

# Air Traffic Organization



Federal Aviation  
Administration

## NextGen Demonstrations Update

*Presented to:* NAS Enterprise Architecture Conference

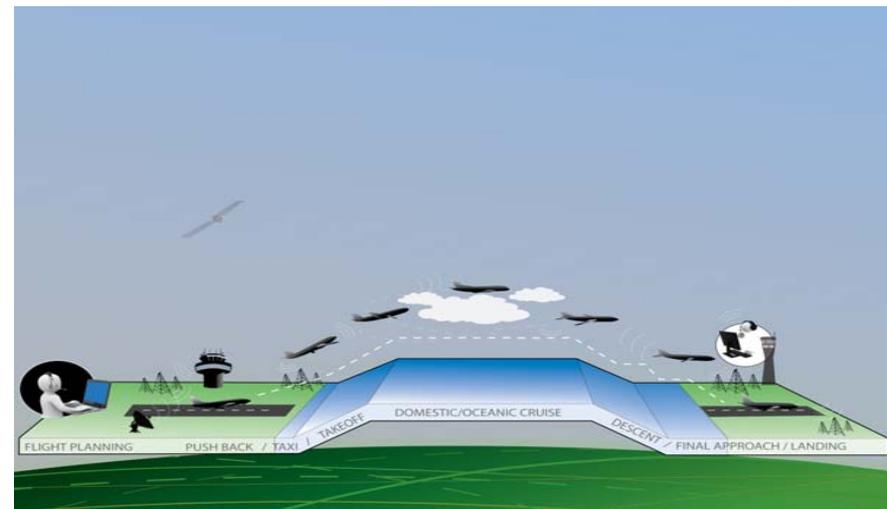
*By:* John Marksteiner (Advanced Technology and  
Prototyping Group (AJP-67))

June 25, 2009



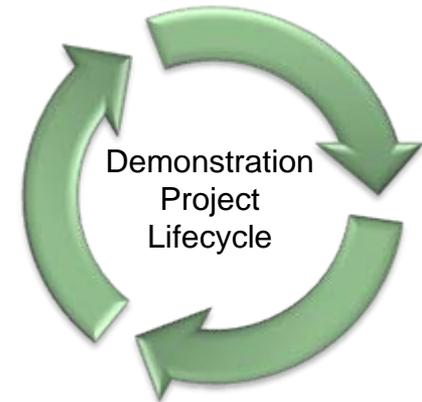
# Purpose of NextGen Demonstrations

- ❖ Prove concept feasibility and support both validation and fast-time modeling
- ❖ Identify performance requirements
- ❖ Develop and refine operational concepts
- ❖ Collect data to support business case and investment decisions
- ❖ Provide early user benefits
- ❖ Promote industry involvement



# NextGen Demonstration Objectives

- ❖ **Clear Entry/Exit Criteria**
- ❖ **Demonstration Project Plan**
- ❖ **Identify environment, platform/systems, stakeholders and partners**
- ❖ **Target Decision Point(s)**
- ❖ **Funding Report**



