

FY09 NextGen Portfolio



Federal Aviation
Administration

High Altitude Concept

Date: December 2008

Overview

- **High Altitude Capability**
- **High Altitude Smart Sheet**
- **Airspace & Procedures Roadmap**
- **FY09 NextGen Implementation Plan Commitments**
- **High Altitude Framework**
- **Research Areas**
- **Project Schedule**
- **High Altitude Interdependencies**
- **High Altitude Requirements Development**
- **Key Personnel**
- **Acquisition Status/Requirements**
- **Project Risk Identification and Mitigation Strategy**



High Altitude Capability

- **Problem Description**

- Today's airspace and routes are highly structured, limiting the ability to dynamically adjust resources to meet demand
- Air navigation service provider (ANSP) training is extensive, time-consuming, and focused on specific sectors of airspace
- ANSPs working high altitude airspace (FL340 and up) may not require knowledge of specific local airspace procedures, particularly in trajectory-based airspace
- A “generic” airspace concept may allow for flexible allocation of human resources to areas based on system need, and provide the basis for dynamically reconfigurable airspace and other innovations to increase capacity.

- **Is a High Altitude concept operationally feasible?**
- **Does it provide benefit to the agency and the user community?**
- **Can it be developed to provide a level of capability to support safe and efficient Air Traffic Services?**



High Altitude Smart Sheet

• Project Description

The High Altitude (HA) project includes the development and validation of a HA operational concept for the mid-term (2018) that explores the utility and implications of HA performance-based airspace that includes generic sectors, dynamic resource management (people and airspace), and trajectory-based operations (TBO). Through a series of validation activities, concept-level requirements will be derived.

• Problem/Performance Gaps

Current systems operated by Air Navigation Service Providers (ANSPs) and aircraft operators lack the means to achieve the increased level of flexibility and efficiency required to support NextGen objectives. The primary technique available today to address demand-capacity imbalances is traffic flow restrictions, which regulate demand, but often result in delays and other costs to airspace users. In addition, controller staffing responses to changing demand are very limited in scope. Controllers are trained, via a time-consuming and expensive process, on specific local procedures in pieces of airspace; knowledge that is not transferable to other airspace. Improving the capacity side of the system imbalances that occur requires increased flexibility in staffing, airspace, and routes.

• Solution

The HA concept aims to enhance system flexibility in the mid-term for flight levels 340 and above with a generic and adaptive airspace environment that more effectively applies resources to demand in terms of ANSP staffing (promoting interchangeability of ANSP workforce and reducing training time), while improving traffic and airspace management (exploring approaches to managing airspace and flows more dynamically). The concept includes advanced capabilities, i.e., TBO, that may reduce the need for local airspace knowledge, exploit improvements in communications, navigation, and surveillance, and promote the efficiency of HA operations. The validation activities planned for FY09 & FY10 will examine the feasibility, acceptability, and benefits of the HA concept elements.

• Support to Goals

Flight Plan: Increase capacity to meet projected demand and reduce congestion.

NextGen Integrated Plan: Establish an agile air traffic system that accommodates future requirements and readily responds to shifts in demand from all users. The system will have the flexibility to deliver capacity and efficiency improvements, and ensure that equipment and personnel are able to support a wide range and number of operations tailored to customer needs.

