D Coordination	X	X		X
Core Capabilities (Infrastructure)	X			X
Form FAA/NASA Joint Program Office	X		X	X
Technology Demonstration	X	X	X	
Transforming the National Airspace System	X	X		X
Government Industry Partnerships	X	X		X

Air Traffic Video

A DAY IN THE LIFE OF
AIR TRAFFIC OVER
THE CONTINENTAL U. S.

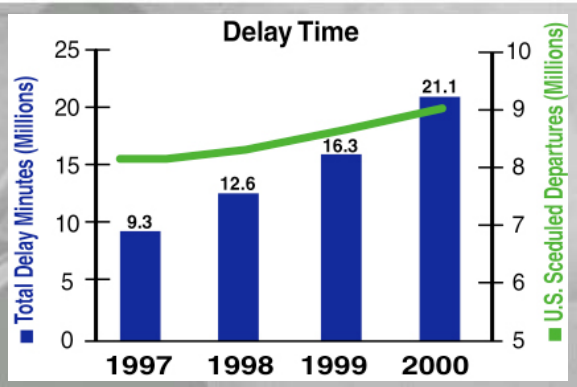
ANIMATION CREATED USING

FUTURE ATM CONCEPTS
EVALUATION TOOL
(FACET)

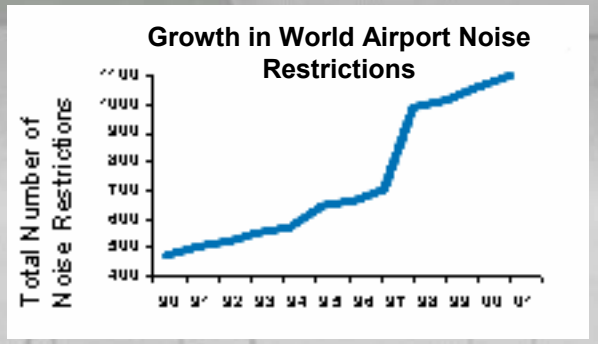
FOR
AVIATION SYSTEMS DIVISION
(AF)
NASA AMES RESEARCH CENTER

Some of Today's Challenges

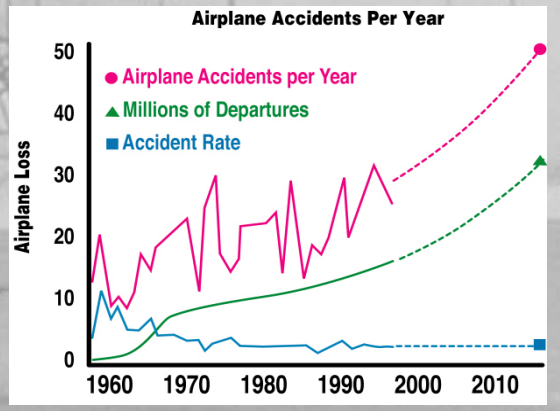
- Limits to capacity - U.S. aviation system is approaching gridlock.



- Noise and emissions are constraints on aviation growth.



- Security and safety must be maintained.



Characteristics of the Future

- Consumers will have lower cost choices for their travel and shipping needs
- Passengers moving through security without delay
- Low cost jets will make private ownership and on-demand service more feasible
- Aircraft will become so environmentally friendly that communities will vie for airports
- Travelers and shippers will take on-time performance for granted

Transformation is required

- Transformation is technologically-enabled change to the system to meet conflicting requirements or to reverse trends
- For example, consider that we need to…
  - Increase ATM productivity while increasing the scalability of the system to handle greater complexity and density of aircraft flows with no degradation for most IMCs
  - Reduce seat-mile costs for small aircraft to allow market-driven penetration of smaller community markets while reducing net fleet environmental impact.
  - Increase airport productivity and efficiency for travelers and shippers while increasing airport security.

