Federal Aviation Administration

AVS Work Plan for NextGen 2011

April 2011

Dear Members of the Aviation Safety Community:

This is a very exciting and yet challenging time in the history of aviation. Nearly 50,000 flights are operating in our National Airspace System (NAS) on any given day, and we expect air travel to continue to increase over the next 20 years. It is going to take all of us working together to ensure the continued safety of the NAS and to meet this increasing demand through the Next Generation Air Transportation System (NextGen).

Last year, we published the first Aviation Safety (AVS) Work Plan for NextGen that outlined how we are supporting NextGen implementation. As we developed this year's plan, we focused on taking NextGen to the next level by focusing on the recommendations of the Future of Aviation Advisory Committee (FAAC). The Secretary of Transportation established the FAAC to provide information, advice, and recommendations to position the U.S. aviation industry to address the evolving transportation needs, challenges, and opportunities of the global economy. This Work Plan captures what AVS is doing to meet two specific FAAC recommendations:

1. Develop and commit to a timetable of when requirements will be set, when operational capabilities and procedures will be available, what training will be necessary, and what authorizations will be require.
2. Ensure safety performance standards and training are embedded into NextGen planning, implementation, and monitoring.

As you will see, we also updated the work plan to align with the FAA NextGen Implementation Plan. We tweaked the description of roles and responsibilities to reflect changes in the NextGen Management Board and NextGen Review Board, and we added a Research and Development section.

Implementing NextGen is a huge, complex challenge, especially in these difficult economic times, but, rest assured, NextGen is the FAA's highest priority when it comes to investing in the future of aviation safety. Together, we will figure out how to most effectively allocate resources, identify priorities, and support the FAA's NextGen goals. Thank you for all of your help in bringing the world new ways to fly and for your professionalism and your commitment to aviation safety.

Margaret Gilligan
Associate Administrator for Aviation Safety

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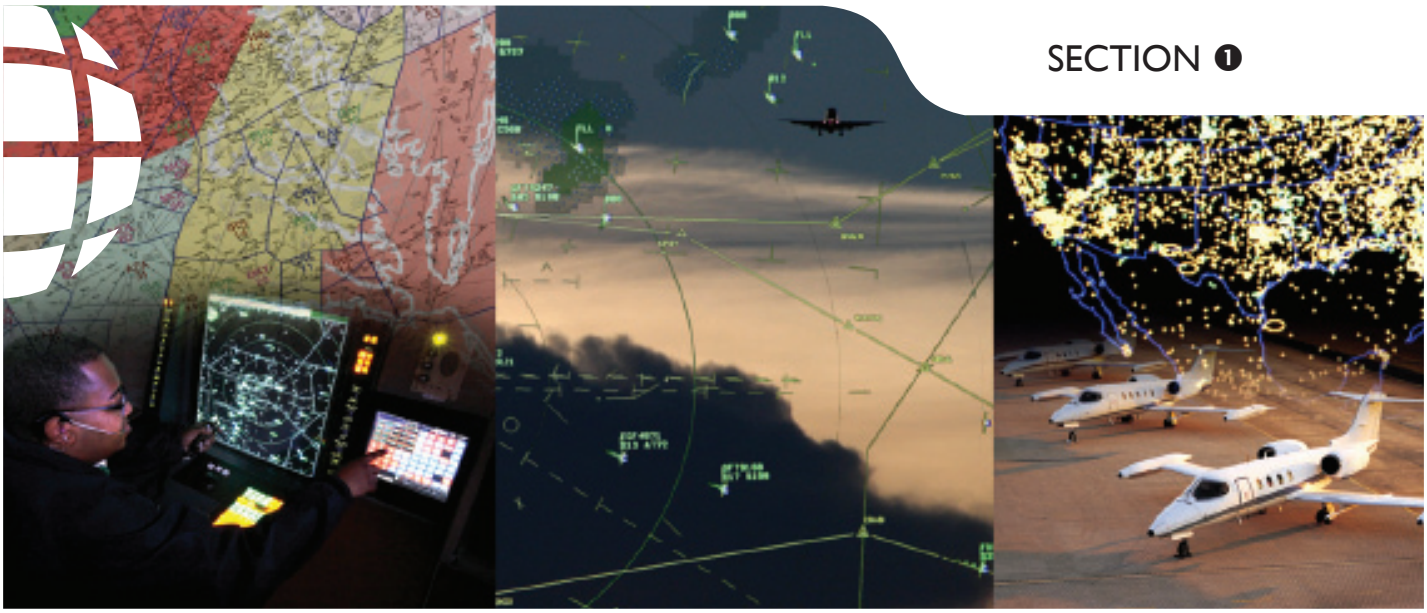
Acronyms Abbreviations

AAM ..... Office of Aerospace Medicine
ACO ..... Aircraft Certification Office
ACOLT ..... Aircraft Certification Office Leadership Team
ADS-B ..... Automatic Dependent Surveillance – Broadcast
AFS ..... Flight Standards Service
AIR ..... Aircraft Certification Service
AML ..... Approved Model List
AMS ..... Acquisition Management System
AOV ..... Air Traffic Safety Oversight Service
AQS ..... Office of Quality, Integration and Executive Services
ARM ..... Office of Rulemaking
ASIAS ..... Aviation Safety Information Analysis and Sharing
ATC ..... Air Traffic Control
ATN ..... Aeronautical Telecommunication Network
ATO ..... Air Traffic Organization
AVP ..... Office of Accident Investigation and Prevention
AVS ..... Aviation Safety
BLI ..... Budget Line Item
CANSO ..... Civil Air Navigation Service Organization
CATMT ..... Collaborative Air Traffic Management Technologies
CDTI ..... Cockpit Display of Traffic Information
COS ..... Continuous Operational Safety
CPDLC ..... Controller Pilot Data Link Communications
CSPO ..... Closely Spaced Parallel Operations
DER ..... Designated Engineering Representative
DME ..... Distance Measuring Equipment
DOT ..... Department of Transportation
EA ..... Enterprise Architecture
EAB ..... Enterprise Architecture Board
EASA ..... European Aviation Safety Agency
EFB ..... Electronic Flight Bag
EFVS ..... Enhanced Flight Vision System
F&E ..... Facilities and Equipment
FANS ..... Future Air Navigation System
FIS-B ..... Flight Information Services - Broadcast
FMS ..... Flight Management System
GBAS ..... Ground Based Augmentation System
GLS ..... (Ground Based Augmentation System) Landing System
GPS ..... Global Positioning System
HUD ..... Head-Up Display
ICAO ..... International Civil Aviation Organization
IFR ..... Instrument Flight Rules
ILS ..... Instrument Landing System
IMC ..... Instrument Meteorological Conditions
INS ..... Inertial Navigation System
ITP ..... In-trail Procedures
IWP ..... Integrated Work Plan
JPDO ..... Joint Planning and Development Office

Acronyms Abbreviations

JPE ..... Joint Planning Environment
JRC ..... Joint Resources Council
LOB ..... Line of Business (AVS, for example)
LPV ..... Localizer Performance with Vertical Guidance
MIT ..... Massachusetts Institute of Technology
NARP ..... National Aviation Research Plan
NAS ..... National Airspace System
NGI&I ..... NextGen Integration & Implementation Office
NGIP ..... NextGen Implementation Plan
NGPT ..... NextGen Policy Team
NIEC ..... NextGen Integration and Evaluation Capability
NMB ..... NextGen Management Board
NRB ..... NextGen Review Board
NTSB ..... National Transportation Safety Board
ODA ..... Organization Designation Authorization
OI ..... Operational Improvement
OPR ..... Office of Primary Responsibility
OTA ..... Other Transaction Authority
PBN ..... Performance Based Navigation
POI ..... Principal Operations Inspector
R&D ..... Research and Development
RCP ..... Required Communication Performance
REB ..... R&D Executive Board
RE&D ..... Research, Engineering and Development
RNAV ..... Area Navigation
RNP ..... Required Navigation Performance
RNP AR ..... RNP Authorization Required
RTA ..... Required Time of Arrival
SAPA ..... Simplified Aircraft-based Paired Approach
SATCOM ..... Satellite Communications
SBAS ..... Space-Based Augmentation System
SMS ..... Safety Management System
SMT ..... Standards Management Team
SRMD ..... Safety Risk Management Document
SSA ..... System Safety Assessment
SSP ..... State Safety Program
SWIM ..... System Wide Information Management
TAWS ..... Terrain Awareness and Warning System
TCAS ..... Traffic Alert and Collision Avoidance System
TCRG ..... Technical Community Representative Groups
TSO ..... Technical Standard Order
TLS ..... Target Level of Safety
UAS ..... Unmanned Aircraft System
VDL ..... (Very High Frequency) Data Link
VMC ..... Visual Meteorological Conditions
VNAV ..... Vertical Navigation
WAAS ..... Wide Area Augmentation System



SECTION ❶

Representing the most significant overhaul of the National Airspace System (NAS) in U.S. history, the Next Generation Air Transportation System (NextGen) is a set of technologies, and a set of actions enabled by those technologies, that transforms the way the aviation system operates. Safety, aircraft centric operations, and aircraft equipage are keys to NextGen's success.

The Aviation Safety (AVS) organization plays a vital role in the successful implementation of NextGen. AVS establishes the standards and policies for NextGen operations, certifies compliance with those standards, and ensures continued operational safety once we adopt new aircraft technologies and change procedures for flight crews and controllers.

Introduction

Throughout the implementation of each NextGen initiative, AVS will use a Safety Management System (SMS) and Aviation Safety Information Analysis and Sharing (ASIAS) to ensure system safety is either maintained or improved. SMS is a proactive approach for managing and evaluating all aspects of system safety, specifically monitoring the level of safety achieved in the air transportation system, and evaluating changes to the system. With ASIAS, we gather crucial safety information from a number of data sources. Then we use sophisticated analysis tools to analyze that data to detect trends, identify precursors, and assess risks. ASIAS will play a significant role in supporting the tenants of a SMS, including Safety Risk Management and Safety Assurance requirements.

With the support of these data-driven analysis tools, each NextGen initiative has an intended outcome that will deliver a positive, measurable impact on aviation safety. Building on the AVS Work Plan for NextGen 2010 that guided our planning activities and focused on AVS-specific responsibilities and deliverables, the AVS Work Plan for NextGen 2011 outlines what, who, when, and how we will accomplish our goals and objectives in support of the overall Federal Aviation Administration (FAA) NextGen Implementation Plan.

Having developed a general understanding of NextGen among the workforce in 2010 through the NextGen 101 briefing (https://employees.faa.gov/tv/?mediaId=213), the AVS Work Plan 2011 focuses on necessary activities through 2015. In the following pages, you can check on the status of 2010 initiatives, learn more about our plans for 2011, see how AVS is organized for NextGen, understand our updated communications and training program, and read new material on research and development (R&D).

SECTION ❷

Overview of AVS Activities for NextGen

This section provides the status of initiatives identified in the 2010 AVS Work Plan for NextGen and summarizes the objectives for future activities. You can find detailed descriptions of future activities in:

Appendix A: Planned policy for NextGen enablers (technology or operational procedures that enable new operations).

Appendix B: Planned policy to further improve the aircraft certification and operational approval processes for NextGen.

Appendix C: Planned activities supporting NextGen operational demonstrations.

Appendix D: Plans for additional studies, policies, or other activity relating specifically to an increment of an operational improvement.

Appendix E: AVS research and development portfolio summary.

A. NextGen Standards

NextGen includes incremental changes within operational improvements (OIs). Many of these initiatives depend on the aircraft being equipped with a capability, and the flight crew being trained and authorized, if appropriate, to conduct the operation. The NextGen plans use the term "enabler" to describe the aircraft and operator capabilities that are required. Appendix A of the FAA NextGen Implementation Plan (NGIP), posted on the FAA's NextGen website: http://www.faa.gov/nextgen/, provides a complete description of all of the enablers and the schedule for completing standards.

Table 1 represents a condensed version of the NGIP Appendix A. The icons below describe the status of technologies from a standards and implementation perspective. Target user categories represent generalized modes of operation. Target areas describe the general deployment strategy. Maturity indicates availability for operator investment.

Table 1. Summary of NextGen Enablers

AVIONICS ENABLERS	CAPABILITY OVERVIEW	TARGET AIRCRAFT	TARGET AREA	MATURITY
PERFORMANCE BASED NAVIGATION (PBN)				
RNP 10	Reduced oceanic separation.			
RNP 4	Further reduced oceanic separation (in conjunction with FANS-1/A).			
RNAV 1, RNAV 2	Ability to fly on more efficient routes and procedures.			
RNP with Curved Path	Ability to precisely fly departure, arrival and approach procedures including repeatable curved paths.			
Vertical Navigation	Ability to fly defined climb and descent paths.			
LPV	Improved access to many airports in reduced visibility, with an approach aligned to the runway.			
RNP Approaches (authorization required)	Improved access to airports in reduced visibility with an approach that can turn to the runway; improved procedures to separate traffic flows.			
AUTOMATIC DEPENDENT SURVEILLANCE - BROADCAST (ADS-B)				
ADS-B Out	Enables improved air traffic surveillance and automation processing.			
Airborne/Ground CDTI	Improved awareness of other traffic.			
Surface Indications/Alerts (ADS-B In)	Displays and provides alerts based on non-normal traffic status.			
In-Trail Procedure (ITP)	Oceanic in-trail climb/descent.			
Interval Management (ADS-B In)	Display of along-track guidance, control and indications, and alerts.			
Airborne/Ground CDTI	Improved awareness of other traffic.			
Airborne-CDTI with Conflict Detection (ADS-B In)	Guidance information for aircraft participating in paired approaches to closely-spaced runways.			
Parallel Approach Guidance and Alerting (ADS-B In)	Guidance information for aircraft participating in paired approaches to closely-spaced runways.			

AVIONICS ENABLERS	CAPABILITY OVERVIEW	TARGET AIRCRAFT	TARGET AREA	MATURITY
ATS Data Communications				
FANS 1/A (Satcom)	Oceanic data communications and surveillance, transfer of communications.			
FANS-1/A+ (VDL mode 2)	Expansion of FANS to domestic clearances.			
ATN Baseline 2	Clearances, terminal information.			
ATN Baseline 3	Expansion of ATN to trajectory operations.			
Low Visibility Operations				
HUD/ILS	Reduced minima at qualifying runways.			
EFVS	Use enhanced flight visibility to continue approach below minimums.			
GLS III	Autoland in very low visibility.			
Avionics Safety Enhancements				
FIS-B	Weather and aeronautical information in the cockpit.			
Engines and Fuel Technologies				
Drop-In Renewable Jet Fuel	Validation of renewable fuels.			
Engine Efficiencies	Engine technology demonstrated with lower full burn, noise and emissions.			
Low Lead Fuels	Standardization for defining new fuel specs & evaluation methods for engine/materials testing.			
Electric Engines	Set min safety & performance standards for electric propulsion system components.			

TARGET USERS
- Air Transport
- Business Aviation
- General Aviation
- Rotorcraft

TARGET AREAS
- Nationwide
- Oceanic
- Metroplex

MATURITY
- Available
- Development
- Concept Exploration

Table 1. Summary of NextGen Enablers (continued)

AVS completed all standards planned in the 2010 plan, as well as some additional supporting policy. The enablers and associated standards are provided in Table 2.

