

**U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE AND TECHNOLOGY**

HEARING CHARTER

The Next Generation Air Transportation System: Status and Issues

Thursday, September 11, 2008
10:00a.m. – 12:00 p.m.
2318 Rayburn House Office Building

Purpose:

On Thursday, September 11, 2008 at 10:00 am, the Committee on Science & Technology will hold a hearing to examine the status of the Next Generation Air Transportation System initiative known as NextGen and explore key issues related to the initiative and the interagency Joint Planning and Development Office (JPDO), the organization entrusted with NextGen planning and research coordination.

Witnesses:

Ms. Victoria Cox

Senior Vice President for NextGen & Operations Planning
Air Traffic Organization
Federal Aviation Administration

Dr. Gerald L. Dillingham

Director
Physical Infrastructure Issues
Government Accountability Office

Mr. Calvin L. Scovel III

Inspector General
U.S. Department of Transportation

Dr. Paul G. Kaminski

Chairman and CEO
Technovation Inc.

Professor Ian A. Waitz
PARTNER Director
Massachusetts Institute of Technology

BACKGROUND

Issues

The following issues are expected to be raised at the hearing:

- *Have the specific and real improvements projected to be gained through NextGen been well defined, are they realistic, and is there a stakeholder consensus in support of them?*
- *What metrics should Congress use to evaluate the progress of the NextGen initiative?*
- *In light of the extremely complex systems engineering challenge facing the NextGen initiative, what will the NextGen interagency partnership and other stakeholders need to do to maximize its chances for success?*
- *Have the views of industry, active air traffic controllers, and technicians who maintain the ATC system been adequately incorporated in NextGen foundational planning documents, such as the Concept of Operations, Enterprise Architecture, and Integrated Work Plan?*
- *Have the research and development (R&D) expectations established by Vision100—the legislation establishing the framework for NextGen—been met by the JPDO and its stakeholders?*
- *What needs to be done to move the JPDO from a position of proposing the R&D necessary for the success of NextGen to one of articulating a clear R&D program with defined and prioritized tasks for each of the partner agencies?*
- *How confident should Congress be that progress in meeting the research, development and testing activities set out in the JPDO's Integrated Work Plan will provide a sufficient basis for achieving the NextGen's goals*

and timetable for quieter, cleaner, and more efficient air traffic operations?

- *Does the current form of the Integrated Work Plan have sufficient detail and priorities to allow it to be effectively used to oversee and manage the NextGen-related R&D efforts of multiple agencies?*
- *What major omissions did the JPDO find when it performed its recent research gap analysis, and how are they being addressed? Did the gap analysis indicate areas in which partners, other than the Federal Aviation Administration (FAA) and National Aeronautics and Space Administration (NASA), need to play a greater role in furthering the NextGen initiative?*
- *What has to happen for FAA to be able to successfully carry out its intent to accelerate the transition from the JPDO's system concepts and R&D activities to the implementation of operational systems without sacrificing the focus needed to ensure that NextGen's long-term benefits of increased system capacity, lower energy consumption, and reduced environmental impacts will be achieved?*
- *Given the impact of aviation on the environment, including climate, what steps should the NextGen initiative take to mitigate that impact?*
- *What assumptions regarding the maturity of near term and long term research and technologies were made as part of the decision to reorganize NextGen and JPDO in FAA?*
- *Can the JPDO continue to be viewed as an "honest broker" by the other participating agencies in light of the recent restructuring action by FAA?*
- *How will FAA and its federal partners ensure that the JPDO and NextGen program adhere to budget and schedule milestones during the upcoming Presidential transition? Will momentum and program focus be impacted by transition activities?*

Overview

While the health of the National Airspace System (NAS) is critical to America's economy, the current approach to managing air transportation is becoming increasingly inefficient and operationally obsolete. Today's NAS is near capacity, with delays growing to record levels, yet a threefold increase in air traffic is expected by 2025. Current processes and procedures do not provide the flexibility nor the scalability needed to meet the growing demand.

In 2003, Congress created the Joint Planning and Development Office (JPDO) as part of P.L. 108-176, *Vision 100: Century of Flight Reauthorization Act*. The JPDO is to plan for and coordinate, with federal and nonfederal stakeholders, a transformation from the current air traffic control system to the NextGen by 2025. NextGen is envisioned as a major redesign of the air transportation system that will entail precision satellite navigation; digital, networked communications; an integrated aviation weather system; layered, adaptive security; and more.

Seven organizations are participating in the JPDO: the Departments of Transportation, Commerce, Defense, and Homeland Security; FAA; NASA; and the White House Office of Science and Technology Policy. The JPDO is housed within FAA, and FAA's FY 2009 budget request includes \$19.5 million to support JPDO. While the JPDO has the planning and development responsibility and can define R&D requirements that it would like the participating agencies to carry out, it has neither budgetary nor management authority over the agencies' activities in support of NextGen. Although the JPDO is responsible for planning the transformation to NextGen and coordinating the related research and development efforts of its partner agencies, FAA is largely responsible for implementing the policies and systems necessary for NextGen, while continuing to safely operate the current air traffic control system 24 hours a day, 7 days a week.

The JPDO envisions that NextGen will be an evolutionary transformation of the Nation's air transportation system that integrates a combination of new procedures and advances in technology to improve delivery of services to both civil and military users. The goal of NextGen, as stated by the JPDO, is to "*significantly increase the safety, security, capacity, efficiency, and environmental compatibility of air transportation operations, and by doing so, to improve the overall economic well-being of the country.*" The JPDO's role is to establish how the air transportation system should be transformed. Part of

this transformation involves integrating and reshaping capabilities across all aspects of air transportation so that the entire system operates as an interconnected structure.