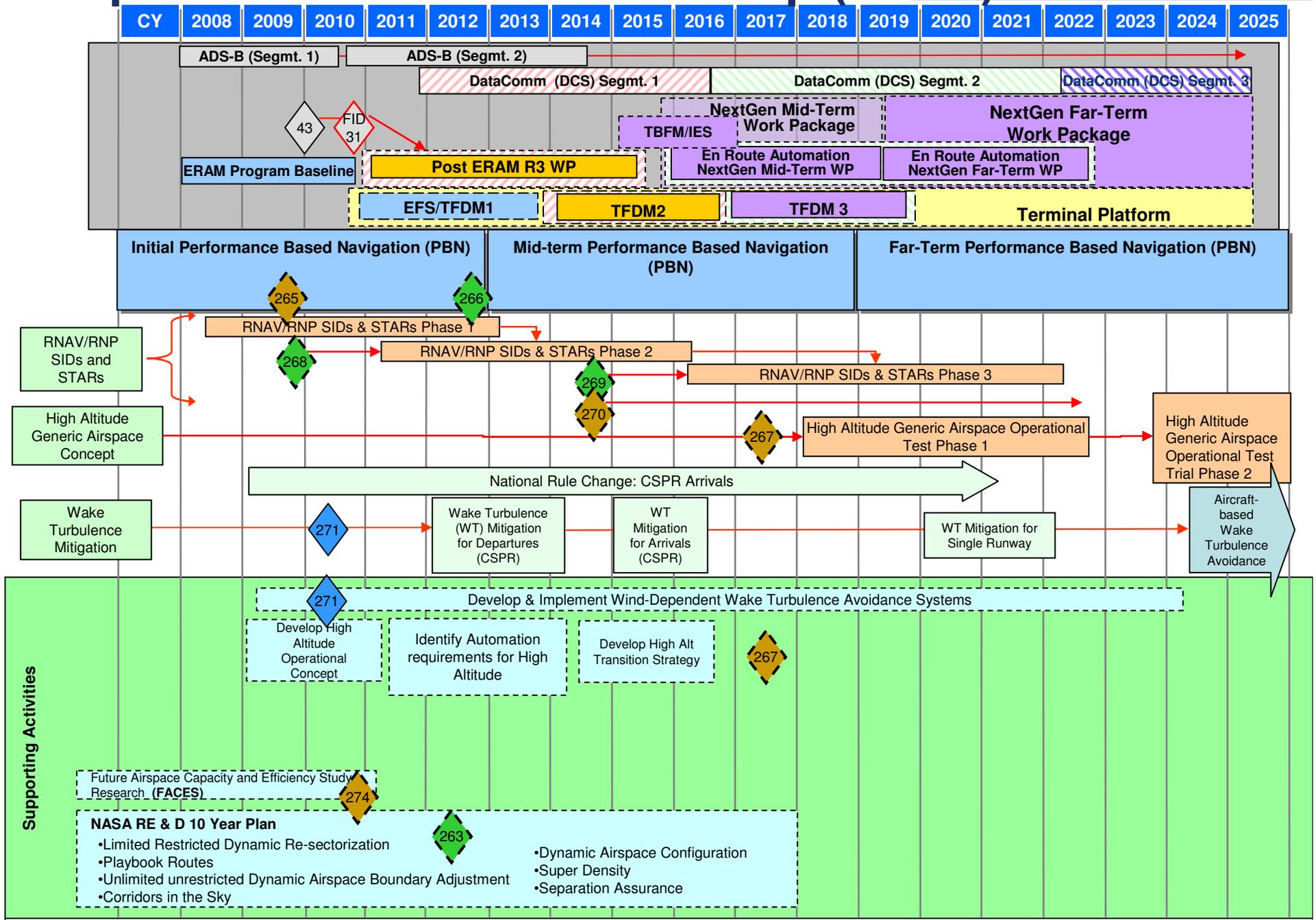
• Interdependencies

Concepts: Multi-Sector Planner, Data-Comm 2, Separation Management, Wake Turbulence

Facilities & Equipment: Future Facilities, ERAM, SWIM, Performance Based Navigation and Airspace