24 – 30 months



# Demonstration Selection Process

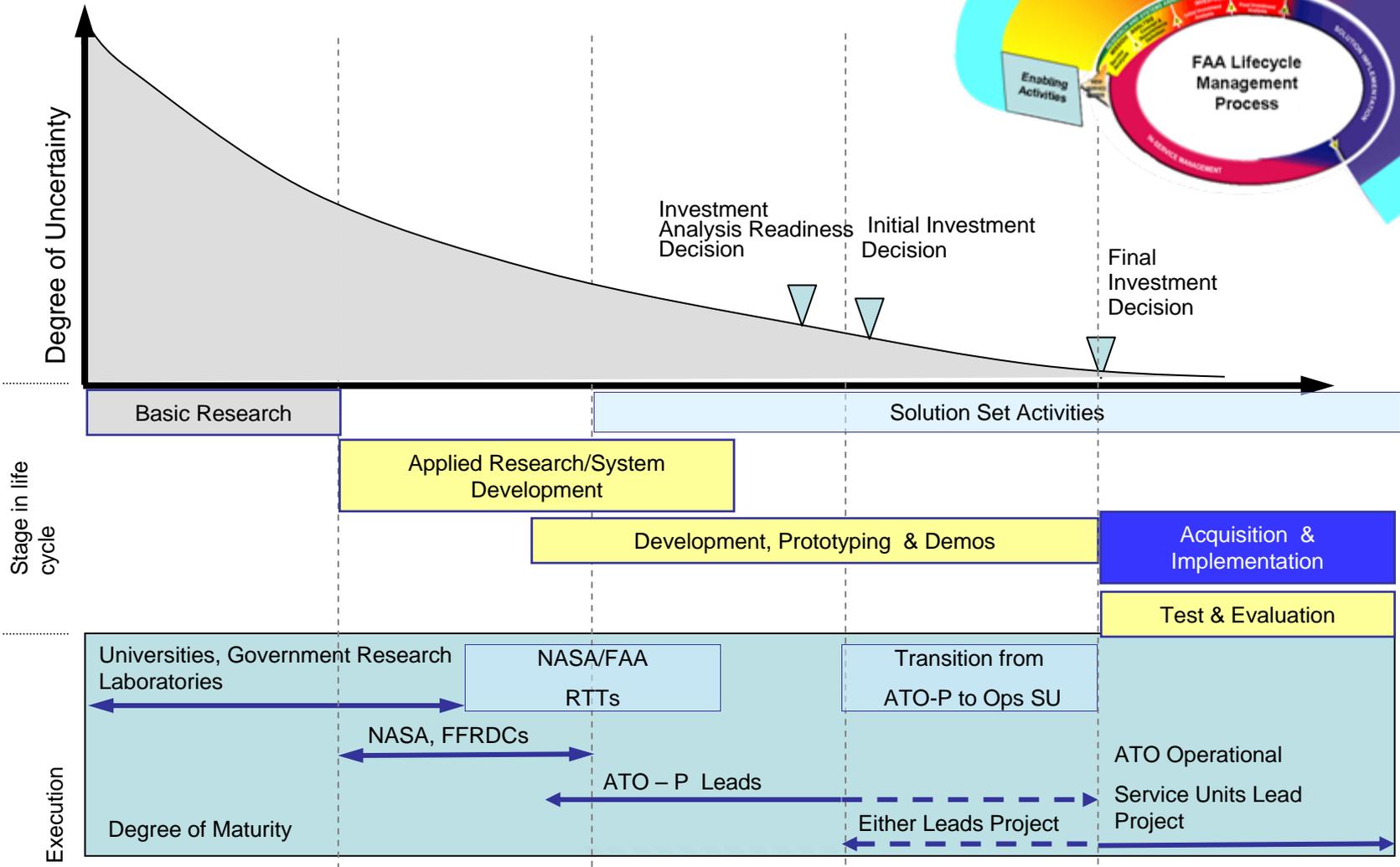
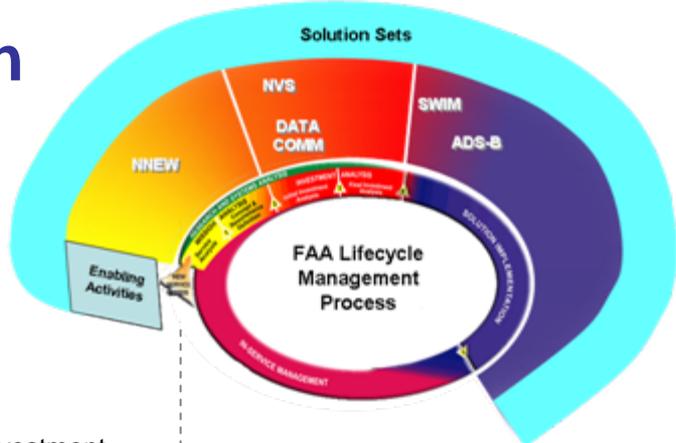
**The current demonstration project selection process is not well defined**

## Recommended Actions to Support NextGen:

- ❖ Establish a small group to propose demonstration projects. This “Demonstration Group” will be composed of representatives from each of the planning organizations (AJP, AJE, AJR, AJT and AJW)
- ❖ Look ahead 12–18 months or more. Focus on decisions requiring community buy-in in 4–5 years
- ❖ Link organizational needs and decisions related to implementations/investments
- ❖ Engage in proactive planning
- ❖ Support global harmonization across NextGen



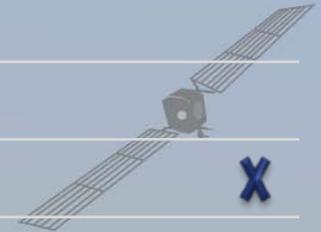
# NextGen Integration and Implementation Spans the Full Life Cycle



