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FEDERAL AVIATION ADMINISTRATION

Key Issues in Ensuring the Efficient Development and Safe Operation of the Next Generation Air Transportation System

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March 22, 2007

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Highlights

Highlights of GAO-07-636T, a testimony before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, House of Representatives

Why GAO Did This Study

The Federal Aviation Administration (FAA) operates one of the safest air transportation systems in the world. It is, however, a system under strain. The skies are becoming more crowded every day, with an estimated 1 billion passengers per year expected by 2015. The current aviation system cannot be expanded to meet this growth. The reauthorization of FAA is an opportunity to examine how the agency is managing the operation and safety of the air transportation system as it leads the transition to the Next Generation Air Transportation System (NextGen)—a major redesign of the current system. GAO's testimony focuses on key issues related to FAA's reauthorization, including (1) FAA's progress in implementing initiatives that could provide a solid foundation for NextGen, (2) issues that need to be addressed to help ensure a successful transition to NextGen, and (3) safety areas that are important for the continued safe operation of the current and future system. This statement is based on recent GAO reports and ongoing work on some management and safety initiatives.

What GAO Recommends

This testimony does not contain recommendations. However, GAO reports containing relevant recommendations are listed among the Related GAO Products, some of which FAA is in the process of responding to.

www.gao.gov/cgi-bin/getrpt?GAO-07-636T.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Gerald L. Dillingham, Ph.D., at (202) 512-2834 or dillinghamg@gao.gov.

What GAO Found

FAA has made significant progress in moving to more businesslike and cost-effective operations and modernizing the air traffic control system. This progress should better position the agency for the complex implementation of NextGen. However, further work remains to fully address past problems in the modernization effort while at the same time finding new leadership—due to losses of key leaders at FAA and its Air Traffic Organization—that can continue an agencywide commitment to transformation. While FAA has improved its financial management capability, including implementing a new cost accounting system and developing a cost allocation methodology, it is not yet clear if that methodology provides a sound basis from which to derive the administration's proposed new cost-based funding structure for FAA. In addition, improved acquisition processes, such as establishing guidance on using Earned Value Management, are positive steps, but they need to be fully implemented across all critical acquisitions. As FAA works toward acquiring and deploying NextGen technology, it will also be important to phase out existing air traffic control equipment using a risk-based approach and continue to maintain existing systems.

Key issues that FAA needs to address as it begins implementing NextGen include continued focus on coordination with the Joint Planning and Development Office (JPDO). FAA, in coordination with JPDO, is developing an implementation plan for NextGen that is expected to include details of the required technologies, procedures, and resources. This is a step in the right direction. While FAA estimates that its cost for NextGen programs may range between $15 billion and $22 billion, it will be important to determine which entities will fund and conduct the necessary developmental research. Also, GAO has recommended that FAA assess its capacity to handle the technical and contract management expertise to determine if it has the capabilities required to oversee the implementation of NextGen. FAA is considering action that would respond to this recommendation.

To deal with current safety issues and the transition to NextGen, it will be important for FAA to address safety in the airport environment, where forecasted traffic growth could lead to increased ground congestion and safety hazards. FAA also needs to establish the appropriate regulatory approach for certain current airspace users, such as air ambulances, and new users, such as the emerging space tourism industry. In addition, to maintain and expand the margin of safety, especially if substantial growth in air traffic materializes, FAA will need to rely more on data than on labor-intensive inspections. GAO has recommended that FAA improve its safety data. FAA has taken some action to improve its data, but more work remains. FAA's ability to ensure a safe system will also be affected by its ability to hire, train, and deploy its workforce of air traffic controllers, inspectors, and technicians.

Mr. Chairman and Members of the Subcommittee:

I appreciate the opportunity to testify before you today as you consider the reauthorization of the Federal Aviation Administration (FAA). FAA operates one of the safest air transportation systems in the world. It is, however, a system under strain. The skies over America are becoming more crowded every day. Demand for air travel has increased in recent years, with over 740 million passengers flying in fiscal year 2006, climbing toward an estimated 1 billion passengers per year in 2015, according to FAA estimates. Already, with the increasing demand for air travel, flight arrival delays have increased; such delays are nearing the record levels of 2000, a year in which one in four flights reached its destination behind schedule. The system is also expected to absorb a variety of different types of aircraft in the near future, ranging from the jumbo Airbus A380—which can hold more than 500 passengers—to very light jets—which may greatly increase the number of aircraft in the sky while transporting six or fewer passengers on any given flight. The consensus is that the current aviation system cannot be expanded to meet this projected growth.

In 2003, recognizing the need for system transformation, Congress authorized the creation of the Joint Planning and Development Office (JPDO), housed within FAA but involving several federal partner agencies,[1] to conceptualize and plan for the Next Generation Air Transportation System (NextGen). NextGen is envisioned as a major redesign of the air transportation system that will move from largely ground-based radars to precision satellite-based navigation and includes digital, networked communications; an integrated weather system; layered, adaptive security; and more. The reauthorization of FAA and the Airport and Airway Trust Fund provides a unique opportunity to examine how the agency is managing the operation and safety of the current air traffic control system as it prepares to implement NextGen. My testimony today focuses on these questions: (1) What progress is FAA making in implementing initiatives that could provide a solid foundation for NextGen? (2) What are the key issues that need to be addressed to help ensure a successful transition to NextGen? and (3) What key safety areas

[1]JPDO was authorized by the Vision 100—Century of Aviation Reauthorization Act (Pub. L. No. 108-176), which requires the office to operate in conjunction with multiple government agencies, including the Departments of Transportation, Commerce, Defense, and Homeland Security; FAA; the National Aeronautics and Space Administration (NASA); and the White House Office of Science and Technology Policy. JPDO also involves industry and other stakeholders through the Next Generation Air Transportation System Institute.

need to be addressed for the continued safe operation of the current and future air transportation system? My statement is based on our recent reports as well as ongoing work for this subcommittee assessing FAA's performance metrics for its acquisitions, runway safety, and safety issues concerning the operation of unmanned aircraft systems in the national airspace. We conducted this work in accordance with generally accepted government auditing standards.

In summary

- Over the past few years, FAA has made significant progress in moving to more businesslike and cost effective operations and modernizing the air traffic control system, which should better position the agency for the complex implementation of NextGen. However, further work remains to fully address past problems in the modernization program. FAA has improved its financial management, including implementing a new cost accounting system and developing a cost allocation methodology; however, it is not yet clear if the cost allocation methodology is sufficiently valid and reliable to derive the administration's proposed new cost-based funding for FAA. FAA has also sought to improve its financial management with efforts to control and reduce costs. For example, FAA plans to produce cost savings through outsourcing such as with its planned contracting out of new surveillance technology, and through facility consolidations. In addition to improvements in financial management, FAA has improved its acquisition management, which will be critical to a successful transition to NextGen. For example, FAA has begun reviewing its major systems acquisitions and has established guidance for using a project management technique known as Earned Value Management[2] in its acquisition management system, although institutionalizing these improvements will continue to be a challenge for FAA. FAA has also established performance measures and targets for its critical acquisitions. While the acquisition and deployment of NextGen technology are key issues facing the agency, it will be critical that FAA continue to maintain existing systems and phase out existing systems using a risk-based approach. And, although FAA has initiated numerous financial, management, and acquisition process improvements, the agency must work to institutionalize these changes while at the same time finding new leadership—due to losses of key leaders at FAA and its Air Traffic

[2]Earned Value Management combines measurements of technical, schedule, and cost performance with the intent of providing an early warning of problems while there is time for corrective action.

Organization (ATO)—that can continue to enforce an agencywide commitment to change and continuous improvement.

- As FAA begins implementing NextGen, key issues remain that will need to be addressed, such as coordinating with JPDO, funding for NextGen-related programs, and ensuring that FAA has both the technical and contract management expertise that will be required to oversee this complex undertaking. FAA has become steadily more focused on NextGen over the past few years and is expanding and revamping its Operational Evolution Plan—renamed the Operational Evolution Partnership—to integrate with JPDO activities and become its implementation plan for NextGen, including details of required technologies, procedures, and resources. This is a step in the right direction. JPDO recently reported that the total cost for NextGen infrastructure may range between $15 billion and $22 billion. The agency also noted that it expects a corresponding cost to system users, who will have to equip themselves with the advanced avionics necessary to realize the full benefits of some NextGen technologies, in the range of $14 billion to $20 billion. Another transition challenge for FAA and JPDO is to address questions about which entities will fund and conduct some of the necessary research, development, and demonstration projects that will be key to achieving certain NextGen capabilities and keeping the development of new systems on schedule. We have also recommended that FAA examine its strengths and weaknesses with regard to the technical and contract management expertise that will be needed for NextGen implementation. In response to our recommendation, FAA is considering convening a blue ribbon panel to study the issue and make recommendations to the agency. We believe that such a panel could help FAA begin to address this challenge.