ENABLER	GUIDANCE
Data Communications (FANS 1/A+, ATN)	AC 20-140A, Guidelines for Design Approval of Aircraft Data Link Communication Systems Supporting Air Traffic Services (ATS), April 2010 AC 120-70B, Operational Authorization Process for Use of Data Link Communication System, August 2010
ADS-B Out	AC 20-165, Airworthiness Approval of Automatic Dependent Surveillance - Broadcast (ADS-B) Out Systems, May 2010
Airborne-CDTI (ADS-B In), Ground-CDTI (ADS-B In)	TSO-C195, Avionics Supporting Automatic Dependent Surveillance - Broadcast (ADS-B) Aircraft Surveillance, September 2010 AC 20-172, Airworthiness Approval for ADS-B In Systems and Applications, February 2011
EFVS	AC 20-167, Airworthiness Approval of Enhanced Vision System, Synthetic Vision System, Combined Vision System, and Enhanced Flight Vision System Equipment, June 2010 AC 90-106, Enhanced Flight Vision Systems, June 2010
LPV	AC 90-107, Guidance for Localizer Performance with Vertical Guidance and Localizer Performance without Vertical Guidance Approach Operations in the U.S. National Airspace System, February 2011
RNP 10	Order 8400.12B, Required Navigation Performance 10 (RNP 10) Operational Authorization, April 2010

Table 2. NextGen Standards Completed from the 2010 AVS Work Plan

Looking ahead, we will make additional enhancements to Performance Based Navigation (PBN), including advanced Required Navigation Performance (RNP) operations. Advanced RNP involves the use of curved path procedures outside of the final segment of an approach, a key NextGen initiative identified by the RTCA Task Force (the NextGen Mid-term Implementation Task Force). We are developing criteria in coordination with the Performance-Based Operations Aviation Rulemaking Committee (PARC) and with the International Civil Aviation Organization (ICAO) PBN study group. To facilitate operational approval of new avionics equipment supporting PBN, we will update the standard for multi-sensor navigation systems (flight management systems).

AVS also plans to develop new policy for an ever-increasing set of ADS-B In applications. We completed standards for situation awareness applications and interim criteria for the use of ADS-B in oceanic airspace (In-Trail Procedure, ITP). We are developing internationally-harmonized standards for ITP and for interval management. MIT Lincoln Labs is conducting applied research to investigate requirements and algorithms for a low-cost alternative to TCAS I with alerting logic compatible with typical VFR traffic patterns. Early operational trials of surface applications identified a number of technical challenges, most notably that multipath interference and line-of-sight blockage on the airport surface inhibit the reliable reception of same-link ADS-B data while taxiing on the airport. The ADS-B In Aviation Rulemaking Committee is scheduled to provide interim recommendations in September 2011 on applications of greatest interest for implementation. A final report to provide recommendations on implementation strategies is due next year. These recommendations will further influence the AVS Work Plan for the set of ADS-B In enablers and operations.

In the area of air traffic data communications, we are updating oceanic standards to reflect advances in satellite systems (Iridium and INMARSAT). We completed standards to support the initial data communications requirements in Europe, and we are developing new criteria for the US deployment of data communications. The final schedule and plan for this activity are dependent on the final program decision, including the investment decision scheduled for 2012.

We continue to leverage new technologies and advanced procedures for low visibility operations. For example, the Enhanced Flight Vision System (EFVS) operational credit currently available to general aviation could be expanded to commercial operators by eliminating or reducing the approach ban requiring visibility to be available before initiating an approach. The FAA is also working with industry to identify possible technologies to enable EFVS use through touchdown, with some required natural visibility to mitigate any system failure. Finally, synthetic vision systems may provide a new capability to depict the runway and aid in the visual acquisition of the required airport environment.

B. Streamlining Initiatives

NextGen involves unprecedented changes to the National Airspace System. As these initiatives are implemented, we must ensure new systems are reliable and safe and all aspects of normal and abnormal operation are addressed.

To meet our safety responsibilities, we must prioritize our involvement in areas more likely to have safety risks and find ways to streamline our approval processes. Last year, we described industry's streamlining recommendations that were identified in RTCA's NextGen Mid-term Implementation Task Force 5 report. AVS completed every streamlining initiative planned for 2010, as described in Table 3.

INITIATIVE	ACCOMPLISHMENT
Plan for NextGen standards	AVS published an updated plan for NextGen standards in Appendix A of the FAA NextGen Implementation Plan.
Coordination Operational Approvals	AFS created NextGen branches in each Regional Office through a revision to Order 1100.1B. These branches implement NextGen for AFS.
Coordination: Aircraft Certification	AIR implemented a NextGen Policy Team (NGPT) under the Standards Management Team to coordinate across the Directorates. Each ACO identified NextGen focal points to facilitate coordination of projects.
Coordination: System Safety Assessments	In conjunction with the Air Traffic Organization, AVS participated in a safety review of the NextGen initiatives planned through 2015.
Procedures for Coordination of New Technology Certification Projects	AIR published Order 8110.112 and AC 20-166, describing the use of issue papers when standards or policies have not been published. These documents include coordination across standards offices, facilitated for NextGen projects through the NGPT.
Tracking Operational Applications	AFS provided status reporting on RNP SAAAR projects.
Coordination of Policy	Policies identified in the 2010 Work Plan were all coordinated through a public comment period.
Aviation Safety Communication	AQS developed a website to promote communication and coordination of NextGen-related projects and policy. See https://employees.faa.gov/org/linebusiness/avs/nextgen/
AVS NextGen Training Plan	AVS developed a training plan to identify NextGen training requirements for the AVS workforce. This plan is reflected in Section 5 of this Work Plan.
Consolidated, Electronic Application Process	Mitre reviewed capabilities of Web-based automated Operations Safety System (WebOPSS) to determine the feasibility of multiple, electronic applications for various NextGen operations, and identified shortcomings. (See Appendix A for 2011 initiatives.)
Process Review: Lean Process review for Instrument Flight Procedures	In conjunction with ATO, AVS conducted a review of processes, tools, and procedures related to standards, policies, development, approval, publication, and utilization of instrument flight procedures such as RNAV and RNP. See http://www.faa.gov/nextgen/media/. (See Appendix A for 2011 initiatives.)

Table 3 - Completion of 2010 Streamlining Initiatives

INITIATIVE	ACCOMPLISHMENT
Early-Adopter Procedure for Coordination	In coordination with the FAA NextGen Office of Integration and Implementation, AVS developed coordination procedures for NextGen projects to ensure early involvement of AVS representatives when the FAA is funding development or implementation of technology or procedure.
Expansion of Consultants for RNP (AR) Approvals	AFS allowed additional companies to obtain accreditation as RNP AR approval consultants. These companies have the skills and experience to assist operators in developing applications for RNP AR operations. Two consultants were added in 2010, for a total of six consultants available to assist operators. See http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afs/afs400/afs470/rnp/
Update guidance for RNP (AR) approaches	Published AC 90-101A, Approval Guidance for RNP Procedures with Authorization Required. This update clarified training, operator flyability, and database validation requirements, and harmonized with ICAO Doc 9613 PBN MANUAL.
Coordination of PBN implementation	AVS re-chartered the Performance-Based Operations Aviation Rulemaking Committee (PARC) with appropriate industry participation to support continued implementation of PBN and data communications. The PARC purview includes domestic developments, certification and operational approval issues, procedure design challenges, and monitoring international development.
Update operations specifications for international RNP approaches	Revised C384 REQUIRED NAVIGATION PERFORMANCE (RNP) PROCEDURES WITH SPECIAL AIRCRAFT AND AIRCREW AUTHORIZATION REQUIRED (SAAAR). Within the operations specification, international procedures table are updated as new procedures are added.
Establish international procedures coordination procedure	AFS improved coordination with International Review Board meetings (for approvals of special procedures in foreign airspace). AFS also published AC 120-105, Foreign Terminal Instrument Procedures (FTIP) Acceptance/Review Process, with guidance to operators on the validation of foreign procedures.
Prioritization and Sequencing	AIR updated the criteria used for sequencing aircraft certification projects, giving NextGen-significant projects priority over other non-safety-related projects.
Manufacturer approval of TSO articles	AIR published AC 21-46, Technical Standard Order Program. This AC explains the privileges and responsibilities afforded to holders of a TSO authorization.
Expansion of Approved Model Lists	AIR completed a review of approved model lists in different categories of aircraft, and a team provided recommendations for consistent policy across all categories. (See Appendix A for 2011 initiatives.)

Table 3 - Completion of 2010 Streamlining Initiatives (continued)

2010 NavLean Report

In response to recommendations from the RTCA TF-5, AVS and ATO charted and jointly sponsored the Navigation Procedures Project (NAV Lean) in January 2010. The purpose of this project was to review and make recommendations to improve and streamline all processes used to request, prioritize, develop, and implement performance-based and conventional instrument flight procedures (IFP). A team of over 100 FAA subject matter experts across three lines of business analyzed the issues and developed recommendations to streamline IFP production. The team included Lean/Six Sigma experts to identify processes that should be improved, using metrics and best practices from industry.

In September 2010, AVS and ATO approved the NAV Lean Team's final report containing 21 specific recommendations. With full implementation, a potential savings of up to 40% may be realized in the time it takes to implement an IFP. For the full report, go to http://www.faa.gov/nextgen.

Two initiatives from the 2010 plan continue into 2011 in addition to a dozen initiatives identified through follow-on work or as new activity. The main themes of the 2010 plan remain valid as well: we must be well-organized to coordinate NextGen activities within AVS, we must ensure we receive appropriate and timely training, we must improve tracking of applications and ease of applying through the better use of information technology, and we must make effective use of delegation.

Appendix B identifies continuing activities and several new initiatives, including the development of an implementation plan for the recommendations in the 2010 NavLean report (see box). As with the initial report, we are developing the implementation plan in conjunction with the Air Traffic Organization (ATO) to ensure an integrated and coordinated strategy for improving the development and implementation of navigation procedures. Once finalized, the implementation plan will allow us to track our progress toward improving this important aspect of the FAA's services.

C. Operational Demonstrations

The 2010 NextGen Work Plan explained how AVS's early involvement in operational demonstrations was key to ensuring safety and reducing risks associated with transitioning an initiative from a demonstration to a routine operation. As a result, we identified demonstrations funded through the NextGen program and listed them in Appendix C.

D. Operational Improvements - Increments

Each operational improvement is a description of specific operational changes to the NAS that will provide an incremental improvement in one or more of the NextGen goals. We can further divide operational improvements into their functional increments. An operational improvement may have only one increment, or it may have several increments as the FAA and industry identify ways to gain early benefits and early experience without compromising the longer-term objectives of NextGen. When increments are combined, their synergistic effects can enable full realization of their supported operational improvement.

Appendix D identifies the mature increments, and associates them with specific enabling aircraft technology or operational procedures (enablers) and with other supporting AVS activities. In some cases, specific equipment or operational guidance is appropriate to an increment. For example, one increment concerns a safety initiative to allow use of electronic flight bags to display traffic on the airport surface. While TSO-C195 and AC 20-172 provide equipment standards and guidance for airport display of traffic, we will provide additional guidance later this year explaining how a portable EFB can accommodate this particular application.

The simulation and analysis capabilities provided by the AFS simulators and computer modeling capabilities are another example of supporting activities. We use these capabilities to evaluate the safety of some operations, including the potential reduction of the distance between independent parallel runways based on replacing historical assumptions of flight crew blunder characteristics with a data-driven model of blunders actually observed in the NAS. (A blunder occurs when an aircraft on an approach to a parallel runway intrudes into the established safety buffer between the two runways.)

AVS also provides oversight of the ATO SMS and the approval of certain safety risk management decisions. The Air Traffic Safety Oversight Service (AOV) monitors NextGen initiatives processed through SMS to ensure their safety. Our objective is to provide early identification of potential safety risks or issues associated with the risk analysis, so that NextGen improvements are safely implemented on schedule.

The most substantial supporting activity that AVS provides to these NextGen initiatives is not listed in Appendix C: the evaluation, approval and oversight of manufacturers and operators. This is one of our most important activities, applying both to NextGen as well as to non-NextGen operations. Although we do not track or list these activities separately in this Work Plan because they are part of our core mission, we continue to forecast aviation activity, based on NextGen and other factors, to most effectively align our resources to ensure the safety of the National Airspace System.

SECTION ❸

This section provides an overview of AVS responsibilities in support of NextGen, recognizes our safety oversight mission, and discusses our three core business areas: developing standards, managing approval processes and procedures, and overseeing continued operational safety. It also reiterates the NextGen roles and responsibilities of each AVS service and office.

AVS Responsibilities in NextGen

A. AVS and the NextGen Transformation
AVS plays a critical role in each development and implementation phase of NextGen technologies and operations. Figure 1 depicts the lifecycle of technologies and operations, highlighting the AVS's role. Generally, initiatives mature from an initial concept, through experimental prototyping, operational prototyping and then deployment. However, not all projects go through these stages – a concept may go directly to implementation without an experimental or operational prototype, if the technology and concepts involved are mature.

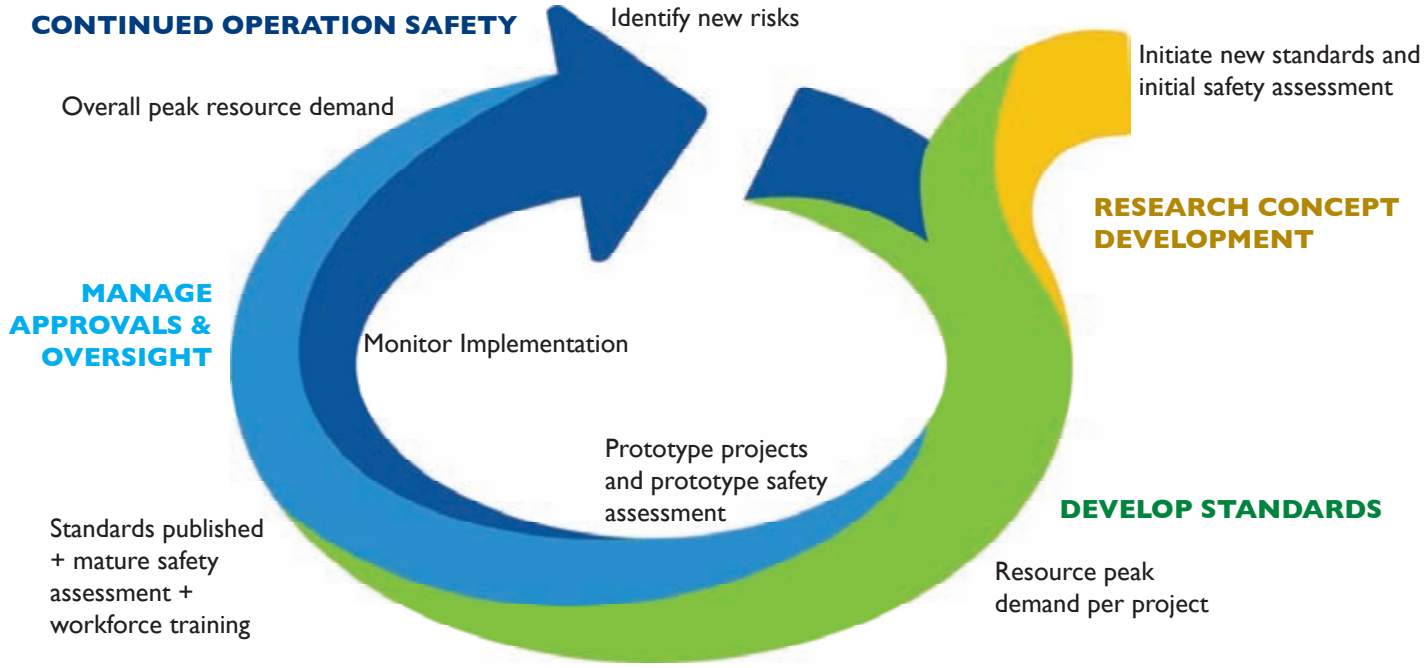


Figure 1. Lifecycle of Technologies and Operations

Figure 1 depicts AVS's primary responsibilities in the collaborative development of standards and the oversight of the safety assessment. It also shows an ideal alignment of the development of standards with the technology itself. The standard should be initiated early in the concept development, with a baseline standard available for use by the operational prototype. If an industry standard is not available in time for an operational prototype, the applicant and the FAA must determine the appropriate requirements to apply to the system to ensure safety and achieve the desired operation. This can be resource-intensive, as the level of safety to be achieved is the same for an operational prototype as it is for full deployment.