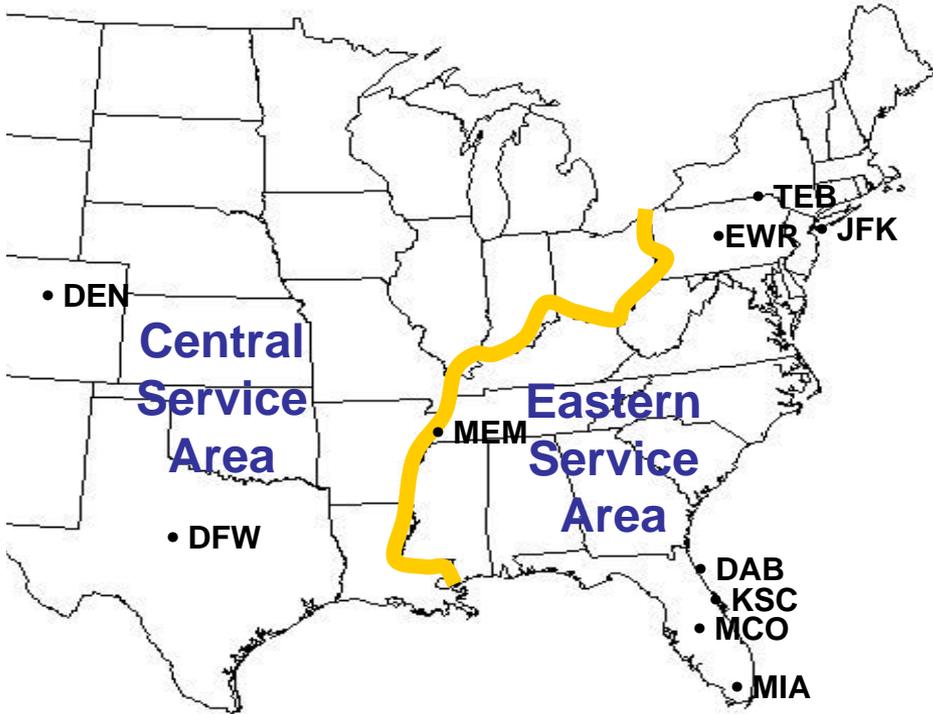
# NextGen Demonstrations (DEMOS)

Program Manager: Paul Fontaine

	CDA	TA	3D PAM	Oceanic TBO	WX Det/TMA	Surface	UAS	GBAS	4D FMS	SNT
TBO				X			X		X	
HD	X	X	X		X	X		X		
FLEX								X		
CATM										
RW					X					
SSE	X	X	X	X		X				
FAC										X



# FY09/10 Demonstrations Locations



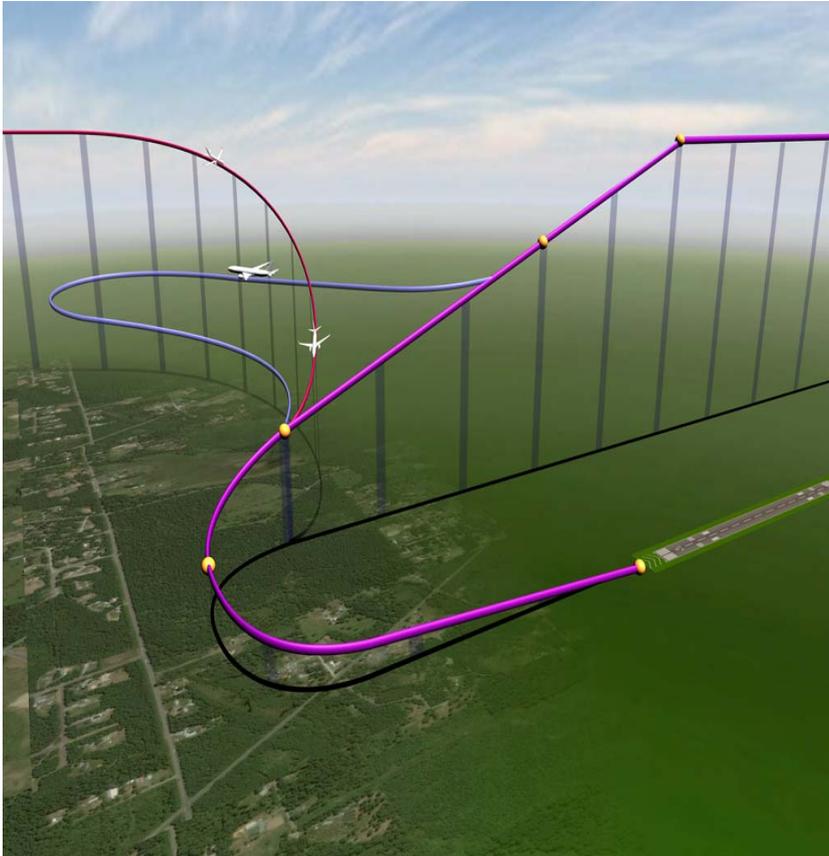
- Surface Management: MEM, MCO, JFK
- Tailored Arrival: MIA, SFO, LAX
- Oceanic: MIA
- Flight Object: DAB
- 4D FMS: TBD
- UAS: KSC
- GBAS: EWR, TEB
- 3D PAM: DEN
- CDA: CHS, MIA, ATL
- Staffed NextGen Tower: DFW