Airspace & Procedures Roadmap (2 of 3) High Altitude



FY09 NextGen Implementation Plan

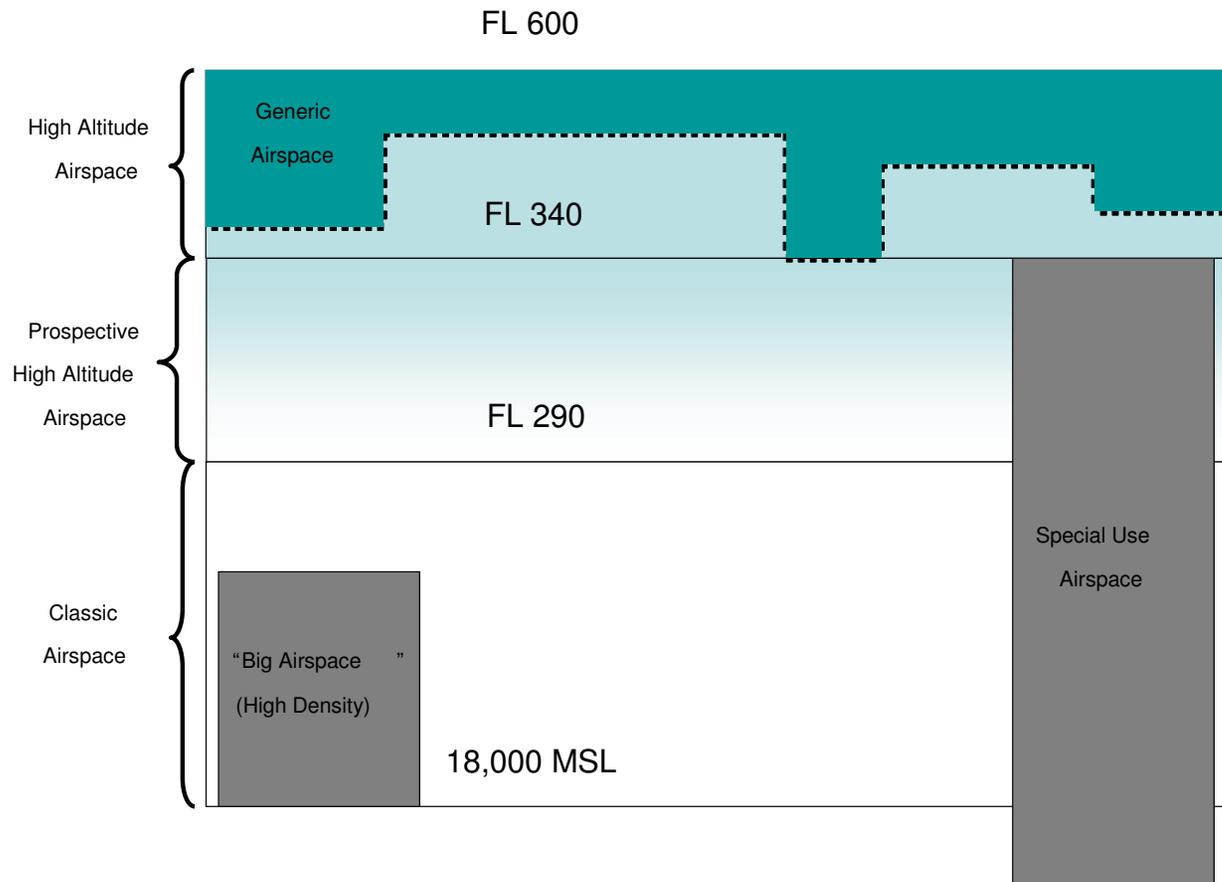
Commitments (PLA Milestones)

- **Conduct airspace design analyses**
- **Identify set of information, operational, and top-level systems requirements**

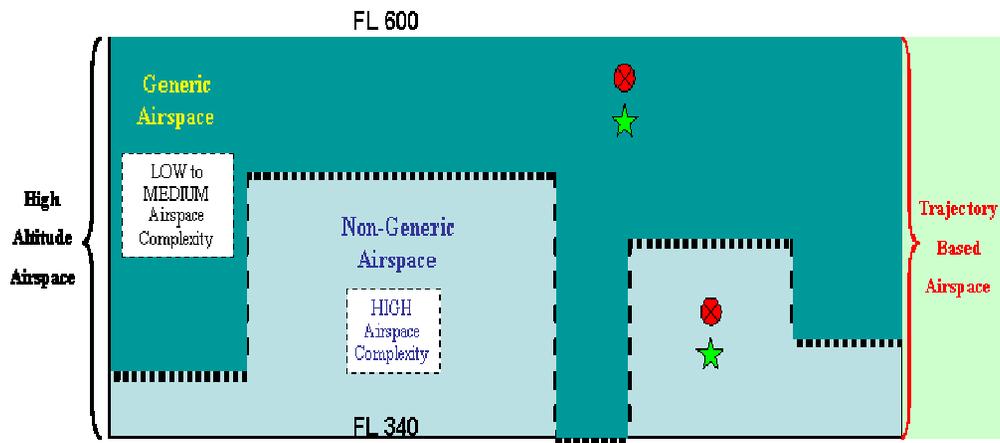
NextGen... Integrating Ideas, Systems and Solutions



High Altitude Framework



High Altitude Framework (cont'd)



Provide flexibility where possible and structure where necessary

High Altitude Capabilities and Operational Benefits

Generic Airspace

- Increased staffing efficiencies
- Reduced controller training time
- Interchangeability of controllers
- Peaks handled with fewer controllers
- Larger pool of controllers from which to draw

Adaptive Airspace Management

Improved ability to respond to capacity changes in off-nominal or heavy flow conditions using adjustable airspace configurations

