



Annual SERC Research Review (ASRR)

Implementing the Next Generation Air Transportation System

Victoria Cox

Assistant Administrator for NextGen

October 5, 2011



FAA

What is NextGen?

- NextGen is not a single program or procedure but a comprehensive initiative that integrates new and existing technologies. NextGen represents the complete transformation of our national airspace system.



The Impact of Aviation in the US



- **5,000 Planes in air at any time**
- **1 Billion passengers per year**
- **More than 10 Million jobs**
- **More than 5% of GDP**

Current System Performance

- Demand remains high
- Air Traffic System not utilizing current available technologies

The New York Times

Airport Delays Worsen

*Delays at New Liberty and
La Guardia Are Worse.*



The Washington Post

Travel Woes Continue

Transportation
Boss asked to
ensure passengers
treated fairly

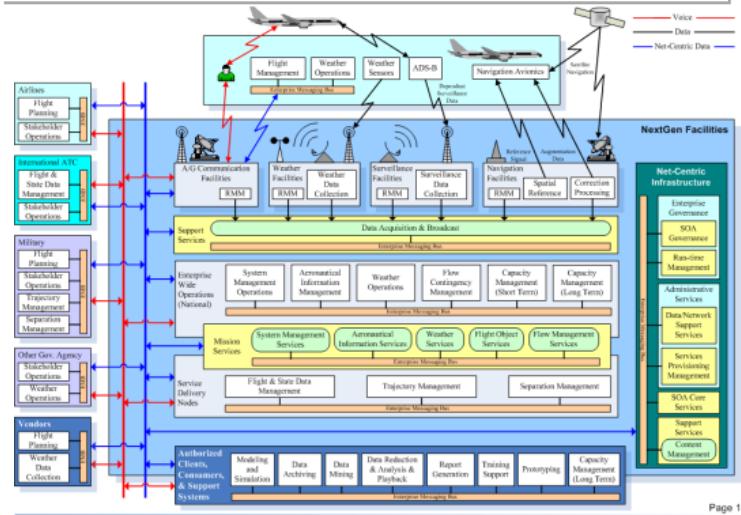
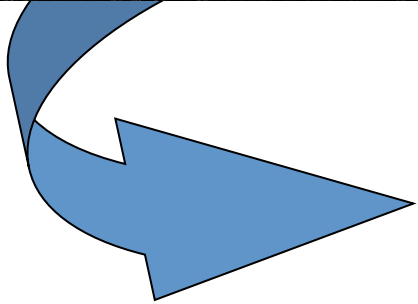
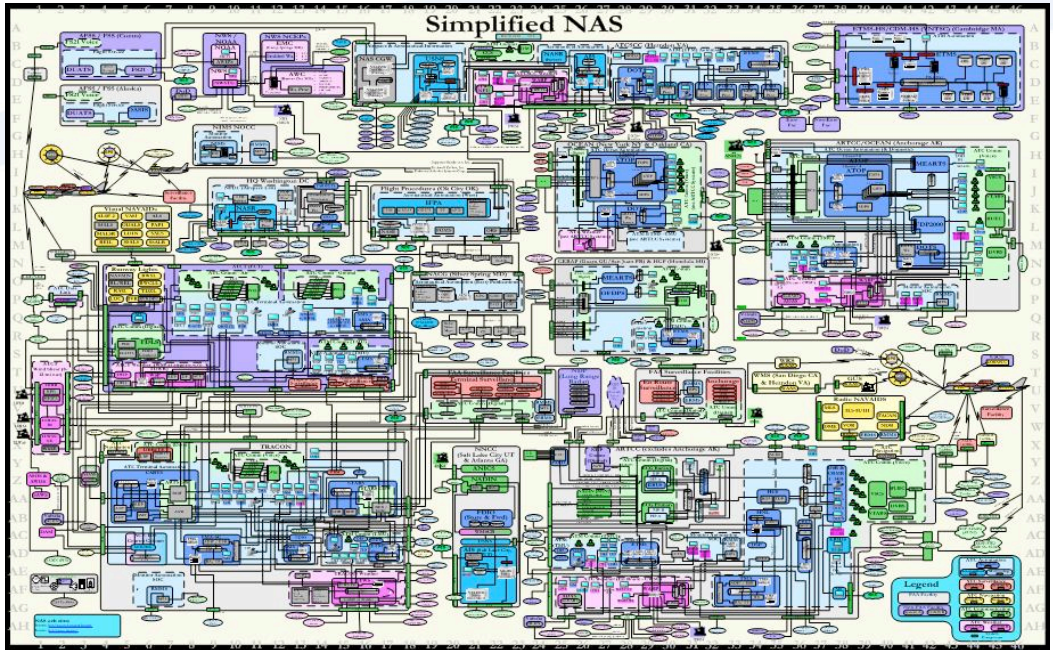


Why do we need to do anything?