The JPDO sees the investments in NextGen resulting in increased system capacity and flexibility to accommodate growing demand for air transportation services and diversity of flight profiles. In its planning documents, the JPDO describes building NextGen in three phases, which it characterizes as *Epochs*.

- In Epoch 1 [Foundational Capabilities (2007-2011)], focus will be on developing and implementing mature foundational technologies and capabilities such as Automatic Dependent Surveillance – Broadcast (ADS-B) which is the surveillance and navigation technology that will serve as the core of the NextGen system by delivering more timely and precise information to the cockpit while giving pilots and controllers a common operational picture.
- In Epoch 2 [Hybrid System (2012-2018)], the required automation and procedures are implemented to allow pilots a more active role in the system through self-separation, merging, and passing. According to the JPDO, by the completion of Epoch 2, operational improvements and fleet evolution will provide a number of environmental benefits such as increased fuel efficiency at 34 FAA-designated airports within the continental United States. For example, in the terminal airspace operations area, NextGen capabilities and improvements in aircraft engine technologies will, according to the JPDO, produce an overall improvement in fuel efficiency estimated at 6 percent compared to the baseline. This will have a commensurate positive effect on reducing the level of emissions generated.
- The JPDO views Epoch 3 [NextGen Operations (2019-2025)] as the expansion of NextGen into a nationwide system which also allows for more complex, high-density operations across the system to take full advantage of the airspace and the precision provided by satellite-based technologies that will be fully deployed by then.

NextGen Funding

Preliminary benefits analyses by the JPDO indicate that NextGen capacity increases could yield significant economic growth. As stated in its Business Case

released in August 2007¹, using data derived from the joint FAA/NASA 2004 Socioeconomic Demand Forecast (SEDF) study on aviation demand, the JPDO estimated “*a rough-order-of-magnitude annual economic value of \$3,000 per flight. Every additional flight accommodated by expected NextGen capacity gains represented an economic benefit, whereas every additional flight that cannot be accommodated represented an economic loss.*” The JPDO found that “*preliminary results from the SEDF study indicate that the cumulative positive impact to consumer surplus resulting from estimated NextGen capacity gains is expected to be up to \$80 billion by the end of Epoch 2 (2018) and as much as \$176 billion by the end of Epoch 3 (2025)*”. The JPDO notes that these benefits are not achievable without investments by the government and industry: Initial estimates of the FAA investment required to achieve the NextGen benefits are projected at \$15 billion to \$22 billion through 2025 and preliminary investment estimates by the aviation industry are projected to be in the range of \$14 billion to \$20 billion during this same time frame².

NextGen investment over the next five years (from FY09 to FY13) including Research and Development is currently projected by the JPDO to total over \$7.2 billion. Requested budgets by partner agencies for FY09 total \$978.5 million. NextGen investments for FY08 through FY13 are shown in Table 1 on the next page.

¹ JPDO, Business Case for the Next Generation Air Transportation System, Version 1.0 (Aug. 24, 2007)

² JPDO, Making the NextGen Vision a Reality: 2006 Progress Report to the Next Generation Air Transportation System Integrated Plan (Mar. 14, 2007).

Table 1: NextGen Investments FY08 through FY13

\$ in millions						
Agency	FY08 (Enacted)	FY09 (Requested)	FY10	FY11	FY12	FY13
FAA (Capital, which includes NextGen Systems Development)	187.7	631.1	986.5	1,056.2	1,227.5	1,494.2
DOC/NOAA (Capital)	2.6	3.7	3.7	3.7	3.7	3.7
Capital Subtotal	190.3	634.8	990.2	1,059.9	1,231.2	1,497.9
FAA (Safety and Operations)		0.7				
Safety and Operations Subtotal		0.7				
FAA (Research)	24.3	56.5	72.9	74.7	73.4	72.3
DOC/NOAA (Research)	0.7	1.8	1.8	1.8	1.8	1.8
NASA (Research)	283.9	284.6	284.4	286.9	289.7	298.8
DHS (Research)						
DOD (Research)						
Research Subtotal	308.9	342.9	359.1	363.4	364.9	372.9
Total NextGen	499.2	978.5³	1,349.3	1,423.3	1,596.1	1,870.8

Source: Synthesized from JPDO-generated, NASA and FAA FY 2009 Budget data

It should be noted that to date, the Department of Defense (DOD) and Department of Homeland Security (DHS) have not identified specific NextGen-related investments in their out-year budgets.

Uniquely establishing NextGen Research and Development costs⁴ requires adding FAA's System Development activities funded in the agency's Capital Account to agencies' activities characterized as RE&D or R&D. Doing so shows that NextGen's projected Research and Development costs in the next five years are projected to total over \$2.2 billion; requested budgets for NextGen Research and

³ In FY2009, FAA's contribution to JPDO support is \$19.5 million and is included in this total.

⁴ The R&D costs in this table are components already included in the Table 1.