Figure 1 also illustrates the importance of safety assessment throughout the development lifecycle. Consideration of the safety aspects must be embedded within the initial concept development. Otherwise, whole aspects of the technology or operational concept may need revision in order to ensure safety. In addition, the safety assessment must mature as the standards are developed, with a sufficient safety assessment available to enter the operational prototype into service. Typically, the operational prototype is approved with some unique operational limitations to address potential deficiencies in the requirements until the requirements can be validated. The mature standards are aligned with a mature safety assessment. Then the initiative is monitored in service to ensure that any assumptions or analyses are valid and to identify any unanticipated risks.

The demand for AVS resources, on a per-project basis for each operational prototype, peaks throughout the standards development stage. This is when the initial standards and corresponding safety assessments must be accepted, and it is crucial to mature the standards and concepts leading to a final standard.

The demand for AVS resources, as applied to an entire initiative, peaks in the approval and oversight phase as many applicants seek approvals and the scope of monitoring safety continues to expand. We can reduce the required resources for the implementation phase by ensuring standards are robust and simple. In general, we will develop NextGen standards as performance-based standards when possible, due to the flexibility in implementation that they accommodate. However, this flexibility increases the workload for implementation since the AVS workforce must be prepared to provide oversight of the technological and operational variations engendered by that flexibility. This is an important consideration when standards are developed.

While Figure 1 describes generalized phases for the lifecycle of a NextGen initiative, it does not describe all necessary tasks. For example, aircraft requirements may begin with a special condition or rule, and standards development involve the equipment standard and installation guidance. Engineers may also need technical training on a specific technology. To ensure continued operational safety after standards are developed, we must address flight operational requirements and consider maintenance requirements.

Flight operational requirements involve several factors, depending on the complexity and maturity of the technology and the operating environment. The following factors apply to operational prototypes (including demonstrations or trials) and to NAS-wide implementations:

- Operating rule (e.g., Title 14 of the U.S. Code of Federal Regulations (14 CFR) part 91, 121, or 135)
- Simulation, modeling, and analysis
- User information (e.g., Aeronautical Information Manual/Pilot Controller Glossary)
- Operational approval guidance (e.g., Advisory Circular)
- Operational authorization method
- Inspector guidance
- Inspector training
- Aeronautical information and charting
- Procedure/Route design criteria
- SRM/Operational Safety Assessment panel participation

B. Service and Office Roles and Responsibilities

NextGen involves implementation of new complex systems and flight crew procedures. We are responsible for ensuring these systems are reliable and safe, and for addressing the operational aspects of these systems. Our certification and operational approval processes provide the tools to address flight crew procedures, maintenance procedures, training development, and continuous safety monitoring.

We approve modifications to aircraft, including installation or upgrades to aircraft avionics, through the certification process defined in 14 CFR part 21. The use of specific navigation, surveillance, and communication equipment for a particular operation typically requires operational approval for air carriers and air taxi operators. It can also require operational approval for general aviation if there are unique training or qualification requirements warranting additional FAA oversight. An overview of each service and office's NextGen responsibilities follows.

Flight Standards Service (AFS) Roles and Responsibilities

The Flight Standards Service supports NextGen implementation through aviation safety standards and oversight of aircraft operators. AFS promotes the safety of flight of civil aircraft by establishing regulations and standards for the operator and airmen. AFS accomplishes certification, inspection, surveillance, investigation and enforcement activities related to operators and airmen.

The operational approval for a commercial operator includes:

- Approval of flight crew procedures
- Approval of maintenance procedures
- Approval of training programs

For general aviation operations, AFS provides standards, guidance, and recommended practices and procedures for installing equipment and conducting flight operations. A unique operational approval is only required for operations where the complexity of the operation, or the level of risk associated with conducting the operation, warrants unique FAA oversight.

With respect to NextGen, the operational approval focuses on all of the above areas and considers the ability of the aircraft to support the operation (aircraft qualification). Due to both the unique technologies and the new operations, flight crew and maintenance training and procedures require particular emphasis.

Specific approvals are reflected in Operations Specifications (Ops Specs), Management Specifications (MSpecs for part 91 subpart K), and Letters of Authorization (LOA for part 91). The approval identifies the operation, the aircraft, and any unique requirements or limitations.

For example, AFS Principal Operations Inspectors (POI) completed nineteen Required Navigation Performance with Authorization Required (RNP AR) applications in 2010. Such approvals increase access and capacity with more fuel-efficient approach procedures through the NAS.

Aircraft Certification Service (AIR) Roles and Responsibilities

The Aircraft Certification Service supports NextGen by administering safety standards that govern the design, production, and airworthiness of civil aeronautical products. AIR promotes the safety of flight of civil aircraft by establishing regulations and standards for aircraft, engines, and avionics.

Aircraft certification includes:

- Developing avionics equipment performance standards and installation guidance
- Overseeing design, production, and airworthiness certification programs to ensure compliance with prescribed safety standards
- Working with aviation authorities, manufacturers, and other stakeholders to help them successfully improve the safety of the international air transportation system.

With respect to NextGen, the aircraft certification evaluation process considers the design of the system, potential failure conditions and crew interface issues, to ensure the equipment can support its intended function. The Type Certificate or Supplemental Type Certificate (STC) reflects approval of installed equipment. A Technical Standard Order (TSO) authorization reflects approval of avionics (prior to installation). Both processes are in accordance with procedures defined in 14 CFR part 21.

For example, in 2010, the Rotorcraft Certification

Office completed seven STC projects for ADS-B applications in the Gulf of Mexico, increasing helicopter access by reducing instrument flight rule separation to five nautical miles. Additionally, the Chicago Aircraft Certification Office (ACO) completed certification projects for synthetic vision, an ADS-B In display, and Wide Area Augmentation System (WAAS) capability into the flight management system of the Falcon 20 and 50; the Cessna Citation 550 and 650; and the Lear 35 and 60 models.

Air Traffic Safety Oversight Service (AOV) Roles and Responsibilities

The Air Traffic Safety Oversight Service supports NextGen implementation by providing oversight of Air Traffic Organization (ATO) NAS changes, including new equipment, modifications to existing equipment, or procedural changes. The complexity of NextGen demands safety risk management oversight, and early involvement in the development process to promote seamless integration into the existing NAS. AOV accomplishes this task through certification, inspection, surveillance, and compliance actions related to ATO operations.

Any new NextGen initiative will require certification of new equipment and requisite standards development. Once new equipment is certified and new standards are developed, the NextGen initiative must integrate safely into air traffic control operations. Through early, proactive engagement and mitigation of potential safety concerns, AOV seeks to avoid last minute non-approvals or non-acceptance actions. By coordinating safety requirements for NextGen initiatives with AIR and AFS, AOV minimizes potential operational disruptions.

Accident Investigation and Prevention (AVP) Roles and Responsibilities

The Office of Accident Investigation and Prevention coordinates the FAA Safety Management System, the catalyst for proactive risk management and that successful transition to NextGen. AVP established an integrated approach to a safety management system that will provide a strategy for building increased safety into the air transportation system. AVP supports the FAA NextGen implementation and manages the safe transition of the NAS. Throughout NextGen implementation, AVP continues to evolve and define its emerging analytical requirements through a series of activities that include research, analysis, demonstrations, and acquisition. AVP also continues to define the evolving role of a system safety management in improving the safety of the current and future NAS.

As a core responsibility, AVP conducts FAA major accident and incident investigations both as the FAA party representative to National Transportation Safety Board (NTSB) investigations and as the Investigator in Charge for the FAA investigation. These investigations identify opportunities for safety improvement, and are the foundation for recommendations for agency actions to avoid similar events in the future. AVP also manages safety recommendations brought forward by other sources, parties, or data analysis.

Additionally, AVP ensures certain changes resulting from NextGen initiatives maintain or enhance safety while delivering capacity and efficiency benefits to the FAA and stakeholders. In support of NextGen implementation, AVP roles and responsibilities include:

- Lead and manage the Agency's transition to a SMS.
- Define and coordinate the implementation of integrated system safety risk management capabilities, including system safety information sharing and risk modeling.
- Manage the implementation process to ensure system safety performance is improved as NextGen increases capacity and efficiency.
- Identify unsafe conditions as a result of accident and incident investigation, and develop recommendations to mitigate future risk.
- Research and respond to NTSB and FAA safety recommendations and provide a timely course of action to address identified issues or emerging safety risks and concerns that require a change to a process, procedure or operation.
- Manage the AVS research requirements and budget process to support safety and other NextGen priorities, coordinating NextGen-specific research requirements with the NextGen I&I office for inclusion in the budget.
- Manage Aviation Safety Information Analysis and Sharing (ASIAS) capabilities that ensures an enhanced system safety perspective is applied to evolving NextGen technologies. These capabilities have already identified potential safety issues that can be addressed through procedural and airspace design or incorporated into NextGen design and planning processes. For example, ASIAS data can inform the Metroplex Prioritization process, while addressing Traffic Alert and Collision Avoidance System (TCAS) and Terrain Awareness and Warning System (TAWS) safety concerns.

Rulemaking (ARM) Roles and Responsibilities

The Office of Rulemaking manages the FAA's rulemaking process. The Rulemaking Management Council sets priorities and determines how resources are allocated to individual rulemaking projects. ARM works with all lines of business within the FAA to facilitate the drafting, reviewing, and timely processing of rulemaking documents. ARM provides these same rulemaking services to NextGen initiatives. For example, ARM completed rulemaking activity for ADS-B in 2010.

Quality, Integration and Executive Services (AQS) Roles and Responsibilities

The Office of Quality, Integration, and Executive Services manages the AVS budget for NextGen in support of the other services and offices. AQS also provides the workforce with information technology to improve our efficiency, and the specific tools identified for NextGen communication, coordination, and training.

Aerospace Medicine (AAM) Roles and Responsibilities

We have not identified specific NextGen activities for the Office of Aerospace Medicine. However, the Civil Aerospace Medical Institute (CAMI) may support future human factors studies. Since NextGen technologies will be more automated and integrated, the role of human-in-the-loop interaction will need to be monitored. Incorporation of new technologies in the cockpit may require a better understanding of how pilots actually use these devices.

SECTION ❹

A. AVS Integration

As specific initiatives within NextGen evolve and we learn from research, prototyping and early in-service experiences, AVS's role in NextGen will continue to expand. The following section describes the AVS management structure, and how NextGen activities are coordinated.

AVS Management Team

The AVS Management Team (AVSMT) provides oversight to all AVS NextGen activities. To effectively coordinate NextGen efforts across the agency, the AVSMT designated AVS Deputy Associate Administrator, John Hickey (AVS-2), as AVS's representative on the FAA's NextGen Management Board. In this role, Mr. Hickey has the critical responsibility of representing AVS on diverse issues.

Additionally, the AVSMT identified the Deputy Director of Flight Standards Service Policy Oversight, John McGraw (AFS-2P), as the AVSMT lead for NextGen. In this role, Mr. McGraw is responsible for establishing a organizationally coordinated position and recommendation on all NextGen-related matters.

AVS-2, AFS-2P, and the Service Management Leads meet at least monthly during to prepare AVS-2 for NextGen Management Board meetings.

Service Management Leads
Within AVS, NextGen has the greatest effect on the AIR, AFS and AOV. These organizations identified NextGen management leads responsible for coordinating and monitoring NextGen developments:

- Aircraft Certification Service: AIR-100 (Bruce DeCleene)
- Flight Standards Service: AFS-400 (Les Smith)
- Air Traffic Safety Oversight Service: AOV-300 (Alex McDowell)

NextGen focal points exist throughout AVS. Because their organizations are not as impacted by NextGen, the focal points monitor NextGen developments and handle routine issues but do not participate on the NextGen Review Board. NextGen focal points are:

- Office of Rulemaking: ARM-100 (Ida Klepper)
- Office Quality, Integration and Executive Services: AQS-400 (Charles Davis); Communication, AQS-300 (Colleen McKenna); Training, AQS-500 (Stacy Wells)
- Office of Accident Investigation and Prevention: AVP-220 (Warren Randolph)

AVS NextGen Working Group
To promote coordination and integration of NextGen activities, AVS established the AVS NextGen Working Group to meet biweekly to share information and concerns on NextGen initiatives, with emphasis on the planning, resources, and policy. The Aircraft Certification and Flight Standards Services leads co-chair this working group made up of service and office leads and key AVS representatives on the Joint Planning and Development Office (JPDO), NextGen Integration and Implementation Office, and the Enterprise Architecture Board. This working group coordinates inputs provided by AVS to ATO in the following areas:

- NextGen Implementation Plan
- NextGen Segment Implementation Plan
- Enterprise Architecture
- JPDO Working Groups

Coordination between Headquarters and Other AVS Offices

Field coordination between AFS, AIR, and AOV is required. Fostered by headquarters offices coordination, the AFS NextGen branches, AIR-130 NextGen focal points, and the AOV-330 NextGen Program work together on NextGen-related projects and applications (see Figure 2).

AFS established NextGen Branches in each region to facilitate approvals of new technologies and operators and ensure standardization and coordination among offices. These NextGen Branches improve standardization, quality of service, support, and specialized training for NextGen capabilities. AFS also established a policy team consisting of the headquarters divisions to coordinate policy relating to NextGen.

The AIR Standards Management Team created a NextGen Policy Team to coordinate policy and discussions across Directorates. Aircraft Certification Offices with significant NextGen-related activity identified NextGen focal points to work with the AFS NextGen Branches in the same region. These focal points are knowledgeable in NextGen issues and facilitate approval of new technologies in an efficient, consistent and standardized manner. They also work with AIR-130 and directorate standards staff in the development of policy for new and novel applications. We will update the AVS NextGen website with the NextGen Policy Team charter (https://employees.faa.gov/org/linebusiness/avs/nextgen).

AOV provides specialists from its NextGen Program to oversee and support the NextGen Implementation Plan. Through AOV, AVS provides a leading-edge local presence in each office that is able to monitor NextGen activities in other offices, maintain a rapport with other NextGen specialists and the policy offices, and facilitate flow of information within the organization.