- To deal with current and future safety issues, it will be important for FAA to also address several issues as it works to ensure that its safety programs are aligned to meet future demand. First, ground safety is an area of increasing concern because air traffic is forecast to grow substantially during the coming decades, which will result in more aircraft and increased congestion and safety hazards in the complex airport environment. FAA needs to keep on schedule to deploy NextGen technology that warns controllers of imminent ground collisions and implement recommendations by the National Transportation Safety Board (NTSB) (which continues to place runway incursions on its Most Wanted Transportation Safety Improvements list). Second, FAA needs to establish an appropriate regulatory approach for some current airspace users, such as air ambulances, and new users such as the emerging space tourism industry. For example, we suggested that Congress should consider

revisiting FAA's dual role for ensuring safety and promoting the emerging space tourism industry and decide whether the elimination of FAA's promotional role is necessary to alleviate a potential conflict of interest. Third, to maintain and expand the margin of safety—especially if substantial growth in air traffic materializes—FAA cannot rely on its current oversight approach, which focuses on labor-intensive inspections. Accurate, complete safety data would provide FAA with an early warning of hazards that can lead to accidents. We have recommended that FAA improve the accuracy and completeness of its safety data and its analysis of that data. FAA is in the early planning stages of addressing our recommendations, but more work remains. Fourth, FAA's ability to ensure safety in NextGen will be affected by its ability to manage its human capital, including safety inspectors, engineers, technicians, and air traffic controllers. FAA faces challenges in improving its staffing processes, addressing human factors issues associated with significant increases in the automation of air traffic management, replacing the large percentage of staff expected to retire, and addressing the contentious relations with its employee unions, which have the potential to hinder the agency's ability to retain and recruit skilled staff.

Improved, Businesslike Operations Should Better Position FAA to Implement and Manage NextGen, but Further Work Remains

Although the NextGen effort involves multiple government agencies and the private sector, FAA will be the entity largely responsible for implementing the policies and systems necessary for NextGen while safely operating the current air traffic control system 24 hours a day, 7 days a week. This means that FAA will be responsible for keeping a number of large NextGen systems acquisitions on budget and on schedule as it manages and sustains the current system. Historically, FAA has had serious weaknesses in its financial management as well as chronic cost and schedule difficulties with air traffic control system acquisitions. During the past few years, FAA has made significant progress in implementing businesslike processes and procedures for financial management, acquisitions, and organization structures. The implementation of these types of initiatives has improved FAA's management of the current system and should better position the agency to manage the enormously complex transition to NextGen. However, further work remains to fully address past problems and institutionalize these changes throughout the agency, especially given the changing leadership within both FAA and its ATO.

FAA Has Improved Its Financial Management, although the Soundness of Its Cost Allocation Methodology is Uncertain

Sound financial management, including sound cost accounting and cost allocation systems, is important for the current operation of FAA and lays the foundation for the transformation to NextGen and proposed changes to the agency's funding system laid out in the administration's reauthorization proposal. In 1999, we placed FAA on our high-risk list for its financial management practices, noting weaknesses that rendered the agency vulnerable to fraud, waste, and abuse by undermining its ability to manage operations and limiting the reliability of financial information provided to Congress. In 2005, we removed FAA's financial management from our high-risk list because the agency had made significant progress, including implementing a new financial management system called Delphi[3] and receiving unqualified opinions from auditors on its annual financial statements for fiscal years 2001 through 2005. Nonetheless, external auditors issued a qualified opinion on FAA's fiscal year 2006 financial statement and repeated a material internal control weakness that was reported in 2005. The concerns that led to the qualified opinion stemmed from FAA's inability to support the accuracy and completeness of its construction-in-progress account, reported in the financial statement as $4.7 billion. FAA is working to address the problem.

As part of its improved financial management, FAA has developed a cost accounting system and a cost allocation methodology, which are critical to the successful implementation of the new cost-based funding system included in the administration's reauthorization proposal.[4] The proposal would change FAA's financing system from one based mainly on excise taxes to one that provides a better link between revenues and the costs that users of the national airspace system impose on the system, according to the agency. FAA also says the proposal would improve revenue adequacy, equity, and efficiency.[5] While the reauthorization proposal may

[3]Delphi is a commercial off-the-shelf financial management system that was acquired by the Department of Transportation and fully implemented in FAA in 2003.

[4]The reauthorization proposal includes, among other things, introducing direct user charges for commercial aircraft based on the cost of the air traffic services they receive, eliminating many current taxes, substantially increasing the fuel taxes general aviation operators pay, charging both commercial and general aviation a fuel tax to pay for airport capital improvements, and linking the contribution to FAA's budget from the General Fund of the U.S. Treasury to the public benefits FAA provides. Under the administration's proposal, these changes would begin in fiscal year 2009.

[5]Revenue adequacy refers to the ability of FAA's funding system to produce revenues commensurate with workload changes over time. Equity refers to the equitable distribution of costs to aviation users. Efficiency refers to incentives that encourage the efficient use of the national airspace system.

address some of the equity and efficiency concerns that FAA has raised with the current funding structure, we have reported that it is not yet clear if FAA has developed a sound cost allocation methodology from which to derive the new cost-based funding.[6] We are reviewing FAA's cost allocation methodology and expect to issue a report later this year.

FAA has also improved its financial management through increased efforts to achieve cost savings and cost avoidance throughout the agency. For example, FAA is outsourcing flight service stations and estimates a $2.2 billion savings over 12 years. Similarly, FAA is seeking savings through outsourcing its planned nationwide deployment of Automatic Dependent Surveillance-Broadcast (ADS-B), a critical element of NextGen. FAA is planning to implement ADS-B through a performance-based contract in which FAA will pay "subscription" charges for the ADS-B services and the vendor will be responsible for building and maintaining the infrastructure. (FAA also reports that the ADS-B rollout will allow the agency to remove 50 percent of its current secondary radars, saving money in the program's baseline. The remaining radars will serve as a back-up system to ADS-B.) As for consolidating facilities, FAA is currently restructuring ATO's administrative service areas from nine offices to three offices, which FAA estimates will save up to $460 million over 10 years.

We previously reported that FAA should pursue further cost control options, such as exploring additional opportunities for contracting out services and consolidating facilities. However, we recognize that FAA faces challenges with consolidating facilities, an action that can be politically sensitive. In recognition of this sensitivity, the administration's reauthorization proposal presents a "BRAC-like" initiative in which the Secretary of Transportation would be authorized to establish an independent, five-member commission, known as the Realignment and Consolidation of Aviation Facilities and Services Commission, to independently analyze FAA's recommendations to realign facilities or services. The commission would then send its own recommendations to the President and Congress. In the past, we noted the importance of potential cost savings through facility consolidations; however, it must also be noted that any such consolidations must be handled through a process that solicits and considers stakeholder input throughout and fully

[6]GAO, *Federal Aviation Administration: Observations on Selected Changes to FAA's Funding and Budget Structure in the Administration's Reauthorization Proposal*, GAO-07-625T (Washington, D.C.: Mar. 21, 2007).

considers the safety implications of both proposed facility closures and consolidations.

Progress Has Been Made but Further Work Remains to Institutionalize Recent Improvements in Management and Acquisition Processes

A successful transition to NextGen will depend, to a great extent, on FAA's ability to manage the acquisition and integration of multiple NextGen systems. Since 1995, we have designated FAA's air traffic control modernization program as high risk because of systemic management and acquisition problems. However, in recent years, FAA has made significant progress toward improving its acquisition management. Realization of NextGen goals could be severely compromised if FAA's improved processes are not institutionalized and carried over into the implementation of NextGen, which is an even more complex and ambitious undertaking than past modernization efforts.

To its credit, FAA has taken a number of actions to improve its acquisition management. By creating ATO in 2003 and appointing a chief operating officer (COO) to head ATO, FAA established a new management structure and adopted more leading practices of private sector businesses to address the cost, schedule, and performance shortfalls that have plagued air traffic control acquisitions. ATO has worked to create a flatter organization, with fewer management layers, and has reported reducing executive staffing by 20 percent and total management by 16 percent. In addition, FAA uses a performance management system to hold managers responsible for the success of ATO. More specifically, to better manage its acquisitions and address problems we have identified,[7] FAA has

- undertaken human capital initiatives to improve its acquisition workforce culture and build towards a results-oriented, high-performing organization;
- developed and applied a process improvement model to assess the maturity of its software and systems acquisitions capabilities resulting in, among other things, enhanced productivity and greater ability to predict schedules and resources; and

[7]GAO, *Federal Aviation Administration: Stronger Architecture Program Needed to Guide Systems Modernization Efforts*, GAO-05-266 (Washington, D.C.: Apr. 29, 2005); *Air Traffic Control: System Management Capabilities Improved, but More can be Done to Institutionalize Improvements*, GAO-04-901 (Washington, D.C.: Aug. 20, 2004); and *Information Technology: FAA Has Many Investment Management Capabilities in Place, but More Oversight of Operational Systems is Needed*, GAO-04-822 (Washington, D.C.: Aug. 20, 2004).

- reported that it has established a policy and guidance on using Earned Value Management (EVM) in its acquisition management system and that 19 of its major programs are currently using EVM.[8]

Institutionalizing these improvements throughout the agency will continue to be a challenge for FAA. For example, the agency has yet to implement its cost-estimating methodology, although, according to the agency, it has provided training on the methodology to employees. Furthermore, FAA has not established a policy to require use of its process improvement model on all major acquisitions for the national airspace system. Until the agency fully addresses these residual issues, it will continue to risk program management problems affecting cost, schedule, and performance. With a multibillion dollar acquisition budget, addressing these issues is as important as ever.

