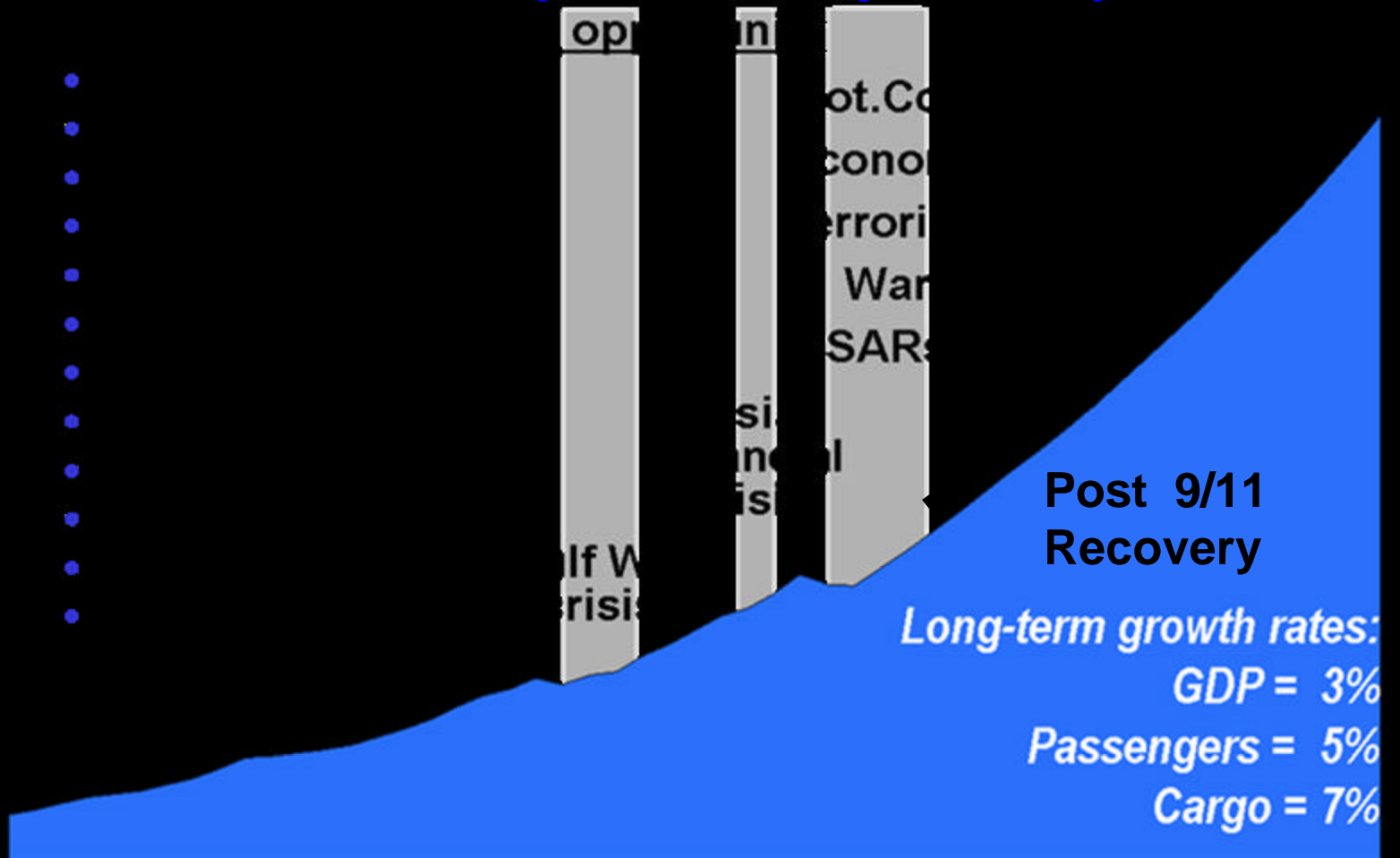


# Long-Term Market Projections

**"Safe and efficient global air transportation system"**



**Looking forward to sustained global growth:  
How do we increase air traffic capacity?**

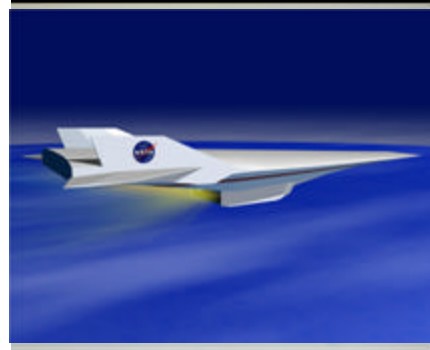
# 21st Century Options and Opportunities