Joint Planning and Development Office Coordination

- Joint Planning and Development Office (JPDO)
  - Objective - transforming the Air Transportation System by
    - Developing a National Plan, including a transition roadmap and action plan
    - Developing and implementing government - industry partnerships
    - Coordinating international harmonization of transformation plans and programs
    - Aligning policy and programs across agencies
    - Measuring and reporting on progress toward the National Plan
  - Participating Organizations
    - Federal Aviation Administration
    - NASA
    - Department of Defense
    - Department of Homeland Security
    - Department of Commerce
    - Office of Science and Technology Policy

The Stage is Set for Transformation

Implications for Policy

- Engineering the system to:
  - increase airport capacity in all weather conditions
  - strategically and tactically manage higher volumes and more complex traffic flows
- Incentivizing investment in equipage, infrastructure and training
- Understanding and resolving issues associated with alternative operational roles for pilots, controllers and others
- Regulatory action for new vehicles
- Changes in services effecting trust fund profile – e.g., more on-demand flights

NASA Airspace Systems Program

Goal:

Enable major increases in the capacity and mobility of the air transportation system through development of revolutionary concepts for operations & vehicle systems

Objectives:

- Improve throughput, predictability, flexibility, collaboration, efficiency, and access of the NAS
  - Enable general aviation and runway-independent aircraft operations
- Maintain system safety, security and environmental protection
- Enable modeling and simulation of air transportation operations

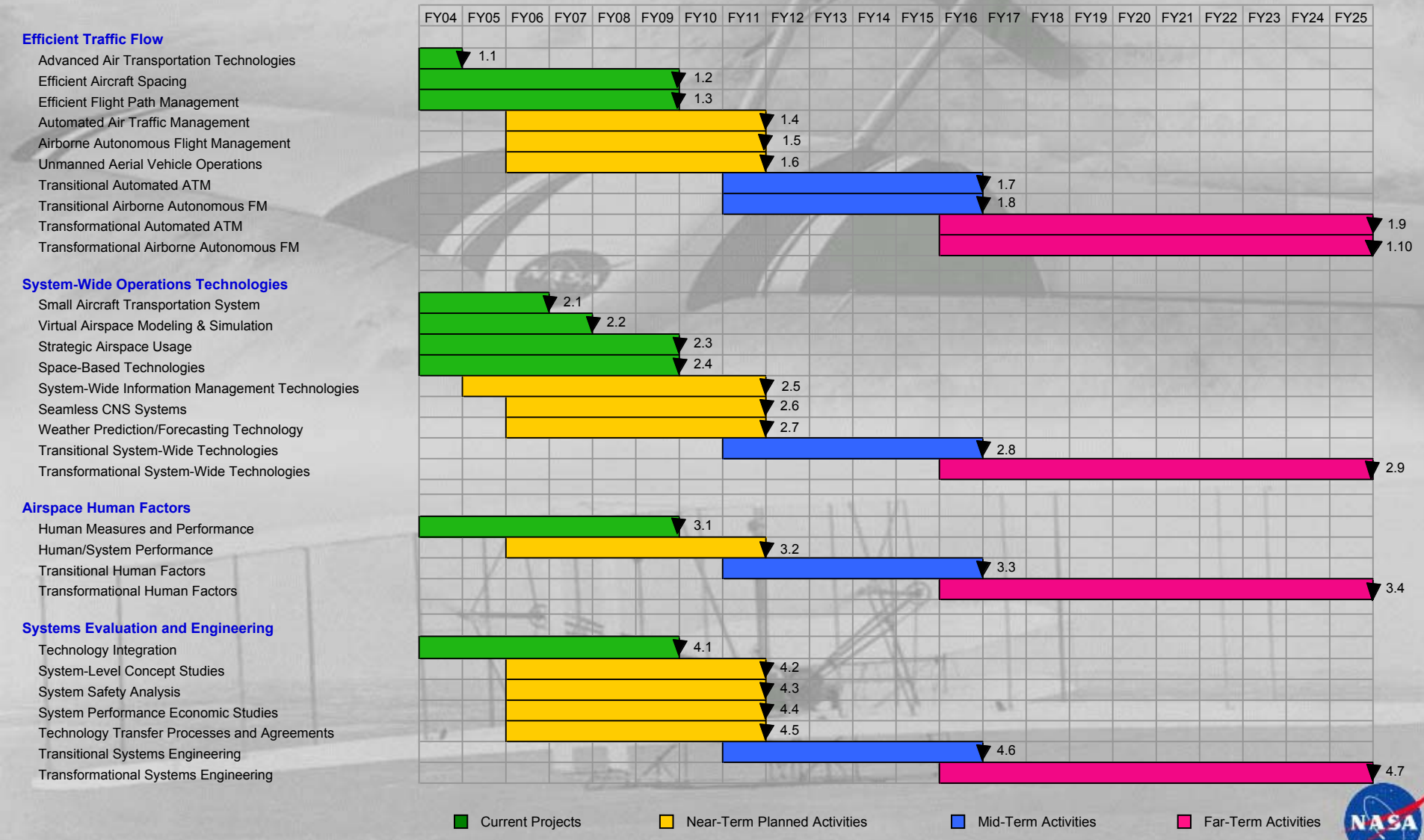
Airspace Systems
Strategic Technical Focus Areas