FAA's Methodology for Tracking and Reporting Performance on Critical Acquisitions is Subject of Ongoing Work for this Subcommittee

In another effort to improve agency processes, FAA expanded its use of performance measures to track its performance. In its fiscal year 2007 portfolio of goals, FAA lists 30 performance measures. As part of our ongoing work,[9] we are currently reviewing how FAA selects and measures two of these goals in particular: critical acquisitions on budget and critical acquisitions on schedule.[10] FAA has reported exceeding targets for both of these measures for the past 3 fiscal years. FAA's targets for fiscal year 2006 were to have 85 percent of critical acquisition programs within 10 percent of budget, as reflected in its capital investment plan, and to have 85 percent of critical acquisition programs on schedule. For fiscal year 2006, FAA reported that its critical acquisitions were 100 percent on budget and over 97 percent on schedule. This represents a major turnaround in a program that remains on our high-risk list.

It will be important, as FAA begins to implement NextGen systems, to maintain critical acquisitions on schedule and on budget in order to meet the goal of transitioning to NextGen by 2025 and to prevent escalation of the costs of NextGen. Our ongoing work is examining FAA's performance

[8]EVM is a project management technique that combines measurements of technical performance, schedule performance, and cost performance with the intent of providing an early warning of problems while there is time for corrective action.

[9]This work is in response to a joint request from this subcommittee and the Subcommittee on Aviation of the Senate Commerce, Science, and Transportation Committee.

[10]ATO has the lead responsibility for both of these goals.

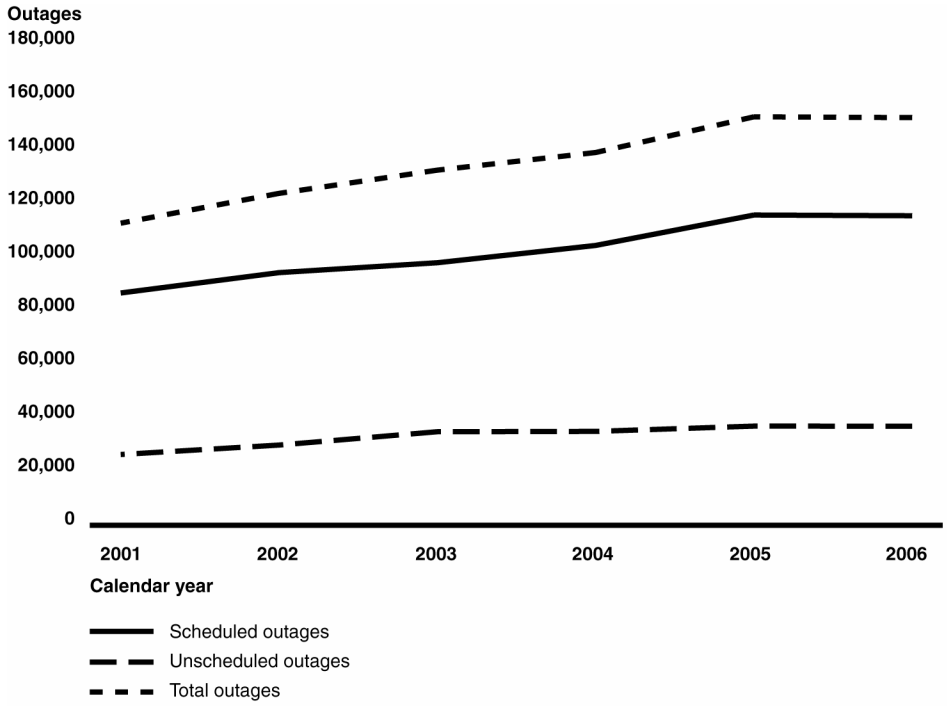
and reporting on its critical acquisitions, including applicable performance measures. We are also exploring FAA's use of the most recently approved cost and schedule baselines, which may have changed significantly since the start of an acquisition, to measure program performance. Rebaselining acquisitions is an accepted practice and there are valid reasons for doing so, such as when changes in a program's requirements fundamentally alter the acquisition and make the originally approved schedule unrealistic. Because rebaselining resets the cost and schedule variances to zero, we want to verify that FAA's practice is not masking acquisition performance problems. We expect to issue a report on these issues later this year.

Although FAA Is Now Focusing on NextGen, It Must Continue to Manage and Sustain the Current System

While the acquisition and deployment of NextGen technology are key issues facing the agency, it will be critical for FAA to continue to maintain existing systems and phase out existing systems using a risk-based approach. The adequacy of FAA's maintenance of existing systems was raised following a power outage and equipment failures in Southern California that caused hundreds of flight delays during the summer of 2006. Investigations by FAA and the Department of Transportation Inspector General into these incidents identified a number of underlying issues, including the age and condition of equipment. Nationwide, the number of scheduled[11] and unscheduled outages of air traffic control equipment and ancillary support systems has been increasing (see fig. 1). Increases in the number of unscheduled outages indicate that systems are failing more frequently.

[11]Scheduled outages occur for scheduled maintenance.

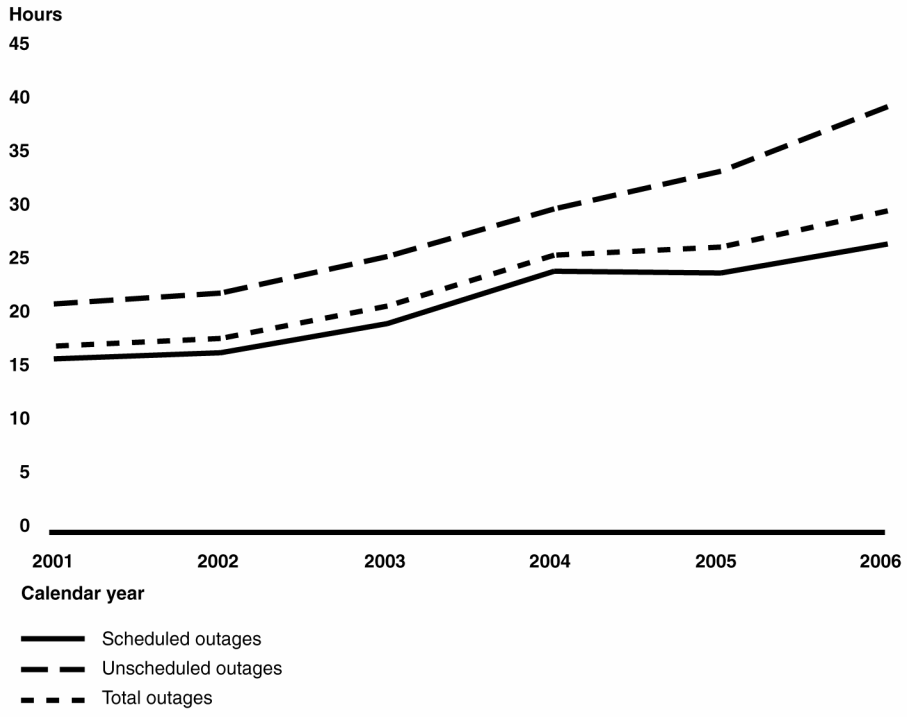
Figure 1: Number of Scheduled and Unscheduled Equipment Outages, Calendar Years 2001-2006



Source: GAO analysis of FAA's NASPAS data.

In addition, the duration of unscheduled equipment outages has also been increasing in recent years from an average of about 21 hours in 2001 to about 40 hours in 2006 (see fig. 2), which may indicate, in part, that maintenance and troubleshooting activities are requiring more effort and longer periods of time. However, according to FAA, it considers user impact and resource efficiency when planning and responding to equipment outages. As a result, according to the agency, although some outages will have longer restoration times, the agency believes they do not adversely affect air traffic control operations. It will be critical for FAA to monitor and address equipment outages to ensure the safety and efficiency of the legacy systems, since they will be the core of the national airspace system for a number of years and, in some cases, will become part of NextGen.

Figure 2: Average Duration of Scheduled and Unscheduled Equipment Outages, Calendar Years 2001-2006



Source: GAO analysis of FAA's NASPAS data.

Institutionalizing Change Within FAA Will Require Continued Strong Leadership

While FAA has implemented many positive changes to its management and business processes in recent years, it currently faces the loss of key leaders. We reported that the experiences of successful transformations and change management initiatives in large public and private organizations suggest that it can take 5 to 7 years or more until such initiatives are fully implemented and cultures are transformed in a sustainable manner. Such changes require focused, full-time attention from senior leadership and a dedicated team.[12] However, the agency will have lost two of its significant agents for change—the FAA administrator and the COO, who heads ATO—by the end of September 2007. The administrator's term ends in September 2007; the COO left in February

[12]GAO, *National Airspace System: Transformation will Require Cultural Change, Balanced Funding Priorities, and Use of All Available Management Tools*, GAO-06-154 (Washington, D.C.: Oct. 14, 2005).