Development activities by partner agencies for FY09 total \$384.3 million. The NextGen R&D activities from FY09 through FY13 are shown below in Table 2:

Table 2: NextGen R&D Activities FY09 through FY13

\$ in millions						
Agency	Activity	FY09 (Requested)	FY10	FY11	FY12	FY13
FAA NextGen System Development (From ATO Capital Account)	ATC/Tech Ops Human factors (Controller Efficiency)	3.8	11.7	11.7	11.7	11.7
	ATC/Tech Ops Human Factors (Air/Ground Integration)	2.9	7.7	7.7	7.7	7.7
	Environment & Energy (Noise and Emissions reduction)	2.5	12.5	12.5	12.5	12.5
	Environment & Energy (Validation Modeling)	4.5	7.5	7.5	7.5	7.5
	New ATM Requirement	5.4	27.5	27.9	29.2	31.9
	Operations Concept Development (Validation Modeling)	4.0	15.0	15.0	15.0	15.0
	System safety management Transformation	16.3	19	19.7	19.7	20
	Wake Turbulence (Re-categorization)	2.0	2.0	2.0	2.0	2.0
FAA NextGen R & D (From R,E&D Account)	Wake Turbulence	7.4	7.6	7.9	7.7	7.6
	Air Ground Integration	2.6	11.3	11.7	11.5	11.3
	Self Separation	8.0	9.8	10.1	10.0	9.8
	Weather Technology in the Cockpit	8.0	9.9	10.2	10.0	9.9
	Environmental Research— Aircraft Technologies, Fuels, and Metrics	16.1	19.7	20.4	20.0	19.7
DOC/ NOAA R&D	Various activities	1.8	1.8	1.8	1.8	1.8
NASA R&D	NextGen--Airspace	61.3	56.0	57.3	58.5	60.8
	NextGen—Airportal	13.3	16.7	16.9	16.9	17.5
	Aircraft Aging and Durability	10.6	11.3	11.2	12.0	12.4
	Integrated Intelligent Flight Deck	15.2	16.3	16.0	15.7	16.1
	Integrated Vehicle Health Management	19.7	19.9	18.8	18.6	19.2
	Integrated Resilient Aircraft Controls	17.1	18.5	19.0	18.2	18.8
	Subsonic Fixed Wing	89.0	85.9	88.3	89.4	91.5
	Subsonic Rotary Wing	23.2	23.9	24.0	24.2	25.2
	Supersonics	35.2	35.9	35.4	36.2	37.3
Total NextGen R&D		384.3	462	467.4	470.2	481.2

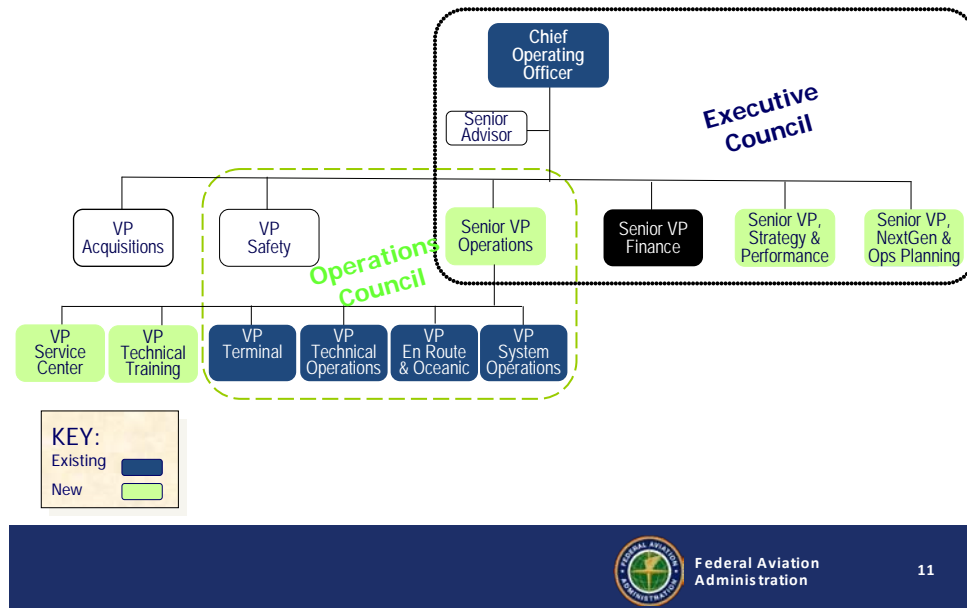
Source: Synthesized from JPDO-generated, NASA and FAA FY 2009 Budget data

**Realignment of NextGen Activities
And Responsibilities in FAA**

FAA recently realigned its NextGen activities and modified JPDO's position and status within the FAA. Organizationally, the agency added a Senior Vice President for NextGen and Operations Planning to the Air Traffic Organization (ATO). Arguing that the change would give FAA "*a clear decision-maker and a distinct line of authority on issues relating to NextGen*", the FAA Acting Administrator designated Ms. Victoria Cox as the Senior Vice President responsible for NextGen and Operations Planning. [Ms. Cox, one of the hearing witnesses, will be able to provide an update on the status of this realignment.]

Prior to the recent realignment, the JPDO, which has always been housed in the FAA, reported to FAA's Administrator and the Chief Operating Officer of ATO. Today, the JPDO reports to the Senior Vice President for NextGen and Operations Planning, one of four Senior Vice Presidents in the ATO structure headed by the Chief Operating Officer and no longer reports directly to the FAA Administrator. This restructuring is contrary to the intent of the House-passed FAA Reauthorization bill [H.R. 2881], which envisions having the head of the JPDO report directly to the FAA Administrator and be a voting member of FAA's Joint Resources Council. The new ATO structure is shown on the next page.