B. Overview of FAA NextGen Organizational Structure

NextGen is a massive, complex undertaking that reaches beyond the FAA and the Department of Transportation. It is a combination of many initiatives in different phases of maturity and adoption. Seven solution sets support eight portfolios (see Figure 3) with several key planning documents providing the overall structure. The Joint Planning and Development Office (JPDO) serves as the lead inter-agency coordinating body to ensure NextGen's seven participating government agencies and offices perform in a coordinated and complementary manner. JPDO develops the overall vision and far-term plan while FAA plans and implements the majority of NextGen's near-term (current through 2012) and mid-term (2012 through 2018) goals. The FAA uses several planning documents, described below, to provide the framework for its NextGen activities. The FAA publishes an annual overview of the plan through the NextGen Implementation Plan (NGIP). Internally, the more detailed NextGen Segment Implementation Plan (NSIP) serves as the master working document used to align all activities. Figure 4 shows the overview of planning activities.

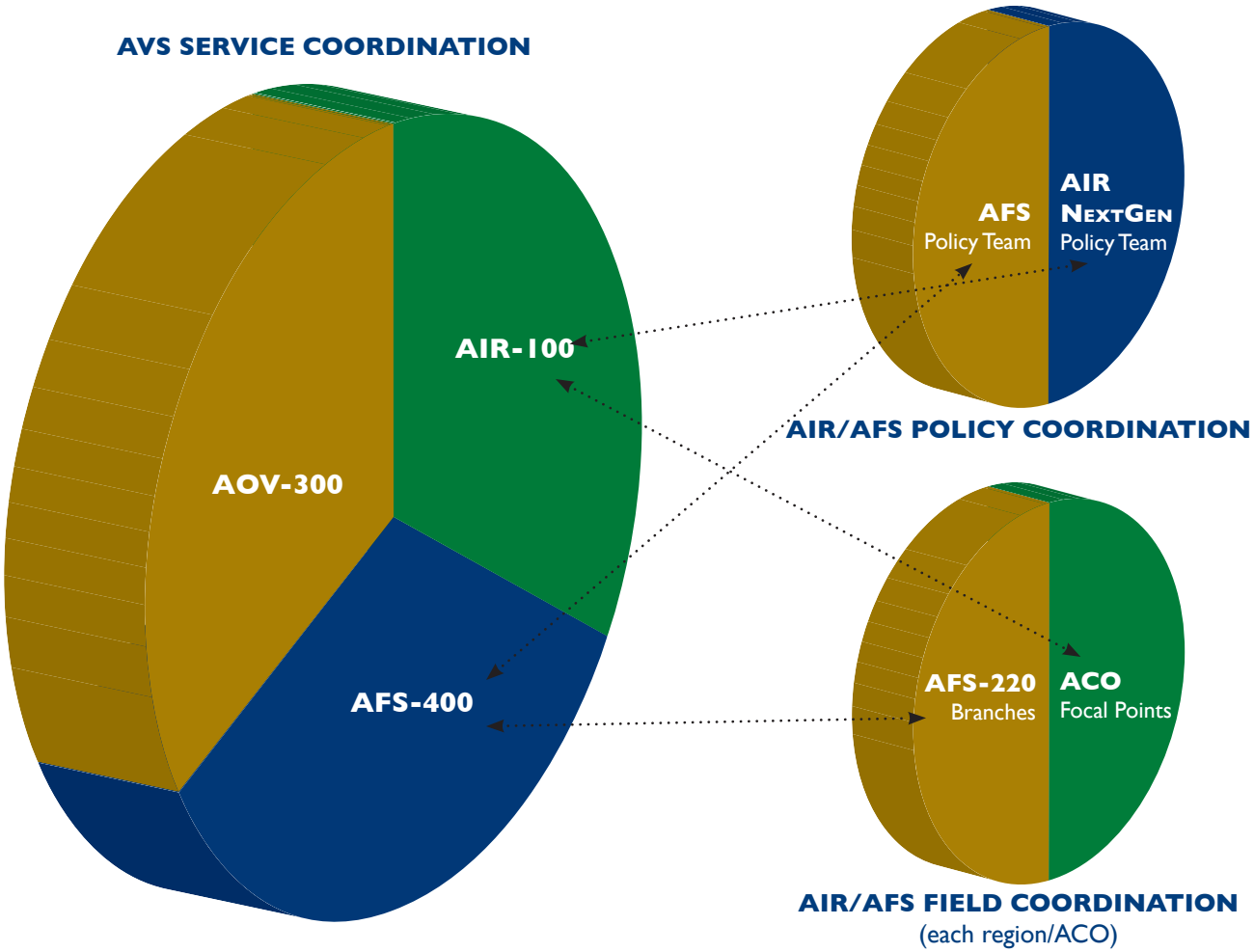


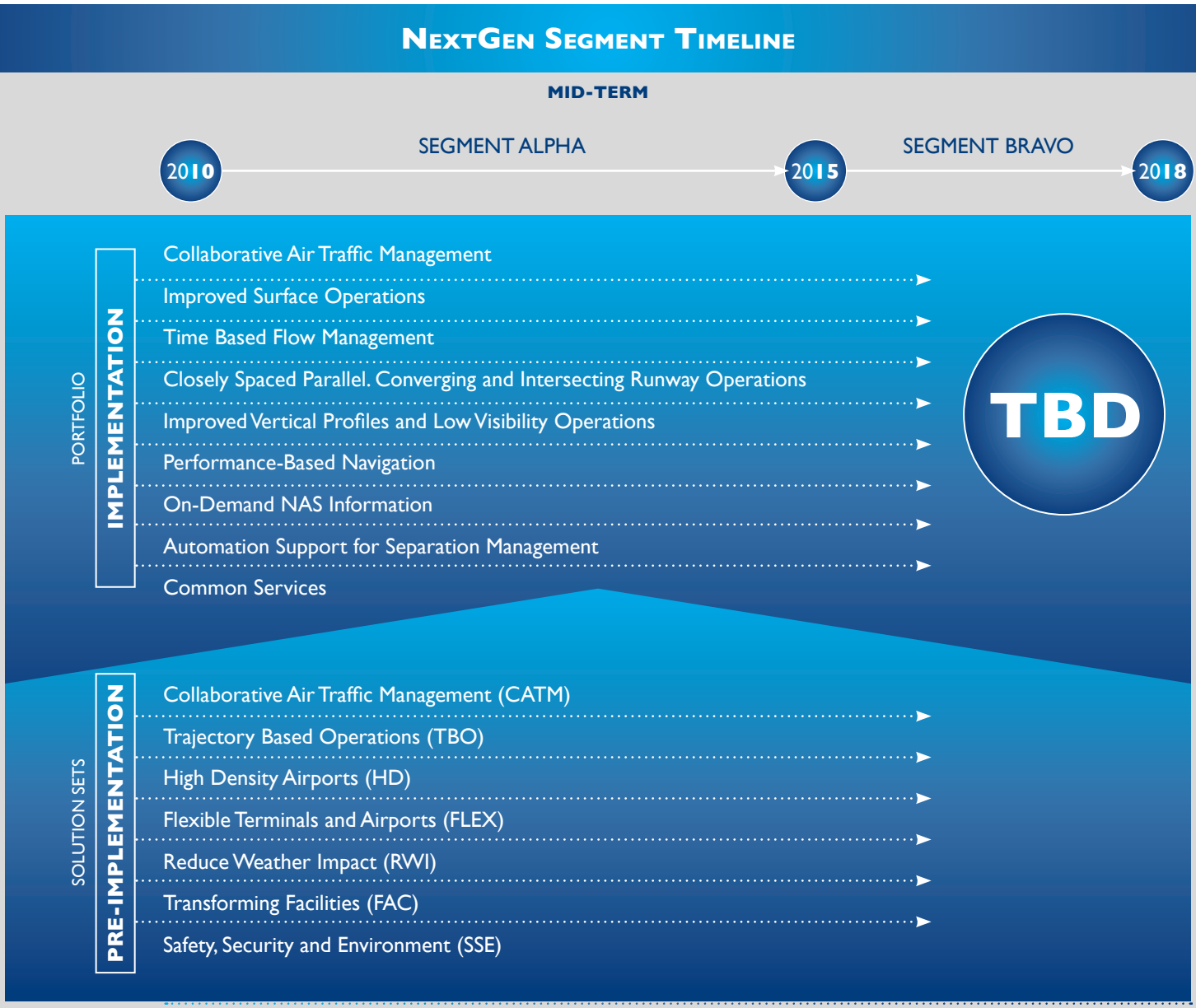
Figure 2. AVS NextGen Coordination between HQ Offices and Field

C. Plans

JPDO Enterprise Architecture

The JPDO Enterprise Architecture (EA), commonly referred to as the blueprint for NextGen, is a 600-page technical document that describes the segments, capabilities, operational activities, and identified relationships to the key target components of NextGen in the year 2025. The EA defines how these capabilities fit together and serves as a tool for planning, negotiating and understanding the dynamic, interrelated business processes and technical solutions affecting the aviation community. The key difference between the JPDO EA and the FAA's NAS Enterprise Architecture is the JPDO Enterprise Architecture has a broader scope and looks at the entire air transportation system, including operations and systems beyond the responsibilities of the FAA. For further JPDO EA information, refer to the Joint Planning Environment (JPE) website at http://jpe.jpdo.gov/ee/.

Figure 3. NextGen Portfolio Approach



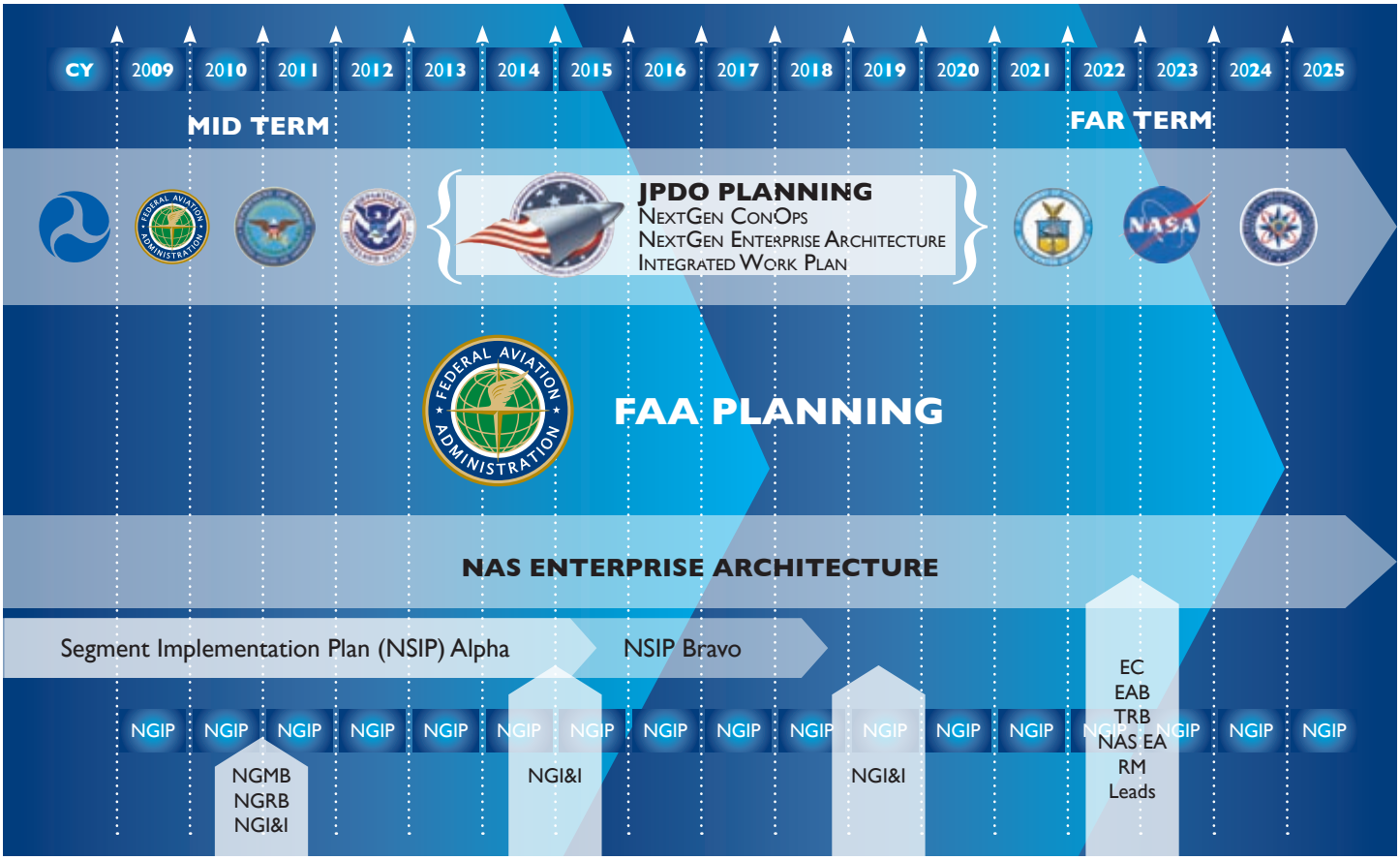


Figure 4. NextGen Planning Overview

JPDO Integrated Work Plan

The Integrated Work Plan (IWP) supports the collaborative planning and deliberation required among partners and stakeholders to prioritize needs, establish commitments, coordinate efforts, and focus resources on the work needed to achieve NextGen. The IWP provides comprehensive information about the elemental operational improvements, enablers, development and research milestones, and policies that define the overall NextGen plan. The IWP facilitates coordination with government and industry partners as they implement NextGen. For further IWP information, refer to the JPE website, http://jpe.jpdo.gov/ee/

NAS Enterprise Architecture

The National Airspace System (NAS) Enterprise Architecture (EA), updated each December, establishes the foundation to model the transition of the NAS. The structure and discipline of ongoing NAS EA efforts aim to provide accurate and concise architecture information for NAS enterprise-level decision making. The NAS EA includes a comprehensive set of Operational Improvements (OIs), which are the specific operational changes that will deliver benefits under NextGen. The NAS EA also includes operational depictions and technology roadmaps of the FAA's plans. The Aircraft Roadmap is one aspect of the NAS EA of particular interest to AVS since it concerns needed aircraft capabilities. Aspects of the EA are approved by the Joint Resources Council, notably program funding (for baseline programs), and identification of key decision points. The NAS EA is an online database of information, available at http://nasea.faa.gov .

NextGen Implementation Plan

The NextGen Implementation Plan (NGIP) provides an overview of the FAA's ongoing transition to NextGen. The NGIP addresses results of the previous year's activities as well as the FAA's current and mid-term commitments (defined as 2012-2018). The NextGen Integration and Implementation (I&I) Office (AJP-A) manages this document, released each calendar year. The NGIP and the FAA response to the RTCA Mid-Term Implementation Task Force are also on the FAA's NextGen website: http://www.faa.gov/nextgen.

NextGen Segment Implementation Plan

A detailed planning document aligned with the FAA NAS EA, the NextGen Segment Implementation Plan (NSIP) identifies increments of operational improvements in safety, efficiency, capacity, and the environment. Each increment represents a distinct change in the NAS that delivers benefits in one or more of these areas. The NSIP currently focuses on near-term, high priority activities and is being expanded to address other mid-term initiatives and related key issues.

D. Planning Organizations

Since the implementation of NextGen involves organizations across the FAA, understanding how these organizations relate to each other is essential. The following paragraphs explain how FAA organizations fit into the NextGen managing structure (see Figure 5).