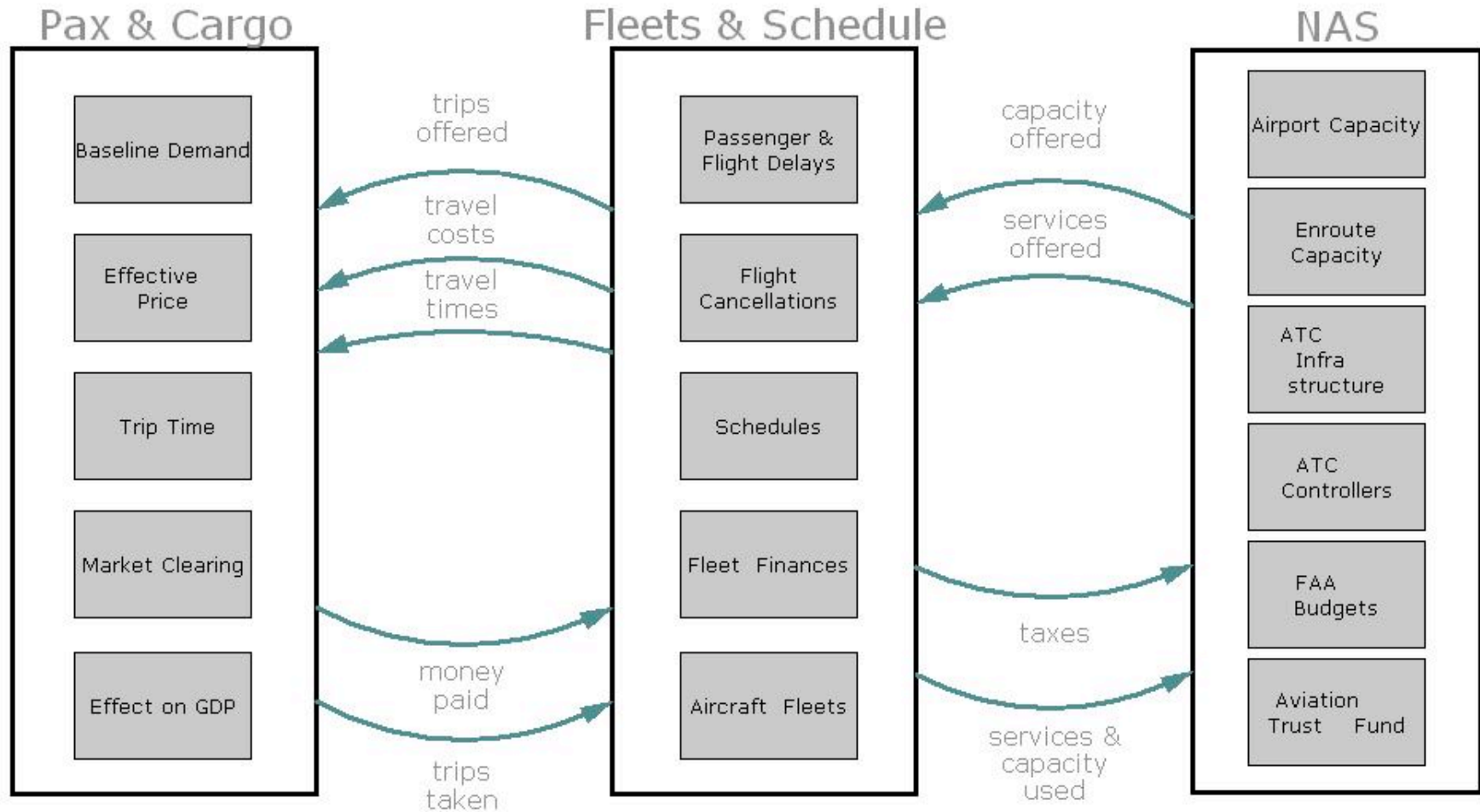
- Make it **Safer** – current ground based radar “sees” aircraft every 12 seconds versus satellite which updates every second
- Make it **More Efficient** - delays in 2009 resulted \$2 Billion in lost income and \$9 Billion in lost productivity
- Make it **Flexible** - demand and congestion will increase dramatically and our system must be flexible to accommodate NAS user needs
- Make it **Sustainable** – impacts the environment with petroleum based fuels, carbon emissions and noise



Transition to NextGen: The Path is Extremely Complex



Air Transportation Forms a Complex Dynamic System Driven by Economic, Societal & Technical Factors



What do we need?

A system that will:

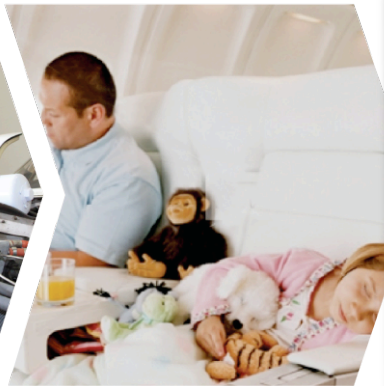
- Ease congestion and offer increased capacity to match demand while ensuring safety
- Reduce impact on the environment and without impacting the aviation's contribution to our economy
- Prepare for the new types of aircraft that may utilize our airspace – UAS and commercial spacecraft, for example



Where Do We See NextGen?



**ECONOMIC
IMPACT**



SAFETY



SUSTAINABILITY FLEXIBILITY



FAA

NextGEN

NextGen is...

Economic Impact





NextGen is...

Safety

A woman with long dark hair in a ponytail, wearing a pink tank top, is seen from the side, looking upwards. She is standing in front of a large, textured rock formation. The sky is a clear, bright blue with a single white contrail. In the background, there are green trees and a valley with a river and mountains under a clear sky.

NextGen is...

Sustainability

NextGen is...

