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# AIR TRAFFIC CONTROL

## Status of the Current Modernization Program and Planning for the Next Generation System

Statement for the Record by  
Gerald L. Dillingham, Ph.D., Director  
Physical Infrastructure Issues



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# Highlights

Highlights of [GAO-06-738T](#), a statement for the record for the Subcommittee on Transportation, Treasury, the Judiciary, Housing and Urban Development, and Related Agencies, Committee on Appropriations, U.S. Senate

## Why GAO Did This Study

Over a decade ago, GAO listed the Federal Aviation Administration's (FAA) effort to modernize the nation's air traffic control (ATC) system as a high-risk program because of systemic management and acquisition problems. Two relatively new offices housed within FAA—the Air Traffic Organization (ATO) and the Joint Planning and Development Office (JPDO)—are now primarily responsible for planning and implementing these modernization efforts. Congress created ATO to be a performance-based organization that would improve both the agency's culture, structure, and processes, and the ATC modernization program's performance and accountability. Congress created JPDO, made up of seven partner agencies, to coordinate the federal and nonfederal stakeholders necessary to plan a transition from the current air transportation system to the "next generation air transportation system" (NGATS). This statement is based on GAO's recently completed and ongoing studies of the ATC modernization program. GAO provides information on (1) the status of ATO's efforts to improve the ATC modernization program, (2) the status of JPDO's planning efforts for NGATS, and (3) actions to control costs and leverage resources for ATC modernization and the transformation to NGATS.

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## AIR TRAFFIC CONTROL

### Status of the Current Modernization Program and Planning for the Next Generation System

#### What GAO Found

ATO has taken a number of steps as a performance-based organization to improve the ATC modernization program, but continued management attention will be required to institutionalize these initiatives. ATO has adopted core values, streamlined its management, and begun to revise its acquisition processes to become more businesslike and accountable. For the past 2 years, ATO has met its major acquisition performance goals. ATO still faces challenges, including sustaining its transformation to a results-oriented culture, hiring and training thousands of air traffic controllers, and ensuring stakeholder involvement in major system acquisitions.

JPDO has made progress in planning for NGATS by facilitating collaboration among federal agencies, ensuring the participation of federal and nonfederal stakeholders, addressing technical planning, and factoring global harmonization into its planning, but JPDO faces challenges in continuing to leverage the partner agencies' resources and in defining the roles and responsibilities of the various agencies involved. JPDO could find it difficult to sustain the support of stakeholders over the longer term and to generate participation from some key stakeholders, such as current air traffic controllers. JPDO has taken steps to develop an enterprise architecture (the blueprint for NGATS) and will have an early version later this year. The robustness and timeliness of this enterprise architecture are critical to many of JPDO's future NGATS planning activities.

ATO has taken a number of actions to control costs and maximize capital funds, which will become increasingly important during the transition to NGATS. ATO has established cost control as one of its key performance metrics, developed a cost accounting system, and is using its performance management system to hold its managers accountable for controlling costs. ATO has developed a formal cost control program that includes, among other things, (1) conducting annual business case reviews for its capital programs, (2) decommissioning and consolidating ATC facilities, and (3) pursuing cost reduction opportunities through outsourcing. These cost control initiatives represent an important first step to improved performance but will require review and monitoring.

#### Air Traffic Control Tower



Source: National Aeronautics and Space Administration.

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Mr. Chairman and Members of the Subcommittee:

We are pleased to present this statement for the record regarding the status of efforts by the Air Traffic Organization (ATO) and the Joint Planning and Development Office (JPDO) to modernize and transform the nation's air traffic control (ATC) system. Both offices are within the Federal Aviation Administration (FAA) and represent recent efforts by Congress to, among other things, ensure a national airspace system that is safe, efficient, and capable of meeting a growing demand for air transportation—a demand that is expected to triple by 2025. ATO has responsibility for operating, maintaining, and modernizing the current ATC system. ATO was authorized as a performance-based organization (PBO)<sup>1</sup> in 2000 and includes 36,000 of FAA's roughly 46,000 employees. JPDO, authorized in 2003, is responsible for planning and coordinating the broader and longer-term transformation (through 2025) to the "next generation air transportation system" (NGATS).

The ATC system is composed of an array of subsystems, including radars; automated data-processing, navigation, and communications equipment; and ATC facilities. These systems work together to support all phases of flight for aircraft operating in U.S. airspace. The ATC system also includes the FAA employees who manage, operate, and maintain ATC equipment and facilities. Over a decade ago, we designated FAA's ATC modernization program as high risk because of systemic management and acquisition problems, which we have reported on and made recommendations to address over the years.

Efforts to modernize and transform the ATC system will be costly, yet FAA anticipates lean capital budgets for the immediate future. Thus, to maintain the current ATC system while preparing for the next, FAA will have to work even harder to make the best and most efficient use of increasingly scarce resources. These transformation efforts are getting under way and will continue as the United States confronts multiple challenges and demands for resources. ATC transformation also involves the recognition that other nations are upgrading their aviation technologies, creating a need for global harmonization to support international travel.

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<sup>1</sup>PBOs are discrete units, led by a Chief Operating Officer, that commit to clear objectives, specific measurable goals, customer service standards, and targets for improved performance.