**Evolving current lines  
of development** →

**Breakthrough - expand  
the range of the  
'possible'** →

**Whole new game –  
where the gap –  
"possible" to current  
reality is very large** →

**Efficient Platforms  
E-enabled**



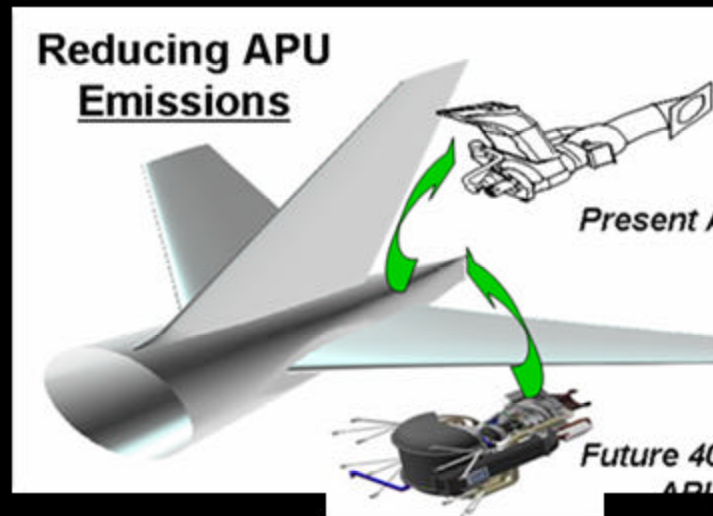
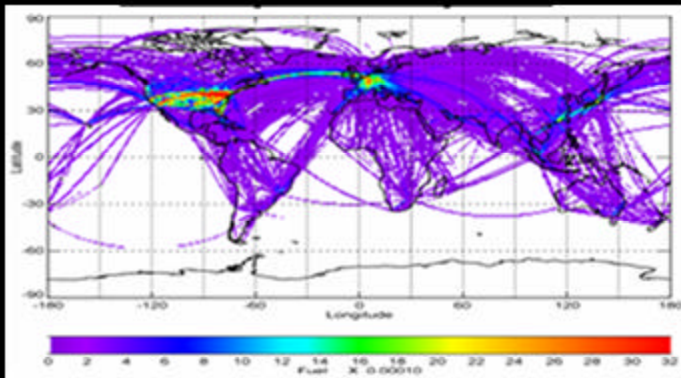
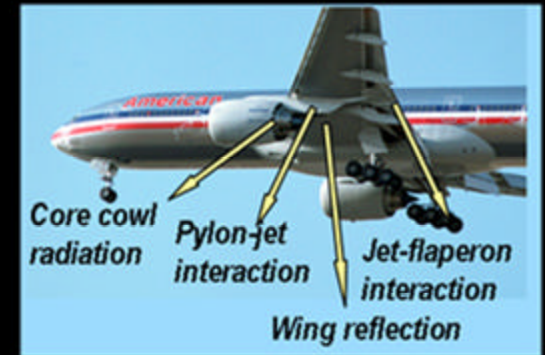
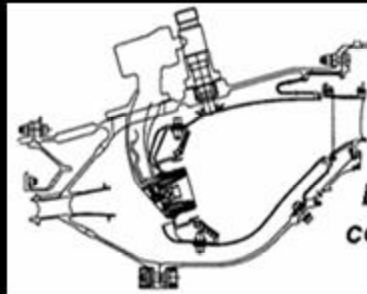
**Systems of Systems  
Air Ops Center**



# NASA Science and Technology Efforts - Great Significance to Boeing Future Products

- **Noise reduction (community, jet, and aircraft interior noise)**
- **Emissions reduction**
- **Turbine engine efficiency improvement**
- **Enhancement of aircraft performance and prediction techniques**
- **Fluid mechanics research into flow control schemes**
- **Improved computational methods**
- **Intelligent vehicle control systems**
- **Revolutionary configuration concepts**
- **Transformation of air traffic management**
- **Air transportation safety and security**

# Boeing-NASA Technologies Reducing Airplane Environmental Impact



# Emerging & Disruptive Technologies

## *Nanotechnology > 10 X Performance*

- **Vehicle design, structures propulsion & materials physical properties**

Strength, weight, durability & environmental tolerance

vehicle weight => fuel burn

engine efficiency => fuel burn

4% reduction in fuel burn produces 1% more cash

- **Systems, Communications & Processing**

- A/C as Smart nodes

- Micro adaptive Flow Control

- Multi-functional smart structure

- Crash Proof, Self healing, robust & fault tolerant

***Enables next wave systems - innovative configurations, decrease structure weight, increase life & engine efficiency***

# Create New Possibilities with Aerospace

## Translations

- Use a consistent R&D Management philosophy
- Focus R&D investments to best insert new technology

## Accelerators

- DARPA Grand Challenge and X-Prize
  - tremendous entrepreneurial motivator
- Closer ties to universities and link to industry.
- Even closer ties to DARPA and other Government agencies

## Critical Steps

- Take leadership role in implementing Air Traffic Management through the Joint Planning and Development Office (JPDO)
- Continue planning roadmapping with industry to develop robust technology insertions
- Perform joint R&D planning, technology management, and Program implementation with other Government agencies

# One Option: Create New NASA Agency with R&D Management Strategy

## Customer Pull

- 20 year vision of customer capability
- Apply current technology in scale demos
- Pursue technology deficiencies for 20 year vision