Flexibility



Delivering Benefits Today & Tomorrow

2018 Estimates

\$23 Billion in Benefits

Reduce
Delays
35%



Reduce
CO₂ Emissions
14M Tons
Cumulative



Reduce
Fuel Use
1.4B Gallons
Cumulative



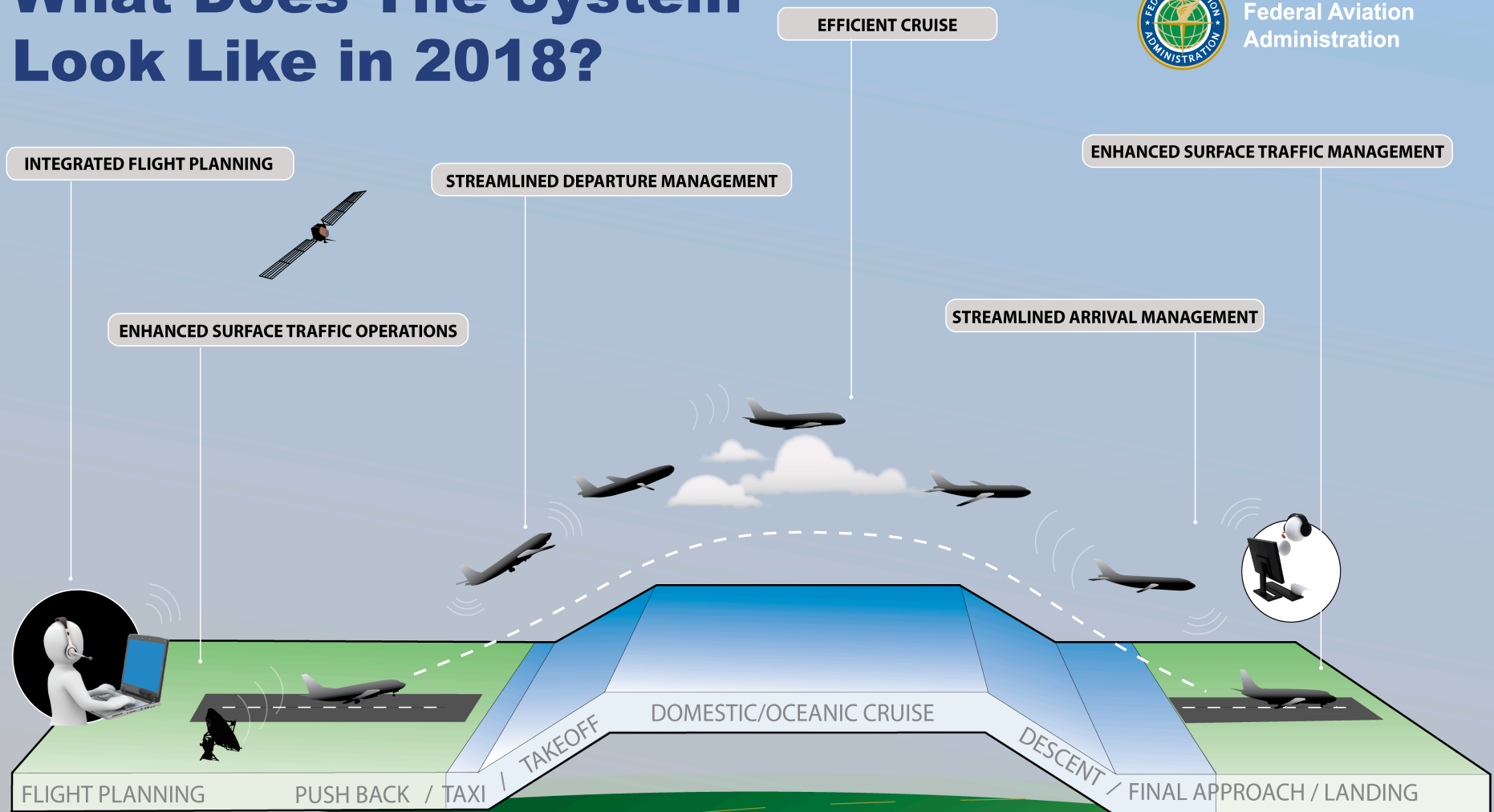
FAA

Next**GEN**

What Does The System Look Like in 2018?



