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NEXT GENERATION AIR TRANSPORTATION SYSTEM

Status of Key Issues Associated with the Transition to NextGen

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Highlights of [GAO-08-1154T](#), a testimony before the Committee on Science and Technology, House of Representatives

Why GAO Did This Study

To prepare for forecasted air traffic growth, the Federal Aviation Administration (FAA), in partnership with other federal agencies and the aviation industry, is planning and implementing the Next Generation Air Transportation System (NextGen), a new, satellite-based air traffic management system that is expected to increase the safety and enhance the capacity of the air transport system. NextGen will replace the current radar-based air traffic control (ATC) system.

Within FAA, the Air Traffic Organization (ATO) is responsible for implementing the transition to NextGen, and ATO's Joint Planning and Development Office (JPDO) is coordinating efforts to plan for this transition, including developing a 20-year research and development (R&D) agenda for NextGen. JPDO has drafted three basic planning documents for NextGen—a Concept of Operations, an Enterprise Architecture, and an Integrated Work Plan (IWP).

This testimony responds to six questions about NextGen and JPDO raised by the House Committee on Science and Technology, and addresses two related challenges identified by GAO. The statement is based on recent related GAO reports and testimonies, including a report issued today that reflects GAO's analysis of interviews with 25 key NextGen stakeholders about progress and challenges involved in the transition to NextGen.

To view the full product, including the scope and methodology, click on [GAO-08-1154T](#). For more information, contact Gerald L. Dillingham at (202) 512-2834 or dillinghamg@gao.gov.

NEXT GENERATION AIR TRANSPORTATION SYSTEM

Status of Key Issues Associated with the Transition to NextGen

What GAO Found

Have the Views of Industry and Air Traffic Controllers Been Adequately Incorporated in NextGen Planning Documents? FAA and JPDO have established mechanisms for obtaining stakeholder views. However, given the large number of NextGen stakeholders and the evolution of opportunities for participation in NextGen, we believe that stakeholders will continue to differ on how adequately their views have been incorporated in NextGen planning.

Is the Current Version of IWP Sufficiently Detailed for Effective Use in Overseeing and Managing NextGen? No. The current version lacks some needed information, but the next version, to be released this month, is to contain more detail, including schedule information, and is automated and searchable, making it more user friendly and useful for oversight.

How Confident Should Congress Be that IWP Will Provide a Sufficient Basis for Achieving NextGen's Goals? The current plan does not provide a sufficient basis for Congress to be confident. The upcoming version will provide a firmer basis for confidence, but additional R&D issues that are not part of the plan will have to be addressed, including technology transfer issues.

Can JPDO Continue to Be Viewed as an "Honest Broker" in Light of FAA's Recent Restructuring? The restructuring made JPDO a component of ATO rather than an independent office, but other federal agencies are reportedly still cooperating with JPDO, suggesting that they continue to view it as an honest broker. However, it is too early to tell if the restructuring addresses stakeholders' concerns about the fragmentation of management responsibility for NextGen activities.

What Needs to Be Done to Move JPDO from Proposing R&D to Articulating a Clear R&D Program with Defined and Prioritized Tasks? The move is underway. JPDO needs to continue collaborating with its partner agencies to identify and prioritize R&D and leverage their R&D programs. It is too soon to assess the results of steps JPDO and the partner agencies have taken thus far.

What Metrics Should Congress Use to Evaluate the Progress of NextGen? Schedule information in the upcoming version of IWP and cost information in the subsequent version will help provide Congress with metrics for evaluating NextGen's progress.

Additional Infrastructure and Human Capital Challenges Identified by GAO. NextGen's implementation further depends on FAA's reconfiguring and maintaining its ATC facilities, expanding runways, and hiring staff with the engineering and contract management skills needed to provide oversight.

Mr. Chairman and Members of the Committee:

I appreciate the opportunity to participate in today's hearing to discuss the status of issues associated with the Next Generation Air Transportation System (NextGen)—the planned air traffic management system intended to address current and anticipated aviation congestion. Today, the nation's air traffic control (ATC) system is experiencing some of the worst delays in recent times, with one in four flights delayed. Currently, the U.S. air transportation system handles roughly 50,000 flights over a 24-hour period. By 2025, air traffic is projected to double or triple, increasing to 100,000 to 150,000 flights every 24 hours. Stakeholders acknowledge that the current air transportation system will not be able to meet these air traffic demands.

Recognizing the need to transform the current system and to prepare for the forecasted growth in air traffic, Congress in 2003 mandated the creation of the Joint Planning and Development Office (JPDO)¹ to conceptualize and plan for NextGen. JPDO works in partnership with the Departments of Transportation, Commerce, Defense (DOD), and Homeland Security (DHS); the Federal Aviation Administration (FAA); the National Aeronautics and Space Administration (NASA); the White House Office of Science and Technology Policy; and the private sector. Housed within FAA—first as an independent office and now, following restructuring, as a component of FAA's Air Traffic Organization (ATO)—JPDO is responsible for coordinating the related efforts of these partners to plan the transformation to NextGen. JPDO initially prepared three basic planning documents for NextGen—the Concept of Operations, Enterprise Architecture, and Integrated Work Plan (IWP)—which, collectively, form the basis of the joint planning environment for NextGen.

My statement today responds to the six questions you raised about NextGen and JPDO and addresses two related challenges that we have identified in the course of our work—infrastructure issues associated with the configuration of ATC facilities and the capacity of airport runways and staffing issues related to FAA's in-house technical expertise. Your six questions are as follows:

¹Vision 100—The Century of Aviation Reauthorization Act, Pub.L. No. 108-176, § 709.