2007, after serving 3 years. This situation is exacerbated by the fact that the current director of JPDO is new, having assumed that position in August 2006. For the financial, management, and acquisition improvements to further permeate the agency, and thus provide a firm foundation upon which to implement NextGen, FAA's new leaders will need to demonstrate the same commitment to improvement as the outgoing leaders. This continued commitment to change is critical over the next few years, as foundational NextGen systems begin to be implemented. Because this is a critical time for FAA, the agency needs to move expeditiously to find a new COO for ATO. It could be useful to have a COO whose tenure lasted the length of the current statutory 5-year term. This would allow for stable leadership at ATO during this critical transition from planning to early implementation of NextGen.

Key Issues Remain in the Transition From Planning to Implementing NextGen

Several key issues will need to be addressed to help ensure a successful transition to NextGen as FAA moves from the conceptualization and planning of NextGen, handled largely through the interagency collaborative efforts of FAA's JPDO, to the implementation of NextGen technologies and systems. Those issues include (1) continuing to focus on the coordination between ATO and JPDO and stakeholder involvement; (2) determining which entities will fund the necessary research, development, and demonstration projects for NextGen; and (3) determining whether FAA has the technical and contract management expertise necessary to oversee the complex implementation of NextGen.

FAA Has Improved Coordination with JPDO, but Some Key Stakeholder Involvement is Absent

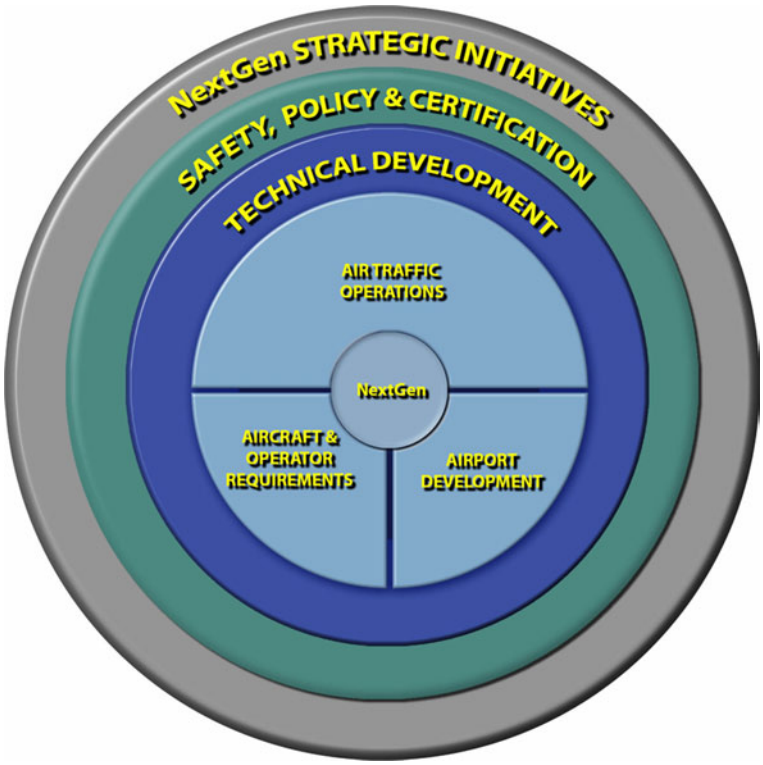
FAA has become steadily more focused on NextGen implementation, but some key stakeholders, such as FAA technicians who will maintain NextGen systems, are not currently involved. One of the most important changes FAA has made with regard to NextGen is the expansion and revamping of its Operational Evolution Plan (OEP)—renamed the Operational Evolution Partnership—to become FAA's implementation plan for NextGen. This is a step in the right direction. The OEP is being expanded to apply to all of FAA and is intended to become a comprehensive description of how the agency will implement NextGen, including the required technologies, procedures, and resources.[13] (Figure 3 shows the OEP framework.) An ATO official told us that the new OEP is

[13]Prior to expansion of the OEP, the document centered on plans for increasing capacity and efficiency at 35 major airports.

expected to be consistent with JPDO's key planning documents and partner agency budget guidance.[14] According to FAA, the OEP will allow it to demonstrate appropriate budget control and linkage to NextGen plans and will force FAA's research and development to be relevant to NextGen's requirements. According to FAA documents, the agency plans to publish the new OEP in June 2007.

[14]The planning documents include the Concept of Operations, Enterprise Architecture, and Integrated Work Plan. The Concept of Operations describes how the transformational elements of NextGen will operate in 2025. It is intended to establish general stakeholder buy-in to the NextGen end state, transition path, and business case. The Enterprise Architecture follows from the Concept of Operations and describes the system in more detail. It will be used to integrate planning efforts and drive partner agency guidance. The Integrated Work Plan lays out a timeline for deploying and integrating NextGen systems.

Figure 3: New OEP Framework



Source: JPDO.

Note: The concentric rings indicate the nature of initiative development from the outer ring (NextGen strategic initiatives), in which new programs and concepts are analyzed and demonstrated; to the second ring, where decisions are made regarding safety, operating policy, performance standards, and certification requirements; to the third ring (technical development), where concepts are prototyped and investment analysis decisions are made. The progression through the rings is not necessarily linear, and a program may be in more than one ring at a time. Data communications, for example, is in the technical development ring and also in the middle ring as policy and rulemaking is considered. The core is divided into three sections, which indicate the FAA offices that implement the final NextGen program.

In an effort to further align FAA's efforts with JPDO's plans for NextGen, FAA has created a NextGen Review Board to oversee the OEP. This review board will be co-chaired by JPDO's director and ATO's vice president of operations planning services. Initiatives, such as concept demonstrations or research proposed for inclusion in the OEP will now need to go through the review board for approval. Initiatives are to be assessed for their relation to NextGen requirements, concept maturity, and risk. An ATO official told us that the new OEP process should also help identify some smaller programs that might be inconsistent with NextGen

and could be discontinued and will assist in project integration. Additionally, as a further step towards integrating ATO and JPDO, the administration's reauthorization proposal calls for the JPDO director to be a voting member of FAA's Joint Resources Council and ATO's Executive Council.

Some stakeholders, such as current air traffic controllers and technicians, will play critical roles in NextGen, and their involvement in planning for and deploying the new technology will be important to the success of NextGen. In November 2006, we reported that air traffic controllers were not involved in the NextGen planning effort.[15] Controllers are beginning to become involved as they are now represented on a key planning body. However, the technicians do not participate in NextGen efforts. Input from current air traffic controllers who have recent experience controlling aircraft and current technicians who will maintain the new equipment is important in considering human factors and safety issues. Our work on past air traffic control modernization projects has shown that a lack of stakeholder involvement early and throughout a project can lead to cost increases and delays.

FAA Has Begun Budgeting for NextGen Programs, although Questions Remain About the Funding of NextGen Research and Development

JPDO recently reported some estimated costs for NextGen, including specifics on some early NextGen programs.[16] JPDO believes the total federal cost for NextGen infrastructure through 2025 will range between $15 billion and $22 billion. JPDO also reported a preliminary estimate of the corresponding cost to system users to equip themselves with the advanced avionics that are necessary to realize the full benefits of some NextGen technologies may range from $14 billion to $20 billion. JPDO, in its recently released 2006 Progress Report, noted that this range for avionics costs reflects uncertainty about equipage costs for individual aircraft, the number of very light jets that will operate in high-performance airspace, and the amount of out-of-service time required for installation.

In its capital investment plan for fiscal years 2008-2012, FAA includes estimated expenditures for 11 line items that are considered NextGen

[15]GAO, *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).

[16]JPDO, *Making the NextGen Vision a Reality: 2006 Progress Report to the Next Generation Air Transportation System Integrated Plan* (Washington, D.C.: March 2007).

capital programs.[17] The total 5-year estimated expenditures for these programs is $4.3 billion. In fiscal year 2008, only 6 of the line items are funded for a total of roughly $174 million; funding for the remaining 5 programs would begin with the fiscal year 2009 budget. According to FAA, in addition to capital spending for NextGen, the agency will spend an estimated $300 million on NextGen-related research and development from fiscal years 2008 through 2012. The administration's budget for fiscal year 2008 for FAA includes a total of $17.8 million to support the activities of JPDO.

The administration's reauthorization proposal would allow for $5 billion in Treasury debt financing authority for NextGen-related capital needs for fiscal years 2013-2017. Projects that might be appropriate for such financing include safety-critical and mission-essential software and systems that controllers and traffic flow managers will use to support certain aircraft operations in the NextGen system, according to the proposal. However, the proposed borrowing authority seems unlikely to have a major impact on FAA's ability to pay for capital investment associated with moving to NextGen because the payback period is relatively short. With a maximum payback period of 5 years, the advantage of matching the time period for paying for a capital investment with the time period in which the benefits of that investment are realized is unlikely to be achieved. Therefore, the advantage of borrowing versus receiving appropriations for a period of up to 5 years is unclear.