Federal Aviation Administration



PHASES OF FLIGHT *Mid-Term 2018*



FAA

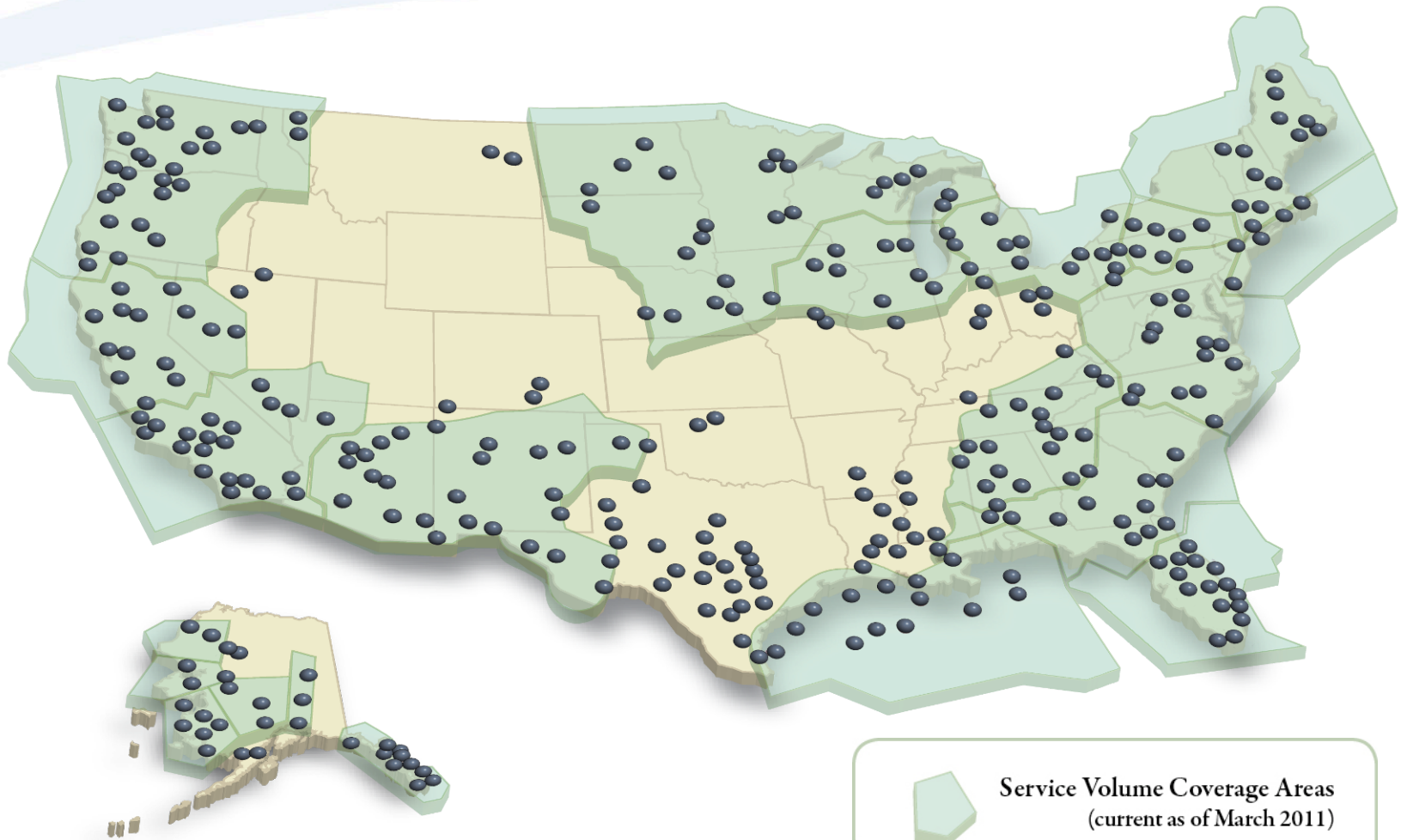
NextGEN

Automatic Dependent Surveillance – Broadcast (ADS-B)

- Far more accurate than ground-based radar
- Provides properly equipped aircraft with:
 - Terrain maps
 - Surface Traffic information
 - Airborne traffic information
 - Weather information
 - Critical flight information
 - Increased Situational Awareness



ADS-B



FAA

NextGEN

Performance Based Navigation

Enables Increased Efficiency and Access

RNAV: General purpose satellite navigation

RNP: High-precision satellite navigation for congested airspace

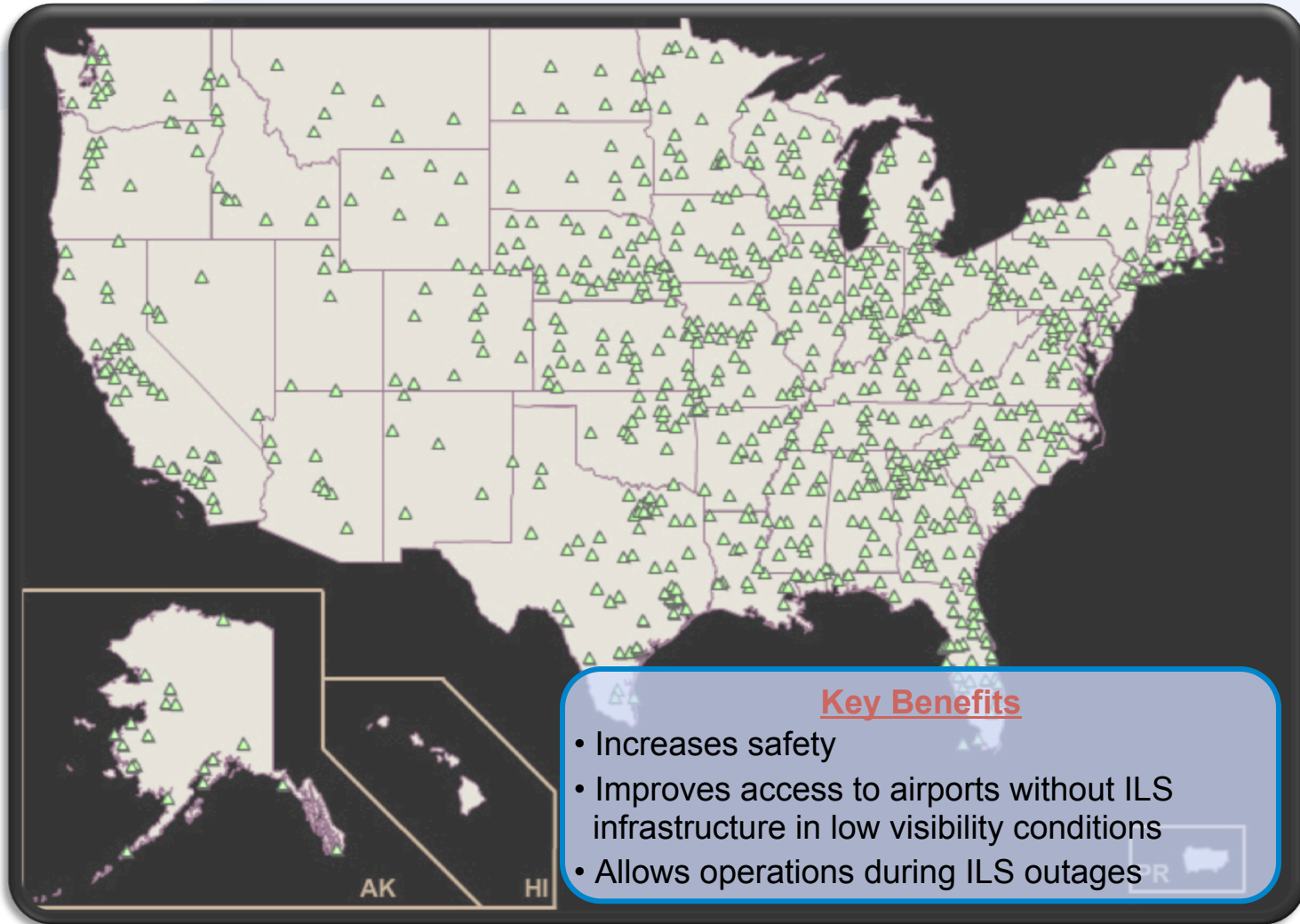
- Provides aircraft with the ability to fly shorter, more efficient flight paths
- Increases capacity of runways and in the airspace –
 - Ability to “de-conflict” airports, avoid sensitive areas
- Reduces delays, fuel burn, and aircraft noise