# Back-Up Slides

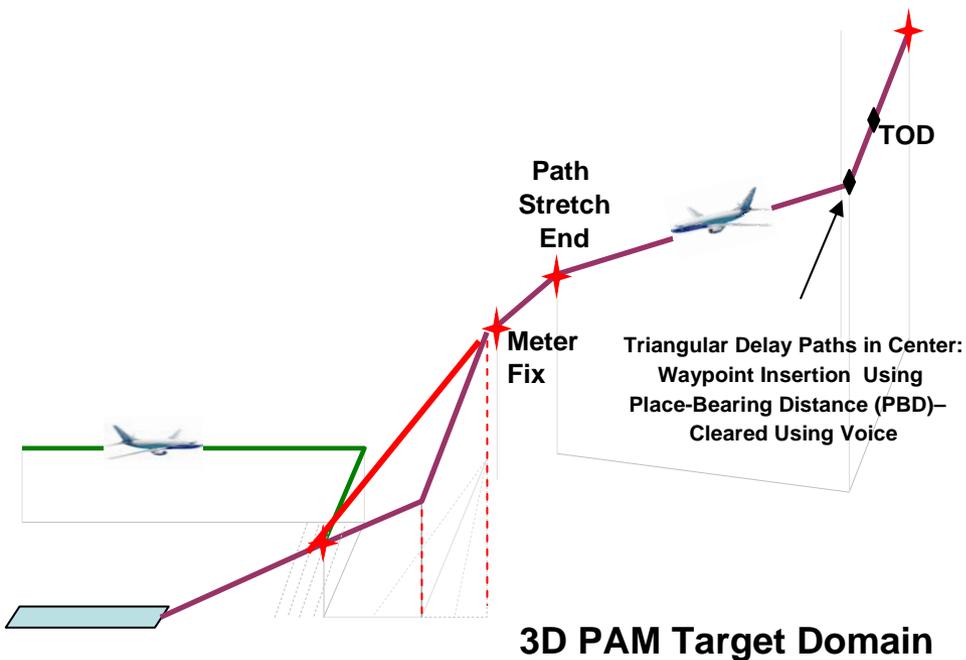


# Demonstrations: Continuous Descent Arrivals (CDA)



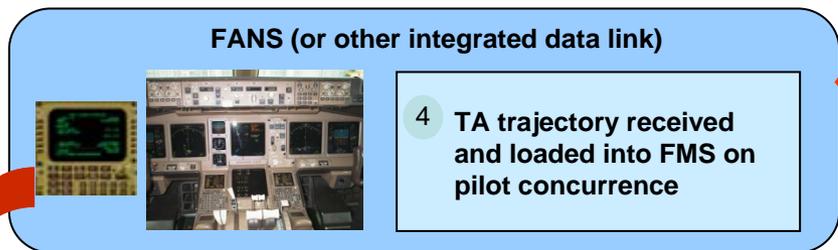
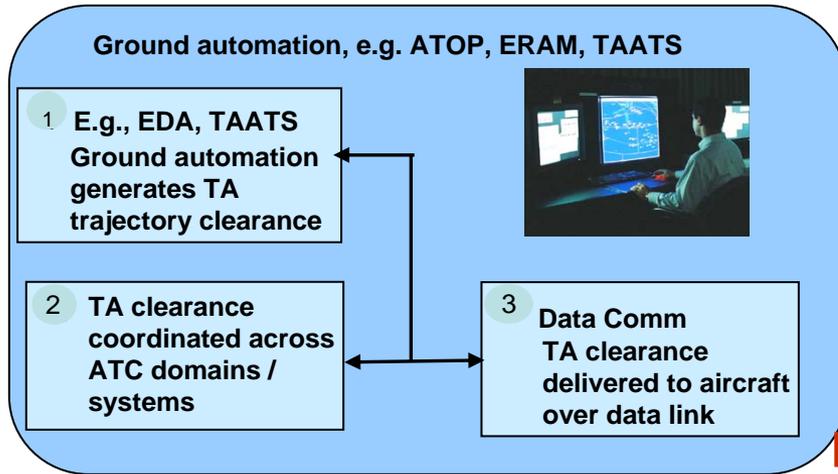
- **Initiative:** Uses Area Navigation (RNAV) / Required Navigation Performance (RNP) arrivals with optimized vertical profile
- **Benefit:**
  - Approximately 200 to 400 LBS of fuel per arrival
  - Reduced noise and emissions
- **Partners:** American Air Lines, Delta, US Air Force Mobility Command (AMC), International Air Carriers, Georgia Tech, MITRE
- **Schedule:**
  - Demonstration flights by AMC at CHS in Sept 09
  - Publish CHS OPD procedures for public use in FY-10
  - Publish ATL OPD procedures for public use in Feb 2010
- **Status:**
  - ATL Flight Tests: May 5 -16th, 11 partial/full CDAs conducted (Delta)
  - MIA Flight Tests: May 5-19th, 10 partial/full CDAs conducted (American)
  - CHS Flight Test: Fly draft procedures in C-17
    - Delta simulations in Dec 08
    - C-17 simulation in Mar 09
  - Prioritized list of recommended airports for CDA implementation – Apr 09
  - Results indicate approximately 50-135 gallons per flight savings

# Demonstrations: 3D Path Arrival Management (3D PAM)



- **Initiative:** Deliver aircraft from TOD to a meter fix efficiently and predictably. The concept is an initial attempt at 4D trajectory operations in the arrival domain. The project includes the development of a new automation support tool
