

NextGen Weather

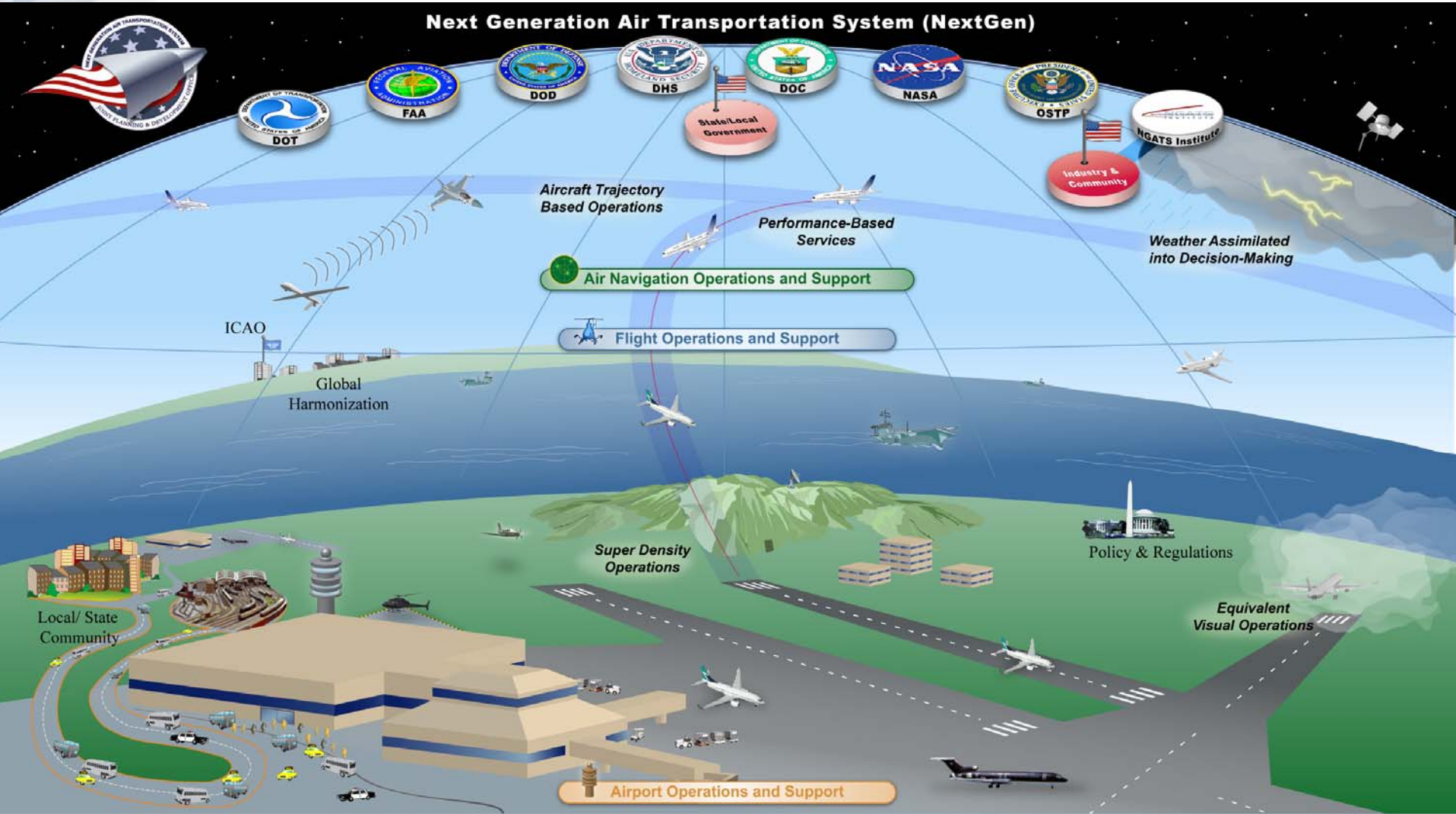


NextGen Weather Overview

- Background
- Assumptions
- Key themes
- Policy/Research
- Status



NextGen Scope



Flight Planning
Environment

Flight Data
Layered Adaptive Security

Aeronautical Information
Surveillance

Enterprise Services

Net Centric Infrastructure Services

Geospatial Information
Position, Navigation, and Timing

Communication
Safety

Performance Metrics
Weather

Questions/Comments:
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Network-Enabled Information Access