WAAS/LPV: Provides ILS-like capability without ILS infrastructure costs



WAAS/LPVs Facilitate General Aviation Access

Over 2,440 published serving more than 1,200 airports



Wide Area Augmentation System (WAAS) Localizer Performance with Vertical Guidance Approaches (LPVs)



FAA

NextGEN

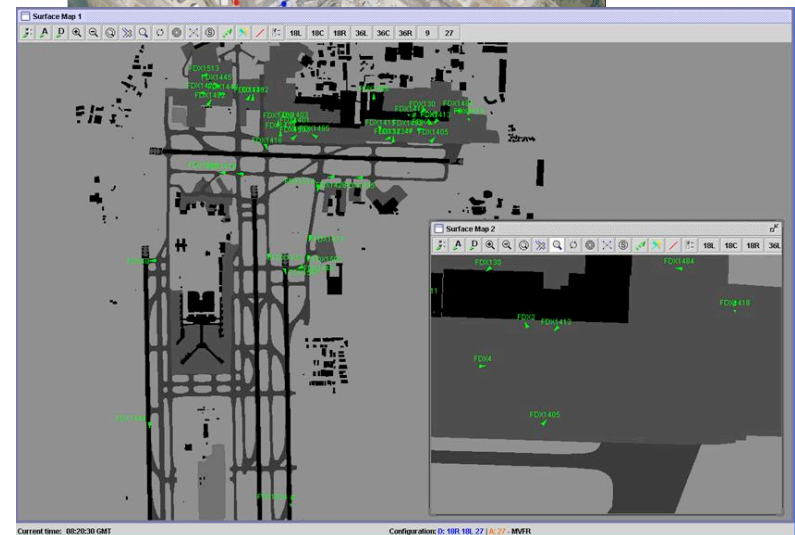
Surface Surveillance and Data Sharing

Surface data sharing for ASDE-X infrastructure underway in 2010

- Leverage installed ASDE-X infrastructure
- Will provide surface traffic data sharing
- Stepping stone for more robust collaborative decision support tools

Benefits

- Delay reduction
- Reduced fuel burn and environmental footprint
- Improved situational awareness and decision making
- Collaborative planning at airport