While FAA and JPDO have begun to release estimates for FAA's NextGen investment portfolio, questions remain over which entities will fund and conduct some of the necessary research, development, and demonstration projects that will be key to achieving certain NextGen capabilities and keeping the development of new systems on schedule. In the past, a significant portion of aeronautics research and development, including intermediate technology development, has been performed by NASA. However, NASA's aeronautics research budget and proposed funding shows a 30-percent decline, in constant 2005 dollars, from fiscal year 2005

[17]FAA has six capital investment programs that it considers transformational NextGen programs slated to receive funding in fiscal year 2008: ADS-B nationwide implementation, System Wide Information Management (SWIM), NextGen Data Communications, NextGen Network Enabled Weather, National Airspace System Voice Switch, and NextGen Technology Demonstration. In addition, five other programs are slated to begin funding in 2009: NextGen System Development, NextGen High Altitude Trajectory Based Operations, NextGen High Density Airports, NextGen Networked Facilities, and NextGen Cross-Cutting Infrastructure.

to fiscal year 2011. To its credit, NASA plans to focus its research on the needs of NextGen. However, NASA is also moving toward a focus on fundamental research and away from developmental work and demonstration projects. FAA and JPDO face the challenge of determining the nature and scope of the research and technology development necessary to begin the transition to NextGen. They also have to identify the entities that can conduct that research and development and the source of funding to support it.

FAA Needs to Explore whether It Has the Technical and Contract Management Expertise Necessary to Implement NextGen

In the past, a lack of expertise contributed to weaknesses in FAA's management of air traffic control modernization efforts, and industry experts with whom we spoke questioned whether FAA will have the technical expertise needed to implement NextGen. In addition to technical expertise, FAA will need contract management expertise to oversee the systems acquisitions and integration involved in NextGen. In November 2006, we recommended that FAA examine its strengths and weaknesses with regard to the technical expertise and contract management expertise that will be required to define, implement, and integrate the numerous complex programs inherent in the transition to NextGen.[18] In response to our recommendation, FAA is considering convening a blue ribbon panel to study the issue and make recommendations to the agency about how best to proceed with its management and oversight of the implementation of NextGen. We believe that such a panel could help FAA begin to address this challenge.

Aviation Safety Record Remains High, but Some Areas Need to be Addressed for Current and Future Safety as FAA Transitions to NextGen

As FAA works to develop the policies and systems to transition to NextGen, it will be important for the agency to also ensure that its safety programs are aligned with these changes. While recent safety trends are generally positive, improving upon those trends will be necessary simply to maintain the same level of safety if air traffic doubles or triples during the coming decades. Moreover, certain recent trends—such as the commercial air carrier fatal accident rate—may warrant immediate attention. Although this accident rate has steadily declined in recent years, FAA did not meet its performance target in this area for fiscal year 2006 due to four accidents, including two accidents on runway and ramp areas and one runway overrun. FAA's ability to deal with current safety issues and the transition to NextGen would be enhanced by (1) acquiring and

[18] GAO-07-25.

deploying new safety enhancing technologies; (2) establishing appropriate regulatory approaches for current airspace users and emerging sectors; (3) improving the accuracy and completeness of its safety data; and (4) addressing human capital issues associated with hiring, training, and deploying its skilled workforce of air traffic controllers, safety inspectors, engineers, and technicians.

FAA Faces Challenges in Implementing Advanced Technology and Other Measures to Improve Safety in the Airport Environment

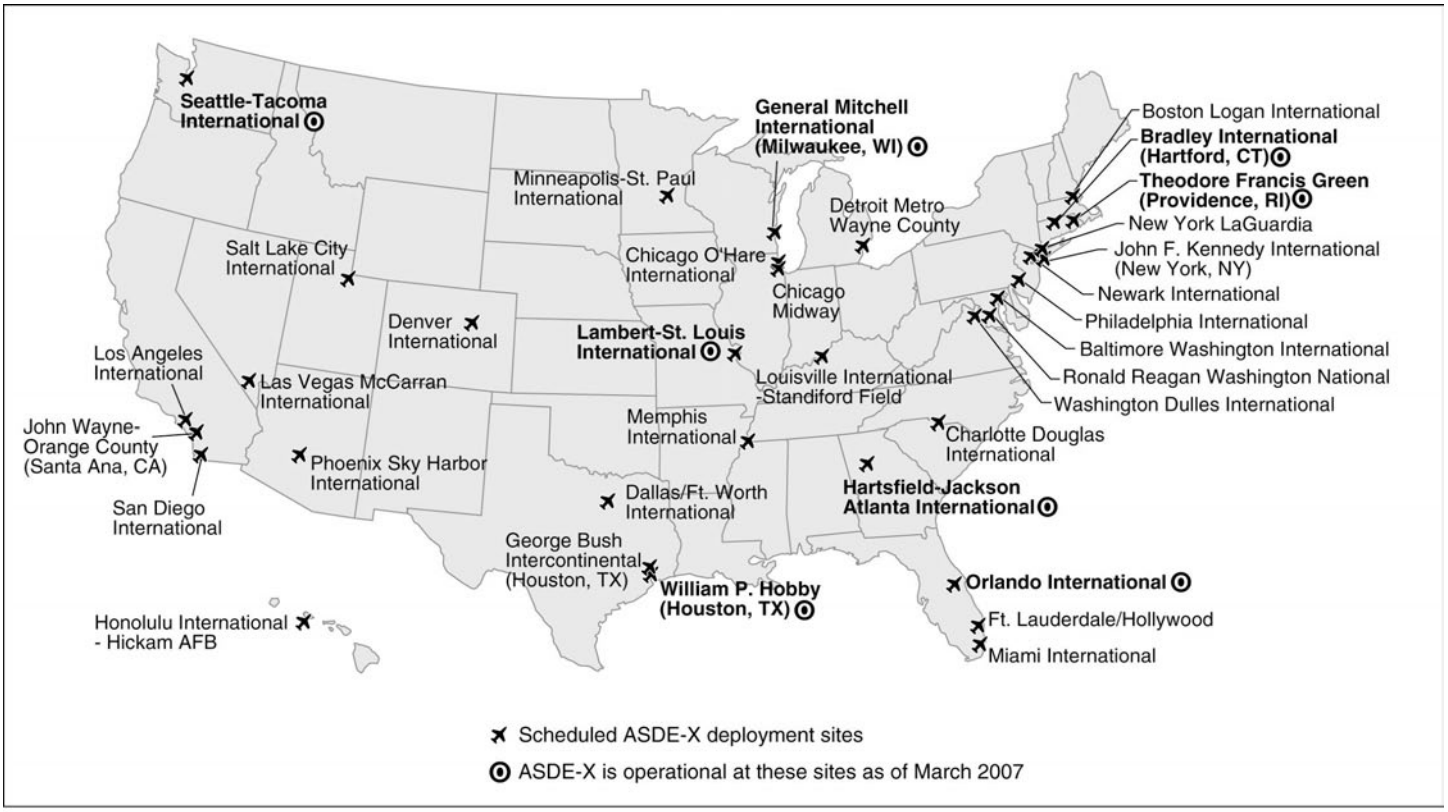
Safety in the airport environment is an area of increasing concern because air traffic is forecast to grow substantially during the coming decades. More aircraft and congestion at the airport will make maintaining safety even more critical, as the airport environment involves enormously complex interactions between air traffic controllers and the people who operate on the airport surface, including pilots, mechanics, maintenance technicians, and airport employees. FAA's efforts to improve safety in the airport environment include deploying NextGen technology, such as the Airport Surface Detection Equipment Model X (ASDE-X),[19] evaluating runway status lights, and testing a low-cost surface surveillance system. FAA pursues new technologies to improve runway safety because the incursion rate at U.S. airports was higher in fiscal year 2006 than it was in fiscal year 2002.[20] (Incursions are potential collisions on the ground.) However, the deployment of new technology has faced schedule delays. FAA originally planned to deploy ASDE-X at 35 major airports by 2007, but the technology is operational at only 8 airports to date, and deployment at the remaining 27 airports is not scheduled to be complete until 2011 (see fig. 4). At the same time, FAA is evaluating the performance of runway status lights, another technology aimed at preventing runway incursions by warning pilots when a runway is unsafe for crossing or departure. FAA expects to decide this year whether to deploy the system at 35 large airports at an estimated cost of $300 million. Although the 35 airports that are to receive ASDE-X—and may receive runway status lights—handle about 70 percent of enplanements in the United States, they represent only about 6 percent of the country's 573 commercial service airports. Therefore, FAA is also evaluating a low-cost surface surveillance system that could meet the needs of small- to medium-sized airports. The system

[19]ASDE-X is the upgraded digitally-based technology that enables air traffic controllers to detect potential runway conflicts by providing detailed coverage of movement on runways and taxiways. ASDE-X warns controllers of potential runway incursions.

[20]The rate was 5.4 incursions per 1 million tower operations in fiscal year 2006 and 5.2 incursions per 1 million tower operations in fiscal year 2002.

is designed to alert controllers of potential conflicts and hazards and provide direct warnings to pilots entering or approaching active runways.

Figure 4: Airport Surface Detection Equipment Model X (ASDE-X) Deployment Sites



Source: FAA.

The number of serious incursions—incidents where a collision was narrowly avoided—rose from 28 in fiscal year 2004 to 31 in fiscal year 2006. As a result, NTSB continues to place runway incursions on its Most Wanted Transportation Safety Improvements list. FAA has not yet implemented any of the six runway incursion prevention recommendations that NTSB made in 2000. The recommendations include such things as implementing at commercial airports ground movement safety systems that provide a direct warning to flight crews of possible

incursions and changing air traffic control procedures.[21] According to NTSB, FAA has not completed its evaluation and implementation of technology to address the recommendation on safety systems, and the two agencies have not reached agreement on the recommendations to change air traffic control procedures.