Efficient Traffic Flow — Improving the efficiency of individual aircraft operating within the National Airspace System (NAS)

System – Wide Operations Technologies — Efficient operation of the NAS as an overall Nation-wide system with global interaction

Airspace Human Factors — Human interaction, performance and reliability in the design of complex airspace systems

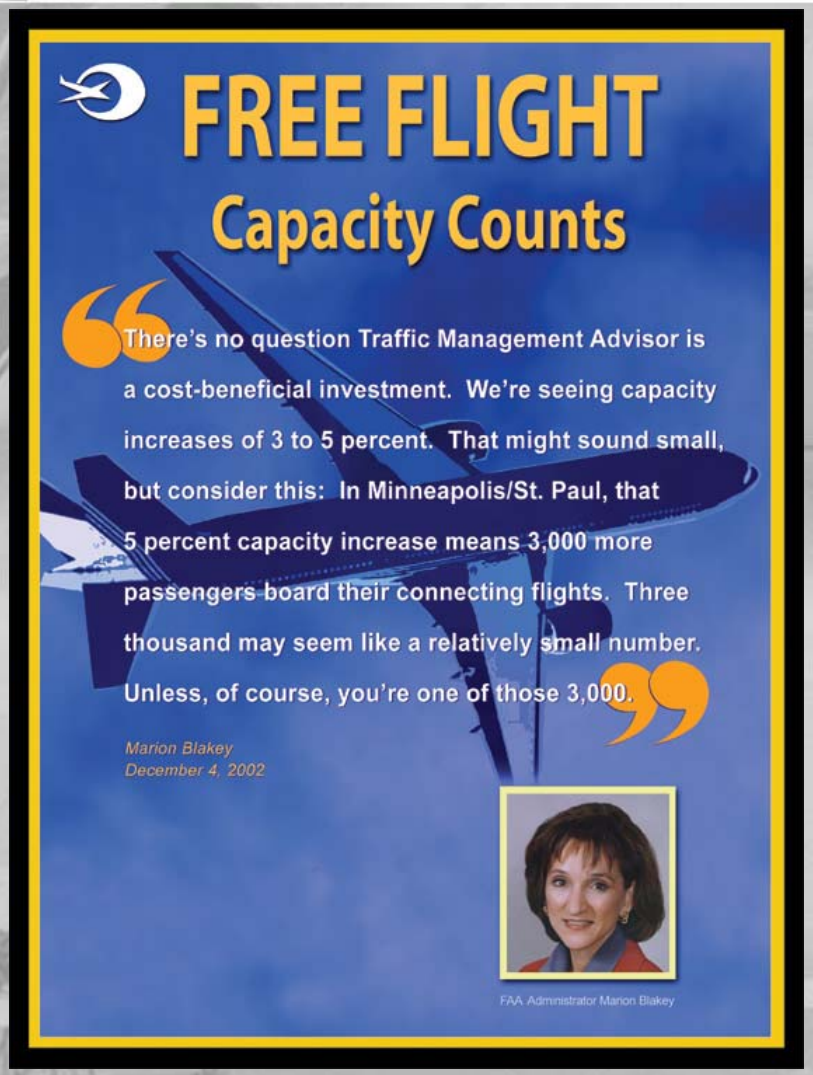
Airspace Systems Baseline Roadmap



FAA Perspective on TMA

"There's no question Traffic Management Advisor is a cost-beneficial investment. We're seeing capacity increases of 3 to 5 percent. That might sound small, but consider this: In Minneapolis / St. Paul, that 5 percent capacity increase means 3,000 more passengers board their connecting flights. Three thousand may seem like a relatively small number. Unless, of course, you're one of those 3,000."

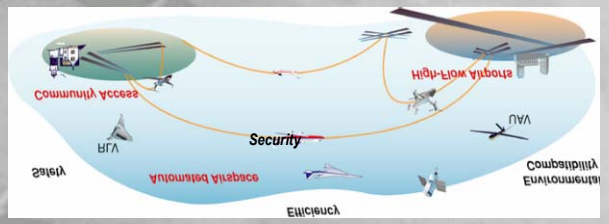
Marion Blakey
December 4, 2002



Candidate Operational Concepts

Virtual Airspace Modeling & Simulation Project

Identified candidate future Air Transportation System capacity-increasing operational concepts.