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1. Have the views of industry and active air traffic controllers been adequately incorporated in NextGen plans, such as those embodied in the Concept of Operations, Enterprise Architecture, and IWP?
 2. Is the current version of IWP sufficiently detailed and prioritized for effective use in overseeing and managing the NextGen-related research of multiple agencies?
 3. How confident should Congress be that progress in meeting the research, development, and testing activities set out in IWP will provide a sufficient basis for achieving NextGen's goals and timetable for quieter, cleaner, and more efficient air traffic operations?
 4. Can the other partner agencies continue to view JPDO as an "honest broker" in light of FAA's recent restructuring action?
 5. What needs to be done to move JPDO from proposing research and development (R&D) for NextGen to articulating a clear R&D program with defined and prioritized tasks?
 6. What metrics should Congress use to evaluate the progress of the NextGen initiative?

This statement is based on recent related GAO reports and testimonies, including a report to this committee and other congressional requesters we are issuing today.² Our work on this most recent report included interviewing 25 key NextGen stakeholders about the progress of and challenges to planning for and achieving the transition to NextGen. We conducted this work in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the

²*Next Generation Air Transportation System: Status of Systems Acquisition and the Transition to the Next Generation Air Transportation System*, GAO-08-1078 (Washington, D.C.: Sept. 11, 2008); *Aviation and the Environment: NextGen and Research and Development Are Keys to Reducing Emissions and Their Impact on Health and Climate*, GAO-08-706T (Washington, D.C.: May 6, 2008); *Aviation and the Environment: FAA's and NASA's Research and Development Plans for Noise Reduction Are Aligned but the Prospects of Achieving Noise Reduction Goals Are Uncertain*, GAO-08-384 (Washington, D.C.: Feb. 15, 2008); *Next Generation Air Transportation System: Status of the Transition to the Future Air Traffic Control System*, GAO-07-784T (Washington, D.C.: May 9, 2007); *Joint Planning and Development Office: Progress and Key Issues in Planning the Transition to the Next Generation Air Transportation System*, GAO-07-693T (Washington, D.C.: Mar. 29, 2007); and *Federal Aviation Administration: Key Issues in Ensuring the Efficient Development and Safe Operation of the Next Generation Air Transportation System*, GAO-07-636T (Washington, D.C.: Mar. 22, 2007).

work to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

NextGen is a multidecade, multiagency effort to transform the current ATC system to the next generation air transportation system by moving from relying largely on ground-based radars to using precision satellites; digital, networked communications; and an integrated weather system. Often characterized as “curb to curb,” NextGen involves every aspect of air transportation, from arrival at the airport to departure from the destination airport, and it is expected to increase the safety and enhance the capacity of the air transport system. JPDO was charged with coordinating the research activities of the federal partner agencies with the goal of developing a 20-year R&D agenda for NextGen. FAA will play the central role in implementing NextGen, since it will be responsible for acquiring, integrating, and operating the new ATC systems. Industry stakeholders will also play a key role in implementing NextGen because they are expected to develop, finance, and operate many of the new NextGen systems that will need to be installed in aircraft. FAA plans to spend roughly \$5.4 billion from fiscal years 2009 through 2013 on NextGen development and capital costs. JPDO estimated that total federal spending for NextGen may range from \$15 billion to \$22 billion through 2025. The agency also noted that it expects system users to incur \$14 billion to \$20 billion in costs to equip themselves with the advanced avionics necessary to realize the full benefits of some NextGen technologies.

JPDO’s authorizing legislation requires the office to create an R&D plan for the transition to NextGen. This requirement led JPDO to develop initial versions of the Concept of Operations, Enterprise Architecture, and IWP. The Concept of Operations is the fundamental planning document from which the other two documents flow. Version 2 of the Concept of Operations, issued in June 2007, describes how the NextGen system is envisioned to operate in 2025. Version 2 of the Enterprise Architecture, issued in July 2007, is a technical description of the NextGen system, akin to blueprints for a building. The Enterprise Architecture provides a means for coordinating among the partner agencies and private sector manufacturers, aligning relevant R&D activities, and integrating equipment. Version 0.2 of IWP describes the integrated framework needed to transition to NextGen from the current system to the end state and will continually be refined and enhanced to reflect current priorities, budgets,

and programs. It is JPDO's plan for achieving NextGen. Version 1.0 of IWP is scheduled to be released at the end of this month.

Have the Views of Industry and Air Traffic Controllers Been Adequately Incorporated in NextGen Planning Documents?

JPDO, FAA, and industry stakeholders have different perspectives on whether the views of industry and air traffic controllers have been adequately incorporated in NextGen planning. JPDO's organizational structure and processes provide for industry representatives and, to a lesser extent, air traffic controllers to participate in NextGen planning, but nearly all the industry stakeholders we spoke with questioned both the meaningfulness of their involvement and the usefulness of the NextGen planning documents. Furthermore, active air traffic controllers maintain that they have not participated in NextGen development activities. According to FAA, however, their involvement will increase as NextGen efforts shift from planning to implementation.

JPDO includes several organizations with industry participants, and industry representatives have reviewed and provided input to key JPDO planning documents. For example, JPDO's NextGen Institute serves as a vehicle for incorporating the expertise of industry, state and local governments, and academia into the NextGen planning process. Additionally, the Institute Management Council, composed of top officials and representatives from the aviation community, including air traffic controllers, oversees the policies, recommendations, and products of the Institute and provides a means for advancing consensus positions on critical NextGen issues. JPDO also includes nine working groups,³ through which federal and private sector stakeholders come together to plan for and coordinate the development of NextGen technologies. JPDO created the working groups in early 2007 to replace its integrated product teams and, in part, to address concerns expressed by stakeholders about their participation. Unlike the previous teams, which were chaired by a representative from a federal agency, the working groups, which have the same members as the previous teams, are jointly led by government and industry officials. (See table 1.) JPDO expected the working groups to be more efficient and output- or product-focused than the integrated product teams. Currently, 265 industry representatives participate in JPDO. In addition, JPDO provided a draft of the Concept of Operations and IWP to industry representatives for review and comment. For example, version

³The nine working groups are Airport, Security, Air Navigation Services, Aircraft, Net-centric Operations, Safety, Environment, Weather, and Global Harmonization.