FAA is also making efforts to prevent runway overruns, which occur when aircraft pass the ends of runways during aborted takeoffs or while landing, by the construction of runway safety areas or the installation of arresting material at the end of runways. In 2000, FAA established its Runway Safety Area program to accelerate the construction of runway safety areas—areas surrounding the runways designed to reduce the risk of damage to aircraft from overruns. Since 2005, commercial service airports have been required[22] to bring their runway safety areas into compliance with FAA standards by 2015. According to FAA, as of January 2007, 70 percent of the 1,020 runways at 573 commercial airports in the United States substantially comply with runway safety area standards, up from 55 percent in 2000. In fiscal year 2006, the Airport Improvement Program (AIP) awarded more than $240 million in grants for runway safety area improvement projects. FAA indicates that about $1.1 billion in AIP funds will be needed to complete the remainder. The administration's budget request for FAA calls for $2.75 billion in AIP funds in fiscal year 2008, a substantial reduction from the $3.5 billion funding levels for fiscal years 2006 and 2007. It will be important for FAA to consider these runway safety areas as it prioritizes AIP funds. FAA considers the installation of an Engineered Materials Arresting System (EMAS), a bed of crushable concrete designed to safely decelerate and stop overrunning aircraft, to be an acceptable alternative for meeting runway safety area standards. As of December 2006, EMAS was installed on 21 runways at 16 U.S. airports and had successfully stopped three aircraft from overrunning runways. We are conducting ongoing work for this subcommittee on runway and ramp safety and expect to issue our final report later this year.

[21]Recommended changes to air traffic control procedures include clarifying authorized runway crossings, increasing the situational awareness of the flight crews for arriving aircraft at night or in poor visibility conditions without relying on the controllers, and the use of international landing clearance procedures and standard phraseology for airport surface operations.

[22]Public Law 109-115.

FAA and Congress Should Address Regulatory Approaches to Some Current Airspace Users and Emerging Sectors

Future air traffic is expected to include not only increases in the number of traditional airspace users, but new users as well. It will be important for FAA to establish the appropriate regulatory approach for current users and new users such as the emerging space tourism industry and unmanned aircraft systems. For example, we recently found that FAA's current oversight approach for air ambulances was not geared to the unique operating characteristics and risks associated with that sector.[23] Further, in 2006, NTSB recommended, among other things, that FAA require that all air ambulance operators comply with Part 135 of Title 14 of the Code of Federal Regulations during all flights with medical personnel on board.[24] Under FAA regulation, most air ambulances operate under rules specified in Part 135. However, pilots may operate under different standards, depending on whether they are carrying patients. Without patients or passengers on board, pilots may operate under rules specified in Part 91 of Title 14 of the Code of Federal Regulations. With patients on board, pilots are required to operate under Part 135 rules. Parts 91 and 135 flight rules differ significantly in two key areas—(1) weather and visibility minimums and (2) rest requirements—with Part 135 requirements being more stringent.

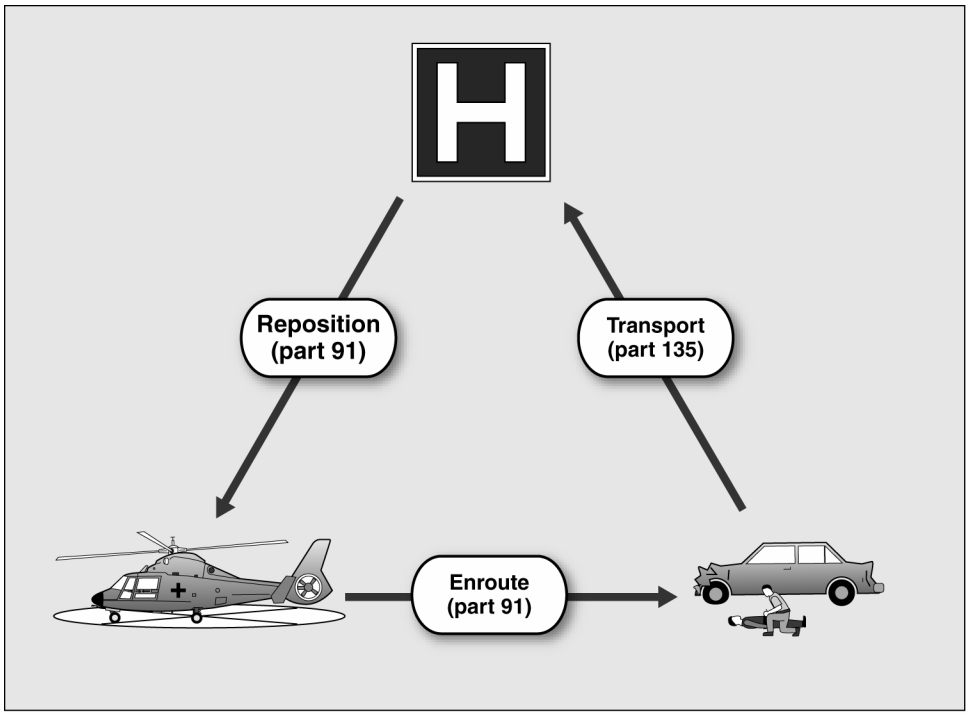
In many air ambulance trips, part of the trip may involve Part 135 rules, while another part may involve Part 91 rules. For example, scene response missions for air ambulance helicopters frequently have three legs—the flight en route to the accident scene, the transport of the patient to the hospital, and the reposition of the helicopter back to its base (see fig. 5). Only the leg during which patients or other passengers (medical crew members are not considered passengers) are on board must be flown under Part 135 flight rules. Of the 89 air ambulance accidents that we examined from 1998 through 2005, 64 took place during Part 91 flight and the remaining 25 took place during Part 135 flight. However, because air ambulance flights without patients or passengers could be flown under Part 91 requirements, there may be more than twice as many flights taking place under Part 91 compared with Part 135. A better understanding of the trends in the air ambulance industry, including accident data, will be important in deciding if the current regulatory approach is appropriate or

[23]GAO, *Aviation Safety: Improved Data Collection Needed for Effective Oversight of Air Ambulance Industry*, GAO-07-353 (Washington, D.C.: Feb. 21, 2007).

[24]NTSB, *Special Investigative Report on Emergency Medical Services Operations* (Washington, D.C.: 2006). According to NTSB, as of December 21, 2006, this recommendation and others made in this report were still open.

if more fundamental changes, such as revising FAA regulations, need to be made.

Figure 5: Air Ambulance Scene Flight Response Legs



Source: GAO.

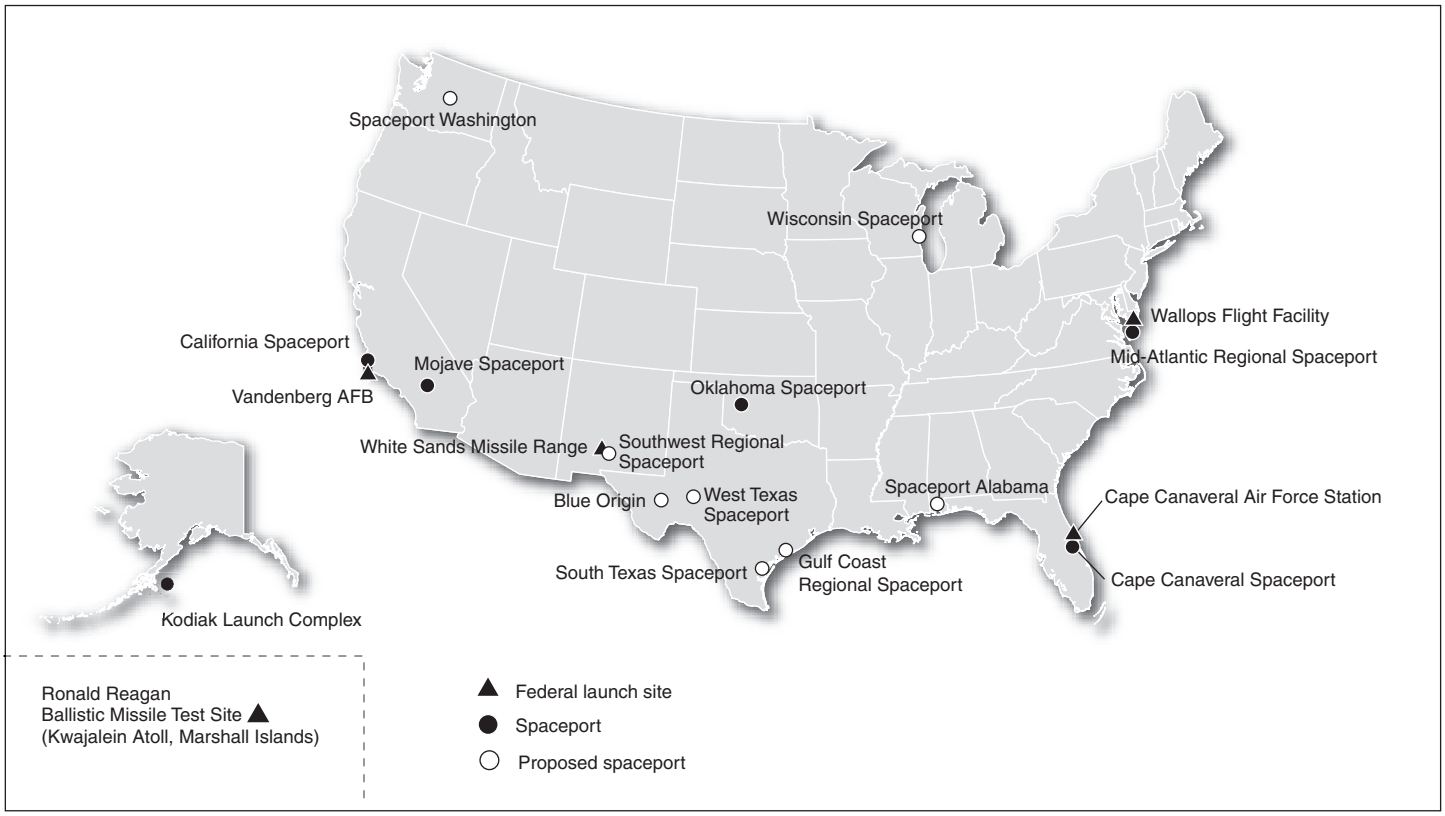
As another example, the need for a different regulatory approach for all-cargo operations has been raised. According to FAA, from 1998 through 2005, the accident rate for scheduled air cargo operators declined significantly but was still about 2.5 times higher than the accident rate for scheduled passenger operators. The Congressional Research Service pointed out that the size of aircraft, the range of operations flown by all-cargo operators, and the large growth in the all-cargo sector introduce unique risks to operators, airports, and the public that may call for revisiting the safety standards that apply to all-cargo operations.[25]