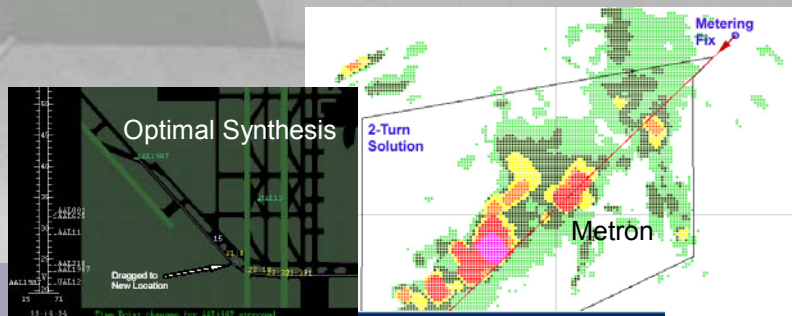


Selected concepts will be explored and leveraged to achieve NASA's long-term capacity goals

Utilized NASA Research Announcements to competitively involve external community

Selected concepts range from system level to all of the specific domains, address all user classes, and span the gamut of human/automation control.

Participants: Boeing, Raytheon, Northrop Grumman IT, Metron Aviation, Optimal Synthesis, Seagull Technologies, NASA ARC, NASA LaRC, University Group



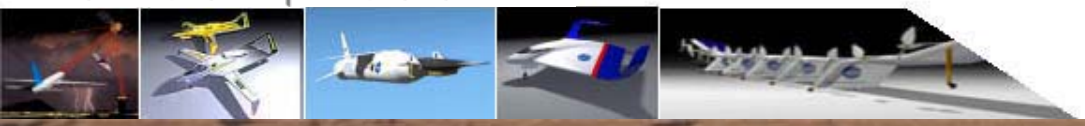
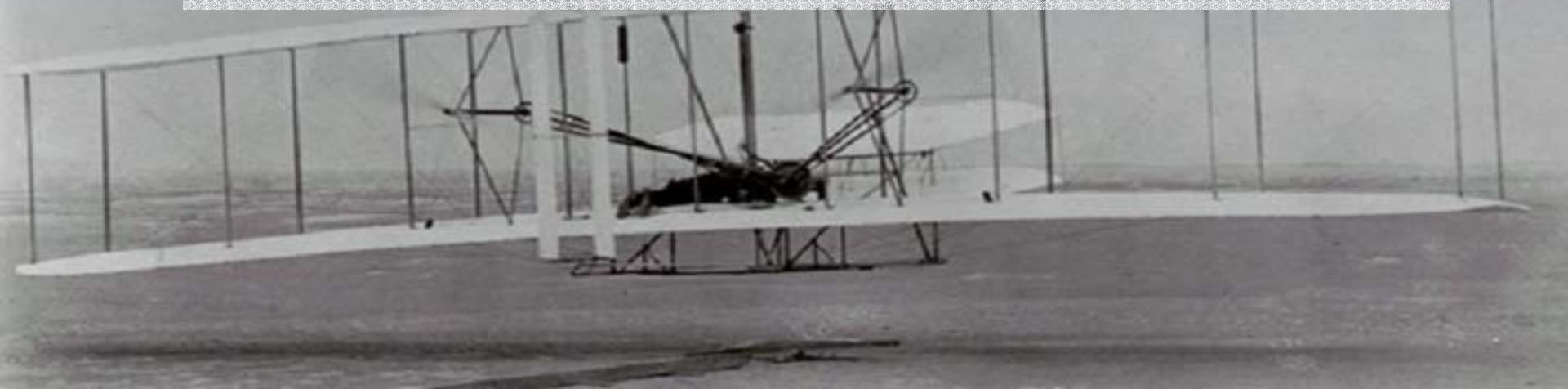
Airspace Systems Major FY 05 Annual Performance Goals

- Complete experimental validation of SATS airborne systems
- Establish the fluid dynamics mechanism for alleviating wake through experimental and computational fluid mechanics studies
- Complete development of WakeVAS concept of operations and downselect WakeVAS architecture
- Complete human-in-the-loop concept and technology evaluation of shared aircraft separation
- Complete System-Wide Evaluation and Planning Tool initial simulation and field demonstration

Aerial Regional-scale Environmental Survey of Mars Animation

AERONAUTICS
enterprise

An Aeronautics Vision



The Wright brothers took humankind to our sky. Let us fully utilize and protect our sky and enable humankind to explore other skies.