0.2 of IWP was circulated to stakeholders and, according to a senior JPDO official, the office received about 1,100 stakeholder comments, which were addressed and incorporated in version 1.0 of the document.

Table 1: JPDO’s Working Groups, Strategies, and Agency and Industry Leads

Working group	Strategy	Agency lead	Industry lead
Airport	Develop airport infrastructure to meet future demand	FAA	Trillion Aviation
Security	Establish an effective security system without limiting mobility or civil liberties	DHS	Global Initiative
Air Navigation Services	Develop air traffic management and air traffic control procedures for safe and efficient flight operations	FAA	Computer Sciences Corporation
Aircraft	Develop plans and recommendations for the performance, function, and capabilities of aircraft that will enable NextGen operations	FAA	Boeing
Net-Centric Operations	Develop a robust, globally interconnected network in which information is shared in a timely and consistent way among aviation users	DOD	Boeing
Safety	Establish a comprehensive and proactive approach to safety	FAA	Boeing
Environment	Develop environmental protection that allows sustained aviation growth	FAA	Aerospace Industries Association
Weather	Develop a systemwide capability to reduce weather impacts	Department of Commerce	National Business Aviation Association
Global Harmonization	Harmonize equipment and operations globally	FAA	Lockheed Martin

Sources: GAO and JPDO.

With these efforts, JPDO has sought to obtain participation from industry stakeholders and air traffic controllers in its planning activities, and we have reported that many stakeholders felt they did have an opportunity to participate.⁴ In fact, one industry stakeholder group told us that it worked

⁴GAO-08-1078.

closely with JPDO to help revise an early version of the Concept of Operations. However, other stakeholders said they frequently attended meetings, but were frustrated by a lack of tangible products being developed and a lack of progress being made during these meetings. Furthermore, 13 of 15 stakeholders who discussed the issue stated that they did not feel that their level of participation in either JPDO's planning for or FAA's implementation of NextGen allowed for sufficient or meaningful input toward decision making. Some stakeholders expressed concern that JPDO and FAA did not include their input in planning documents and other products. In their view, critical issues they raised are not being addressed or incorporated in NextGen plans. In particular, some stakeholders noted that planning documents were drafted by JPDO staff and then provided to them for review and comment. This approach, one industry stakeholder noted, did not take full advantage of stakeholders' capabilities. Others were critical of FAA's decision-making structure for implementing NextGen and indicated they felt that FAA and JPDO should lay out the broad plans and schedules for NextGen and then obtain industry input on the best ways to accomplish the technical changes for NextGen. Another stakeholder indicated it had the opportunity to provide input to FAA on decisions such as the deployment of ADS-B technology, but did not feel its input was considered by the agency. Still others felt that FAA provided sufficient briefings on NextGen activities, but allowed no opportunity for their input or comments.

A number of stakeholders also expressed concerns about the usefulness of JPDO's three planning documents and of FAA's implementation plan for NextGen (a document previously known as the Operational Evolution Partnership and now called the NextGen Implementation Plan). Nineteen of 21 industry stakeholders who discussed the issue said that these planning documents lack the information that industry participants need for successful planning. Many of the stakeholders we interviewed said that while the planning documents provide a high-level view of NextGen benefits, they do not provide specific details such as a catalog of critical needs, clearly defined and prioritized intermediate objectives, and a structured plan for achieving tangible results. According to stakeholders who manufacture aviation equipment, the plans lack specific details to inform them about the types of technology they need to design for NextGen or to provide insights to market, build, and install systems that support NextGen. Some industry stakeholders further noted that the current planning does not identify all of the key research for NextGen, establish priorities for R&D, or show how to obtain those results. In addition, several stakeholders characterized the documents as long and confusing—qualities that detracted from their usefulness. We agree that

the latest publicly available versions of these documents lack information that various stakeholders need. For example, the documents do not include key elements such as scenarios illustrating NextGen operations; a summary of NextGen's operational impact on users and other stakeholders; and an analysis of the benefits, alternatives, and trade-offs that were considered for NextGen. Our review of the upcoming version of IWP confirmed that it is to have information that is lacking in the current document. According to JPDO and FAA officials, it includes schedule information that has been updated to reflect newly available information, coordination with FAA's schedule and plans, and revisions in response to public comments received on the previous version. In addition, a senior JPDO official noted and we agree that these documents are not the appropriate place for some of the detailed information stakeholders would like and need, such as specific information on the types of technology stakeholders need to design or install.

Active air traffic controllers are represented on JPDO's Institute Management Council, and other controllers and aviation technicians participate in certain JPDO efforts. However, stakeholders from the National Air Traffic Controllers Association—an FAA employee union—have indicated that although the union participates in FAA meetings and briefings related to NextGen, it does so as a recipient of information rather than an equal party in the development of NextGen. Technicians in another FAA employee union—the Professional Aviation Safety Specialists—have indicated that they do not participate in NextGen planning or development activities. Although air traffic controllers and technicians will be responsible for a major part of the installation, operations, and maintenance of the systems that NextGen will comprise, our work has shown that these stakeholders have not fully participated in the development of NextGen. Insufficient participation on the part of these employees could delay the certification and integration of new systems and result in increased costs, as we have seen in previous ATC modernization efforts.