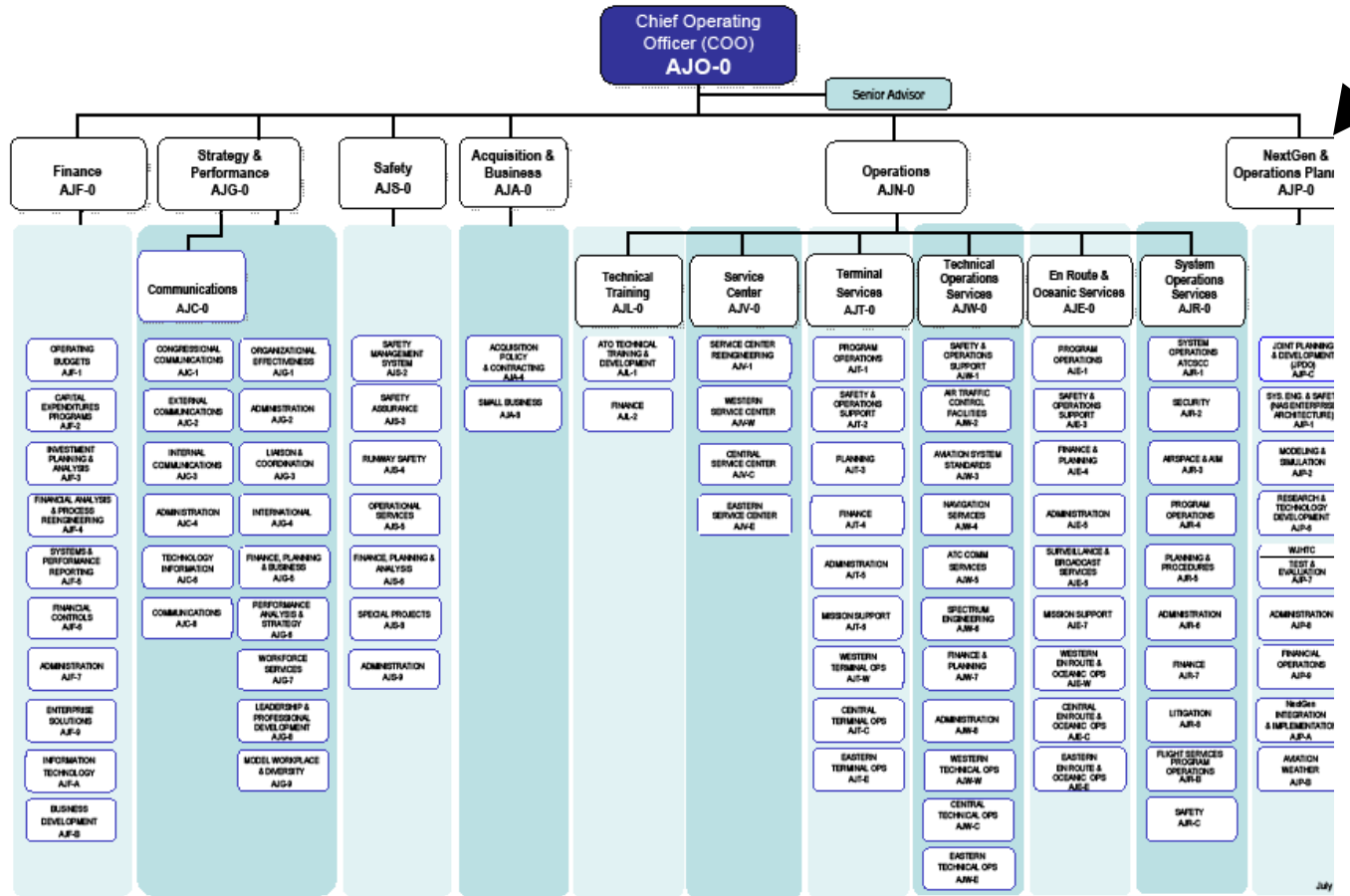
New ATO Structure



Source: FAA

In addition to the JPDO, the Senior Vice President for NextGen and Operations Planning has purview over Operations Planning as well as the newly established NextGen Integration and Implementation Office. According to FAA, the JPDO will maintain/revise the Integrated Work Plan; “*maintain the vision of the future*” and produce “*a long-term R&D Plan/Roadmap that demonstrates alignment across partner agencies performing long-term research*”; and facilitate interagency cooperation. For its part, the newly formed Integration and Implementation Office has been tasked to “*ensure effective and efficient application, planning, programming, budgeting and execution of FAA’s NextGen portfolio and manage NextGen portfolio across FAA lines of business.*” Responsibility for the execution of individual acquisitions, such as Automatic Dependence Surveillance Broadcast (ADS-B), and System Wide Information Management (SWIM) would remain in operational units. The ATO organization and the units reporting to the Senior Vice President for NextGen and Operations Planning are shown on the next page.

AIR TRAFFIC ORGANIZATION



Source: NextGen Senior Policy Committee Documentation

Aviation and the Environment

The NextGen initiative has, from the onset, recognized the need to consider aviation’s impact on the environment. This is because environmental effects, such as noise level near airports and effects of aircraft emissions on local air quality, are known capacity limiters. Furthermore, aviation’s contribution to climate change is becoming a major topic.