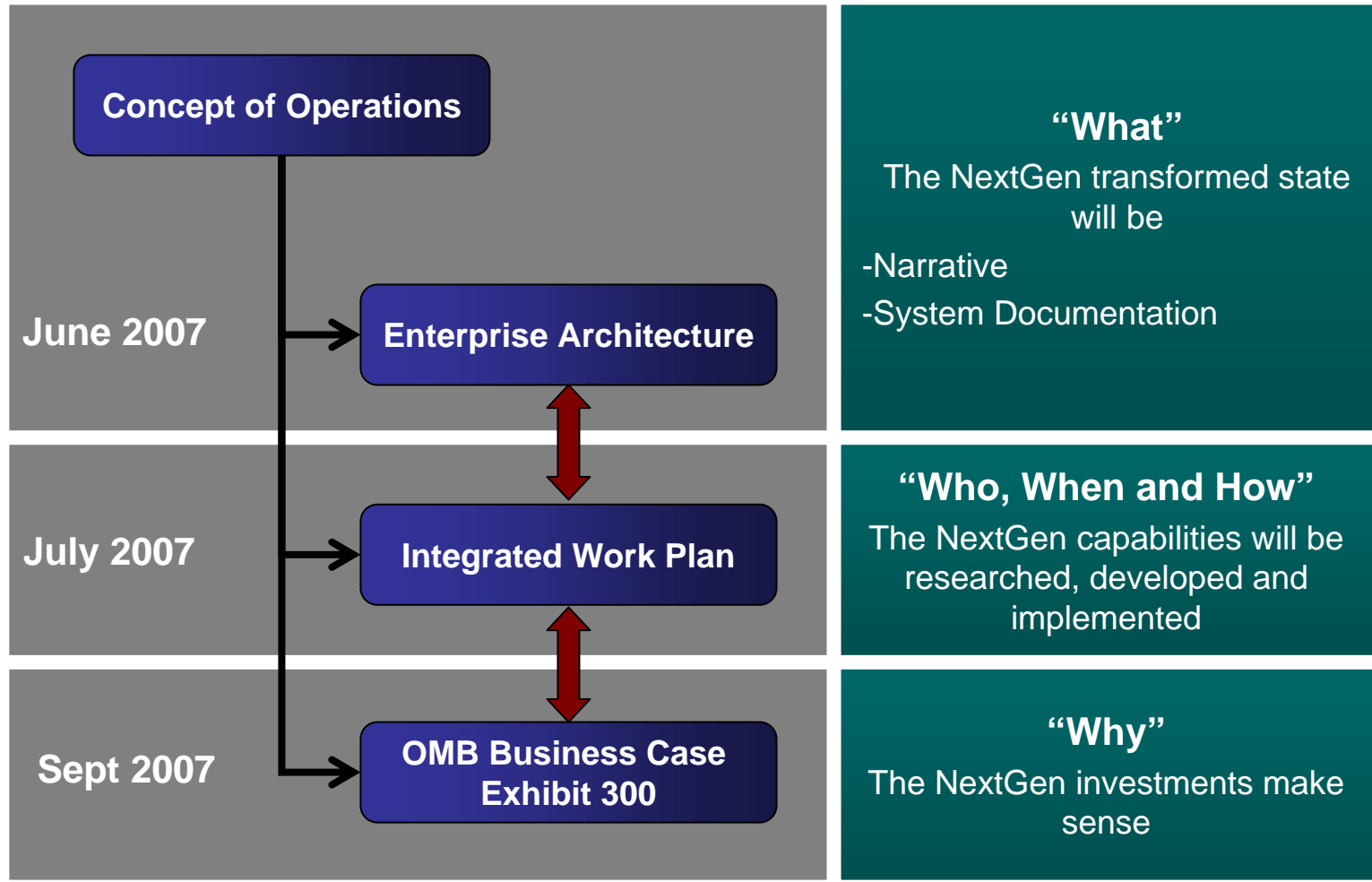
NextGen Goals

NextGen Weather Supports

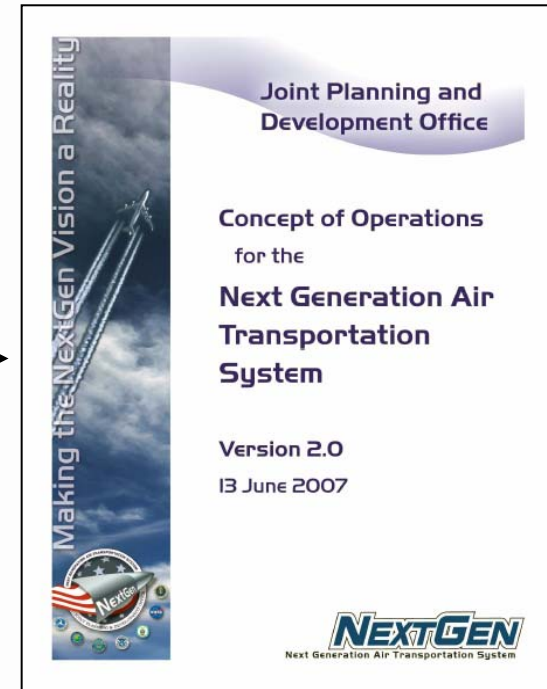
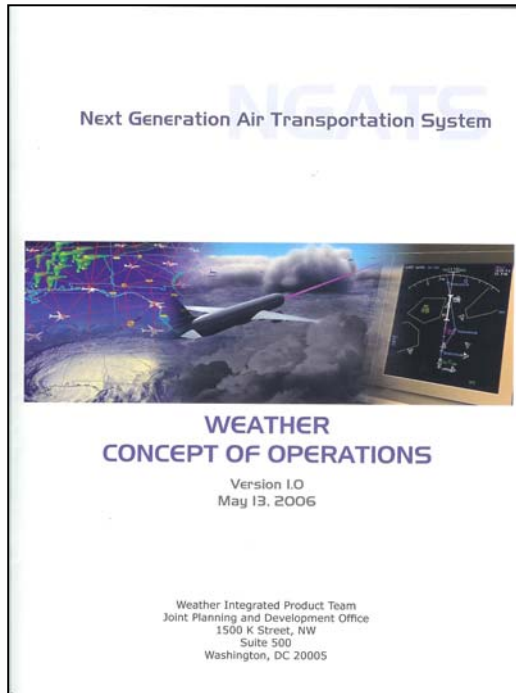
- Trajectory Based Operations
- Collaborative Air Traffic Management
- High Density Departure/Arrival Operations
- Equivalent Visual Operations
- Performance Based Services



NextGen Plan



NextGen Weather Concept of Operations



NextGen Weather

- Weather significantly impacts the national airspace system
- NextGen goals are not achievable without improving integration of weather information into decision support systems
- NextGen weather vision (a major paradigm shift) is focused on:
 - Providing a multiple user common weather picture
 - Consistent and reliable weather information
 - An improved weather information data storage approach containing observation and forecast data (i.e., the “4 Dimension* Weather Cube”) enabling NextGen dissemination capabilities
 - Leveraging JPDO agency 4D Weather Cube capabilities from:
 - NOAA
 - DOD
 - FAA
- Weather Working Group has made significant progress

* 4 dimensions are 3D space and time



Today/NextGen Weather Information Attributes

Today

- Not integrated into aviation decision support systems (DSS)
- Inconsistent/conflicting on a national scale
- Low temporal resolution (for aviation decision making purposes)
- Disseminated in minutes
- Updated by schedule
- Fixed product formats (graphic or text)

NextGen (new requirements)

- Totally integrated into DSS
- Nationally consistent
- High temporal resolution
- Disseminated in seconds
- Updated by events
- Flexible formats

NextGen Weather

Key Themes

- An integrated and nationally consistent weather common operational picture for observational and forecast data is available to all system users
 - NextGen operational systems are supported by a “single authoritative source”
 - Weather common operational picture fully utilizes envisioned NEO capabilities
 - Data Latency (seconds)
 - Data Refresh (seconds)
 - Data Sharing Standards/Protocols
 - Weather information sharing is two-way
 - Unlimited end-user product formats are made possible