FAA officials, however, note that both unions are represented on its NextGen Management Board, a decision-making body for resolving emerging NextGen implementation issues. Furthermore, FAA has indicated that air traffic controllers, pilots, and airline operations center personnel will be a part of the extended team that is directly involved in the planning and execution of a gradual rollout of NextGen technologies and procedures in a Florida

demonstration. In addition, according to FAA, these stakeholders will continue to be heavily involved in NextGen throughout its life cycle through their participation on advisory committees such as RTCA,⁵ the Air Traffic Management Advisory Committee,⁶ the Performance-Based Operations Aviation Rulemaking Committee,⁷ and the Research, Engineering and Development Advisory Committee.⁸

FAA and JPDO have established mechanisms for obtaining stakeholder views. However, given the large number of NextGen stakeholders and the evolution of opportunities for participation in NextGen, we believe that stakeholders will continue to differ on how adequately their views have been incorporated in NextGen planning.

Is the Current Version of IWP Sufficiently Detailed for Effective Use in Overseeing and Managing NextGen?

Our work indicates that the current version of the IWP lacks critical information and is not sufficiently “user friendly” to be effectively used to oversee and manage NextGen activities. For instance, 19 of the 21 stakeholders who discussed the issue said that the planning documents did not provide specific details such as a catalog of critical needs, clearly defined and prioritized intermediate objectives, and a structured plan for achieving tangible results. However, the next version of the plan, to be released at the end of September, is to have further details and research priorities that should be useful for NextGen oversight. According to senior JPDO officials, this next version will identify the specific operational improvements and capabilities that NextGen will incorporate and will show what policies, research, and other activities are needed to enable those improvements and capabilities, when they are needed, and what entities are responsible for them. Moreover, this version includes schedule information that has been updated to reflect newly available information,

⁵Once called the Radio Technical Commission for Aeronautics, RTCA is a private, not-for-profit corporation that develops consensus-based performance standards for ATC systems.

⁶The Air Traffic Management Advisory Committee, a component of RTCA, provides FAA with consensus-based, recommended investment priorities that are expected to improve the safety, capacity, and efficiency of the air transportation system.

⁷The Performance-Based Operations Aviation Rulemaking Committee was established by FAA to provide a forum for the U.S. aviation community to discuss, prioritize, and resolve issues; provide direction for U.S. flight operations criteria; and produce U.S. consensus positions for global harmonization.

⁸The Research, Engineering and Development Advisory Committee advises the FAA Administrator on R&D issues and coordinates FAA’s research, engineering, and development activities with industry and other government agencies.

coordination with FAA schedules and plans, and public comments received on the previous version, according to JPDO and FAA officials. Our review of the upcoming version—which is an automated, searchable, user-friendly database—verified that it will have the capability to track dates and identify programs that are behind schedule, making it useful, but not sufficient, for oversight.

Senior JPDO officials expect subsequent versions of IWP to include cost information and more detail on which programs are responsible for completing particular actions. We believe that JPDO’s upcoming version of the work plan shows progress in providing needed details and making the document more useful than earlier versions. With cost information, subsequent versions of the plan should be even more useful for NextGen oversight.

How Confident Should Congress Be that IWP Will Provide a Sufficient Basis for Achieving NextGen’s Goals?

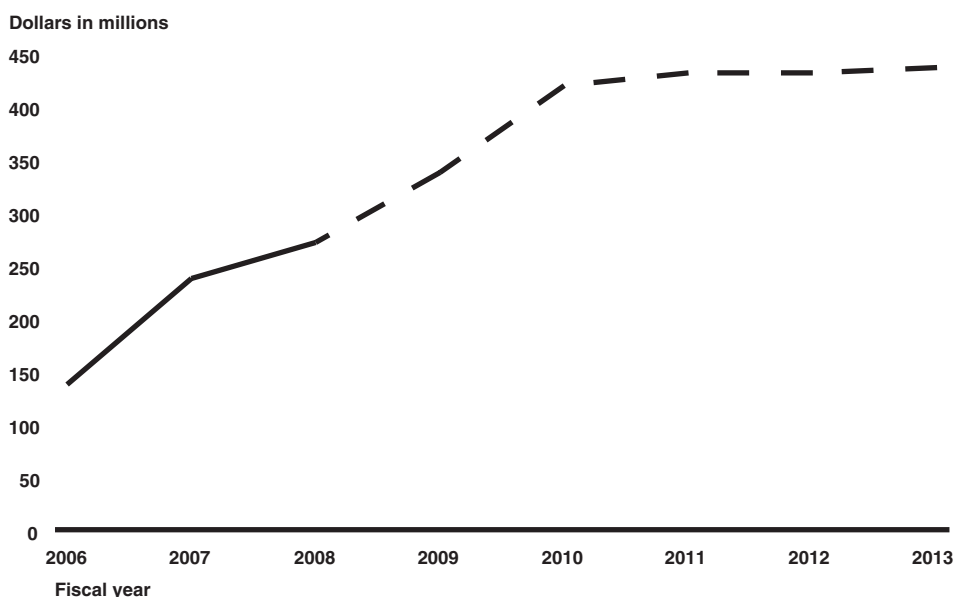
The research, development, and testing activities set out in the current IWP do not provide a sufficient basis for Congress to be confident that the goals of NextGen will be achieved. However, the enhanced information that is planned for inclusion in the upcoming version will provide a firmer basis for congressional confidence. The current plan can best be viewed as a necessary but not a sufficient step in the planning and early implementation of NextGen. However, additional issues that are not part of the current plan will have to be addressed to achieve NextGen goals, such as obtaining the necessary funding, establishing the infrastructure to support the scope of needed R&D, and filling the gap that may exist between basic research and the research needed to bring technologies far enough along for transfer to industry for further development.