- **Benefit:** Move from controller-based to Trajectory Management using automation for fuel and emissions saving with reduced controller work load
- **Partners:** NASA Ames, Boeing, Sensis, Continental, AAL
- **Schedule:**
  - FY09 Human-in-the-Loop Simulation (HITLS)
  - Sept 09 Live Flight Trials at DEN
  - Finalize the 3D PAM/Tailored Arrivals Integrated Roadmap - Nov 09
- **Status:**
  - Integrated ATC / Flight Deck Simulation completed September 18, 2008
  - Two Flight Deck HITLS successfully completed Nov 08- Feb 09
  - Two ATC HITLS successfully completed Feb-May 09

# Demonstrations: Tailored Arrivals (TAs)



5 TA trajectory flown with FMS

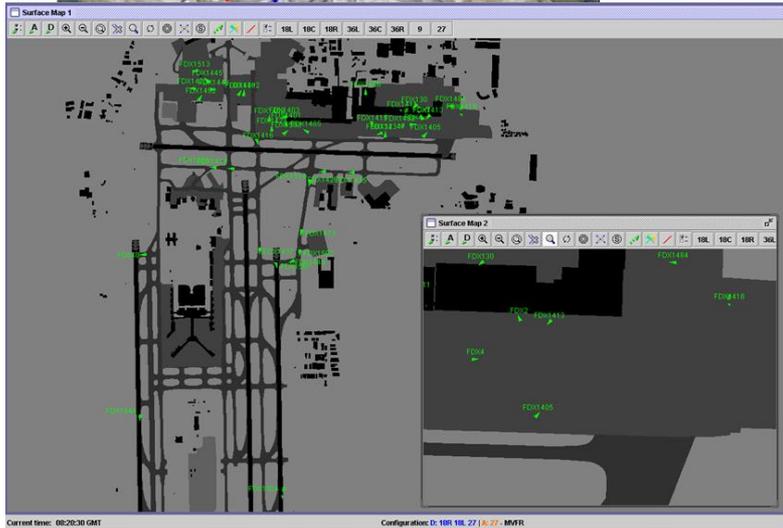
- **Initiative:** Integrate automation tools and Data Comm to provide cleared trajectory path, which is uplinked to the aircraft and flown by Flight Management System (FMS) \*
- **Benefits:**
  - 400/600 LBS of fuel reduction per arrival in end-state
  - Reduced fuel burn and environmental footprint
- **Partners:** NASA Ames, Boeing, Sensis, American Air Lines & Foreign Carriers
- **Schedule:**
  - Continued trials of TAs at MIA, and SFO with collection and analysis of fuel saving data
  - Development of update ITA schedule for FY-10 through FY-11
  - LAX TA profiles in development with live flight trails (Mid CY 2009)