[25]Congressional Research Service, *Reauthorization of the Federal Aviation Administration: Background and Issues for Congress* (Washington, D.C.: Jan. 29, 2007).

In recent work, we also raised issues concerning FAA's regulation of the emerging space tourism industry.[26] Specifically, we suggested that Congress should consider revisiting the granting of FAA's dual mandate for ensuring safety and promoting space tourism and decide whether the elimination of FAA's promotional role is necessary to alleviate a potential conflict. FAA licenses the operation of commercial space launches and launch sites. Historically, these launches carried commercial payloads and were unmanned. The prospect for commercial space tourism materialized in 2004, after the successful launches of SpaceShipOne raised the possibility of an emerging U.S. commercial space tourism industry that would make human space travel available to the public. Several companies are planning to start taking paying passengers on suborbital flights within the next few years and a number of commercial spaceports are being planned. For example, Virgin Galactic intends to provide suborbital space flight from a planned spaceport in New Mexico starting in 2009. It plans to carry 3,000 passengers over 5 years, with 100 individuals having already paid the full fare of $200,000. Figure 6 shows current and planned spaceports. In 1984, the Commercial Space Launch Act gave DOT the authority to license and monitor the safety of commercial space launches and to promote the industry. It is important that FAA's statutory responsibility to promote the commercial space launch industry does not interfere with its safety oversight of the industry as the space tourism sector develops. We have no evidence that FAA's promotional activities, such as sponsoring an annual industry conference and publishing economic impact studies, have conflicted thus far with its safety regulatory role, but conflicts could occur as the industry matures.

[26]GAO, *Commercial Space Launches: FAA Needs Continued Planning and Monitoring to Oversee the Safety of the Emerging Space Tourism Industry*, GAO-07-16 (Washington, D.C.: Oct. 20, 2006).

Figure 6: Federal Commercial Launch Sites and Existing and Proposed Spaceports in the United States, October 2006



Sources: FAA and GAO.

In addition, FAA faces the challenge of determining the circumstances under which it would regulate the safety of crew and space flight participants. In 2004, the Commercial Space Launch Amendments Act prohibited FAA from regulating crew and passenger safety before 2012, except in response to high-risk incidents, serious injuries, or fatalities. FAA has interpreted this limited authority as allowing it to regulate crew safety in certain circumstances and has been proactive in proposing regulations concerning emergency training for crews and passengers. However, FAA has not developed safety indicators by which it would monitor the developing space tourism sector and determine when to step in and regulate human space flight. We have recommended that the agency be proactive about safety rather than respond only after a fatality or serious incident occurs by identifying and monitoring safety indicators that might trigger the need for regulation before 2012. Actions have not been taken on our recommendations.

Another emerging sector that poses regulatory issues is unmanned aircraft systems (UAS)[27] (see fig. 7), which are expected to be part of the mix of aircraft that will operate in NextGen. A small number of UASs are currently used by government agencies for a variety of purposes, such as border security, search and rescue, firefighting, military training exercises, and other law enforcement and homeland security initiatives. Recent projections indicate that over 10,000 UASs could be in operation in the United States by 2015, but FAA believes that the number may be less. We have work ongoing for this subcommittee to assess issues such as the technological and regulatory issues that remain in order for UASs to be safely integrated in the national airspace system, the timeframes for completing such work, and the identification of entities that should take the lead in such work. We expect to issue a report later this year.

Figure 7: U.S. Air Force's Global Hawk UAS

Source: Department of Defense.

[27]Unmanned aircraft systems do not carry a human operator; they are either programmed for autonomous flight (called a "drone") or are flown remotely by a ground operator.

Our preliminary work, indicates that UASs pose unique safety challenges and questions. For example, what standards should UASs meet to ensure that they detect, sense, and avoid other aircraft? What standards should be set for UAS safety and reliability? How should FAA classify UASs, which can range in size from very small, hand launched systems to those similar in size to a large passenger aircraft? What pilot qualifications are needed for UAS operators? FAA has begun to answer such questions by reviewing its existing safety regulations developed for manned aircraft to determine how or whether they need to be modified to enable UASs to be safely integrated into the national airspace system. FAA expects this to be a 5- to 10-year effort. In the meantime, FAA will continue its existing oversight approach and review each request to operate on a case-by-case basis. If FAA determines that a UAS can operate safely under specified conditions, the agency issues a certificate of authorization and the airspace is restricted during the period of operation.[28] In fiscal year 2006, FAA processed 96 applications for certificates of authorization and issued 62 certificates. FAA projects that it will receive over 400 applications in 2010. The agency may have difficulty handling such an increase under its existing case-by-case process, which could serve as a *de facto* limit on the number of UASs operating in the next few years.

FAA Needs Improved Data and Analysis for Current Safety Oversight and for the Transition to NextGen

FAA cannot rely on its current oversight approach, which focuses on labor-intensive inspections to maintain and expand the margin of safety, especially if substantial growth in air traffic materializes. FAA acknowledges this situation and sees the need to establish a safety information system that can provide an early warning of hazards that may lead to accidents and help the agency manage risk. However, our past work has found problems with the accuracy and completeness of FAA's safety data. For example, FAA does not collect actual flight activity data for general aviation operators, air taxis, or air ambulances. As a result, FAA lacks information to monitor the rate of accidents and determine the effectiveness of its oversight. We have recommended that FAA improve the accuracy and completeness of its safety data and evaluate this information to identify nationwide trends. FAA is in the early planning stages of addressing our recommendations, but more work remains.

[28]A certificate of authorization allows an operator to use defined airspace for a specified time (up to one year, in some cases) and includes special provisions unique to each operation. For instance, a certificate may include a requirement to operate only under visual flight rules.

An important aspect of FAA's safety oversight is the use of over 13,000 private individuals and organizations, known as designees, to leverage inspector resources. Designees act as representatives of the agency to conduct many safety certification activities, such as administering flight tests to pilots, inspecting repair work by maintenance facilities, and approving designs for aircraft parts. In reviewing FAA's designee programs, we found that the agency's oversight of designees was hampered, in part, by limited data on designees' performance.[29] FAA is in the early stages of addressing our recommendation to improve the consistency and completeness of designee information. FAA is also changing and expanding the designee programs by replacing certain designee programs with an organization designation authorization. By expanding the number and types of organizational designees, FAA's role is being further transformed to monitoring the performance of organizations rather than overseeing the individuals who perform the certification activities. It will be important for FAA to have the data, evaluative processes, and a well-trained inspector staff to effectively monitor the new program to make sure that safety is not adversely affected.

FAA is in the early stages of addressing some of these data issues as it begins planning a new system— Aviation Safety Information Analysis and Sharing System—that would provide access to large volumes of industry safety data. FAA began planning for the new system in 2006. Because this activity is in the early planning stages, our concerns about FAA's data remain relevant. The successful completion of this planning effort will be critical to FAA's ability to improve safety. In fiscal year 2008, FAA proposes budgeting $32 million for safety databases and computer systems. As FAA prioritizes the activities that it undertakes with these funds, it will be important to continue addressing these critical data limitations.