JPDO and FAA have determined that research gaps now exist because of cuts in NASA’s aeronautical research funding and NextGen’s expanded research requirements. In the past, NASA performed a significant portion of aeronautics R&D. However, NASA’s aeronautic research budget declined from about \$959 million in fiscal year 2004 to \$511 million in fiscal year 2008. While NASA still plans to focus some of its research on NextGen needs, the agency has moved toward a focus on fundamental research and away from developmental work and demonstration projects. As a result, in some cases, NASA’s research focuses on developing technologies to a lower—and therefore less readily adopted—maturity level than in the past.

Budget requests for FAA have increased to help provide the needed R&D funding for NextGen. According to FAA, the agency will spend an

estimated \$740 million on NextGen-related R&D during fiscal years 2009 through 2013. The administration's proposed budget for fiscal year 2009 requests \$56.5 million for FAA R&D to support the integration and implementation of NextGen programs, a substantial increase over the \$24.3 million authorized for fiscal year 2008. The actual and projected increase in FAA's overall R&D funding reflects the expected increases in NextGen research funding. (See fig. 1.) In addition, increased funding for NextGen R&D is contained in proposed legislation to reauthorize FAA, although that legislation has not been enacted.

Figure 1: FAA's R&D Budget for Fiscal Years 2006 through 2008 and Proposed Budget through Fiscal Year 2013, in Constant 2008 Dollars



Source: GAO analysis.

If FAA is authorized to receive increased R&D funding for NextGen, some observers believe that the agency lacks the R&D infrastructure to adequately address the developmental research needed for NextGen. According to a draft report by the Research, Engineering and Development Advisory Committee, establishing the infrastructure within FAA to conduct the necessary R&D could delay the implementation of NextGen by 5 years. Unless an adequate R&D infrastructure is in place as funds become available, the implementation of NextGen could be delayed.

One critical area in which an R&D gap has been identified is the environmental impact of aviation. According to a JPDO analysis, environmental impacts will be the primary constraint on the capacity and flexibility of the national airspace system unless these impacts are managed and mitigated. FAA's Continuous Lower Energy, Emissions, and Noise (CLEEN) initiative, in which NASA would participate as an adviser, is intended to address the gap between NASA's fundamental research in noise reduction and the need for near-term demonstrations of technology. This program would establish a research consortium of government, industry, and academic participants that would allow for the maturation of these technologies via demonstration projects.⁹ In proposed legislation reauthorizing FAA, \$111 million for fiscal years 2008 through 2011 may be used for a new FAA program to reduce aviation noise and emissions.¹⁰ This program would, over the next 10 years, facilitate the development, maturation, and certification of improved airframe technologies.

The CLEEN program would be a step toward further maturing emissions and noise reduction technologies, but experts agree that the proposed funding is insufficient to achieve needed emissions reductions. While acknowledging that CLEEN would help bridge the gap between NASA's R&D and manufacturers' eventual incorporation of technologies into aircraft designs, aeronautics industry representatives and experts we consulted said that the program's funding levels may not be sufficient to attain the goals specified in the proposal. According to these experts, the proposed funding levels would allow for the further development of one or possibly two projects. Moreover, in one expert's view, the funding for these projects may be sufficient to develop the technology only to the level that achieves an emissions-reduction goal in testing, not to the level required for the technology to be incorporated into a new engine design. Although we believe that this level of funding is a step in the right direction, additional funds would permit the agency to "buy down" R&D risks—that is, the more projects that can be funded, the greater the chance that at least one of the projects will yield a product for the next stage of development. FAA recognizes the implications of the proposed funding structure for CLEEN and characterizes the program as a "pilot."

We are guardedly optimistic that the NextGen goals and timetable for quieter, cleaner, and more efficient air traffic operations can be achieved.

⁹GAO-08-384.

¹⁰H.R. 2881, § 505.