NextGen Weather Key Themes

- NextGen proactively adjusts on multiple strategic and tactical time scales to probabilistic weather information
 - Operational decision making utilizing uncertainty based information
 - Weather-influenced 4D trajectory updates “on the fly”
 - New operational weather paradigms (business models) are required
 - Strategic adjustments to departure/arrival planning
 - Areas (volumes) of weather constrained airspace are reduced



NextGen Weather Key Themes

- Direct integration of weather information into operational decision making processes
 - Reduced requirement for government provided weather “products”
 - Weather information sets become the government provided product in most cases
 - Opportunity for tailoring of private sector provided products significantly increase
 - Weather information is translated into operational decision options for human/automated systems
 - Standalone Weather “Systems” become obsolete



Benefit/Cost

- Annual benefits of Improved Weather Capability
 - Reduces \$1.2 Billion in economic loss due to delay
 - Increased overall system safety
- 4D Cube 10 year implementation costs (early estimates in the hundreds of \$M)
- Integration of weather into NextGen decision support systems (2-3 X cost of implementing the cube) over 10 years

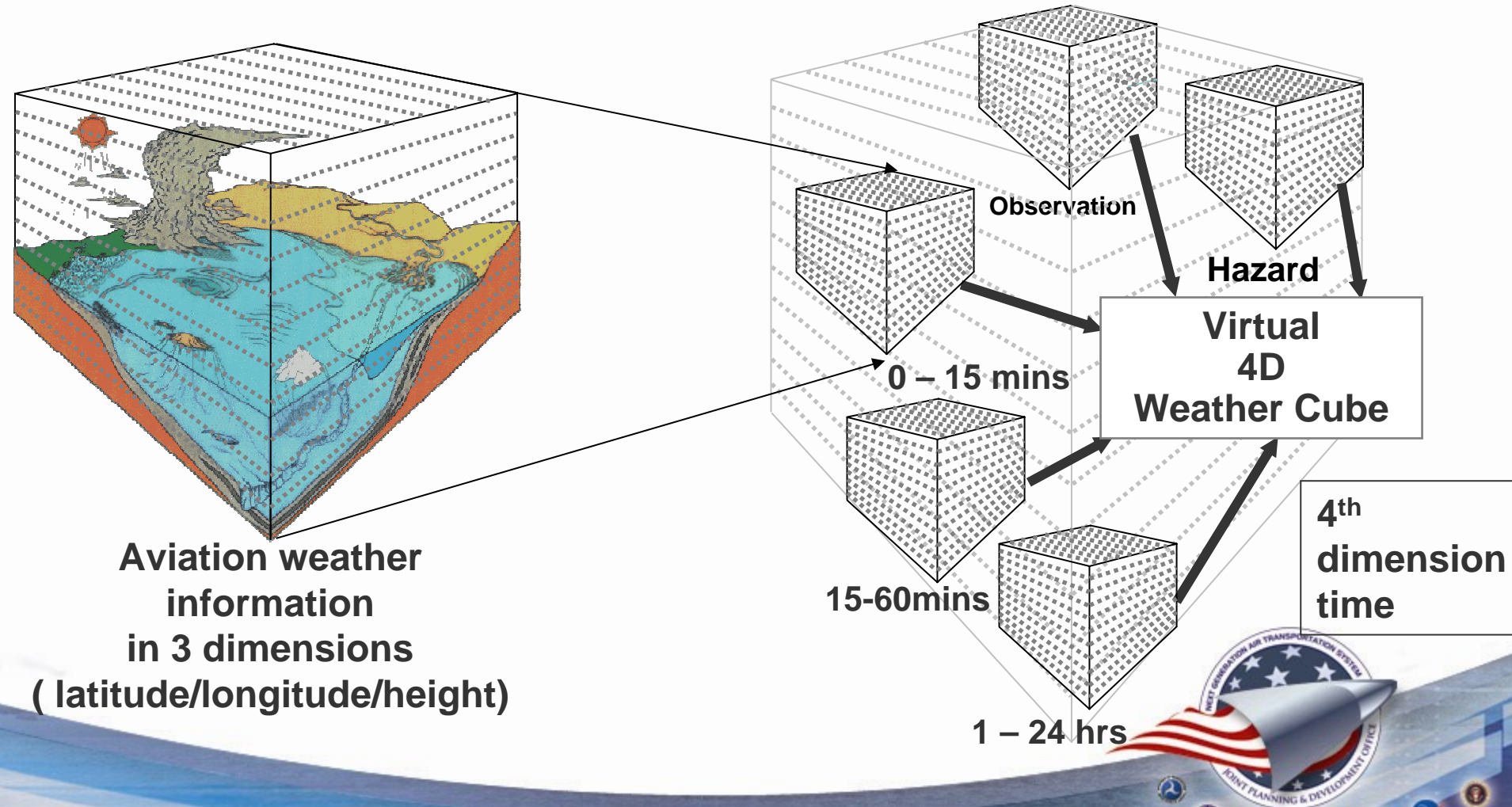


NextGen Weather Assumptions

- Network Enabled Operations concept is in place with robust communication capability
- Identified policy issues resolved (discussion later today)
- Agency and industrial based aviation weather research synchronized (discussion later today)
- NextGen transforms the national system with respect to the utilization of weather information
- Technology continues to advance the state of the art in observing and forecasting weather
 - Ability to define uncertainty as important as accuracy



Virtual 4D Weather Cube



NextGen Implementation Status

Funded Commitments

FY07

ADS-B - Implement 1st segment of advanced surveillance & broadcast services to deliver en-route, terminal, & surface surveillance data from key sites via broadcast comm. link

FY08

SWIM - Implement 1st set of data exchange services using net-centric technology and architecture to support increase shared situational awareness

NNEW – Demonstrate inter-agency Wx Dissemination Mgmt capabilities to Integrate effective Wx info into Operational decision-making

DataComm – Develop architecture to transform from a voice-only comm. to an air-ground data comm. capability

Demos & Infrastructure - Perform formal demos that advance R&D, operational concepts and key infrastructure

