

Air Traffic Organization

NextGen Demonstrations Update

Presented to: Demonstration and Prototyping Information
Exchange Briefing

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Federal Aviation
Administration



Why Demonstrations?

- **Identification of performance requirements**
- **Develop and refine operational concepts**
- **Validate new technologies and benefits**
- **Provide early user benefits**

**Support Service Analysis, CRD and
IIA phases of AMS**

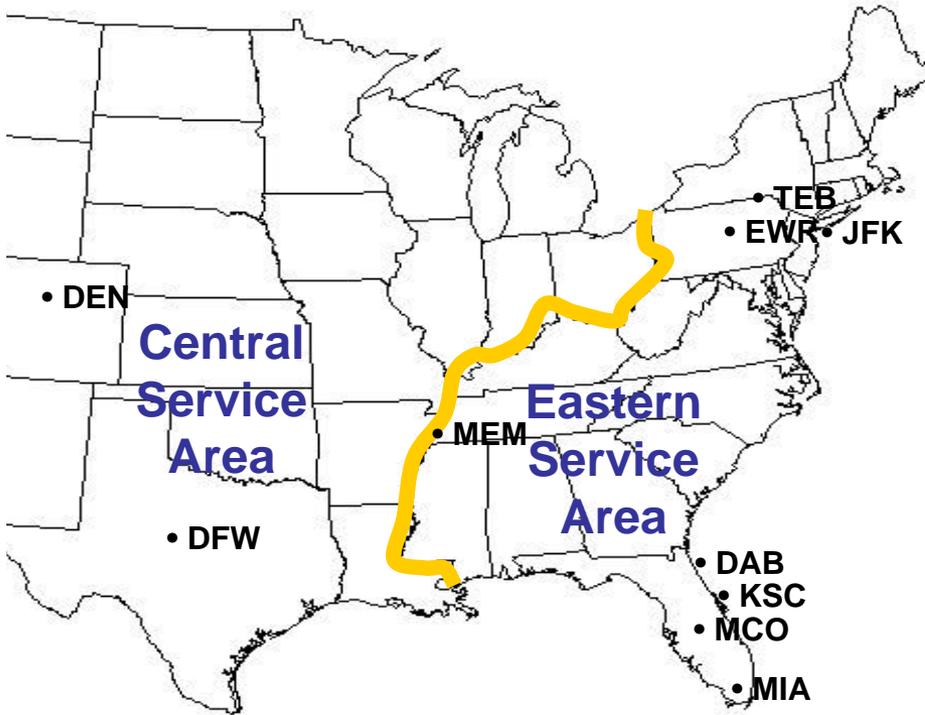


History

- **“Accelerating NextGen” initiative from Jan – Apr 08 resulted in designation of three geographic focus areas**
 - Florida Test Bed
 - New York Area Airports
 - Texas Airports
- **OMB also called for the designation of a NextGen Test Bed**