In addition, FAA is shifting to a data-driven, risk-based approach to maintaining the agency's approximately 40,000 pieces of air traffic control equipment, but it has not yet determined its new data needs. FAA is in the very early planning stages of a 10-year or longer effort to switch to this new approach, termed reliability centered maintenance (RCM), which private industry and other federal agencies, such as the Department of Defense (DOD) and NASA, use to maintain equipment. FAA expects the

[29]GAO, *Aviation Safety: FAA Needs to Strengthen the Management of Its Designees Programs*, GAO-05-40 (Washington, D.C.: Oct. 8, 2004).

new approach to improve equipment performance. However, we reported in November 2006 that FAA had not developed a plan to implement RCM, has not determined the data needs for RCM, and has not decided what training will be provided to staff.[30] As the agency moves forward with this approach, it will be important for FAA to address the issues we identified as well as work with stakeholders, including FAA maintenance technicians, to ensure that decisions are not driven entirely by cost savings and that the safety and efficiency of national airspace operations are not adversely affected.

FAA Faces Human Capital Challenges

FAA's ability to ensure safety in NextGen will also be affected by its ability to manage its human capital, including air traffic controllers, safety inspectors, engineers, and technicians. FAA faces a challenge in managing human capital due to contentious relations with its labor unions. Fourteen unions represent more than 34,000 of FAA's 43,200 full time permanent employees. With the exception of two unions—the National Air Traffic Controllers Association (NATCA) and the Professional Airway System Specialists (PASS), which represent about 23,000 FAA employees—12 unions have negotiated a contract or memorandum of agreement with FAA, according to agency officials. In April 2006, after reaching an impasse in negotiations with NATCA, FAA used its authority[31] to settle the impasse by imposing a contract on its air traffic controllers. After 4 years of contract negotiations with PASS, FAA reached an agreement in April 2006. The PASS membership, however, according to an FAA official, rejected this proposed contract. Subsequently, FAA filed a complaint with the Federal Labor Relations Authority claiming an unfair labor practice, according to the same FAA official. Until this complaint is adjudicated, the previous PASS contract remains in effect, according to the FAA official. Improving the contentious relationship between FAA and these unions could have positive effects on both the safety of FAA operations and the implementation of new air traffic management systems under NextGen. For example, delays in union approvals that may be needed to implement new systems could lead to delays in their implementation if labor management relations are acrimonious. In addition, the current contract situations have the potential to hinder FAA's ability to retain and recruit skilled technical staff.

[30]GAO, *FAA's Proposed Plan for Implementing a Reliability Centered Maintenance Process for Air Traffic Control Equipment*, GAO-07-81R (Washington, D.C.: Nov. 9, 2006).

[31]49 U.S.C. §40122(a)(2).

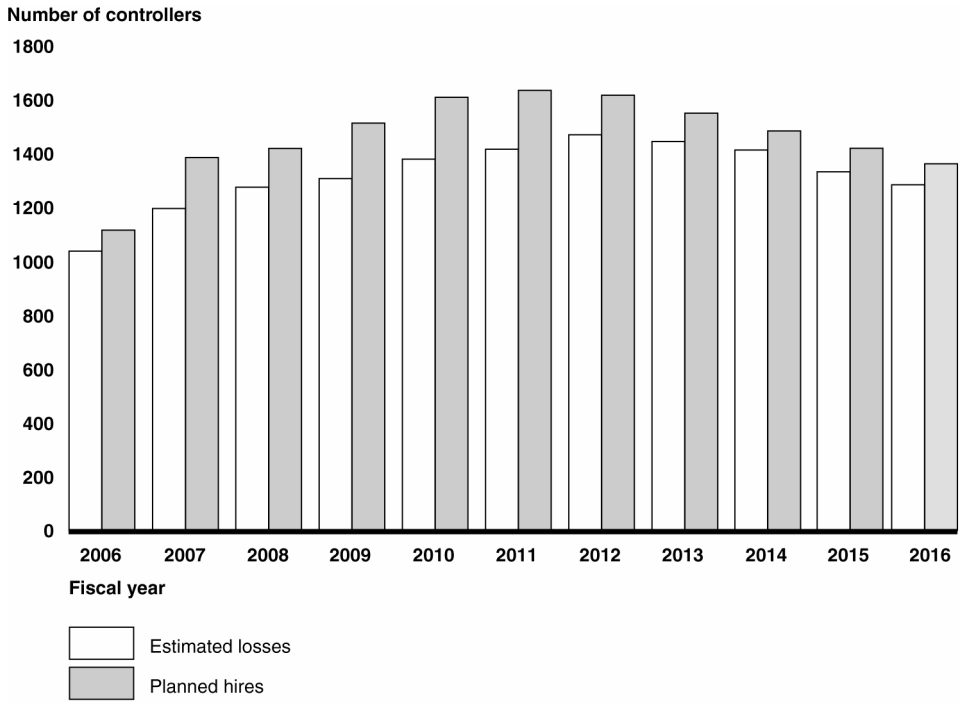
FAA estimates it will lose about 72 percent of its air traffic controller workforce over the next 10 years. (See fig. 8.) To replace these controllers, FAA plans to hire 15,004 new controllers from fiscal years 2006 through 2016, according to the agency's March 2007 controller workforce plan. This recent hiring target is higher than FAA's June 2006 hiring target[32] to reflect recent data indicating that controllers are retiring at a faster rate than FAA anticipated. To meet these higher targets, FAA has expanded its hiring sources, which had focused on individuals with prior FAA or DOD air traffic control experience and graduates from FAA's collegiate training initiative program to include the general public. This strategy is needed, according to FAA officials, because DOD has recently become less of a hiring source for controllers due to military incentives for retaining controllers and DOD's higher salaries than FAA's entry-level salary.[33] However, those new hires that lack prior air traffic control experience will require more training to become certified controllers.[34] Additionally, since it can take up to 3 to 5 years for a controller to become certified, within a few years, a large portion of the controller workforce may be trainees and not fully certified. Based on FAA's hiring and retirement projections, by 2010, about 40 percent of the air traffic controller workforce will have 5 or fewer years of experience. This high percentage of newly hired controllers will continue for a number of years, making it important for FAA to carefully balance the ratio of trainees to certified controllers at each air traffic control facility.

[32]In June 2006, FAA planned to hire 11,851 new air traffic controllers from 2006 through 2015. FAA's revised plan calls for hiring 13,641 new controllers for the same time period.

[33]Under FAA's recently implemented contract with air traffic controllers, most current controllers continue to receive their existing base salaries and benefits, while new controllers are hired at lower wages.

[34]Only newly hired controllers without any previous experience or specialized education are required to complete 5 weeks of initial qualification training.

Figure 8: Estimated Controller Losses and Planned Hires, Fiscal Years 2006-2016



Source: FAA.

Note: Numbers for fiscal year 2006 represent actual losses and hires.

In addition to the challenge of hiring and training new air traffic controllers, it will be important to deploy them in an optimal manner to reflect changing air traffic demands. FAA's recent controller workforce plan includes facility-by-facility staffing standards for fiscal year 2007 expressed as ranges.[35] The staffing standards are intended to take into consideration facility-specific information, such as air traffic operations, productivity trends, expected retirements, and the number of controllers in training. These new standards are an improvement over FAA's historical approach, which was to compute the number of controllers needed systemwide and negotiate the distribution of these totals to the facility level. However, FAA's current staffing does not align with the new standards at about one-third of FAA's 314 facilities—93 of which are

[35]For example, the staffing range at the Seattle-Tacoma International Airport is from 23 to 29 controllers.

currently overstaffed and 11 understaffed. This situation adds further complexity to the controller hiring, training, and staffing issues that FAA must carefully manage in the upcoming years. Furthermore, FAA has not factored into its staffing standards or its projected hiring targets the effect of new NextGen technologies on controller workload. The new technologies will result in a more automated system that, over time, is expected to change the role of controllers as well as productivity. In future updates of the controller workforce plan, it will be important to begin to factor in this impact.

Furthermore, having the right skill mix of safety inspectors and technicians and deploying them to make best use of their skills is especially important as new and developing sectors emerge. By 2010, 44 percent of FAA's inspector workforce of about 3,865 will be eligible to retire. To begin addressing this situation, FAA has requested funding to hire an additional 87 inspectors in fiscal year 2008. In addition to maintaining a sufficient number of safety inspectors, it will be important to deploy them where they are most needed. However, FAA lacks a staffing model to accomplish this. The National Academy of Sciences recently completed a study that analyzed FAA's staffing processes for safety inspectors and identified a number of issues that the agency needed to address. For instance, the study indicated that the current staffing process does not focus resources in the areas of greatest need and the match between individual inspectors' technical knowledge and the facilities and operations they oversee is not always optimal. In response to academy recommendations, FAA expects to develop a staffing model, but the agency does not have a specific time frame for initiating this effort. In addition, FAA lacks staffing standards for its approximately 6,100 technicians, who are responsible for maintaining the agency's air traffic control equipment. The development of staffing models for safety inspectors and technicians is important in the changing aviation environment and is critical to FAA's ability to ensure that its safety programs and workload are aligned to meet the future demands for which NextGen is preparing.

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Related GAO Products

Federal Aviation Administration: Observations on Selected Changes to FAA's Funding and Budget Structure in the Administration's Reauthorization Proposal. GAO-07-625T. Washington, D.C.: March 21, 2007.

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