NextGen Management Board

The NextGen Management Board (NMB), chaired by the FAA's Deputy Administrator, develops and executes the FAA's NextGen plan through an enterprise-wide approach. With representatives from all key agency lines of business, including AVS-2, the Board has the authority to force timely resolution of emerging NextGen implementation issues. The Board's focus includes:

- Measuring implementation progress and key activities.
- Ensuring essential resources are available, including reprioritizing resources as necessary.
- Issuing policy and guidance.
- Identifying leaders that are accountable for delivering system changes.

The NextGen Management Board also manages cross-agency issues, including accommodating aircraft at various levels of equipage during the mid-term, increasing capacity on closely spaced parallel runways, managing priorities across our lines of business, overseeing environmental challenges, pursuing a global strategy, and maintaining the integrity of information shared through NextGen systems.

NextGen Review Board

The NextGen Review Board (NRB) provides oversight, status, and prioritization of guidance on existing and proposed NextGen initiatives. The NRB monitors the progress of NextGen initiatives outlined in the NextGen Segment Implementation Plan and mitigates any problems that arise. To facilitate this oversight, the NRB includes members from various organizations to assist with integration and identification of required policy changes and the understanding of funding impacts. The NRB provides recommendations to the NextGen Management Board.

The AVS NRB members are John McGraw (AFS-2P), Bruce DeCleene (AIR-130), and Les Smith (AFS-400, alternate member). The AVS NRB/NMB linking member is John McGraw (AFS-2P).

Senior Vice President for NextGen and Operations Planning

The FAA's Senior Vice President for NextGen and Operations Planning has the primary responsibility for:

- Developing and executing the NextGen plan.
- Managing the FAA's research and development, Enterprise Architecture, systems engineering, and performance modeling.

NextGen Integration and Implementation Office

The NextGen Integration and Implementation (I&I) Office (AJP-A) develops and maintains the NextGen Implementation Plan and NextGen Segment Implementation Plan. This office is deeply involved in NextGen system integration, coordinating obligation of NextGen funds, monitoring the progress of NextGen development and implementation, and facilitating key collaboration processes.

NAS Enterprise Architecture Board

The NAS Enterprise Architecture Board develops and maintains the FAA's architecture, which describes the structure of how the FAA's systems are inter-related. It also describes how future FAA systems integrate into a single coherent enterprise. AVS participates on this Board, representing the aircraft and aircraft related activities in the Enterprise Architecture's various system views.

AVS Participation: Aircraft Roadmap Lead (Steve Van Trees, AIR-130)

Joint Planning and Development Office

The Joint Planning and Development Office (JPDO) focuses on the long-term NextGen vision (2018-2025) and ensures the FAA's alignment with partner government agencies and other stakeholders that contribute to the overall NextGen effort. JPDO member organizations include the Departments of Defense, Homeland Security, and Commerce, as well as NASA and the White House Office of Science and Technology Policy.

The JPDO (see Figure 6), established working groups as joint industry-government bodies exploring NextGen-related issues and building industry-government consensus around possible solutions. The current working groups are Aircraft, Air Navigation Services, Airports, Safety, Environment, Weather, Net-Centric, Security, and Global Harmonization. AVS serves as the government co-chair to the Aircraft and Safety Working groups (see arrow).

Figure 5. FAA NextGen Organization Managing Structure

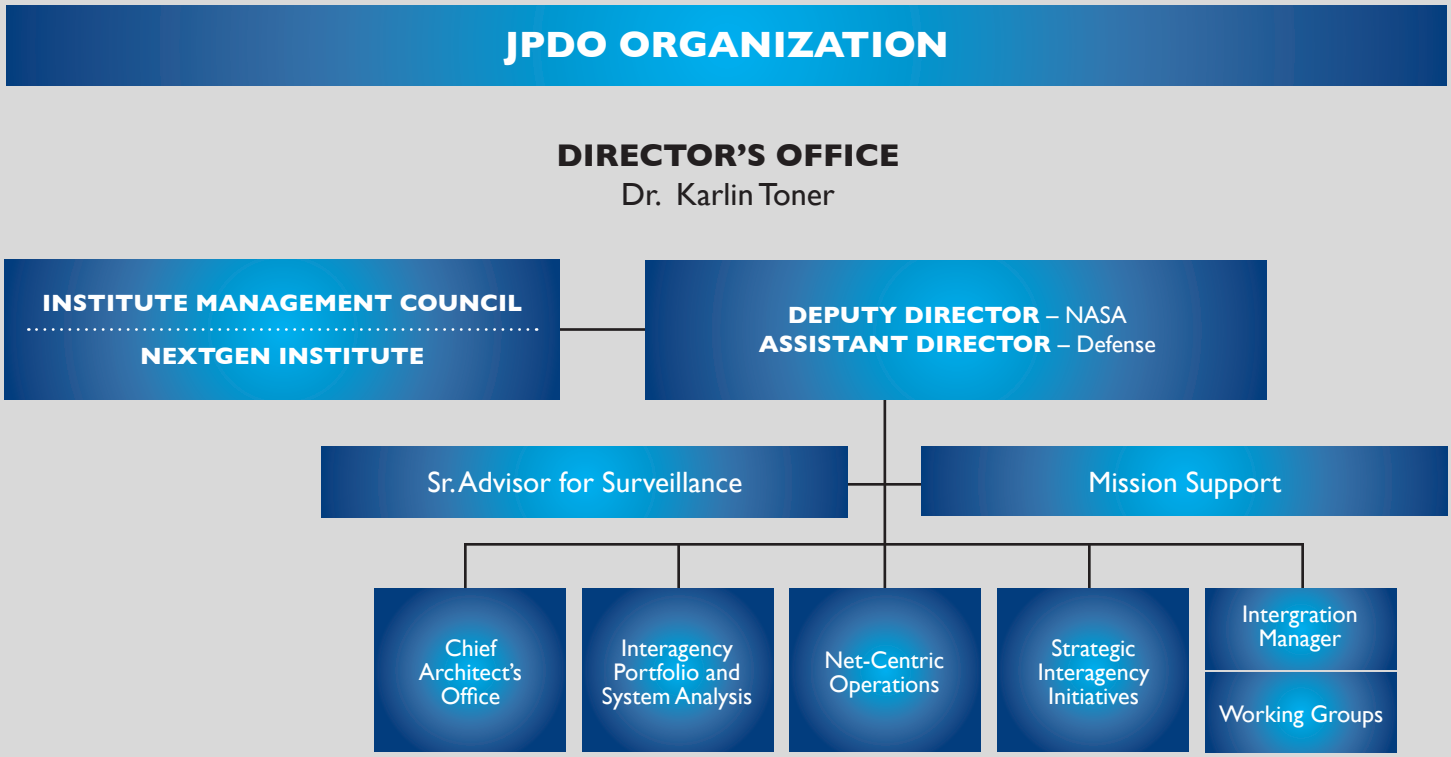


Figure 6. JPDO Organization Chart

AVS Participation within JPDO Working Groups:

Aircraft Working Group: Co-Chair (Steve Van Trees, AIR-130)

Member (Trent Prange, AIR-130)
Member (Hank Cabler, AFS-430)
Member (Brian Hint, AFS-430)
Member (Art Politano, AOV-320)

Safety Working Group: Co-Chair (Warren Randolph, AVP-220)

Member (Frank Stadmeyer, AVP-200)
Member (Scott VanBuren, AVP-5)
Member (Ann Azevedo, AIR-100)

Safety Working Group: Co-Chair (Warren Randolph, AVP-220)

Member (Frank Stadmeyer, AVP-200)
Member (Scott VanBuren, AVP-5)
Member (Ann Azevedo, AIR-100)
Member (Don Arendt, AFS-900)
Member (Andy Muir, AFS-20)
Member (Charles Huber, ANM-100)
Member (Sherry Borener, AVP-220)
Member (Steve Van Trees, AIR-130)
Member (Mark Liptak, AVP-200)

Air Navigation Services Working Group:

Member (Trent Prange, AIR-130)
Member (Brian Hint, AFS-430)

Global Harmonization Working Group:

Member (Hank Cabler AFS-430)
Member (Brian Hint, AFS-430)

Weather Working Group, Weather Policy Team, 4-D Cube Definition:

Member (Roger Sultan, AFS-430)

Current NAC Structure

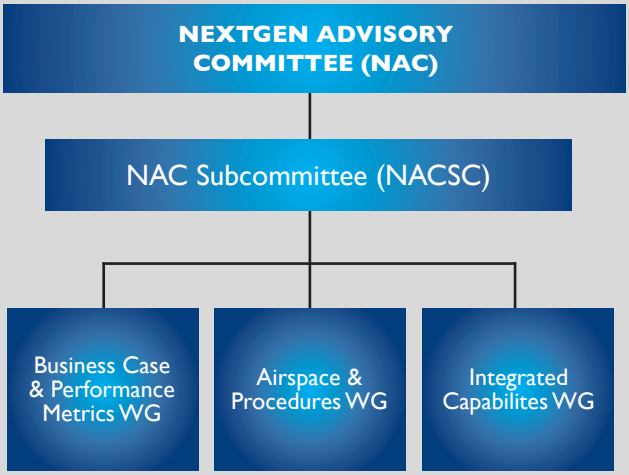


Figure 7. NextGen Advisory Committee

NextGen Advisory Committee (NAC)
To foster greater industry collaboration in the development and implementation of NextGen, the FAA worked with RTCA in 2010 to stand up the NextGen Advisory Committee (see Figure 7).

The NextGen Advisory Committee (NAC) developed a charter to create a common understanding of NextGen priorities in the context of overall NextGen capabilities and implementation constraints, with an emphasis on the near- and mid-term goals through 2018. The Committee is responsible for fostering a common understanding of success through joint performance objectives and development milestones, and focusing on implementation issues to include prioritization criteria at a national level, joint investment priorities, location and timing of capability implementation. Top-level executives representing operators, manufacturers, air traffic management, aviation safety, airports and environmental, civil and military, domestic and international make up the NAC.

AVS RTCA NAC member: Peggy Gilligan (AVS-1)

RTCA NAC Working Subcommittee
The NAC Subcommittee provides technical advice and staff support through the establishment and sponsorship of standing Work Groups and ad hoc Task Groups. Currently there are three standing work groups:

- Airspace and Procedures Working Group
- Business Case and Metrics Working Group
- Integrated Capabilities Working Group

AVS RTCA NAC Subcommittee member: Bruce DeCleene (AIR-130)

AVS RTCA NAC Airspace & Procedures Working Group member: Gary Powell (AFS-401)

AVS RTCA NAC Integrated Capabilities Working Group member: Bruce DeCleene (AIR-130)

In order to foster greater industry collaboration in the development and implementation of NextGen, the FAA worked with RTCA in 2010 to stand up the NextGen Advisory Committee (see Figure 7).

Communications

To ensure the safety of the new systems and operations as NextGen deploys, the AVS workforce must be aware of the changes taking place and be prepared to enhance safety standards and oversight. To prepare the workforce to identify, mitigate and manage risk, we will provide information about NextGen across AVS and train the workforce to reach and sustain NextGen levels of safety and efficiency. This section addresses the NextGen key messages for AVS, identifies communication strategies to ensure the workforce is informed of the latest NextGen developments, and describes the training plan for NextGen.

Communications and Training

A. Key Messages

1. NextGen is an integrated collection of initiatives, not a single program.

Individual initiatives to improve safety, efficiencies, and the environment make up NextGen. It consists of different acquisition programs, operational changes, research projects and prototypes. Some initiatives are mature while other initiatives are still in the research phase. These initiatives will take advantage of existing aircraft capabilities, empower the flight crew by providing applicable information to the flight deck, and be implemented as performance-based operations where practical. Many of the cockpit initiatives relate to the transformational programs of Performance-Based Navigation, ADS-B, and ATC data communications. The NAS transformation will occur over time, not all in one year.

2. NextGen will help improve safety.

As NextGen is implemented, we will ensure the safety of the NAS is not only maintained but also improved commensurate with the increased exposure. Safety improvements, including SMS and ASIAS, must accompany both the expected increase in traffic and new operations flown in increasingly demanding conditions. SMS is a comprehensive, proactive approach for managing and evaluating all aspects of system safety, especially monitoring the level of safety achieved in the air transportation system, as well as evaluating changes to the system. ASIAS is a tool that will play a significant role in supporting the tenants of SMS, including Safety Risk Management and Safety Assurance requirements

3. Efficient safety oversight is vital.

The implementation of NextGen involves a significant investment from industry and government. For that to continue, work must demonstrate a return on investment within a few years. We must use our resources effectively to identify and mitigate risks, while promptly introducing new systems and operations that have been tested and proven safe. In addition, we must ensure industry understands the safety requirements and expectations through early involvement of AVS in developmental activities.

4. NextGen requires integration of AVS activities.

We developed an AVS Work Plan for NextGen to capture the impact of NextGen on AVS Services and Offices. The field is the first to see the applications for approval of new technologies and operations. Increased communication through such groups as the NextGen Policy Team and the Flight Standards NextGen Branches helps coordinate the integration of NextGen technologies and procedures. We are aligning resources to meet these challenges of NextGen, through the NextGen branches in AFS, NextGen focal points in AIR, and the NextGen program plan in AOV.

5. Synergy between FAA offices promotes NextGen.

Over the last several years, we have worked closely with the Air Traffic, Airports, and Environment and Energy lines of business to plan for NextGen. The aircraft applicant cannot achieve benefit for equipage if air traffic automation and the Air Traffic Control workforce cannot implement the change. Since many core NextGen changes for air traffic and airspace redesign rely on improved aircraft capability, the success of NextGen hinges on collaboration and cooperation among the different FAA lines of business.

6. Stakeholder coordination is crucial.

The FAA cannot implement NextGen initiatives alone. We must coordinate the planned capabilities to ensure members of the aviation community can align their plans and focus their resources to support the transition of the NAS. As manufacturers develop these new aircraft systems, operators are installing those systems and training for their use. To ensure widest adoption, we must also coordinate with other agencies as appropriate (for example, the Department of Defense).

B. Communication Strategies

We must all have an opportunity to review NextGen objectives and contribute to their refinement and to the program's overall success. The AVS workforce has unique insights into the opportunities and challenges we face in implementing NextGen, and must be engaged. AVS uses the following tools to inform and engage the workforce:

1. AVSMT site visits

The AVS Management Team continues to promote NextGen understanding during their visits to field offices.

2. AVS Town Hall meetings

Town hall meetings, conducted for the benefit of the entire AVS workforce, allow the AVSMT to discuss pertinent NextGen issues and to address the workforce's questions.

3. AVS intranet site for NextGen communication

The AVS NextGen internet site, www.faa.gov/NextGen houses a NextGen fact sheet and an e-mailbox (AVSNextGen@faa.gov) for feedback, which is checked regularly to answer AVS employee questions about NextGen. The site also contains AVS-specific documents, including this plan, and a link to the FAA NextGen website, http://www.faa.gov/nextgen where NextGen videos, a calendar of events and more information are located.

4. Identify appropriate target audiences for messaging -- who needs to know what – general knowledge by everyone versus applied knowledge by few for early adoption

AIR: NextGen Policy Team (NGPT) and ACO focal points

Tasked by the Standards Management Team (SMT) to create policy plans on its behalf, the NextGen Policy Team (NGPT) is a cross-organization team that coordinates policy and initial issue papers relating to NextGen technologies and complex avionics issues. The NGPT focuses on the development of consistent and coordinated approaches to the airworthiness approval of these systems. Initial issue papers include first installations of NextGen and related technologies. In some cases, prototype or early-adopter projects precede the availability of standards and guidance, and require additional coordination to balance the precedent established by the project. Some of these projects require coordination with other organizations, such as AFS and ATO. Additionally, ACO focal points work with AIR-130 and directorate standards staff to develop policy for new and novel applications.