In his prepared statement presented at a hearing before the Space and Aeronautics Subcommittee in March 2007 on FAA’s R&D Budget Priorities for Fiscal Year 2008, Dr. Donald Wuebbles, Chair of a workshop on the impacts of aviation on climate change (jointly sponsored by the JPDO’s Environmental Integrated Product Team and the Partnership for Air Transportation Noise and Emissions

Reduction Center of Excellence) summarized the findings and conclusions of his workshop as follows:

“As a key conclusion, the workshop participants acknowledged an urgent need for aviation-focused research activities to address the uncertainties and gaps in the understanding of current and projected impacts of aviation on climate and to develop metrics to better characterize these impacts. This effort will entail coordination with existing and planned climate research programs within government agencies, and could be organized through expansion of such programs or by totally new activities. The workshop participants indicated that such efforts should include strong and continuing interactions among the science and aviation communities as well as among policy makers to develop well-informed decisions. The next steps required include further ranking and prioritizing of identified research needs; creating a research roadmap with associated roles and responsibilities of various participating agencies and stakeholders; and identifying resources needed to implement the roadmap.”

In addition, GAO testified before the House Committee on Transportation and Infrastructure’s Subcommittee on Aviation in March 2008 [GAO-08-706T] and said:

“Aviation contributes a modest but growing proportion of total U.S. emissions, and these emissions contribute to adverse health and environmental effects. Aircraft and airport operations, including those of service and passenger vehicles, emit ozone and other substances that contribute to local air pollution, as well as carbon dioxide and other greenhouse gases that contribute to climate change. EPA estimates that aviation emissions account for less than 1 percent of local air pollution nationwide and about 2.7 percent of U.S. greenhouse gas emissions, but these emissions are expected to grow as air traffic increases.”

The JDPO and its partners believe that there are uncertainties in our present understanding of the magnitude of climate impacts due to aviation emissions. In its most recent assessment, the Intergovernmental Panel on Climate Change (IPCC), a scientific intergovernmental body set up by the World Meteorological Organization (WMO) and by the United Nations Environment Programme (UNEP) has estimated that aviation in 2005 accounted for about 3% of worldwide anthropogenic radiative forcing. Because growth in demand is expected over the next few decades, the JPDO has identified the urgent need to understand and quantify the potential impacts of aviation emissions in its research program.

Such urgency is also needed in light of steps by the European Union (EU) to include both domestic and international aviation in an emissions trading scheme. The congressionally-directed report *Aviation and the Environment, A National Vision Statement, Framework for Goals and Recommended Actions* that was prepared by the Partnership for Air Transportation Noise and Emissions Reduction (PARTNER) in 2004 [Professor Ian Waitz, one of the hearing witnesses, participated in the study and may be able to provide additional details] said:

“The concerns extend well beyond American shores. For example, within the European Union (EU) the climate impacts of aviation are identified as the most significant adverse impact of aviation, in contrast to the United States and many other nations where air quality and noise are the current focus of attention. As a result, there are increasing EU calls for regulation—trading, taxes and charges, demand management and reduced reliance on aviation—even though there is large uncertainty in the understanding of the climate effects of aircraft and appropriate means to mitigate these effects. Despite the importance of this issue, the United States does not have a significant research program to assess the potential impacts of aviation on climate. This may put the United States at a disadvantage in evaluating technological, operational and policy options, and in negotiating appropriate regulations and standards with other nations. The international concerns will continue to grow with the strong increase in air transportation demand anticipated for Asia.”

According to GAO, the emissions trading scheme involves a “cap and trade” system that sets allowances for greenhouse gas emissions for industries and other sources⁵. Parties that pollute below their allowance receive emissions credits, which they can trade in a market to other parties that have exceeded their allowance. As proposed, the EU’s scheme would apply to air carriers flying within the EU and to carriers, including U.S. carriers, flying into and out of EU airports in 2012. For example, under the EU proposal, a U.S. airline’s emissions in domestic airspace as well as over the high seas would require permits if a flight landed or departed from an EU airport. Airlines whose aircraft emit carbon dioxide at levels exceeding prescribed allowances would be required to reduce their emissions or to purchase additional allowances. According to GAO, although the EU’s proposal seeks to include U.S. airlines within the emissions trading scheme, FAA and industry stakeholders have argued that U.S. carriers would not legally be subject to the legislation.

⁵ GAO, *Aviation and the Environment: NextGen and Research and Development Are Keys to Reducing Emissions and Their Impact on Health and Climate* (May 2008).

Subcommittee on Space and Aeronautics'
March 2007 Hearing On Status and Issues
Related to the JPDO and NextGen

During the March 29, 2007 hearing held by the Subcommittee on Space and Aeronautics on the status and issues associated with JPDO and NextGen, Mr. Charles Leader, Director of the JPDO, testified that two fundamental NextGen technologies were just beginning implementation: Automatic Dependence Surveillance Broadcast (ADS-B), and System Wide Information Management (SWIM) and mentioned the near-term release of three important NextGen documents: the Concept of Operations, the Enterprise Architecture, and the Integrated Work Plan. Dr. Gerald Dillingham from GAO discussed the JPDO's organizational structure, technical planning, and research funding. He urged the JPDO to involve all stakeholders, including active traffic controllers and technicians. Mr. John Douglass, then the President and CEO of the Aerospace Industries Association, noted that industry was an essential partner in NextGen and that it is important for industry to have confidence in the government's commitment to NextGen. Dr. Bruce Carmichael, Director, Aviation Applications Program, Research Applications Laboratory, National Center for Atmospheric Research stated that seventy percent of delays in today's system are attributable to weather and that NextGen will integrate the weather programs of the FAA, DOD and NOAA.