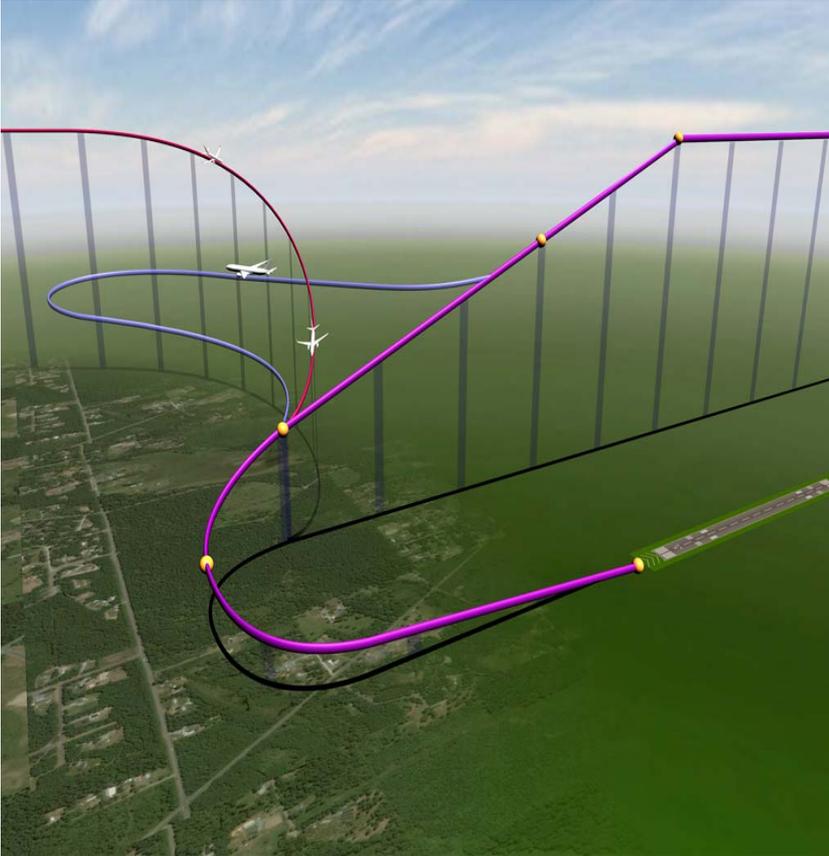


FY09/10 Demonstrations Locations



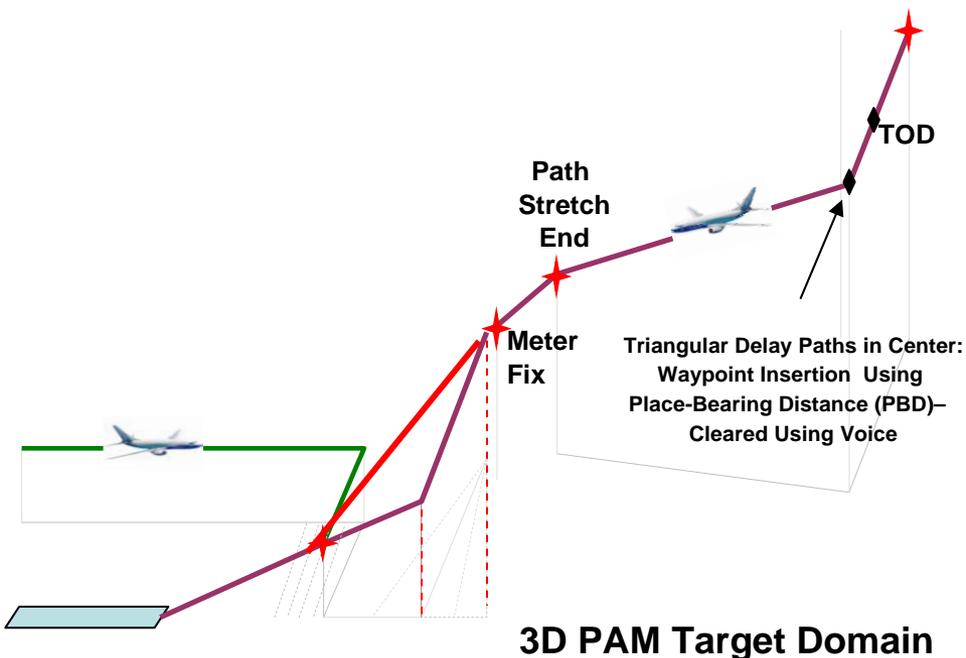
- Surface Management: MEM, MCO, JFK
- Tailored Arrival: MIA, SFO, LAX
- Oceanic: MIA
- Flight Object: DAB
- 4D FMS: TBD
- UAS: KSC
- GBAS: EWR, TEB
- 3D PAM: DEN
- CDA: CHS, MIA, ATL
- Staffed NextGen Tower: DFW