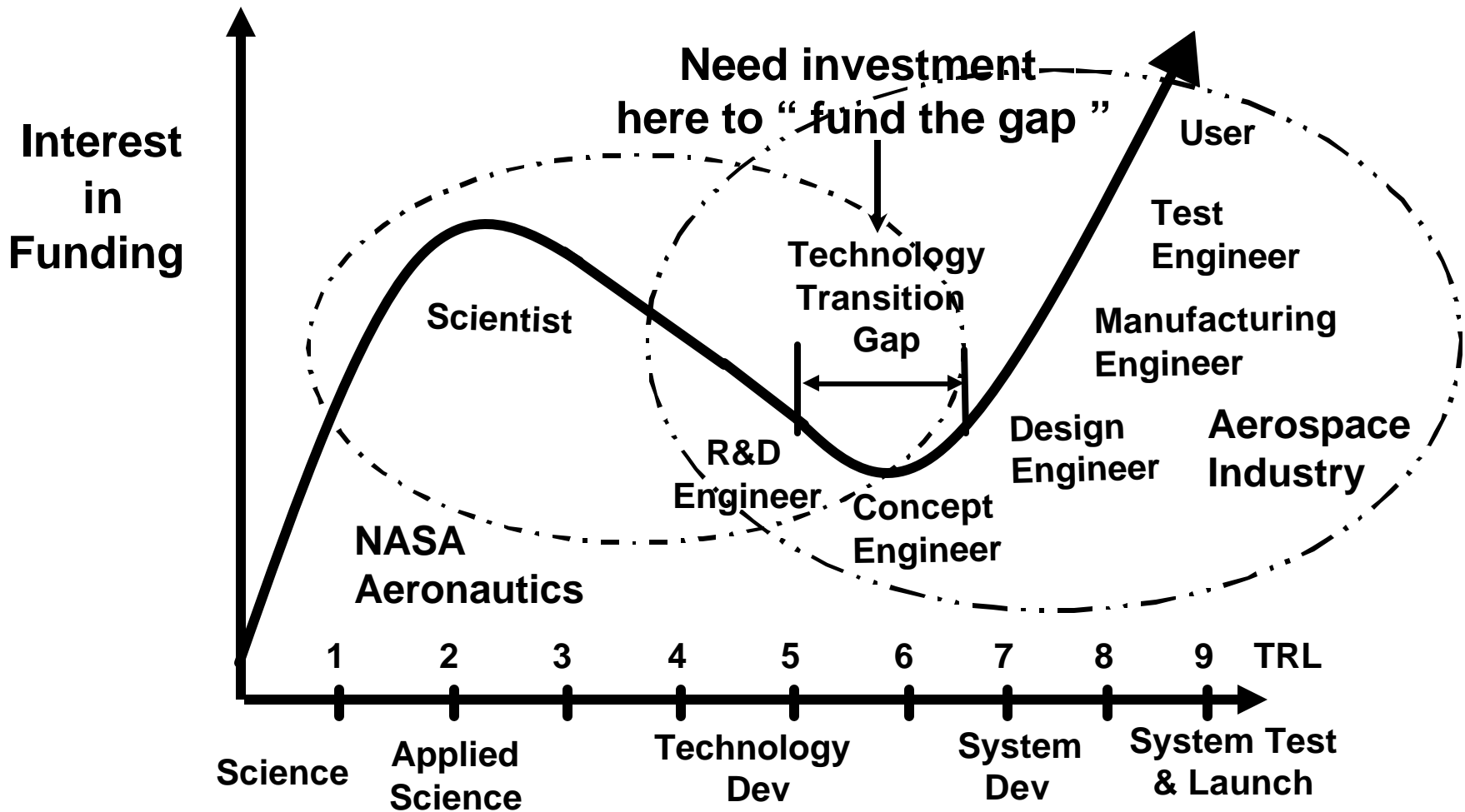
## Technology Push

- Invest in areas of potential payoff
- Exploit technology for customer capabilities
- Focus on long-term technology development



**Underlying Foundation of Affordability**

# Focus R&D investment to best insert new technology



*Need to balance the investment stream to enhance technology transition flow*



# Why a NARPA (NACA)?

- Focused charter and mission
- Separate budget identity (program element)
- Separate identified leadership
  - national visibility
- Match EU assist to EU Aerospace Industry

# NASA vs EU

## Aeronautics Planning 2006

**NASA \$727M**  
**Vehicle Systems**  
**\$365M**  
**Flight System Demos**  
**Long-term goal**  
SST low boom  
Quiet subsonic  
Zero-emissions  
Long endurance

**EU Sixth**  
**Framework \$1100M**  
**+\$1100M Industry Match**  
**Technology**  
**Near/mid-term goals**  
All composite wing  
All composite fuselage  
Efficient, low noise  
engines  
All weather hazard  
protection systems

***NASA eliminates EU assist as a competitive factor for near-term technology : then - focus on long-term R&D***

# Recommendations and Options

- **Create new possibilities for future of aerospace**
- **Create a separate Aeronautics agency within NASA**
- **Match European Union near to mid term R&D to eliminate competitive factor or until they remove assist**

*Create an agency within an agency : Aeronautics Agency under NASA - similar to DARPA and DoD*