Progress in Completing
Key Foundational Documents

At the March 2007 hearing, the JPDO acknowledged that it had been working to establish a Memorandum of Understanding (MOU) between its participating agencies since at least August 2005 but indicated that only two signatures on a draft MOU had been secured to date. Witnesses at that hearing supported the need for a signed MOU, one witness saying that the document needed to be in place to span likely changes in senior management and another witness characterizing the MOU as fundamental, in that without one, the delayed dialog among entities "is almost impossible to put into any rational context". It was not until June 9, 2008 that the MOU was finally signed by all five agencies.

Three key planning documents were released by the JPDO subsequent to last year's hearing. These documents form the NextGen baseline plan: the Concept

of Operations (Version 2.0), released June 13, 2007; the Enterprise Architecture (Version 2.0), released June 22, 2007; and the Integrated Work Plan (Version 0.2), released February 15, 2008. The Research Plan, released August 31, 2007, has since been incorporated into the Integrated Work Plan.

The Concept of Operations document is the most fundamental and explains how the system will work and what it will look like. The JPDO states that this is important in developing the structure, policy, and procedures, and the changes needed to make the system a reality. The Enterprise Architecture document is a highly technical description of the NextGen system. According to the JPDO, it is meant to provide a common tool for planning and understanding the interrelated systems that make up NextGen. As such, the Enterprise Architecture serves as a guide in coordinating R&D activities and developing JPDO's future needs for research and capital investment. The Integrated Work Plan provides the research, policy and regulation, and acquisition timelines necessary to achieve NextGen by 2025.

External Reviews of NextGen and JPDO

There have been several recent independent reviews on the progress of NextGen and JPDO's activities subsequent to the March 2007 hearing held by the Subcommittee on Space and Aeronautics. Some of the key findings and recommendations of those reviews are as follows:

Government Accountability Office

Dr. Gerald Dillingham of the GAO testified on May 9, 2007 before the House Committee on Transportation and Infrastructure's Subcommittee on Aviation [GAO-07-784T] on the status of the NextGen initiative [Dr. Dillingham, one of the hearing witnesses, participated in the study and will be able to provide an update]. Some of the main points made by Dr. Dillingham were as follows:

- *“JPDO has continued to make progress in furthering its key planning documents. JPDO has experienced delays in the release of key documents, but currently plans to have initial versions of these documents released by July 2007. JPDO has been working since 2005 to establish a memorandum of understanding between its partner agencies, although as of May 4, 2007, the memorandum had been signed by the*

- Departments of Transportation and Commerce and NASA, but was not yet signed by the Departments of Defense and Homeland Security.”*
- *“FAA and JPDO continue to face a number of challenges in moving toward NextGen, including questions about FAA’s technical and contract management expertise; FAA’s ability to maintain a number of existing systems, including monitoring and addressing equipment outages to ensure the safety of these existing systems as it transitions to NextGen; and conducting necessary human factors research.”*
 - *“In addition, while JPDO recently estimated that the total federal cost for NextGen infrastructure through 2025 will range between \$15 billion and \$22 billion, questions remain about which entities will fund and conduct the necessary research, development, and demonstration projects that will be key to achieving certain NextGen capabilities.”*
 - *“Also, JPDO faces a continuing challenge in ensuring the involvement of all key stakeholders, such as active air traffic controllers and system technicians, in its NextGen planning efforts.”*

In providing answers for the record for that same hearing, GAO responded [GAO-07-928R] to a question from Chairman Costello on the extent to which moving the JPDO out of the FAA’s Air Traffic Organization (ATO) would give the JPDO greater visibility and authority, and the potential pluses and minuses of such a move. GAO said:

- *“Currently, JPDO is located within FAA and reports to both the FAA Administrator and the Chief Operating Officer of ATO. In GAO’s view, JPDO should not be moved out of FAA.”*
- *“However, JPDO’s dual reporting status hinders its ability to interact on an equal footing with ATO and the other partner agencies. On one hand, JPDO must counter the perception that it is a proxy for the ATO and, as such, is not able to act as an “honest broker.” On the other hand, JPDO must continue to work with ATO and its partner agencies in a partnership in which ATO is the lead implementer of NextGen. Therefore, it is important for JPDO to have some independence from ATO. One change that could begin to address this issue would be to have the JPDO Director report directly to the FAA Administrator. This change may also lessen what some stakeholders now perceive as unnecessary bureaucracy and red tape associated with decision making and other JPDO and NextGen processes.”*

- *“As a part of any change in the dual reporting status of JPDO's Director, consideration could be given to the possibility of creating the position of Associate Administrator of NextGen and elevating the JPDO Director to that post.”*
- *“One plus or advantage of moving JPDO out of ATO is that it could raise JPDO’s authority and visibility in interagency deliberations by putting JPDO on an equal footing with ATO and other FAA lines of business. For example, moving JPDO out of ATO might strengthen its linkages to the Department of Defense (DOD) and the Department of Homeland Security (DHS). In addition, JPDO may be able to work more effectively with other FAA lines of business, such as Airports, for which JPDO has planning responsibilities. For example, JPDO is responsible for developing plans to increase airport capacity. A minus or disadvantage of moving JPDO out of ATO is that because much of the work related to implementing NextGen must occur under ATO, this work could be harder to accomplish.”*

GAO also reported to the Subcommittee on Space and Aeronautics earlier this year on noise and other environmental impacts of aviation that may fundamentally constrain air transportation in the 21st century [GAO-08-384]. GAO said that FAA and NASA have aligned their aviation noise R&D plans through a number of planning and coordinating mechanisms in order to ensure that these plans are complementary and contribute to goals for addressing the environmental impacts of aviation, particularly as these impacts relate to the implementation of NextGen.