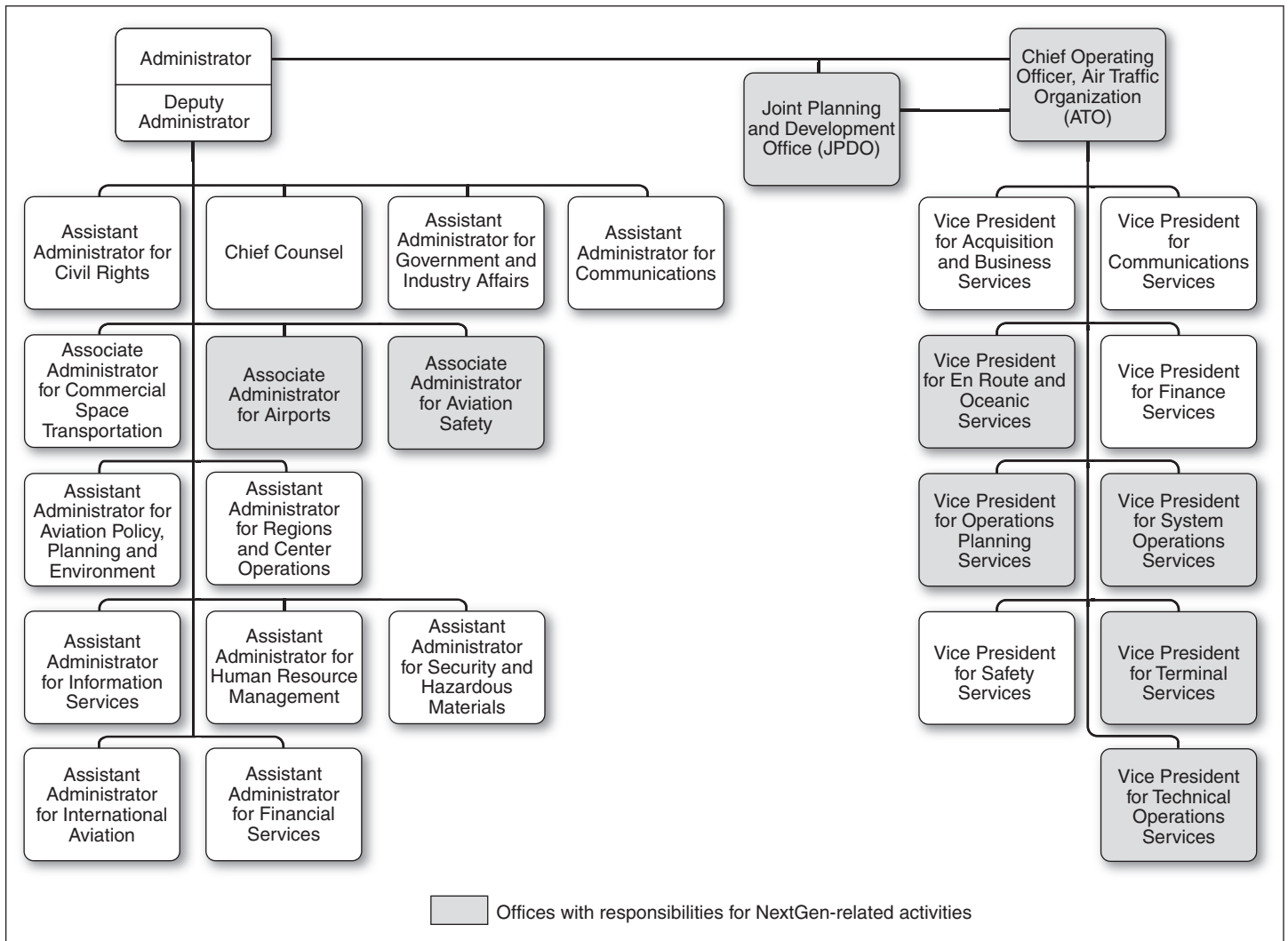
The administration has requested increased funding for NextGen R&D and FAA and JPDO recognize the need to establish an R&D infrastructure and fill any gaps that may exist between basic research and the transfer to industry for further development.

Can JPDO Continue to Be Viewed as an “Honest Broker” in Light of FAA’s Recent Restructuring?

Prior to May 2008, when FAA restructured ATO, JPDO reported directly to both the Chief Operating Officer (COO) of ATO and the FAA Administrator. Figure 2 shows FAA’s management structure as of November 2007, with the shaded boxes showing offices with responsibilities for NextGen activities. We expressed concerns about this dual reporting status, suggesting that it might keep JPDO from interacting on an equal footing with ATO and the other partner federal agencies.¹¹ We recognized that JPDO needed to counter the perception that it was a proxy for ATO and, as such, was not able to act as an “honest broker” between ATO and the partner federal agencies, but we also understood that JPDO must continue to work with ATO and its partner agencies in a partnership in which ATO is the lead implementer of NextGen. Therefore, we reported that it was important for JPDO to have some independence from ATO and pointed out that, to address this issue, the JPDO Director could report directly to the FAA Administrator. We observed that such a change could also lessen what some stakeholders perceived as unnecessary bureaucracy and red tape associated with decision making and other JPDO and NextGen processes.

¹¹GAO, *Responses to Questions for the Record; Hearing on the Future of Air Traffic Control Modernization*, GAO-07-928R (Washington, D.C.: May 30, 2007).

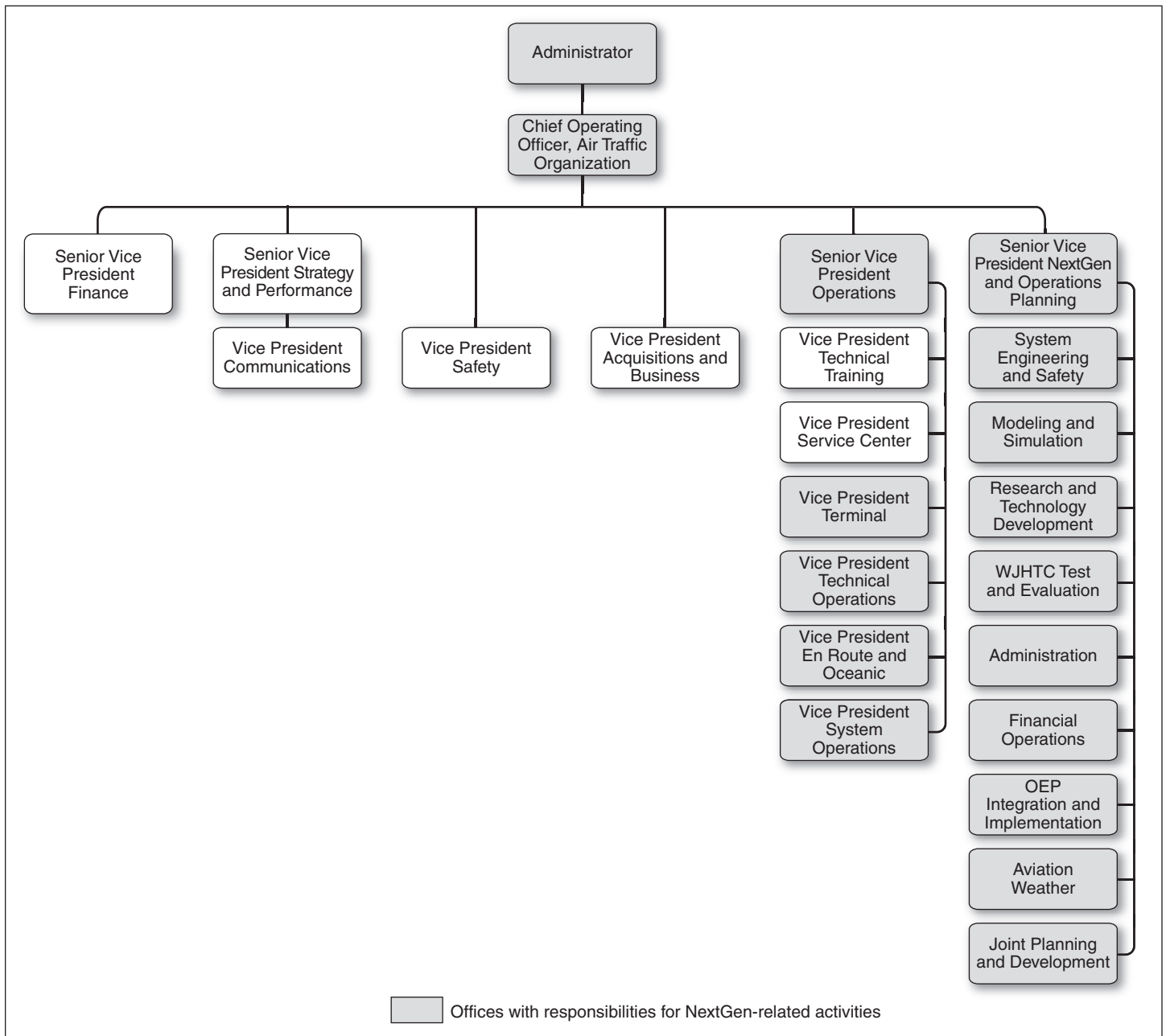
Figure 2: FAA Organization, November 2007