Leveraging demos at JFK and MEM

Incremental Approach to Implementing NextGen

Produces Benefits and Builds a Foundation

Best Equipped Best Served Prototyping



Airspace Deconflict



Airspace Deconflict



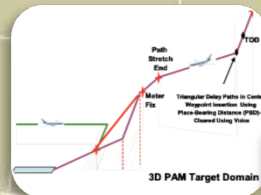
Surface Management



Tailored Arrivals



3D PAM

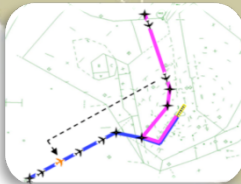


CSPO

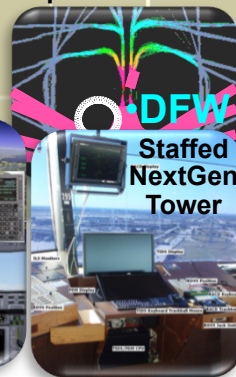


Focus on Integrated

RPI



Airspace Deconflict



Surface Management

Surface Management



UAS

4-D FMS



Staffed NextGen Tower

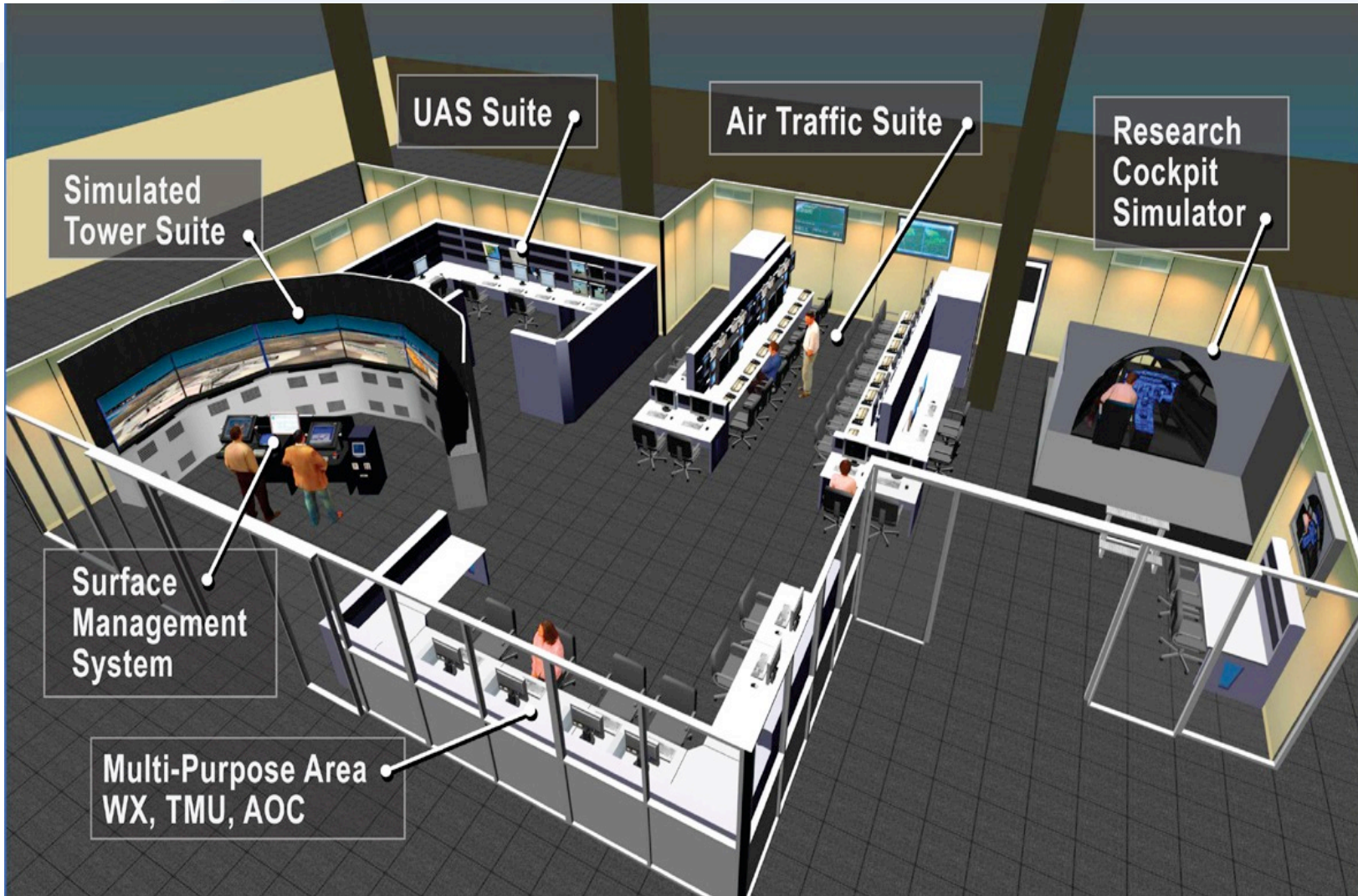
Tailored Arrivals

NextGEN



New NextGen Integration and Evaluation Capability (NIEC)