Department of Transportation Office of the Inspector General

On April 14, 2008, the DOT’s Office of the Inspector General (OIG) released a report [AV-2008-049] on how FAA’s air traffic control projects are impacted by plans for NextGen [Mr. Calvin Scovel, DOT’s Inspector General and one of the hearing witnesses, participated in the study and will be able to provide additional details]. Some of the main findings and recommendations of the OIG study were as follows

Findings

- *“Much work remains to determine NextGen’s impact on existing projects. FAA is currently exploring ways to accelerate elements of NextGen. FAA faces complex integration issues (linking new and legacy*

- systems) and must manage interdependency among diverse projects. The pace of introducing new automation, more flexible airspace, and data-link communications will be governed by the pace of existing projects.”*
- *“Over the next 2 years, over 23 critical decisions must be made about ongoing programs. These decisions affect major lines of the modernization effort with respect to automation (modernizing terminal and en route capabilities), communications (moving forward with data-link programs), navigation (deciding whether to retain or discontinue certain ground-based systems), and surveillance (using satellite-based and radar information with existing ATC systems).”*
 - *“These decisions and many others will depend heavily on the development of a comprehensive Enterprise Architecture (a technical roadmap) that lays out the vision of how the system will work and what changes will be required. The Enterprise Architecture must establish a transition path that identifies the role and evolution of current systems and how they will transition to NextGen.”*
 - *“FAA has made progress in developing the NextGen Enterprise Architecture, but planning documents lack details on requirements, particularly for automation, that could be used to develop reliable cost estimates. FAA must revise these documents to prioritize NextGen operational improvements and systems and ensure that these priorities are reflected in NextGen planning documents and budget requests.”*
 - *“Along with refining the Enterprise Architecture, FAA must chart a clear transition course from the current NAS architecture to the vastly different NextGen environment. Our work shows that FAA needs to conduct a gap analysis between the current system and the NextGen architecture planned for the 2025 timeframe. This will help establish budget priorities, better define requirements, and refine transition plans. In addition, FAA needs to develop an interim architecture or “way-point” that is manageable and executable for what is expected of the NAS by 2015. Until these steps are taken, it will not be possible to determine technical requirements that translate into reliable cost and schedule estimates for existing or future acquisitions.”*

Recommendations

- *“Develop and report on a new set of metrics for measuring progress with NextGen initiatives that focus on the delivery of a new capability*

- with respect to enhancing capacity, boosting productivity, or reducing Agency operating costs.”*
- *“Complete a gap analysis of the NAS enterprise architecture that closely examines current systems (the “as is”) and the planned NextGen enterprise architecture (the “to be”) and develop and establish priorities.”*
 - *“Once the gap analysis is completed, develop an interim architecture that details what can be accomplished in the 2015 timeframe that will allow FAA to more accurately determine costs and other factors required for NextGen.”*
 - *“Use the interim architecture as the basis for an integrated program plan that establishes an executable program for the NextGen capabilities. This effort should include detailed cost, schedule, requirements, acquisition strategies, risk management, and the supporting organizational structures to execute the integrated program.”*

At an exit conference with FAA officials from ATO and JPDO, those officials generally concurred with all of the OIG’s recommendations, including the need to establish metrics for measuring progress with NextGen initiatives and develop an interim architecture for NextGen.

National Academies Workshop on Assessing the Research and Development Plan for the Next Generation Air Transportation System

On April 1 and 2, 2008, a workshop was led by the National Academies’ National Research Council to gather reactions to the research and development aspects of JPDO’s baseline Integrated Work Plan (IWP). The workshop was composed of experts from JPDO, session moderators, members of the workshop organizing committee, and invited guests from government, industry, and academia who were familiar with air traffic management. Although the workshop was not a consensus activity, a number of issues were raised by the participants in the workshop. As indicated in the prepublication copy of a summary of the workshop, these included:

- *“The issue of a sensed lack of urgency on the part of the JPDO was mentioned most often by workshop participants. There clearly are economic pressures to move quickly and the rest of the international aviation world is moving forward, particularly in Europe. However, the JPDO is still proposing R&D that needs to be done rather than articulating a clear program. “*

- *“A second issue raised by many of the participants was the JPDO’s inability to articulate the goals of the NextGen program. The JPDO outlined a large number of excellent research tasks in its presentations, most of which will likely be required to support future U.S. airspace system needs. However, many participants felt that there was a lack of focus on the most important future needs: airspace and airport capacity.”*
- *“Tied to the concern about the lack of clearly stated goals is the concern that prioritization of the individual pieces of the program has not been done. It is important to consider how best to spend limited research dollars and to determine the likely payoff for particular investments.”*
- *“During the workshop, several participants expressed concern with the narrow boundaries and inward focus (at FAA and NASA) of the NextGen R&D program. Participants suggested that a number of connections needed to be made or strengthened with other constituents, such as airport authorities, controllers, local communities, industry, DOD, and international organizations.”*
- *“Most participants also felt that the IWP [Integrated Work Plan] was not well-structured from the research perspective and stressed that the document should make research priorities clear. However, these and other participants felt that the current draft IWP contains too much unprioritized detail and is not properly detailed to plan what research needs to be done. Further, other participants felt the IWP does not appear to be the most effective way to oversee or manage the research.”*
- *“Concerns were raised by many participants that there may not be sufficient resources to enable development of these transition paths. First, it was not clear how the activity is being financed. That is, it was not clear to the participants who is ultimately responsible for paying for the R&D needed to get to implementation of the program.”*
- *“The last key issue centered on political difficulties. Foremost among the workshop participants was the concern about the challenge of making difficult (politically charged) decisions. Government agencies tend to be risk-averse, and some participants feel that the lack of decision making is holding up the JPDO’s ability to move forward on NextGen’s research needs. A number of specific issues were identified that are difficult, but which participants felt will need to be addressed. For example, some participants raised the question of how to deal with the issue that although manufacturers are willing to invest in changes desired for environmental improvements, airlines are not willing to pay the additional costs; that is, there is an issue of the trade-off between outcome and cost constraints.”*