Source: FAA.

Since ATO was reorganized in May 2008, JPDO has been housed within the new NextGen and Operations Planning Office and reports through the Senior Vice President for NextGen and Operations Planning only to ATO's COO. (See fig. 3.) Now that JPDO is no longer a separate, independent office within FAA and no longer reports directly to the FAA Administrator, its organizational position within FAA has declined. Nonetheless, we believe that it is too early to tell whether JPDO will be able to act as an "honest broker" between FAA and the other federal partner agencies. Currently, according to a senior JPDO official, JPDO's partner agencies are cooperating with JPDO, indicating that the office is apparently maintaining its status as an honest broker.

Figure 3: ATO Organization, July 2008



Source: FAA.

However, it is also too early to tell if ATO's reorganization sufficiently addresses concerns that many industry stakeholders expressed about the adequacy of the previous organizational relationship between FAA and JPDO—when JPDO reported directly to both the COO and the Administrator—for the transition to NextGen. Proposed legislation reauthorizing FAA would address the earlier concern of stakeholders by designating the Director of JPDO as the Associate Administrator for the Next Generation Air Transportation System, appointed by and reporting directly to the Administrator.¹² The proposed legislation would also address observations we have made about JPDO's organizational placement within FAA.

Finally, it is too early to tell if the reorganization of FAA's management structure addresses concerns that stakeholders have expressed about the fragmentation of management responsibility for NextGen activities. Specifically, some industry stakeholders expressed frustration that a program as large and important as NextGen does not follow the industry practice of having one person authorized to make key decisions. They pointed out that although FAA's COO is nominally in charge of FAA's NextGen efforts, the COO must also manage the agency's day-to-day air traffic operations and may therefore be unable to devote enough time and attention to managing NextGen. In addition, these stakeholders noted that many of NextGen's capabilities span FAA operational units both within and outside ATO. The reorganization does not address concerns about this fragmentation, since other offices in ATO and FAA continue to have responsibility for parts of NextGen and the division of responsibility for NextGen efforts among them is not clear. A senior FAA official noted that ATO executives are knowledgeable and supportive of the reorganization, but that the agency could better communicate the changes to stakeholders outside of FAA. A focused outreach to industry stakeholders would help to get their buy-in and support of FAA's efforts.

¹²H.R. 2881, § 202.

What Needs to Be Done to Move JPDO from Proposing R&D to Articulating a Clear R&D Program with Defined and Prioritized Tasks?

To articulate a clear R&D program with defined and prioritized tasks, JPDO must continue to collaborate with its partner agencies—FAA, NASA, DOD, DHS, and Commerce—to identify and prioritize the R&D needed for NextGen. As it issues new versions of IWP, JPDO continues to update the R&D plans of the partner agencies. However, JPDO has not yet determined what NextGen R&D needs to be done first and at what cost to demonstrate and integrate NextGen technologies into the national airspace system. The next version of IWP, scheduled to be released later this month, is to identify the sequence of research activities that the partner agencies must complete before specific NextGen capabilities can be implemented. The plan should serve as a useful tool in prioritizing and tracking NextGen research. In addition, JPDO has worked with the Office of Management and Budget (OMB) to develop a process that allows OMB to identify NextGen-related research and acquisition projects across the partner agencies and consider NextGen as a unified, cross-agency program. Under this process, JPDO and its partner agencies can jointly present OMB with business cases for the partner agencies' NextGen-related efforts, and these business cases can be used as inputs to funding decisions for NextGen research and acquisitions across the agencies.

In addition, JPDO needs to continue to leverage the R&D programs of the partner agencies, which will conduct and define the research. For example, JPDO monitors NASA's and FAA's efforts to coordinate their research. NASA and FAA have developed a strategy to identify, conduct, and transfer to FAA the R&D needed for NextGen. The strategy establishes four "research transition teams"¹³ that align with JPDO's planning framework and outlines how the two agencies will jointly develop research requirements—FAA will provide user requirements and NASA will conduct the research and provide an understanding of the engineering rationale for design decisions. In addition, the strategy calls for clearly defining metrics for evaluating the research. According to JPDO, as of August 2008, four teams had been established and have conducted initial meetings.