FY09

Mid-Term Capabilities

2012 - 2018

- Initiate Trajectory-based Operations
- Increase Arrivals/Departures at High Density Airports
- Increase Flexibility in the Terminal Environment
- Improve Collaborative ATM
- Reduce Weather Impact
- Increase Safety, Security, and Environmental Performance
- Transform Facilities

NASA programs

- Aviation Safety
- Airspace Systems
- Fundamental Aeronautics

2019-2025

BACKUP Charts



Recommended Action

- JPDO Weather Working Group **proposes a study team be created for a period of six months**, made up of JPDO agency SME's (those involved in agency 4D cube efforts), **with the following deliverables due Jan 1, 2008** to support a Spring 2008 SPC decision on implementation:
 - A set of common NextGen **4D Cube functional requirements** [defined for short (2012), mid (2015), and long (2018+) time frames] -- 2012 requirements highest team priority
 - Document containing higher-level 4D Cube definition (including cost/schedule/ performance information) than proposed for the initial baseline of the JPDO Integrated Work Plan
 - Working jointly with the JPDO System Evaluations and Analysis Division, deliver improved cost-benefit analyses



Inter-agency Policy Opportunities

- Three early inter-agency opportunities identified during the planning process
 - Interagency Net Enabled Information Sharing
 - National Safety Management System
 - NextGen Net Enabled Weather
- Common attributes
 - Critical to NextGen
 - Cross-agency impact (cost and benefit)
 - No single agency has within its mission the integration role among all impacted groups
 - Requirements must be brought together to mature the Integrated Work Plan and Enterprise Architecture



Problem Statement:

Why a National Aviation Information Sharing Agreement?

- Net Centric Operations (NEO) & Information Sharing (NEIS) are at the core of the NextGen vision for NAS transformation
- NextGen IWP Linkages: Net-enabled information sharing is a key enabler to NextGen's envisioned core capabilities, including:
 - 4-D Trajectory Management
 - Integrated Weather and Safety systems;
 - Integrated surveillance;
 - Curb-to-curb system security;
 - Dynamic airspace management
- Considerable investment ***already exists*** among JPDO Partner Agencies in information technology and net-centric operations:
 - DoD – GiG
 - FAA – SWIM
 - DHS – One-Net
- Opportunity exists now, ***with appropriate Partner Agency direction***, to synchronize key efforts in the areas of data interoperability and compatible network-to-network interface mechanisms