Trajectory Based Operations

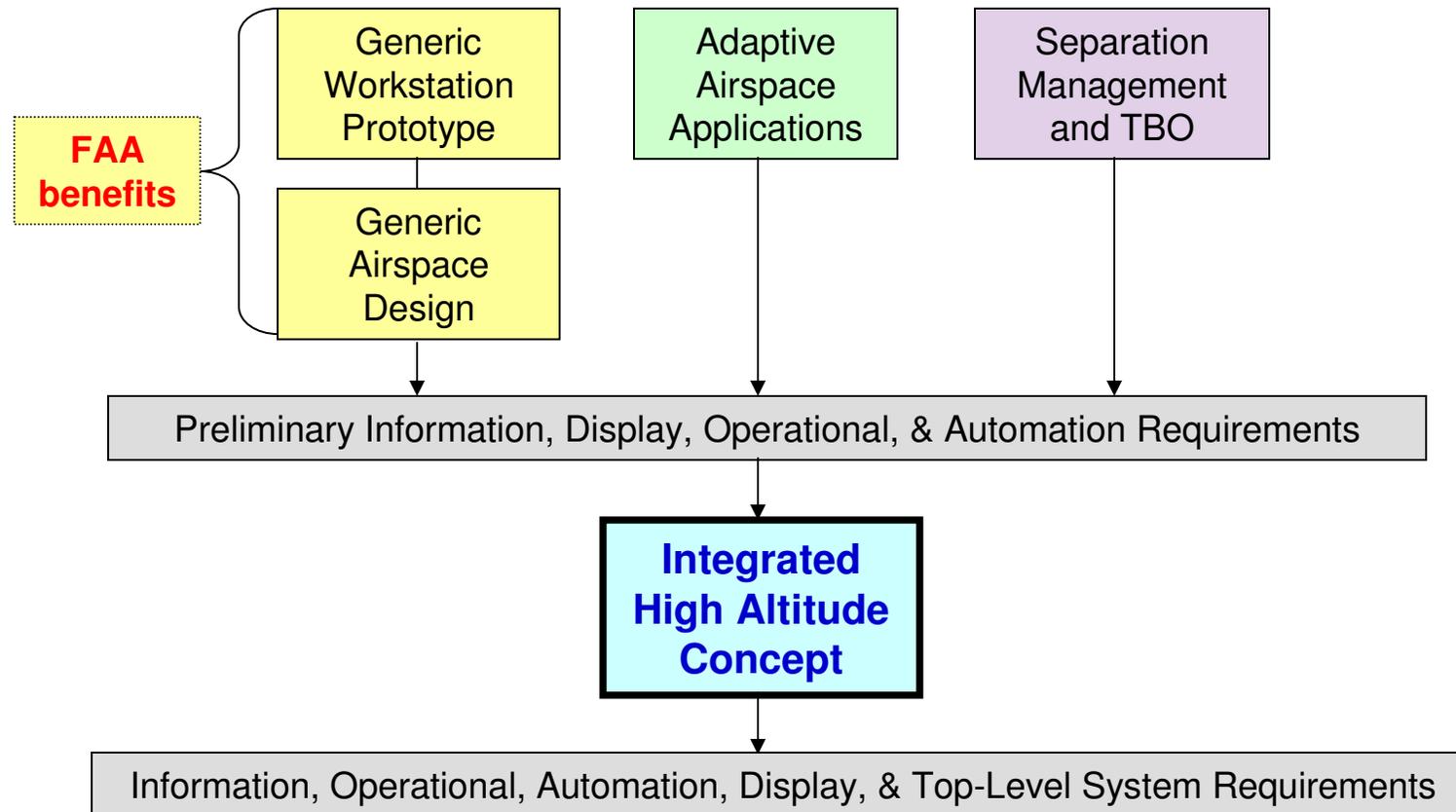
- Flexible and efficient user-preferred routes
- Reduced coordination between users and ANSP
- Improved traffic management of flows

Research Areas

- **Generic Workstation Prototype**
 - Information, decision support, and display needs for increasing staffing flexibility and reducing training time
- **Generic Sector Design Criteria**
 - Heuristics for designing generic sectors to support TBO, criteria for determining where generic sectors apply in the mid-term
- **Adaptable Airspace Applications**
 - Methods to dynamically adjust airspace to accommodate changes in demand (e.g., limited dynamic resectorization, airspace playbook)
- **Separation Management and TBO**
 - Information, decision support, and operational issues, including roles and responsibilities, associated with managing TBO in HA generic and non-generic airspace

Research Areas (cont'd)

- **Modular and Phased Approach**



Project Schedule (FY 09)

Description	S	O	N	D	J	F	M	A	M	J	J	A	S	
Narrative Concept of Operations for Mid-Term (2018) Development	█						▲							
Scenario Development for Validation Activities	█		▲											
Concept Validation Plan				█		▲								
Initiate Validation Activities Fast-Time Modeling, and Part- and Full-Task Human-in-the-Loop Simulations					█									
Generic Workstation Prototype Planning, Conduct, & Analysis						█								
Generic Sector Design Criteria Planning, Conduct, & Analysis						█								
Adaptable Airspace Applications Planning, Conduct, & Analysis						█								
Separation Management and TBO Planning, Conduct, & Analysis						█								