JPDO has begun to move from proposing research to articulating a defined and prioritized R&D program. In addition, JPDO, FAA, and NASA have established mechanisms, such as research transition teams, to define and

¹³The four teams are organized along the framework for near-, mid-, and long-term research goals established in JPDO's IWP. The teams are Separation Management, Trajectory Management, Flow Contingency Management, and Capacity Management.

prioritize R&D. We believe, however, that it is still too early to assess the adequacy of these efforts.

What Metrics Should Congress Use to Evaluate the Progress of NextGen?

Version 1.0 of IWP, scheduled to be released later this month, will provide a baseline for measuring NextGen progress. Congress can use the information contained in the plan to help evaluate whether the actions needed to achieve NextGen are on schedule and whether the specific operational improvements and capabilities that will make up NextGen are being accomplished. Specifically, subsequent versions of the plan will allow the development of metrics to show progress, by agency, in (1) achieving key activities and deploying technology, (2) issuing policies and guidance, and (3) prioritizing resources.

Furthermore, subsequent versions of IWP are expected to include cost information that decision makers can use to help understand the rationale for budget requests, monitor costs, and improve future cost estimates for acquisitions. This information will be helpful to decision makers when budget constraints do not allow all system acquisitions to be fully funded at planned and approved levels and they must decide which programs to fund and which to cut or delay according to their priorities.

Two Related Challenges

At this point, Mr. Chairman, I would like to briefly discuss two additional issues that present challenges to realizing the full potential of NextGen. The first, an infrastructure challenge, is to implement NextGen plans for a new configuration of ATC facilities and enhanced runway capacity. The second, a human capital challenge, is to ensure that FAA staff have the knowledge and skills needed to implement NextGen.

To fully realize NextGen's capabilities, a new configuration of ATC facilities and enhanced runway capacity will be required to go along with new technologies and procedures. According to a senior ATO official, the agency plans to report on the cost implications of reconfiguring its facilities in 2009. However, FAA has no comprehensive plan for reconfiguring its facilities. Until the cost analysis is completed and a plan for facilities reconfiguration has been developed, the configurations needed for NextGen cannot be implemented and potential savings that could help offset the cost of NextGen will not be realized. Some FAA officials have said that planned facility maintenance and construction based on the current ATC system are significant cost drivers that could, without reconfiguration, significantly increase the cost of NextGen. Additionally, some of the capacity and efficiency enhancements expected

from the implementation of NextGen maybe curtailed if the system's infrastructure needs are not fully addressed.

In the meantime, FAA faces an immediate task to maintain and repair existing facilities so that the current ATC system continues to operate safely and reliably. The agency is currently responsible for maintaining over 400 terminal facilities. While FAA has not assessed the physical condition of all of these facilities, the agency rated the average condition of 89 of them as "fair." Based on its assessment of these 89 facilities, FAA estimated that a one-time cost to repair all 400 terminal facilities would range from \$250 million to \$350 million. Two FAA employee unions (NATCA and PASS) contend that many of the 400 facilities are deteriorating for lack of maintenance and that working conditions are unsafe because of leaking roofs, deteriorating walls and ceilings, and obsolete air-conditioning systems. According to FAA officials, while some of these facilities can accommodate NextGen's new technologies and systems, many of them are not consistent with the configurations that will be needed under NextGen. Once FAA develops and implements a facility consolidation plan, the costs of facility repairs and maintenance may be reduced. In the meantime, FAA will have to manage its budgetary resources so that it can maintain legacy systems and legacy infrastructure while configuring the national airspace system to accommodate NextGen technologies and operations.

The transformation to NextGen will also depend on the ability of airports to handle greater capacity. While NextGen technologies and procedures will enhance this ability, new or expanded runways will likely be needed also to handle the expected increases in traffic. FAA has developed a rolling 10-year plan for capacity improvements at the nation's 35 busiest airports, and some airports are building new runways. However, even with these planned runway improvements, FAA analyses indicate that 14 more airports will still need additional capacity. Moreover, without significant reductions in emissions and noise around some of the nation's airports, efforts to expand their capacity could be stalled or the implementation of NextGen delayed. We believe that this is a significant issue that FAA and JPDO will have to address.

To manage the implementation of NextGen, FAA will need staff with technical skills, such as systems engineering and contract management expertise. Because of the scope and complexity of the NextGen effort, the agency may not currently have the in-house expertise to manage the transition to NextGen without assistance. In November 2006, we recommended that FAA assess the technical and contract management

skills FAA staff will need to define, implement, and integrate the numerous complex programs that will be involved in the transition to NextGen.¹⁴ In response to our recommendation, FAA contracted with the National Academy of Public Administration (NAPA) to determine the mix of skills and number of skilled persons, such as technical personnel and program managers, needed to implement NextGen and to compare those requirements with FAA's current staff resources. NAPA expects to complete its assessment in September 2008. We believe this is a reasonable approach that should help FAA begin to address this issue, recognizing that once the right skills have been identified, it may take considerable time to select, hire, and integrate what FAA estimates could be 150 to 200 more staff. This situation could contribute to delaying the integration of new technologies and the transformation of the national airspace system.

Mr. Chairman, this concludes my prepared statement. I would be pleased to respond to any questions that you or other members of the Committee may have.

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¹⁴GAO, *Next Generation Air Transportation System: Progress and Challenges Associated with the Transformation of the National Airspace System*, GAO-07-25 (Washington, D.C.: Nov. 13, 2006).

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