AFS NextGen Field Offices

The Flight Standards Service established NextGen branches in its regional offices. These NextGen liaisons facilitate understanding of the big picture and ensure the FAA's safety workforce sees, knows, and understands where the Agency is headed with NextGen. Administrator Randy Babbitt announced this plan at a NextGen conference, explaining that the newly assigned specialists will expedite the approval aspects of NextGen. "Let's face it: equipment and procedures aren't going to amount to much if the players don't know where it all fits and how it all works. I'm going to make sure that when NextGen shows up at the door, our safety workforce knows exactly what's in the box."

AOV

To address NextGen safety oversight issues with greater focus and effect, AOV recast one of its branches as "Future Systems" in October 2010. The branch focuses on the systematic management of safety risks, establishing and solidifying working relationships between AVS and ATO, and serving as an information exchange for emerging systems. It is also developing a matrixed organizational architecture of safety system experts to collaborate and ultimately provide consultation and feedback to the ATO as they work NextGen systems through the Acquisition Management System. The supporting AOV Safety Management Review process focuses on ensuring early and regular safety system collaboration with emphasis on risk mitigation, solution development, and control validation and verification.

5. Internal Awareness Campaign

In an organization-wide email, the AVS Associate Administrator announced the launch of the AVS NextGen Work Plan for 2010, and encouraged the workforce to become familiar with it. Concurrently, articles posted on Focus FAA and the FAA NextGen website as well as in the internal newsletter, the AVS Flyer, bolstered the launch. To reinforce these messages, AVS Town Hall meetings hosted by the Associate Administrator and Deputy Associate Administrator for Aviation Safety as well as periodic articles in the AVS Flyer on NextGen news or milestones help promote understanding and awareness of what NextGen is, how it will improve aviation, and what the AVS role is in it. For the latest information available on NextGen, go to www.faa.gov/NextGen.

C. Training Plan

Because of NextGen's complexity, implementing interdependent systems in various stages of development and maturity will occur over a variety of timeframes. We need to be responsive to this evolution. Effective engagement and adoption of NextGen capabilities hinges on communicating about the changes, explaining where to find additional information, and providing appropriate training. Like the FAA NextGen Implementation Plan (NGIP), the AVS NextGen Training Plan will evolve over time and must be flexible to serve a varied workforce.

Each AVS Service and Office assessed the unique training needs of their workforce. The NextGen Training Oversight Team (TOT) is proposing NextGen training strategies specific to those needs. Each Service and Office is responsible for implementing its training strategy. The TOT will monitor content to ensure consistency across Services.

The AVS training strategy for NextGen consists of:

- Providing an overview of NextGen as it relates to AVS responsibilities.
- Revising current courses to incorporate NextGen concepts.
- Developing new courses.
- Identifying and documenting the appropriate training for our technical specialties through training profiles.
- Providing employees with resources on the latest NextGen technologies.

We update the training plan annually. NextGen training strategy will include a combination of new courses and revisions to existing courses to pace the evolution of NextGen initiatives.

Training Plan

Focused on NextGen, the AVS NextGen training plan complies with the existing AVS workforce training process and procedures.

Table 4. Planned NextGen training activities

SERVICE/OFFICE	REVISED COURSES	NEW COURSE DEVELOPMENT
Flight Standards Service (AFS)	• Review current training courses to integrate NextGen as courses are revised	• AVS NextGen Overview Course (Apr 2011) AFS-500 lead developer • NextGen Technologies for AFS (Jul 2011) • Oceanic and International Operations (Sep 2011) • NextGen avionics maintenance course (contingent on funding)
Aircraft Certification Service (AIR)	• Update FAA21018 Aviation Safety Engineer/ Systems Job Functions (June 2011) and companion course FAA 27904, Systems Engineering Design Approval Task • Update FAA25811 Advanced Communications, and FAA25815 Advanced Navigation courses. (Cancel these courses when new course becomes available.) • Review the following: _FAA25804 Repairs and Modifications _FAA25814 Low Visibility/ Autopilot	• FAA 27200024 ADS-B Out Installation and Airworthiness Guidance (completed) • Develop NextGen technologies course incorporating relevant content from FAA25811 Advanced Communications and FAA2515 Advanced Navigation (contingent on funding).
Office of Quality, Integration, and Executive Services (AQS)	• Review and incorporate NextGen concepts into AVS New Manager Course and AVS Overview Course (Sept 2011)	
Office of Aerospace Medicine (AAM)	No specialized training needs identified at this time. AAM will address needs on an individual employee level.	
Air Traffic Safety Oversight Service (AOV)	AOV oversight of the ATO employs a systems safety approach requiring competency in safety surveillance, compliance and verification strategies. As NextGen programs are deployed, AOV will leverage targeted training opportunities provided across the FAA to obtain the necessary familiarization and expertise to support NextGen surveillance, compliance, and verification activities.	
Office of Accident Investigation & Prevention (AVP)	No specialized training needs identified at this time.	
Office of Rulemaking (ARM)	No specialized training needs identified at this time.	

SECTION 6

This section provides an overview of the process for identifying AVS Research and Development (R&D) requirements and details the AVS NextGen R&D requirements.

The Office of Accident Investigation and Prevention (AVP) manages the R&D Program and supports the R&D needs of each Service and Office.

The program is supported by Research, Engineering and Development (RE&D) funds appropriated by Congress under the RE&D category of Aviation Safety. The content of the research requirements within the R&D portfolio reflect the evolving needs of the AVS Services and Offices. Aviation Safety R&D is integrated with the research requirements of the other FAA lines of business within the structure of the R&D Executive Board (REB) process, managed by AJP-6. The REB develops an annual FAA R&D portfolio and budget request, which is ultimately submitted to Congress with the President's Budget Request.

The FAA assigned NextGen budget responsibility to NextGen and Operations Planning (AJP), including funding for NextGen-related R&D. In addition, some NextGen development and applied research is funded by Facilities and Equipment (F&E) funding, which is a separate budget development process from the RE&D process.

Research and Development (R&D)

A. Aviation Safety R&D Requirements Process

The aviation safety research community is constantly challenged to identify, conduct, and deliver credible safety research products that respond to the regulatory and oversight needs of the FAA. The structure of the FAA's R&D program must ensure there is a clearly defined and understood vehicle to:

- Collect and evaluate research requirements.
- Identify and prioritize research requirements.
- Present prioritized research requirements.
- Evaluate the priority of pop-up requirements.
- Recommend redirection of research activities.
- Maintain current knowledge.
- Communicate research results to the AVS organizations.

The AVS R&D Requirements Process, a top-down, bottom-up process, defines the steps to develop the annual Aviation Safety R&D portfolio. It starts with the release of strategic guidance from upper management early in the process. In the April-May period, the AVSMT identifies particular areas of research that are line-of-business strategic. Likewise, the Service/Office level and the Division/Directorate level indicate areas that may be strategic at the Service-, Office-, Division-, and Directorate-level. We provide this guidance to the Technical Community Representative Groups (TCRG). The TCRGs are the initial point of origin (bottom-up) in AVS for identifying research requirements. Each TCRG has a particular area of technical responsibility and is responsible for identifying the technical knowledge needed to support the subsequent delivery of AVS products within their area of expertise. Suggestions for new technical requirements, approaches, and technical solutions to meet those research requirements can come from almost any source within the various technical communities.

Based on the strategic guidance and the overall mission of the organization, research requirements are defined and recommended at the lowest levels of the organization. The requirements are then reviewed and prioritized by the management chain, with final approval by AVS-1.

The AVS R&D Requirements Process identifies a clear line of sight between each issue or need and the R&D needed to address it. The process also supports a framework for effective monitoring of the development of products. AVS manages the requirements process to ensure a structured path from the identification of mission needs to a validated prioritized listing of aviation safety research requirements.

Appendix E includes a summary of the Aviation Safety R&D portfolio request for FY11. For more information, please review the National Aviation Research Plan (NARP), an integrated, performance-based plan for the FAA R&D program supporting both the day-to-day operation of the national air transportation system and the future vision of NextGen. The NARP is available on the FAA website.

B. NextGen Portfolio Management Process

The FAA NextGen I&I Office (AJP-A) manages NextGen investment. AJP-A ensures the effective and efficient application, planning, programming, budgeting, and execution of the FAA NextGen portfolio, including the NextGen R&D programs. The NextGen solution set coordinators, along with AJP-A and ATO-P, meet regularly to review and manage NextGen R&D and to allocate resources. FAA NextGen R&D programs are a subset of the FAA R&D portfolio.

Once the FAA NextGen R&D requirements are submitted for consideration, the I&I office prioritizes and allocates funds. Since many of the NextGen Budget Line Items (BLIs) evolved over the last several years, AVS decided to use aviation safety research identification and coordination procedures to identify NextGen research requirements. Although these requirements will not be prioritized through the REB process, they will be provided to the NextGen I&I organization to support AVS obligations to NextGen mid-term and long-term goals.

C. NextGen Research Assets

AFS Flight Operations Simulation Laboratory

The Flight Operations Simulation Branch (AFS-440) provides operational simulations of new, emerging, or modified communications, navigation, and surveillance technologies and procedures in support of aviation safety. AFS-440 manages Boeing 737-800 and Airbus 330 (convertible to Airbus 340) flight simulators (figure 8), along with air traffic controller radar monitors that can be linked to provide real time, realistic, dynamic virtual terminal operations, pilot/controller interface, and pilot/controller/aircraft data collection.

AFS Flight Systems Laboratory

The Flight Systems Laboratory Branch (AFS-450) gathers data from real world aeronautical activities to create simulation models. High-speed computers use these models to generate millions of simulated flight operations and produce data representing years of actual flight operations. For example, the software tool ASAT simulates operational scenarios in realistic environments. The screening tool RNAV-Pro supports the development of required navigation performance/area navigation (RNP/RNAV) routes and procedures. We analyze the data collected from these modeling tools as well as from flight tests and flight simulators, and translate it into performance and safety parameters used to establish NextGen operational standards.

Civil Aerospace Medical Institute (CAMI)

The FAA Civil Aerospace Medical Institute (CAMI) is the medical certification, research, education, and occupational health wing of the FAA's Office of Aerospace Medicine. CAMI focuses on the human element in flight - pilots, flight attendants, passengers, air traffic controllers - and the entire human support system that embraces civil aviation. Under the guidance of the Federal Air Surgeon, the Aerospace Human Factors Research Division at CAMI conducts research on improving individual system effectiveness, efficiency, and safety. General Aviation and Air Traffic Control are two of the broad interest areas of the researchers.

Figure 8 - Airbus 330/340 (left) and Boeing 737-800 Simulator (right)

NextGen Integration and Evaluation Capability

The NextGen Integration and Evaluation Capability (NIEC), located at the FAA William J. Hughes Technical Center, Atlantic City International Airport, NJ, explores, integrates, and evaluates NextGen concepts through simulation activities resulting in concept maturation and requirements definition. For example, the research cockpit simulator is shown in Figure 9.

D. AVS NextGen Research Needs

As we prepare for the advanced technologies and operations of NextGen, AVS will define, prioritize, and conduct research to address core issues relating to the safety of the future system. Through collaboration with industry or by refining internal processes and procedures, we will address other issues, including:

End-to-end safety analysis and performance allocation. Historically, the allocation of responsibility and requirements between the aircraft, the aircraft operator, and the Air Navigation Service Provider (ANSP) has been a pacing item in the deployment of new technologies and applications. We must establish a common process to accomplish this allocation with quantitative vs. qualitative criteria. We are working with US industry, EASA and ICAO to address this challenge.

Identifying safety opportunities.

Every NGIP capability has safety implications, including the safety enhancement resulting from the improvement and the potential risks and mitigations of making the improvement. We must continue to research analysis techniques for the large volume of data available through ASIAS to inform and improve the safety of future NextGen initiatives and priorities.

Regulatory framework.

Mandates for certain operational capabilities or equipment may become a component of NextGen implementation. AVS expects such a mandate would come from an airspace rule sponsored by ATO, and will assist ATO in executing those rules. AVS will evaluate the airworthiness and operational regulations that are within its purview and identify any appropriate changes NextGen implementation. For example, some rules may

Figure 9. NIEC Research Cockpit Simulator

need to transition from system-specific to performance-based. Another example is that the increased role of avionics in future operations may warrant changes to the TSO program or development of new regulations to ensure appropriate avionics performance.

Migration of avionics architecture.

The avionics industry continues to develop more integrated avionics, either as modular avionics or as one-box-does-all equipment. Given the need for continued evolution of avionics, AVS recognizes these architectures are an essential element of NextGen. To address innovations in integration, AVS must continue to improve the certification policy for these systems. For example, with integrated systems and broadband communication, it is technically feasible to update avionics software with remote maintenance.

Improving flight crew awareness.

With the increased role of automation, maintaining flight crew awareness and effective intervention during failure and abnormal conditions is critical. Research suggests mode awareness is already a challenge, a trend that cannot increase as new technologies are introduced. AVS must develop new displays and alerting, as appropriate, to improve awareness and retain the ability for the flight crew to manage the operation.

Trajectory Operations (TOps).

These functions integrate together the traditional functions of navigation (defining a path and creating path guidance) and flight controls (steering the aircraft to that path). It adds additional capabilities for NextGen, including conformance monitoring, trajectory negotiation (a traditional "communication" function), and functions to support trajectory planning (weather data, traffic data, fuel optimization, etc). Strategic trajectory planning, or trajectory optimization (to optimize time or fuel within a given set of constraints such as aircraft performance and weather), may take place within the aircraft TM function or may be accomplished in a ground system and the result communicated to the aircraft. A common operational concept of use for mid-term TOps is in development through RTCA, and a parallel activity in JPDO is defining the long-term TOps capabilities.

Unmanned Aircraft Systems (UAS).

UAS are aircraft flown by pilots remotely under Visual Flight Rules (VFR) or in segregated airspace and are required to comply with current Part 91 aircraft operating rules. In 2010, UAS access to the NAS remained restricted due to a lack of appropriate operational procedures, standards, and policies. The FAA allows UAS operations on a case-by-case basis through the Certificate of Waiver or Authorization (COA) for public aircraft and the Special Airworthiness Certificate – Experimental Category (SAC-EC) for civil users. Due to the diverse utility that UAS offer, their use will increase exponentially in a variety of key military and civil areas. Industry projections for 2018 forecast more than 15,000 UAS in service in the U.S., with almost 30,000 deployed worldwide [World Unmanned Aerial Vehicle Systems, Market Profile and Forecast 2009-2010; The Teal Group]. From an operational, infrastructure and safety perspective, this presents a number of challenges. The solutions will involve and impact all NAS constituencies, but ultimately require a seamless integration of UAS into the NAS.