## Status:

- Since December 2007 – over 1700 complete and partial TAs at SFO (Both B-777 & B-747)
- As of May 09 estimate 38,000 gals of total fuel saved or about 100 – 130 gallons per flight
- Flight Trials resumed in MIA in Jun 09
- Four check flights on 3/9/09 at LAX with Qantas reporting fuel savings of 115 gals (B747) over typical arrival

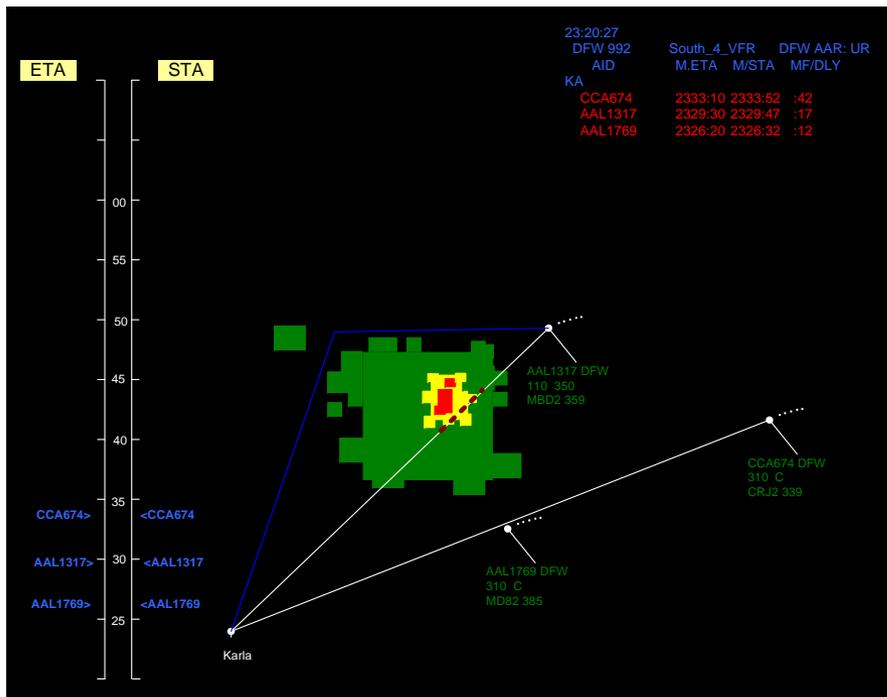
\* Supporting Atlantic Interoperability Initiative to Reduce Emissions (AIRE)

# Demonstrations: Surface Management at John F. Kennedy (JFK) Memphis (MEM) & Orlando (MCO)



- **Initiative:** Leverage FAA investment in surface detection equipment (ASDE-X) to support new decision support tools
- **Benefits:**
  - Collaborative planning at airport
  - Reduced fuel burn and environmental footprint
- **Partners:** Airport Authorities, FedEx, NWA
- **Schedule:**
  - MCO installation Nov 09
  - Concept Requirement Definition (CRD) documentation completed Dec 09
  - MEM Surface Decision Support System
    - Working group formed to evaluate benefits / future enhancements
    - Flight Operations Surface Application (FOSA) interface concept development ongoing (i.e., data sharing interface) – estimated completion Nov 09
    - Collaborative departure Queue Management demo begins Nov 09
  - Ongoing Coordination with ATO-T and SysOps
- **STATUS:**
  - JFK Commercial Ramp Surveillance System installed / operating late 08
    - Feeds to ATC, Airline Ramp Towers and TSA
  - MEM Surface Decision Support System installed late 2008
  - Completed successful STARS interface testing at MCO in May 09
  - Completed MOU with FedEx for joint development of surface data exchange in June 09

# Demonstrations: Weather Integrated into TMA / ERAM



- **Initiative:** Initial demonstration showed incorporation of convective weather data into Traffic Management Advisor (TMA) and EnRoute Automation Modernization (ERAM) to maintain better airport arrival rates
- **Benefits:**
  - Alleviate weather impacts through advanced planning tools
- **Partners:** Embry Riddle, Lockheed Martin, CSC
- **Status:**
  - Laboratory demonstration Nov 08
  - Final Report delivery Apr 09