FAA's Proposed Rule on ADS-B

Last October, FAA issued a Notice of Proposed Rulemaking (NPRM) regarding the agency's transition plan to the Automatic Dependent Surveillance-Broadcast (ADS-B) system, a key foundation for NextGen. FAA's planned implementation would require installing ADS-B on all aircraft operating in U.S. airspace by 2020. According to media reports, the proposed rule garnered more than 300 comments, some centering on the fact that mandated equipment on board aircraft would provide only the ADS-B "out" service, where signals transmitted out (identification, GPS position, altitude, heading, speed and other data once per second) would be used primarily by the air traffic control system. Pilots would not be provided with information about other traffic around them, a capability available only with ADS-B "in" equipment, the addition of which was not mandated by the proposed rule. Aircraft equipage of ADS-B "in" and cockpit displays was optional. It has been reported that some operators view the mandated equipage as providing them little or no benefit, although they acknowledge improvement to controller provided information.

According to media reports, FAA has asked the Aviation Rulemaking Committee (ARC) to perform an NPRM review. Subsequent to the ARC's report and recommendations, FAA will have different options to consider, namely deciding that the NPRM will remain unchanged, modifying it to incorporate some of the committee's recommendations or performing a complete revision of the proposed rule and producing a supplemental NPRM (SNPRM) to replace it. No date has been established for when FAA will announce its choice of option. It is likely that the mandated equipage date for ADS-B will be delayed.

European Air Traffic Modernization and Associated Research and Development Efforts

Last year, the FAA Administrator signed a Memorandum of Understanding with her European counterpart that formalizes cooperation between the NextGen initiative and the "Single European Sky Air Traffic Management Research Programme" or SESAR program, the European equivalent of NextGen. FAA has said that the agency and the European Commission are identifying opportunities and establishing timelines to implement, where appropriate, common, interoperable, performance-based air traffic management systems and technologies. This coordination, FAA said, will address policy issues and facilitate global agreement within international standards organizations.

Compatibility of the NextGen system with SESAR and the air traffic modernization efforts being planned elsewhere in the world is very important to U.S. and international air carriers. That is because failure to ensure compatibility could lead to air carriers having to equip their fleets with two sets of communications, navigation, and surveillance systems.

According to FAA, SESAR is conceived as a system that, while smaller in scope and size, has similar air traffic management goals as NextGen. However, FAA has pointed out an important difference in scope between SESAR and NextGen. The agency says that while SESAR focuses almost exclusively on air traffic management, NextGen takes what is called a “curb-to-curb” approach, and includes not only air traffic control, but also airports, airport operations, security and passenger management, and Department of Defense and Department of Homeland Security requirements.

The JPDO recently completed a comparative assessment of the NextGen and SESAR operational concepts. In this paper, JPDO found that:

- *“The vision and “philosophical” perspectives of both concepts are closely aligned. This is to be expected based on the existence of formal cooperative arrangements between the U.S. and Europe. Further, the participation of a wide variety of stakeholders in both the JPDO and SESAR initiatives allowed for significant information sharing and the identification of best practices to be incorporated.”*
- *“Probably the most easily recognized difference in the two concepts is the breadth of scope. The NextGen ConOps [Concept of Operations] includes a full “curb-to-curb” approach that includes passenger and intermodal security considerations. These build on the traditional “block-to-block” concepts that are centered on the airspace operations (including environmental considerations). The SESAR ATM Target Concept remains focused on the more traditional airspace elements and recognizes the need to include airport operations for a complete gate-to-gate process description.”*
- *“Another area of difference, although not as dramatic, is how weather is considered in the two concepts. In the U.S. National Airspace System, summer convective weather causes a majority of system-wide delays and therefore has been included as a core element of the proposed concept. Weather is recognized in the SESAR ATM Target Concept, but there does*

not appear to be the same level of focus on infrastructure, prediction, modeling, and planning as appears to be included in the NextGen concept.”

The European Union is also focusing its aeronautics R&D on environmental effects. Under the aegis of its Seventh Framework Programme, the EU's main instrument for funding research over the period 2007 to 2013, the Union will be conducting research on developing technologies to reduce the environmental impact of aviation with the aim of halving the amount of carbon dioxide emitted by air transport, cutting specific emissions of nitrogen oxides by 80% and halving perceived noise. The research will address green engine technologies, alternative fuels, novel aircraft/ engine configurations, intelligent low-weight structures, improved aerodynamic efficiency, airport operations and air traffic management as well as manufacturing and recycling processes. The “Clean Sky” Joint Technology Initiative will bring together European R&D stakeholders to develop ‘green’ air vehicle design, engines and systems aimed at minimizing the environmental impact of future air transport systems. This initiative establishes a Europe-wide partnership between industry, universities and research centers, with a total public/private funding of 1.6 billion Euros.