APPENDIX A Enabling Policy

ENABLER	INITIATIVE	SPECIFIC ACTION (ACTIVITY TARGET)	OPR	SCHEDULE
Performance Based Navigation (PBN)				
RNP 1 with curved path	Update equipment standard for PBN operations	TSO-C115c, Multi-Sensor Navigation Systems: Update standard for navigation aspects of flight management systems to align with PBN operations and streamline operational approvals for new equipment designs.	AIR-130	December 2011
	Departure procedure design guidance	Update Order 8260.44 for departure procedures	AFS-420	December 2011
	Operations specifications	Update C063 for this operation	AFS-470	August 2011
Automatic Dependent Surveillance - Broadcast (ADS-B)				
ADS-B Out	Operational guidance	AC 90-ADS-B	AFS-406	August 2011
In-Trail Procedure (ADS-B In)	Equipment standard	TSO-C195a: Harmonize CDTI with EASA, add requirements for oceanic in-trail climb and descend procedures	AIR-130	December 2011
	Installation Guidance	AC 20-172A: Update installation guidance for ADS-B In applications to support ITP.	AIR-130	March 2012
	Operational guidance	AC 90-ADS-B	AFS-406	August 2011
	Operations specifications	Update A353	AFS-406	August 2011
	Inspector Guidance	Order 8900.1 update	AFS-406	August 2011
Interval Management (ADS-B In)	Equipment standard	TSO-C195b: Equipment standard for interval management applications.	AIR-130	December 2012
	Installation Guidance	AC 20-172B: Update installation guidance for ADS-B In applications to support IM.	AIR-130	June 2013
ADS-B Traffic Advisory System (ADS-B In)	Equipment standard	TSO-C195c: Equipment standard for non-TCAS-equipped aircraft to obtain conflict detection capability that is compatible with typical VFR operations.	AIR-130	December 2013
	Installation Guidance	AC 20-172C: Update installation guidance for ADS-B In Traffic Advisory System (ADS-B In).	AIR-130	2013

APPENDIX A Enabling Policy

ENABLER	INITIATIVE	SPECIFIC ACTION (ACTIVITY TARGET)	OPR	SCHEDULE
ATS Data Communications				
FANS-1/A (over SatCom)	SatCom (Inmarsat Swiftbroadband)	TSO-C159b: Update TSO to invoke standards for new INMARSAT service.	AIR-130	May 2012
	Satellite Voice	AC 20-150A: Update for new satellite capabilities.	AIR-130	September 2011
FANS-1/A+ (VDL Mode 2)	VDL M2 Equipment standard	TSO-C160a: Update standard for radio to align with NextGen and SESAR requirements.	AIR-130	March 2012
ATN Baseline 2[2]	Installation Guidance	AC 20-140B: Update AC to support US data link program. Clearances, terminal information, and expansion of ATN to trajectory operations(dependent on funding for US program).	AIR-130	2014
	Operational Guidance	AC 120-70C	AFS-470	2015
Low Visibility Operations				
SVS	Installation Guidance	Update to address use of SVS during instrument approach operations.	AIR 130	2013
EFVS	Installation Guidance	Update AC 20-167 and AC 90-106 to address use of EFVS for touchdown (depending on final operational concept).	AIR-130 AFS-410	2013
GLS Category III	Installation Guidance	Interim criteria (project specific policy).	AIR-130	2014
Avionics Safety Enhancements				
FIS-B	Update equipment standard	TSO-C157a: Update TSO to align with final FIS-B service provided by SBS program.	AIR-130	August 2011
Engines and Fuel Technologies				
Drop-In Renewable Jet Fuel	Fuel standards	Complete validation of renewable fuels, identify updates to standards (as required).	ANE-111	2011-2015
Low lead fuel	Recommendations	Aviation Gasoline Transition Aviation Rulemaking Committee is developing recommendations for the development and transition to unleaded avgas.	ANE-111	2011-2015

[2] This is the same enabler listed in the 2011 NGIP as ATN Baseline 3.

APPENDIX B Streamlining Initiatives

INITIATIVE (ACTIVITY TITLE)	SPECIFIC ACTION (ACTIVITY TARGET)	OPR	SCHEDULE
Procedures for Reporting Operational Applications	Order 8900.1: Define procedures for reporting application status to operators.	AFS-408	July 2011
Coordination of Policy	Incorporate public comment interval into QMS AFS-100-01.	AFS-140	December 2011
Coordination of Policy	Develop guidelines on coordination times.	AIR SMT	June 2011
NextGen Overview Course for AVS	Provide Overview course to all AVS employees to provide basic awareness of NextGen and the AVS role in its implementation.	AFS-408	Contingent on funding
WebOPSS Enhancement: Streamlining Applications (Workflow and Business Rules Engine)	Streamline application submission, tracking, and approval processes; allow greater use of digital signatures for application/approval at each FAA level; provide enhanced visibility on applications in progress; allow applicants to submit bundled applications for different operations electronically.	AFS-260	Contingent on funding
WebOPSS Enhancement: Data Reporting and Export (Operator Aircraft Data Expansion and Data Island Restructuring)	Expand the data collected by aircraft in standardized table(s) rather than embedded in OpSpecs, enabling tracking of NextGen authorizations and compatibility with the ATO Flight Object.	AFS-260	Contingent on funding
NavLean Implementation Plan	Based on the 21 recommendations in the 2010 NavLean report, develop an implementation plan. (2010 report at www.faa.gov/nextgen).	AFS-460	June 2011

APPENDIX B Streamlining Initiatives

INITIATIVE (ACTIVITY TITLE)	SPECIFIC ACTION (ACTIVITY TARGET)	OPR	SCHEDULE
Avionics Manufacturer: Updated procedures for non-TSO functions	Corrects policy to address that non-TSO function "data" is considered acceptable, but not approved, when the TSOA is granted by the ACO. It also addresses that any 21.305.d. "approvals" are coordinated with AIR-100.	AIR-110	May 2011
Expansion of Approved Model Lists	Order describing use of approved model lists for all aircraft product types.	AIR-110	September 2012
Field Approvals of Avionics Installations	Update guidance to aviation safety inspectors on the approval of avionics installations under field approvals, including the use of approved data, and address integration with other avionics. This update will also address the approval authority of changes to the aircraft flight manual.	AFS-360	September 2011
Field Approval Process	Order addressing process for approving major alterations, addressing use of designees and field approvals. The Order will also incorporate revisions to the Major Alterations Job Aid located in Order 8900.1.	AFS-350	August 2012
Guidance Material on Major and Minor Changes in Type Design	Publish guidance material on determining changes in an aircraft type design as being major or minor. - Approve major changes by amended type certificate or supplemental type certificate. - Approve major changes by amended type certificate or supplemental type certificate. - Approve minor changes through several different methods, thereby enabling more flexible and potentially expedient approvals.	AIR-110	April 2012 Contingent on funding

APPENDIX B Streamlining Initiatives

INITIATIVE (ACTIVITY TITLE)	SPECIFIC ACTION (ACTIVITY TARGET)	OPR	SCHEDULE
Communication	Enabler descriptions and tutorials posted on AVS NextGen intranet.	AIR-130	August 2011
Training	AVS NextGen Overview Course.	AFS-408	Contingent on funding
Training	NextGen Technologies for AFS.	AFS-408	July 2011
Training	Oceanic and International Operations.	AFS-408	September 2011
Training	Update FAA21018 Aviation Safety Engineer/Systems Job Functions.	AIR-130	June 2011
Training	Update FAA25811 Advanced Communications.	AIR-130	December 2011
Training	Update FAA25815 Advanced Navigation.	AIR-130	December 2011
Training	Develop NextGen avionics design approval course.	AIR-130	Contingent on funding
Training	Develop NextGen avionics maintenance course.	AFS-360	Contingent on funding
Training	Update NextGen overview in AVS New Manager Course and AVS NextGen Overview Course.	AQS-500	September 2011

APPENDIX C NextGen Demonstrations

DEMO	DESCRIPTION	PARTNERS	AVS ACTIVITY
3D Path Arrival Management (3D PAM)	Deliver aircraft from TOD to a meter fix efficiently and predictably.	NASA Ames, Boeing, Sensis, Continental and United Airlines	No role identified.
4D Flight Management System (4D FMS)	Demonstrate operational capabilities and potential benefits of 4D Flight Management Systems in Trajectory Based Operations.	Honeywell, GE Aviation, Alaska Airlines, SEA Center, Continental Airlines, HOU Center, FedEx, MEM Center	AFS – Support safety assessments, risk analyses and working groups to help develop a concept of operations. AIR- Participate in requirements definition and technology evaluation.
Aircraft Arrival Management System (AAMS)	Research and demonstration of 4D TBO concepts using AAMS to better understand how user decisions can be integrated in a FAA-Airline collaborative decision-making process in support of 4D TBO concepts.	US Airways, PSA, ERAU, ATH Group, MCR, Veracity Engineering	No role identified.
Closely Spaced Parallel Runway Operations (CSPO)	This program will investigate a number of CSPO enabling activities to determine to what level, if any, runway spacing can be reduced.	MITRE, NASA Ames	AFS – Simulator and collision risk analysis of revised blunder assumptions on parallel ILS approaches. AFS – Simulator development for long-term CSPO evaluations. AIR – Definition of requirements for long-term CSPO solutions.
Ground Based Augmentation System (GBAS)	Demonstrate the use of Performance Based Navigation technology to improve arrival rates at airports.	Port Authority of New York & New Jersey, Continental	AFS - Support for operational approval and project management. AIR – Support resolution of technical issues relating to availability and continuity (including effect of interference).
Wide Area Augmentation System (WAAS)	Provide real-time data on NextGen to validate performance requirements for these technologies.	NetJets, NextGen I&I	AFS - Support for operational approval.
Oceanic Tactical Trajectory Management (OTTM)	Demonstrate potential benefits for oceanic trajectory optimization in terms of fuel savings and emissions reductions.	Air Europa Airline, Lufthansa Airlines, NavPortugal	No role identified.
Tailored Arrivals (TAs)	Highly efficient arrival trajectories from Top of Descent (TOD) to the runway threshold.	Multiple operators and ATC facilities	AFS – "Tailored Arrival Design and Operator Authorization" Notice to be released providing guidance and standardization for the design of Tailored Arrivals (TA) and operator authorization to fly TAs. AIR – Requirements definition for aircraft participating in demo.
Wake Turbulence Research Program	Safely change wake turbulence separation standards where possible to improve capacity.	AFS, DOT Volpe, MITRE, Continental and United Airlines, MIT/LL, National Institute of Aerospace, CSSI, NEXTOR	AFS - Establish WVE criteria (metrics), this includes defining WVE hazard boundaries and determining risk levels of WVEs in the NAS.

APPENDIX D NextGen Segment Implementation Plan AVS Activities

INCREMENT NAME	DESCRIPTION	IOC	ENABLER	AIR SUPPORTING ACTIVITY	AFS SUPPORTING ACTIVITY	AOV SUPPORTING ACTIVITY
101102-11 Electronic Negotiations	The Electronic Negotiations increment provides flight planners with information about congestion along their intended routes and proposes flight-specific rerouting. This two-way exchange gives the flight planner the choice of delaying a flight or choosing alternate routes. The initial phase of Electronic Negotiations is limited to the period before a flight plan is filed and is based primarily on ground delays or route options. Controllers will receive these negotiated pre-departure reroute instructions. Through data link, tower controllers can convey revised departure clearances to the users, effectively extending the period of negotiations to the last possible moment before departure.	2012	SWIM	No additional activity.	Possible guidance/policy for dispatch use.	Approve controls that are defined to mitigate or eliminate initial high risk hazards.
103208-12 Cockpit Display of Traffic Information (CDTI)/ Traffic Service-Broadcast (TIS-B) for Surface	Surface traffic information is available via Traffic Information Service Broadcast (TIS-B) for moving map displays. Using TIS-B, Cockpit Display of Traffic Information (CDTI) will provide a graphical depiction of ground and air traffic, which will improve situational awareness for a variety of operations. Surveillance information from ASDE-X will be broadcast in TIS-B format to be received by suitably equipped aircraft. Flight deck-based alerting about runway safety hazards has been developed as an addition to CDTI and is being demonstrated.	2011-2015	1. TIS-B 2. Airborne/ Ground CDTI 3. Moving Map 4. EFB	AC 20-159A	AC 120-76A, AC 91-78	None
103208-14 EVS for Taxi	EVS utilize infrared (IR) sensors to detect IR signatures of the airport environment and display them on flight deck displays (either head-up or head-down). Operators of aircraft equipped with EVS have requested use of EVS for taxiing to the runway even though the reported ground visibility is below the minimum visibility allowed for normal airport operations. EVS enhances visibility (beyond that of the human eye) of the airport environment in reduced-visibility conditions such as night and fog.	2010-2015	EFVS	No additional activity.	Proof of concept study with FEDEX.	None

INCREMENT NAME	DESCRIPTION	IOC	ENABLER	AIR SUPPORTING ACTIVITY	AFS SUPPORTING ACTIVITY	AOV SUPPORTING ACTIVITY
103208-13 Runway Status Lights	RWSL provides pilots with indications of occupied runways to help avoid incursions and hazards resulting from those incursions. RWSL comprises an array of red, in-pavement lights deployed at taxiway/runway intersections and runway take-off and hold positions. Airport surface surveillance sensors provide surface vehicle and traffic information to RWSL, which has logic to enable types of lights that indicate to pilots and vehicle operators that a runway or taxiway is currently occupied and unsafe to enter, cross, land on, or depart from. Runway Entrance Lights (REL) are deployed at taxiway/runway crossings and illuminate red when there is high-speed traffic on or approaching the runway to signal that it is unsafe to enter the runway. Take-off Hold Lights (THL) are deployed by the departure hold zone and illuminate red when there is an aircraft in position for departure and the runway is occupied by another aircraft or vehicle. Runway Intersection Lights (RIL) are deployed at runway/ runway intersections and illuminate red when there is high-speed traffic on the runway approaching the intersection to signal that it is unsafe to cross the intersection. The Final Approach Runway Occupancy Signal (FAROS) provides a visual alert of runway status to pilots approaching a runway for landing. Airport surface surveillance sensors provide surface vehicle and traffic information to FAROS, which has logic that provides runway occupancy alerting, by flashing the Precision Approach Path Indicator (PAPI) lights.	2010-2014	No Aircraft or Operator Enabler.	None	Possible guidance/ policy for pilot training and use of RSWL.	Approve controls that are defined to mitigate or eliminate initial high risk hazards.
104207-11 Revised Departure Clearance via Data Comm	A revised departure clearance (DCL) Data Comm capability will allow FAA to rapidly issue departure clearance revisions, due to weather or other airspace issues, to one or more aircraft waiting to depart. This reduces delays, fuel burn, and emissions on the airport surface. The use of Data Comm for this type of capability has both safety and efficiency benefits over the current voice-based method of communications between ATC and the pilot.	2013-2015	FANS 1/A+ over VDL-2	Define aircraft qualification criteria.	Define approval strategy for use on existing aircraft.	Approve controls that are defined to mitigate or eliminate initial high risk hazards.