# Demonstrations: Ground Based Augmentation System (GBAS)



- **Initiative**
  - Demonstrate the use of Performance Based Navigation technology to improve arrival rates at airports
- **Benefit**
  - Additional throughput to maximize airport efficiency
  - Reduced fuel consumption and lower noise and emissions
  - Improved airport access
- **Partners**
  - NY Port Authority, Continental and NetJets
- **Schedule**
  - GBAS installation at EWR – Aug 09 and TEB Sept 09
  - Aircraft modification – Aug 09
  - Conduct evaluation – Late 2009/10
  - First Commercial Demonstration Flight Oct 09 on ILS overlay
- **Status**
  - MOU Finalization and signing – Jun 09

# Demonstrations: Unmanned Aircraft System (UAS)



- **Initiative:**
  - Utilize advanced capabilities of UAS community as tested for exploring future 4D trajectory based Concepts
  - Examine potential concepts for widespread integration of UAS into future NextGen environment
- **Benefits:** Enables full range of UAS applications
- **Partners:** AAI, General Atomics, GE
- **Schedule:**
  - UAS Baseline Flight Test Aug 09
- **Status:**
  - On track to complete UAS OTA with Embry-Riddle Aeronautical University in June 2009



# Demonstrations: International Air Traffic Interoperability



- **Initiative:** Series of joint demonstration projects aimed at promoting global ATC leadership and collaboration with R&D activities with other countries
- **Benefit:**
  - Global harmonization of ATC infrastructure and advancement
  - Reduce environmental impact
- **Partners:** Boeing, Airbus, Air France, Air Europa, American, Delta, Qantas, United, Air Lufthansa, New Zealand, Airways New Zealand, Airservices Australia, Nav Portugal
- **Schedule:**
  - Conduct integrated oceanic/arrival operational trials in Atlantic for 2 months (June-July 09)
  - Conduct 6 months of ADS-C ops trials in Pacific starting January 2010
- **Status:**
  - ASPIRE flight 3 flown by UAL from Sydney to SFO in Nov 08
  - ADS-C ITP demonstration plan delivered Apr 09
  - Web-Enabled CTP Concept of Operations delivered Apr 09

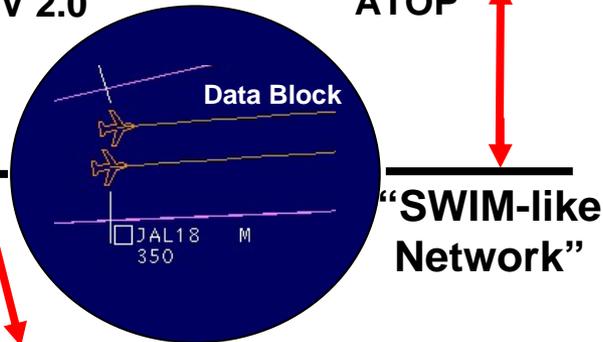
# Demonstrations: International Flight Data Object



ERAM V 2.0



ATOP



Nav Portugal Santa Maria (Adacel Systems)

- **Initiative:** Integrated “disparate” domestic and foreign ATC systems through use of a common “SWIM-like” enabled “Flight Data Object”
- **Benefits:** Helps define requirements and ConOps for common data object across automation platforms
- **Partners:** “SWIM Alliance” partners (Lockheed Martin, Computer Sciences Corp, Boeing, Harris), Adacel, Nav Portugal
- **Schedule:**
  - Fall CY-09 (Oct / Nov) Laboratory Demonstration – Extend Flight Data Object to include Surface TBO
- **Status:**
  - Proof of concept lab demo completed Mar 09

# Demonstrations:

## 4-D Flight Management System (4-D FMS)



### Initiative:

- Demonstrate operational capabilities and potential benefits of 4 Dimensional (4-D) Flight Management Systems in Trajectory Based Operations (TBO).
- Aid in defining “required performance” of 4 Dimensional (4-D) Flight Management Systems in trajectory prediction, negotiation, and guidance.

### Benefits:

- Reduce controller workload and improved productivity
- Enhance reliability, repeatability and predictability of operations, leading to increased throughput.
- Improve efficiency and flexibility by increasing use of operator-preferred trajectories NAS-wide, at all altitudes.