Allows Early Exploration & Assessment of Integrated System Dynamics & Interfaces



FAA

NextGEN

Complex Challenges Ahead



New Systems

New Procedures

New Aircraft Capabilities

Renewable Fuels

New Supporting Infrastructure

New Operational Practices



Objectives Reflect Both Common Goals & Diverse Interests

**NextGen
Objectives
Include...**

**Improved
Access**

**Stakeholder
Equity**

**Return on
Capital**

**Industry/
Government
Partnership**

**Operational
Efficiency**

**Reduced
Delay**

**Noise
Reduction**

**Reduced
Emissions**

**Enhanced
Safety**

**Improved
Flexibility**

**Global
Harmonization**

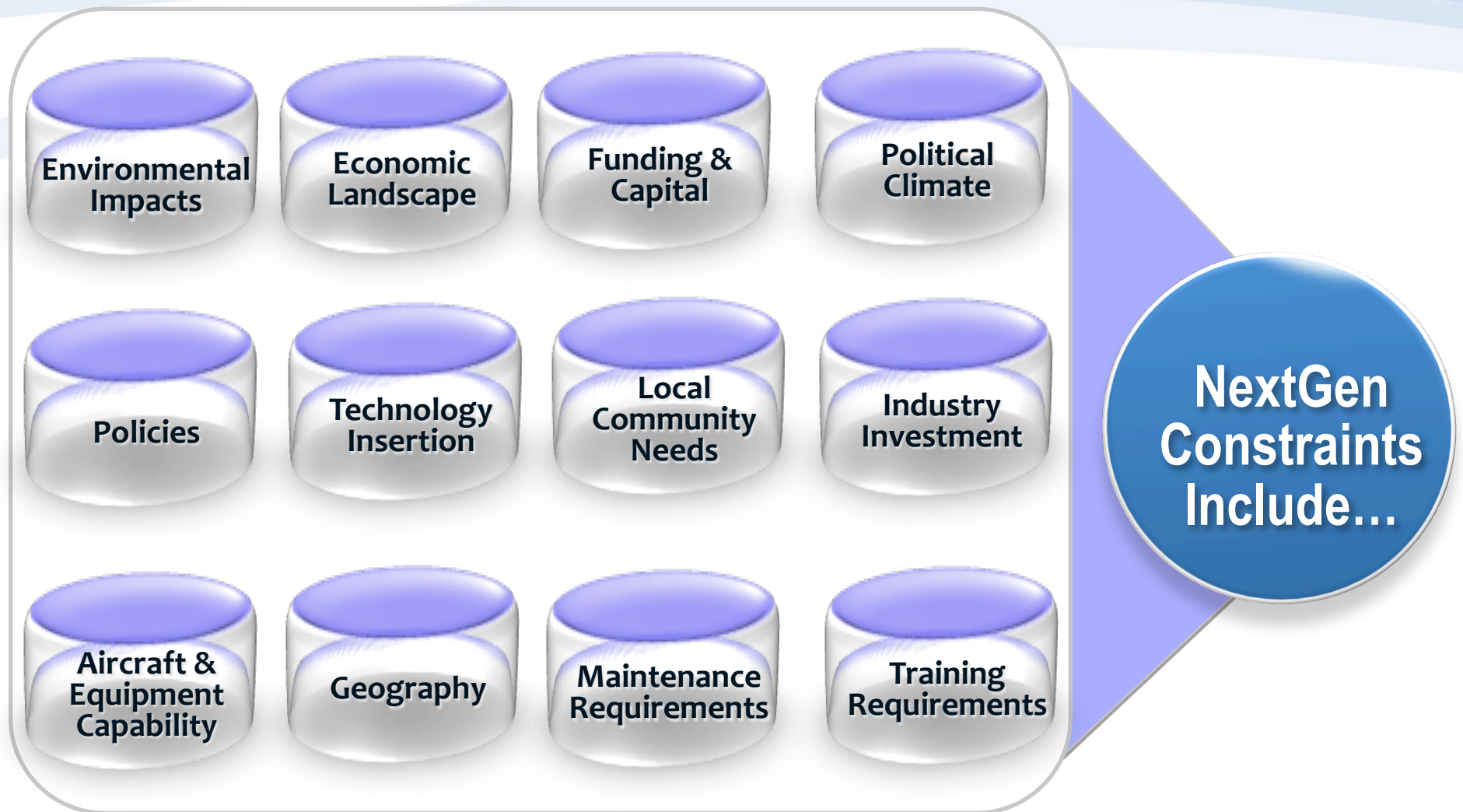
**Improved
Travel
Experience**



FAA

NextGEN

Constraints Also Reflect Diverse Factors



Internal Challenges

- Inherent resistance to change as evidenced in Executive Survey
 - ✦ Strong safety culture
 - ✦ Ownership/control issues
- Culture
 - ✦ Embracing NextGen as an Agency
- Requirement for “Systems thinking”
- Value of engineering expertise
 - ✦ Balance of practical experience with trained engineers & scientists
 - ✦ Understand the difference between needs & requirements
- Labor relations
 - ✦ Strong bargaining unit involvement & buy-in key to success
- Streamlining & defining processes
- Recruiting qualified employees



Key Areas for Improvement

The Foundation for Success analysis effort identified the following four key areas of improvement:

Governance

- The FAA would benefit from **tighter alignment and closer integration of NextGen elements**
 - Program management will benefit from elevated visibility and consistency
- NextGen needs the ability and authority to **bridge the strategic requirements with its tactical implementation**

Processes

- The current set of processes implemented to support NextGen **do not adequately manage its complexity** and scope
- These processes, as implemented, tend to **overlook rather than overcome organizational boundaries**

Capabilities

- While pockets of best practices exist, as a whole the FAA needs to bolster key **individual and organizational capabilities** necessary to fully support and develop NextGen
- These capabilities span multiple areas, including **program management, systems integration, software engineering and communication**

Culture

- A number of **cultural barriers** need to be addressed within NextGen-related activities to **mitigate their negative effect** on the program
- These include **the lack of information sharing, discomfort with managing uncertainty, and the struggle to bridge tactical and strategic viewpoints**