↓ Indicates predecessor/successor relationships



Project Schedule (FY 10)

Description	S	O	N	D	J	F	M	A	M	J	J	A	S
Continue Validation Activities Fast-Time Modeling, and Part- and Full-Scale Human-in-the-Loop Simulations	[Green bar with white triangle at end]												
Generic Workstation Prototype Cognitive Support and Display Requirements Planning, Conduct, & Analysis	[Dotted green bar]												
Airspace/Generic Sector Design Criteria & Analysis Planning, Conduct, & Analysis	[Dotted green bar]												
Adaptable Airspace Applications Planning, Conduct, & Analysis	[Dotted green bar]												
Separation Management and TBO Planning, Conduct, & Analysis	[Dotted green bar]												
Integrated Full-Scale Evaluation Planning, Conduct, & Analysis			[Dotted green bar]										
Develop Concept-Level Requirements Information, Operational, Automation, Display, Preliminary System	[Green bar]												

↓ Indicates predecessor/successor relationships



High Altitude Interdependencies

- **What are the related projects/programs? What is the integration between the projects/programs?**
 - Multi-Sector Planner
 - Separation Management
 - TBO
 - Wake Turbulence
- **What system dependencies exist?**
 - Data communications
 - Conflict detection & resolution
 - ERAM
 - FMS (RNAV/RNP)
 - SWIM
 - ADS-B, CDTI
 - NAS Voice Switch



High Altitude Requirements Development

- **What requirements will be developed?**
 - Information
 - Operational (e.g., airspace, training, procedures)
 - Display
 - Automation/Decision support
 - Top-level system
- **What other activities are required to reach implementation?**
 - CRD¹
 - Requirements development
 - Alternatives analysis
 - Cost-Benefit analysis
 - Shortfall analysis

¹ Need to determine how the capabilities will get allocated to systems and what needs to go through CRD

Key Personnel

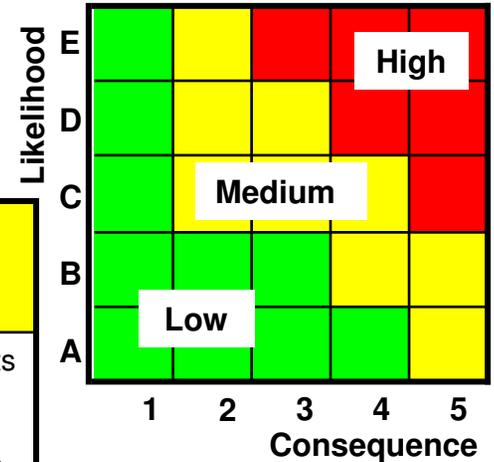
- **FAA Personnel**
 - ATO-P Concept Development & Validation
 - Operational SMEs from Service Units
 - Planning organizations within Service Units
- **Other Government Personnel**
 - NASA Ames
- **Contract/FFRDC Personnel**
 - CSSI Inc.
 - Mitre
 - Others TBD
- **Working Groups**
 - Dynamic Airspace Configuration (DAC) Research Transition Team (RTT)
- **Challenges – discussed in Risk Section**

Acquisition Status/Requirements

- **Existing Contracts**
 - CSSI Inc.
 - REAPS Contract – Ops Concept TDM 40
 - Period of Performance: April 08 – June 09
 - Contracting Officer: Barbara Kates
 - COTR: Debbie Frye
- **New Contract Requirements**
 - MITRE CAASD – Industrial Funding
 - Others TBD – Potentially REAPS (HQ), MASS ESSA (WJHTC), FAA 2012 (WJHTC)
- **Other Agreements**
 - NASA support coordinated through DAC RTT and Interagency Agreement



Project Risks



Risk Level (T,S,C)	Description	Impacts	Mitigation Strategy
S-C4	Development of human-in-the-loop simulation mid-term capabilities at the WJHTC and other facilities	Delay of simulation activities to support concept development & validation	Communicate requirements as early as possible; track development progress; support project-specific lab upgrades
S-C4	Insufficient representation of mid-term capabilities in fast-time models	Delay of simulation activities to support concept development & validation	Communicate requirements as early as possible; track development progress; support the enhancement of tools
S-C4	Availability and commitment of field controller personnel resources to support HITL simulations, cognitive walkthroughs, and other development activities	Delay of simulation activities to support concept development & validation	Communicate requirements as early as feasible; provide backfill overtime \$
S-C4	Availability of laboratories at WJHTC and other facilities to support HITL simulations	Delay of simulation activities to support concept development & validation	Secure required time slot as early as possible

T, S, C: Technical, Schedule, or Cost