Demonstrations: Continuous Descent Arrivals (CDA)



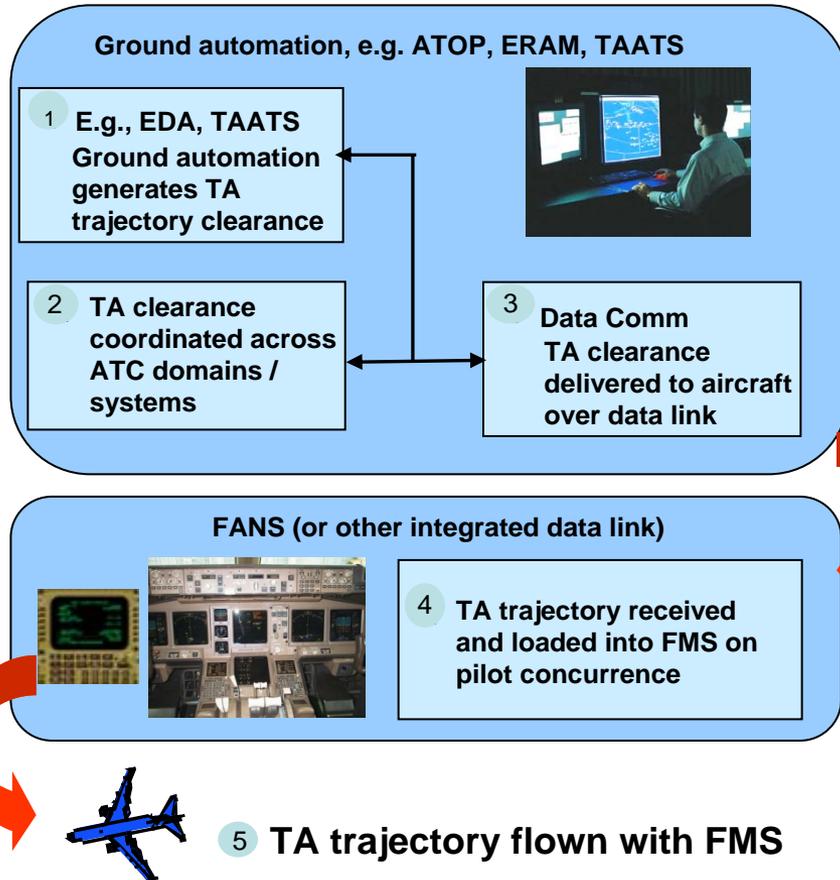
- **Initiative:** Uses Area Navigation (RNAV) / Required Navigation Performance (RNP) arrivals with optimized vertical profile
- **Benefit:**
 - Approximately 200 to 400 LBS of fuel per arrival
 - Reduced noise and emissions
- **Partners:** American Air Lines, Delta, US Air Force Mobility Command (AMC), International Air Carriers, Georgia Tech, MITRE
- **Schedule:**
 - Prioritized list of recommended CDAs – Apr 09
 - CHS Flight Test – Sept 09
- **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
 - Flight Demos planned in Sept 09
- **Results**
 - Results indicate approximately 50-135 gallons per flight savings

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



- **Initiative:** Move toward 4-D Trajectory Management; aircraft executes TMA plan
- **Benefit:** Move from controller-based to Trajectory Management using automation for fuel and emissions saving with reduced controller work load
- **Approach:** Conduct live trials at DEN; integrate enhancements to TMA with FMS equipage
- **Partners:** NASA Ames, Boeing, Sensis, Continental, AAL
- **Schedule:**
 - FY09 Human-in-the-Loop Simulation (HITLS)
 - FY09 Live Flight Trials at DEN
- **Status:**
 - Integrated ATC / Flight Deck Simulation completed September 18, 2008
 - HITL Flight Deck on going
 - HITLS ATC started Apr 09
 - Sept 09 flight trials at Denver