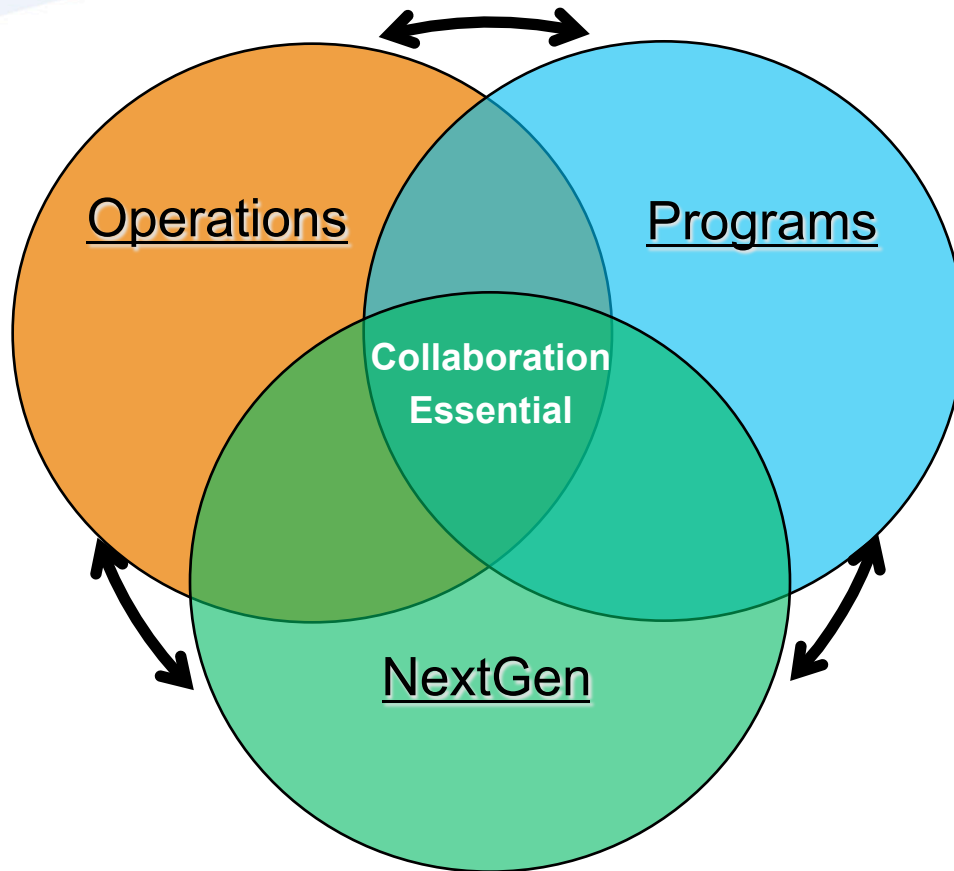
NextGen Design Considerations

The underlying principles for the NextGen Organizational top-level design will carry forward in the functional design of the full organization:

- ✦ Ensure appropriate assignment and recognition of responsibility, accountability and authority
- ✦ Ensure sufficient and consistent integration and communication
 - Amongst planning, program management, and operating group
 - Across all lines of business in NextGen activities
- ✦ Ensure the NextGen effort is receiving the attention and resources necessary to successfully achieve its vision
- ✦ Ensure NextGen operating model creates a platform for continued development of the FAA program management capability



A New Paradigm for NAS-wide Management: Continuous Interdisciplinary Involvement



- “Hand-offs” are eliminated in favor of **collaboration**. NextGen, LoBs, Staff Offices, Programs and Operations engage throughout the capability lifecycle.
- A single FAA-wide process for changes to the NAS that **works with all contributors** to the NAS.
- This collaborative approach requires **shared accountability, responsibility and risk**. This is achieved through direct and obligatory engagement.
- The **collaborative** teams will be responsible for activities such as requirements mgmt, configuration mgmt, and assumption/constraint mgmt.

Maintaining Consensus Around Individual Stakeholder Interests



FAA

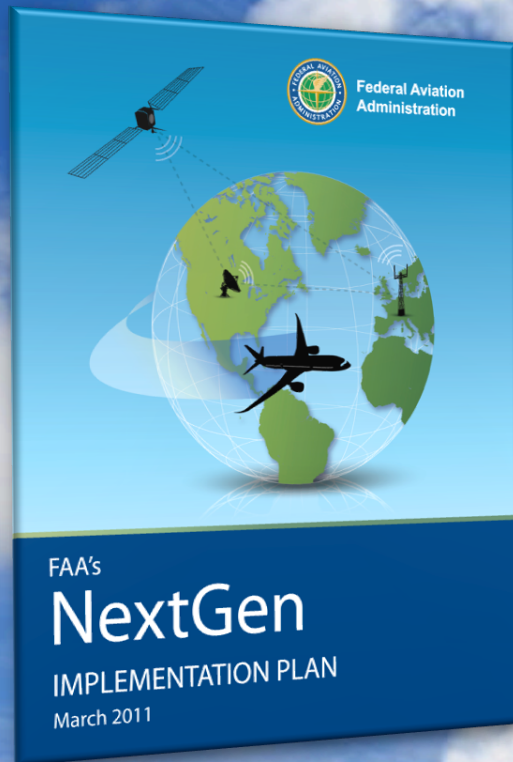
NextGEN

External Challenges

- Complexity
- Diverse/competing interests of stakeholders
- Fiscal problems of airlines
 - ✦ Discourages investment in NextGen avionics
- Environmental constraints
- Congressional support
 - ✦ Potential constituency opposition to NextGen improvements
 - Airspace changes
 - New runways
 - Changing job roles/locations



NextGen Resources



NextGen Implementation Plan

- Targeted for 2018
- Benefits and Accomplishment
- Overview of FAA's work plan

www.faa.gov/nextgen

- News
- Demonstrations
- Documentation

Next GEN



FAA