APPENDIX D NextGen Segment Implementation Plan AVS Activities

INCREMENT NAME	DESCRIPTION	IOC	ENABLER	AIR SUPPORTING ACTIVITY	AFS SUPPORTING ACTIVITY	AOV SUPPORTING ACTIVITY
102141-13 Amend Independent Runway Standards in Order 7110.65	This increment amends runway spacing standards to achieve increased access to parallel runways with centerline spacing less than 4300 feet. Current runway spacing standards for independent closely spaced parallel approaches are based, in part, on outdated assumptions about aircraft blunder rates that include the severity and frequency. Due to the fact the blunder assumptions were based in part on theory, current spacing standards may be too conservative, limiting capacity and airport growth. This increment includes the collection and analysis of data leading to a revision of these assumptions, followed by a safety analysis to determine possible new, reduced, safe minimum spacing for simultaneous independent approaches in IMC, as outlined in Order 7110.65. Changes to standards will result in increased access in a number of possible ways, including reducing spacing for new runway construction and allowing independent approach operations where currently only dependent, or single-runway, operations are authorized.	2010-2015	No Aircraft or Operator Enabler.	None	Complete revised blunder study.	Approve changes or waivers to provisions of handbooks, orders, and documents, including FAA Order 7110.65 Air Traffic Control, current edition, that pertain to separation minima.
102141-12 Implement Satellite Navigation (SATNAV) or Instrument Landing System (ILS) for Closely Spaced Parallel Runway Operations	This increment will enable policy, standards, and procedures to allow for use of SATNAV or ILS when conducting simultaneous independent and dependent instrument approaches. The current standard for parallel approaches relies on ILS for simultaneous independent approaches, and dependent approaches. This increment expands this capability for RNAV Global Positioning System (GPS), RNAV (RNP), RNP with Aircrew Authorization Required (AR), LPV guidance, and GLS for these parallel approach applications, providing more options for ATC and users during IMC. These additional options increase the chance of maintaining higher throughput when needed to support the demand. This improvement will increase access to parallel runways during IMC, particularly where siting constraints prevent ILS installation, and will allow continued operation using SATNAV if the ILS is out of service.	2011-2015	Avionics required for the instrument approach.	None	Follow-up analysis in support of GLS operations.	Approve changes or waivers to provisions of handbooks, orders, and documents, including FAA Order 7110.65 Air Traffic Control, current edition, that pertain to separation minima.

APPENDIX D NextGen Segment Implementation Plan AVS Activities

INCREMENT NAME	DESCRIPTION	IOC	ENABLER	AIR SUPPORTING ACTIVITY	AFS SUPPORTING ACTIVITY	AOV SUPPORTING ACTIVITY
102141-11 Additional 7110.308 Airports	This increment provides airports with maximum use of closely spaced parallel runways by operating dependent, staggered approaches to runways with centerline spacing less than 2500 feet. This increment will implement this parallel approach capability by analyzing procedural and wind-specific operating limitations that enable maximum benefit using available ground and airborne equipment. This includes using variable glide paths or runway thresholds to increase potential benefit. This increment will expand application of FAA Order 7110.308 to additional parallel runway pairs using existing or revised criteria in addition to sites already approved.	2010-2014	Avionics required for the instrument approach.	No additional activity.	No additional activity.	Approve changes or waivers to provisions of handbooks, orders, and documents, including FAA Order 7110.65 Air Traffic Control, current edition, that pertain to separation minima.
102141-11a Expand the 7110.308 Procedure to Heavy/757 Aircraft	This increment expands the use of procedural dependent staggered approach separation of 2.5 nautical miles to allow Boeing 757 and heavy aircraft to use this procedure. This will increase the efficiency of runway throughput at approved airports. Initial Operating Capability (IOC) is planned for FY2011.	2011	No Aircraft or Operator Enabler.	None	None	Approve changes or waivers to provisions of handbooks, orders, and documents, including FAA Order 7110.65 Air Traffic Control, current edition, that pertain to separation minima.
104124-11 Initial Tailored Arrivals (ITAs)	ITAs are used in the Segment Alpha timeframe to address an initial version of the tailored arrivals concept. ITAs are pre-planned, fixed routings assigned by Oceanic Air Traffic Control (ATC) facilities and sent from the Oceanic Automation System (Ocean21) via data communications to suitably equipped (i.e., FANS 1/A) aircraft as an arrival clearance into coastal airports.	2010-2012	RNAV 1, FANS 1/A	None	FAA Notice on ITAs.	None

APPENDIX D NextGen Segment Implementation Plan AVS Activities

INCREMENT NAME	DESCRIPTION	IOC	ENABLER	AIR SUPPORTING ACTIVITY	AFS SUPPORTING ACTIVITY	AOV SUPPORTING ACTIVITY
107117-11 Enhanced Flight Vision Systems (EFVS) Below Decision Altitude to 100 Feet	The ability to conduct approaches to landing in low visibility or ceiling conditions depends largely on the required minima. Based on the rules under which they operate, flight crews are subject to minima when planning for, initiating, and conducting instrument approaches. Effort is under way by FAA and industry to safely lower approach minima and to allow operations below the existing approach minima. These will be accomplished by leveraging existing equipment with new investments made voluntarily by users for EFVS. EFVS allows operations below existing landing minima. Infrared sensor technology is also used in EFVS to provide a pilot with an enhanced visual image and allow him/her to see, in certain low-visibility conditions, the visual references necessary to continue an instrument approach to 100 feet above the airport surface, when the pilot might otherwise be required to execute a missed approach. FAA is engaged in making new rules to expand the scope of the landing minima rules, under certain conditions, and to allow authorized users to use the enhanced visual image to touchdown. This will further increase access to runways in low-visibility conditions.	2010-2011	EFVS, HUD	No additional activity.	1. Complete rulemaking project to enable operation. 2. Publish appropriate OPSPECS to authorize operation.	None
107117-12 Synthetic Vision Systems (SVS) to Enable Lower Decision Altitudes	SVS is already in use for flight crew situational awareness. It is now being pursued as a system to allow operations below existing landing minima. Based on GPS positioning, using a database of terrain, obstacles, and the airport environment, the SVS in the flight deck creates a real-time, synthesized view of the airport environment. This view improves situational awareness and improves the ability of the flight crew to discern needed visual references. The specific requirements are under development by FAA and industry to allow SVS to be used for operating below existing approach minima. FAA and industry are exploring SVS use for operations to 100 feet, as is currently allowed using EFVS.	2012-2014	SVS	Support airworthiness guidance update.	Conduct Proof of Concept Demo .	None

APPENDIX D NextGen Segment Implementation Plan AVS Activities

INCREMENT NAME	DESCRIPTION	IOC	ENABLER	AIR SUPPORTING ACTIVITY	AFS SUPPORTING ACTIVITY	AOV SUPPORTING ACTIVITY
107118-11 EFVS to Touchdown	FAA is currently working with RTCA on concepts, standards, and criteria that allow the use of EFVS all the way to touchdown. EFVS will allow improved access with a greater assurance of landing without needing to execute a missed approach once the approach has been started.	2012-2013	EFVS, HUD	Complete RTCA SC-213 activity.	Complete RTCA SC-213 activity.	None
107115-11 EFVS for Take-off	As a first increment in the Segment Alpha timeframe, FAA is working with RTCA and users on approving the use of EFVS for low-visibility take-off operations. An initial user has applied for credit to use EFVS for reduced take-off minima.	2012-2014	EFVS, HUD	No additional activity.	Conduct Proof of concept study with FEDEX.	None
107119-XX Expanded Low Visibility Using Lower Runway Visual Range Minima	FAA has embarked on a project of expanding CAT II ILS capability (Special Authorization CAT II ((SA CAT II)) and lower than standard CAT I ILS (SA CAT I (150' DH/1400 RVR) in the NAS.	2010-2014	HUD	No additional activity.	1.Update Order 8400.13 2.Oversee the SA CAT I/II program.	None
108209-12 Optimization of PBN Procedures	Teams of stakeholders will be created to address short-term PBN procedures optimization. Efficient development and implementation of PBN procedures will require the collaboration of a broad spectrum of industry, regulatory, aircraft performance, and technical experts. Expert teams focused on the development and implementation of PBN procedures will at a minimum do the following: • Focus knowledge and experience in the application of procedure design criteria. • Provide continuity in the use of tools for the analysis and the development of vertical profiles. • Ensure flexibility of procedures through use of aircraft simulations; ensure viability of procedures through use of human-in-the-loop simulations (HITLS) during and after procedure development. • Provide the basis for analysis of procedure benefits and environmental impacts.	2010-2012	RNAV, RNP 1	No additional activity.	NextGen branch participation on teams.	None

INCREMENT NAME	DESCRIPTION	IOC	ENABLER	AIR SUPPORTING ACTIVITY	AFS SUPPORTING ACTIVITY	AOV SUPPORTING ACTIVITY
108209-17 Flight Management Computer (FMC) Route Offset	Automation provides controllers with support to amend an aircraft's flight plan to indicate that it has been placed on, or has been taken off, a flight management computer (FMC) lateral offset. Controllers will have the capability to trial-plan a proposed lateral offset for an RNAV- or RNP-equipped aircraft. This capability is being performed manually today without entering the trajectory into the FMC – part of Post En Route Automation Modernization program (ERAM) Release 3.	2013-2014	RNP 1	No additional activity.	Update AC 90-105 for offset feature.	Approve controls that are defined to mitigate or eliminate initial high risk hazards.
102108-11 Automation Dependent Surveillance-Contract (ADS-C) Climb/ Descent Procedure (CDP)	The Automatic Dependent Surveillance - Contract (ADS-C) Climb Descent Procedure (CDP) (previously known as ADS-C ITP) is a new concept that allows a properly equipped aircraft (e.g., Future Air Navigation System (FANS) 1/A equipage) to climb or descend through the altitude of another properly equipped aircraft with a reduced longitudinal separation distance (compared with the required longitudinal separation minima for same-track same-altitude aircraft). This procedure allows more aircraft to reach their preferred altitude. ADS-C CDP will increase the benefits from the use of advanced communication, navigation, and surveillance (CNS) capabilities through Controller-Pilot Datalink Communications (CPDLC), Required Navigation Performance (RNP) and ADS-C.	2010-2012	ADS-C FANS-1/A RNP 4	No additional activity.	No additional activity.	Approve changes or waivers to provisions of handbooks, orders, and documents, including FAA Order 7110.65 Air Traffic Control, current edition, that pertain to separation minima.
107107-11 GBAS Category I Non-Federal System Approval	GBAS provides local corrections to GPS to improve accuracy, integrity, and availability of the navigation service. GBAS is designed and being implemented to enable Global Navigation Satellite System (GNSS) Landing System (GLS) precision instrument approaches to Category I, and eventually Category II/ III minima, for multiple runways. This includes those not served by Instrument Landing Systems (ILSs), perhaps due to siting constraints. GBAS systems design approval for Category I use in NAS was approved in 2009, and it will serve as an incremental step toward the development of a Category III vertically guided approach. GBAS Category I is being implemented as a non-federal system on a per-airport request basis. The GBAS Category I increment involves government-industry partnerships and results in service provision at the first airport in 2010.	2010-2014	Cat I GBAS Avionics	Support resolution of RFI issues.	Support resolution of RFI issues.	None

INCREMENT NAME	DESCRIPTION	IOC	ENABLER	AIR SUPPORTING ACTIVITY	AFS SUPPORTING ACTIVITY	AOV SUPPORTING ACTIVITY
102108-13 ADS-B Oceanic In-Trail Procedure and Automation	The ADS-B In-Trail Procedure (ITP) is similar to the ADS-C CDP concept. The ADS-B ITP will enable aircraft equipped with ADS-B and appropriate on-board automation to climb and descend through altitudes where current non-ADS-B separation standards would prevent desired altitude changes. With this procedure, the aircraft desiring to climb or descend (the maneuvering aircraft) obtains flight identification, altitude, position, and ground speed transmitted by proximate ADS-B equipped non-maneuvering (reference) aircraft. The maneuvering aircraft must, therefore, be equipped with ADS-B In capability and an appropriate onboard decision support system, both of which would have to be certified for this application. The reference aircraft is required to have ADS-B Out capability (the maneuvering aircraft should also have ADS-B Out to serve as a reference aircraft for other aircraft). The ADS-B signal can be received by aircraft equipped with ADS-B In and by ground stations providing information to ground stations and other aircraft. The pilot of the aircraft desiring a maneuver uses the ADS-B information received to determine if the ITP criteria have been met before requesting the maneuver. FAA desires to lead an operational trial of ADS-B ITP along South Pacific (SOPAC) routes within the next 18 months, with migration to other oceanic regions. During this operational trial, the ADS-B ITP criteria will be manually checked by the controllers using current Ocean21 tools. FAA has formed a contractual partnership that is focused on the next steps necessary to conduct this operational trial. These steps include, but are not limited to, development and certification of onboard systems that provide the ADS-B ITP criteria and display that information to the pilot. If the operational trial of manual ADS-B ITP is successful, the ground system may be updated to better support ADS-B ITP. The operational trials will help determine what should be automated (e.g., aircraft eligibility checks) and what information should be displayed to the controllers.	2010-2014	ADS-B Out for Lead ADS-B In (ITP), CDTI, FANS-1/A	No additional activity.	No additional activity.	Approve controls that are defined to mitigate or eliminate initial high risk hazards.

INCREMENT NAME	DESCRIPTION	IOC	ENABLER	AIR SUPPORTING ACTIVITY	AFS SUPPORTING ACTIVITY	AOV SUPPORTING ACTIVITY
104115-11 Implement TMA's Adjacent Center Metering Capability at Additional Locations	To expand the benefits of time-based metering and TBFM's other advanced flow management capabilities, AJR-45 (TBFM Program Office) is seeking approval from the Executive Council (EC) to implement TBFM's ACM capability at the locations noted below. In contrast to the Extended Metering increment previously identified, ACM does not deconflict metered flows at ARTCC merge points, and as noted, Extended Metering will build upon the capabilities of ACM to achieve a more accurate, robust, and longer-range TBM capability. The locations are as follows: • LAX — ACM from ZAB and ZLA • SFO — ACM from ZSE, ZOA, ZLA, and ZLC • SAN — ACM from ZLA and ZOA • ATL — ACM from ZDC and ZHU • IAD — ACM from ZNY The EC must approve this expansion of ACM to additional locations. If approved, ACM will be implemented at these sites.	2010-2014	No Aircraft or Operator Enabler.	None	None	Approve changes or waivers to provisions of handbooks, orders, and documents, including FAA Order 7110.65 Air Traffic Control, current edition, that pertain to separation minima.
104115-12 Implement TMA at Additional Airports	To expand the benefits of time-based metering and TBFM's other advanced flow management capabilities, AJR-45 is seeking approval from the EC to fully implement TBFM at the following locations: • BWI • CLE • DCA • SAN • MMU • TEB The EC must approve the implementation of TBFM at these additional locations. If approved, TBFM will be fully implemented at these sites.	2010-2014	No Aircraft or Operator Enabler.	None	None	Approve changes or waivers to provisions of handbooks, orders, and documents, including FAA Order 7110.65 Air Traffic Control, current edition, that pertain to separation minima.

APPENDIX E Research & Development Portfolio Summary

PROJECT NUMBER	FY2011 BUDGET LINE ITEM	PROGRAM	APPROPRIATION ACCOUNT	2010 ENACTED ($000)	2011 REQUEST ($000)
AVIATION SAFETY R&D PORTFOLIO SUMMARY – FY11 (FROM THE 2010 NATIONAL AVIATION RESEARCH PLAN)					
069-110	A11.m	NextGen – Alternative Fuels for General Aviation	R,E&D	0	2,000
111-110	A12.c	NextGen – Air Ground Integration Human Factors	R,E&D	5,688	10,614
111-120	A12.d	NextGen – Self-Separation Human Factors	R,E&D	8,247	9,971
111-140	A12.e	NextGen – Weather Technology in the Cockpit	R,E&D	9,570	9,312
G7M.02-01	1A08G	NextGen – System Safety Management Transformation	F&E	16,300	18,000