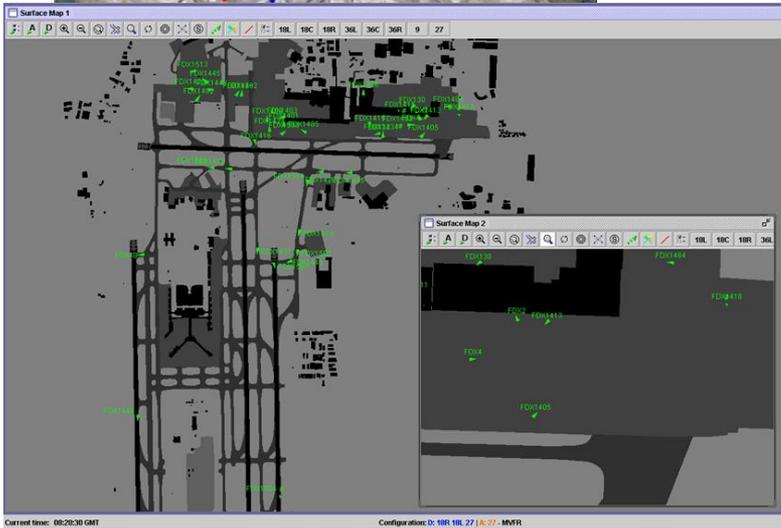
Demonstrations: Tailored Arrivals (TAs)



- **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
- **Status:**
 - SFO: Flight Trials: Since December 2007
 - MIA:
 - Flight Trails: Total of six TA conducted with American and Air France (09/22/08 to 9/24/08). Four full and two partial TAs
 - ATOP issue identified – resume flight trials (Jun 2009)
 - LAX:
 - TA profiles in development
 - FY09 live flight trails (Mid CY 2009)
- **Results**
 - Since December 2007 – over 1700 complete and partial TAs at SFO (Both B-777 & B-747)
 - As of May 08 estimate 38,000 gals of total fuel saved or about 100 – 130 gallons per flight
 - Four check flights on 3/9/09 at LAX with Qantas reporting fuel savings of 115 gals (B747) over typical arrival

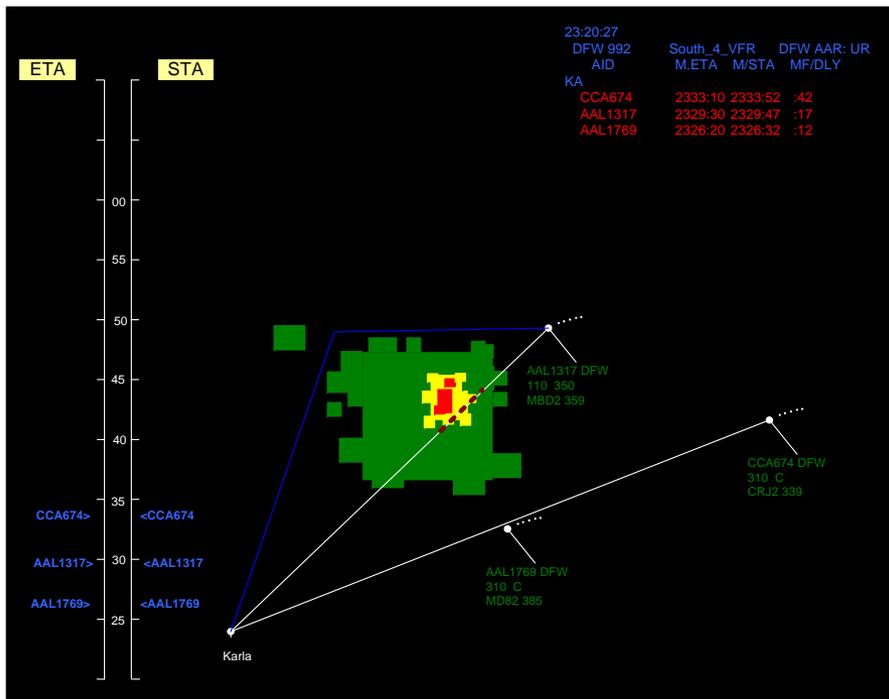
* Supporting Atlantic Interoperability Initiative to Reduce Emissions (AIRE)