**Partners:** Embry Riddle Aeronautical University, General Electric, and Partners in Aviation Consortium

### Schedule:

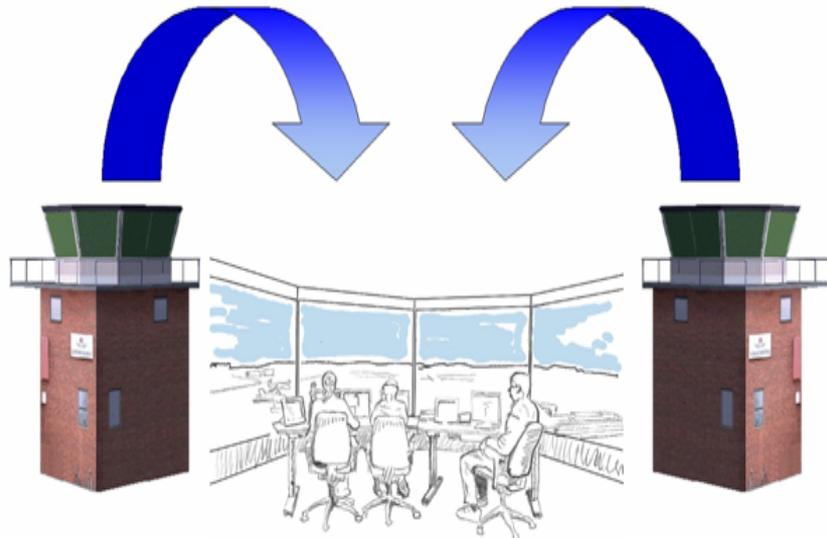
- Finalizing OTA with ERAU
- Developing project plan version 1
- Selecting demonstration sites and partner airlines

### Status:

- Held project kick-off meeting on June 17, 2009
- Held activity coordination meeting with MITRE- May 09
- Obtained signature approval on 3D RNAV & Required Time of Arrival (RTA) Project Level Agreement (PLA)

# Demonstrations:

## Staffed NextGen Towers (SNT)



- **Initiative:** SNT provides surface and tower services without the requirement for direct visual observation by ATC personnel from an airport tower cab
- **Benefits:**
  - Improves service during inclement weather and at night
  - Expands services to a significantly larger number of airports
  - Extends air traffic management tower services when towers close
  - Increases IFR throughput
  - Provides runway incursion awareness and prevention and ability to see new runways obstructed from view of the tower cab
  - Provides flexible staffing through collocation
  - Reduces infrastructure operating and maintenance costs and tower construction
- **Partners:** ATO-Terminal, DFW, MIT Lincoln Labs
- **Schedule:**
  - Field Demonstration Test Plan – Aug 2009
  - Metrics Data Collection Plan – Sept 2009
  - Field Demonstration – Aug 2010
- **Status:**
  - Approved NT ConOps – Sept 2008
  - Final Technology Assessment – Jan 2009
  - Quick Look Study – Jan 2009
  - Approved Research Mgmt Plan – Apr 2009
  - Field Site Final Selection – Mar 2009
  - Field Site Preparation Kickoff – Apr 2009

# Demonstration

## Network Enabled Operations (NEO) - Supporting NextGen Operations



### Initiative:

- Network information technology program with efforts directed at developing / leveraging an innovative, effective and efficient system-to-system operational architecture.

### Benefits:

- Provide the FAA and its Interagency partners with an agile, highly connective network for net centric shared situational awareness.

### Partners:

- DoD, DHS

### Schedule:

- DoD Commitment Being Discussed
- Coordinate with SWIM Program Office to formulate NEO SP2 strategy

### Status:

- Nov 13,2008- Completed the tech review of the 5 Nov Boeing RFP
- 13 May 13,2009- NEO Final PMR / TIM completed
- Coordinating IA Partner Funding (on-going)
- June 3, 2009- Spiral 1 Plus Contract ended
- June 2-5, 09, Kick-off and Planning meeting with DoD C2 Gap Filler Program Leads

# Demonstration: NetJets



**Initiative:** To establish a collaborative partnership between the Federal Aviation Administration (FAA) and NetJets Inc. to support the data capture activities required to quantify the benefits of the Next Generation Air Transportation System (NextGen) capabilities.

**Benefits:**

- Data captured can be used to refine CBA for business aircraft operators and the FAA
- Quantify fuel & emission reductions promised by NextGen
- Help quantify reductions in ATC delays
- Demonstrate new ways to mitigate operational risks
- Demonstrate new business applications

**Partner:** NETJETS

**Status:**

- Developing WAAS Partnership with GNSS Office
- Developing ADS-B Partnership with SBS Office