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



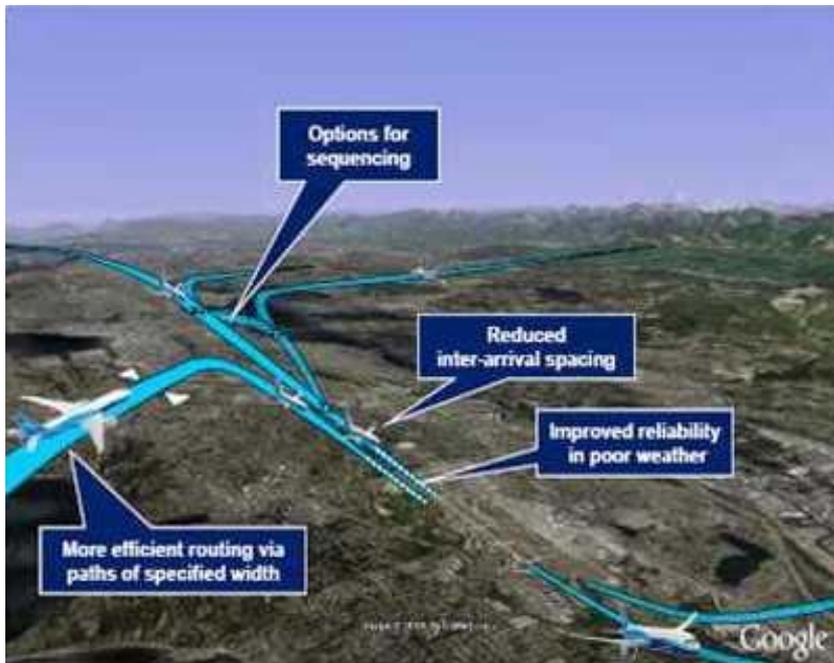
- **Initiative:** Leverage FAA investment in surface detection equipment (ASDE-X) to support new decision support tools
- **Benefits:**
 - Collaborative planning at airport
 - Reduced fuel burn and environmental footprint
- **Partners:** Airport Authorities, FedEx, NWA
- **Schedule:**
 - MCO installation Nov 09
 - Concept Requirement Definition (CRD) documentation completed Dec 09
 - MEM Surface Decision Support System installed late 2008
 - 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
- **STATUS:**
 - JFK Commercial Ramp Surveillance System installed / operating late 08
 - Feeds to ATC, Airline Ramp Towers and TSA
 - Coordination with ATO-T and SysOps ongoing

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)



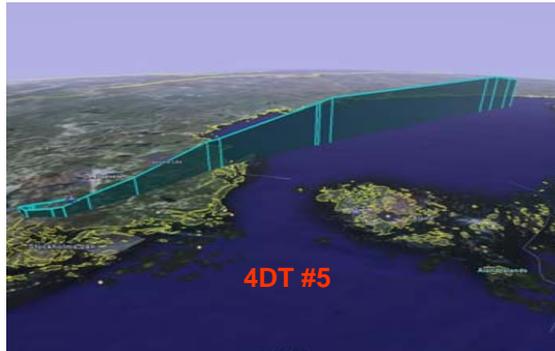
- **Initiative**
 - Demonstrate the use of Performance Based Navigation technology to improve arrival rates at airports
- **Benefit**
 - Additional throughput to maximize airport efficiency
 - Reduced fuel consumption and lower noise and emissions
 - Improved airport access
- **Partners**
 - NY Port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

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 wide-spread integration of UAS into future NextGen environment
- **Benefits:** Enables full range of UAS applications
- **Partners:** AAI, General Atomics, GE
- **Status:**
 - On track to complete UAS OTA with Embry-Riddle Aeronautical University in June 2009
 - UAS Baseline Flight Test – Aug 09

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
- **Status:**
 - Gate to Gate Green Flight demonstration CDG to MIA (June 09)
 - Conduct 2 month integrated oceanic/arrival demonstration (June-July 09)

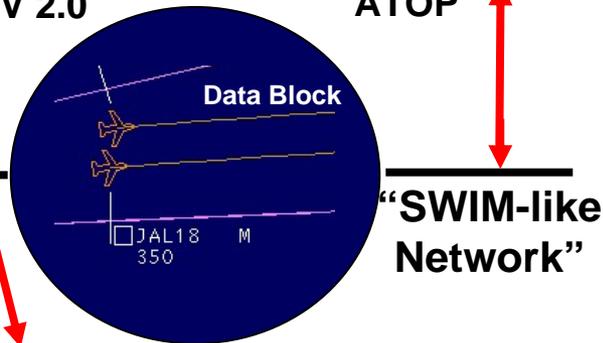
Demonstrations: International Flight Data Object



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
- **Status:** Proof of concept lab demo completed Mar 09
- Fall CY-09 (Oct / Nov) Laboratory Demonstration – Extend Flight Data Object to include Surface TBO

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:

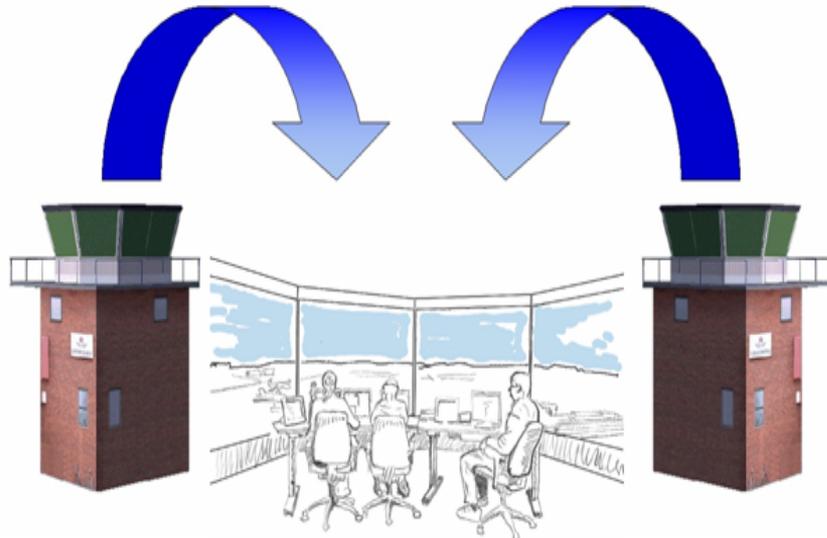
- Reduce controller workload and improved productivity
- Enhance reliability, repeatability and predictability of operations, leading to increased throughput.
- Improve efficiency and flexibility by increasing use of operator-preferred trajectories NAS-wide, at all altitudes.

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

Status:

- Held stakeholder coordination meeting to gain buy-in on project plan
- Finalizing OTA with ERAU
- Initiate coordination for kick-off meeting in June 09

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 Site Final Selection – Mar 2009
 - Field Site Preparation Kickoff – Apr 2009
 - 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

Demonstrations: Surface Conformance Monitoring



- **Initiative:** Begin to link precise movement of aircraft on surface between ATC and future cockpit moving map displays. Key capability to enable Surface 3D Trajectory Operations
- **Benefits:**
 - Increased Safety
 - Shortened path from runway to gate
 - Precise metering to runway
 - Increase situational awareness between ATC and pilot
- **Partners:** Mosaic Air Traffic Management, MITRE, Vople, JHU APL, STI & ATO-T
- **Status:**
 - Concept of Operations – Sept 09

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