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Our statement focuses on three key questions. (1) What is the status of ATO's efforts to improve its performance as it modernizes our nation's air traffic control system? (2) What is the status of JPDO's planning efforts for NGATS? (3) To what extent are efforts being made to control costs and leverage resources to support ATC modernization and the transformation to NGATS? My statement is based on our recently completed and ongoing studies of FAA's ATC modernization program, together with updated information from ATO and JPDO officials and aviation stakeholders.<sup>2</sup> Later this year, we expect to issue two detailed reports related to the issues discussed in this statement. One report will provide our assessment of the status of JPDO's efforts to develop NGATS. Another report will examine a variety of cost-saving and financing options for FAA in the 21st century. We are performing our work in accordance with generally accepted government auditing standards.

The following is a summary of our findings to date:

- Created as a performance-based organization, ATO has been working to establish a results-oriented organizational culture, a more accountable management structure, and more businesslike management and acquisition processes, but continued management attention will be required to institutionalize these initiatives. To bring about cultural change, ATO has adopted core values such as integrity, accountability, and fiscal responsibility and is using FAA Employee Attitude Survey data to establish a baseline for assessing changes in attitudes over time. ATO has begun to hold managers accountable for cost control through its performance rating and bonus system. To improve its acquisitions process, FAA is, for example, evaluating all investment decisions, including those for systems in service beyond 2 years, to ensure that all decisions support agency goals. Recently, FAA has reported positive results: For the past 2 fiscal years, FAA has met its major acquisition performance goal—to have 80 percent of its acquisitions meet scheduled milestones and be within 10 percent of budget. However, FAA still faces challenges, including sustaining ATO's transformation to a results-oriented culture, hiring and training thousands of air traffic controllers to replace those expected to retire, ensuring stakeholder involvement in major system acquisitions to ensure that the acquisitions meet users' needs, and keeping major acquisitions, such as the FAA Telecommunications Infrastructure (FTI) on

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<sup>2</sup>Because ATO includes the majority of FAA employees, this statement will refer to ATO initiatives, even though some may apply FAA-wide.

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schedule and within budget.

- JPDO has made progress in planning for the NGATS that is described in its December 2004 Integrated Plan and its March 2006 Progress Report. JPDO's focus has included facilitating collaboration among federal agencies, ensuring active participation of stakeholders, addressing technical planning, and factoring global harmonization into its planning, but several challenges exist. Our work has shown that it is important for collaborating agencies to leverage resources and define roles and responsibilities.<sup>3</sup> JPDO has facilitated collaboration among its federal partner agencies, but faces challenges in continuing to leverage the partner agencies' resources and in defining the roles and responsibilities of the various agencies involved. JPDO is structured in a way that involves federal and nonfederal stakeholders, but could find it difficult to sustain the support of nonfederal stakeholders over the longer term and has had difficulty obtaining the participation of current air traffic controllers. JPDO is using an iterative process for technical planning, but has not completed some key activities. For example, JPDO's Evaluation and Analysis Division is beginning to model anticipated changes in air traffic controller workload, but has not completed human factors modeling to determine the effects of potential changes in pilot workload. JPDO has taken the initial steps to develop an enterprise architecture (a blueprint for NGATS) and will have an early version by the end of fiscal year 2006. The robustness and timeliness of JPDO's enterprise architecture is critical to many of JPDO's future NGATS planning activities.
- ATO has taken a number of steps to control costs and leverage resources that, in combination with other actions, can provide funds for ATC modernization and transformation to NGATS. ATO has established performance metrics for cost control, developed a cost accounting system, and is using its performance management system to hold its managers accountable for controlling costs. ATO has also developed a formal cost control program that includes (1) conducting annual business case reviews for its capital programs, (2) decommissioning and consolidating ATC facilities, (3) improving its project management of its operations programs, (4) pursuing cost reduction opportunities through outsourcing, (5) assisting Congress in identifying projects for funding priority, and (6) reducing or avoiding personnel costs through workforce attrition and efficiency gains. However, ATO's cost control efforts are at an early stage, and ATO lacks a consistent process to validate savings estimated for

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<sup>3</sup>GAO, *Results-Oriented Government: Practices That Can Help Enhance and Sustain Collaboration among Federal Agencies*, GAO-06-15 (Washington, D.C.: Oct. 21, 2005).

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operations cost control initiatives. Cost control will become increasingly important during the transition from the current ATC system to NGATS, when ATO is expected to remain responsible for the costs of operating and maintaining the current ATC system while assuming major responsibility for the costs of demonstrating and developing new NGATS technologies. Opportunities exist for greater savings and cost control. Many of these opportunities will require risk-based decision making and significant congressional support. ATO and JPDO have collaborated on developing rough near-term estimates of the funding requirements for defining concepts and developing systems for surveillance, communications, and other key NGATS components. However, these funding requirements are not currently in ATO's budget-constrained capital spending plan. ATO's NGATS funding burden could be reduced to the extent that JPDO is successful in leveraging resources from its partner agencies. Further enhancement to NGATS funding could be achieved by ATO utilizing its existing funding flexibility.

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## Background

In 1981, FAA began a program to replace and upgrade ATC facilities and equipment. However, systemic management issues, such as frequent turnover in agency leadership, an ineffective organizational culture, and problems with its acquisition process, contributed to cost growth, schedule slippages, and performance shortfalls, leading us to classify FAA's ATC modernization program as high risk in 1995.<sup>4</sup> That same year, Congress passed legislation that exempted FAA from most federal personnel and acquisition laws and regulations on the premise that FAA needed such freedom to better manage ATC modernization.<sup>5</sup> In December 2000, President Clinton signed an executive order and Congress passed supporting legislation that, together, provided FAA with the authority to create ATO as a performance-based organization (PBO) to control and improve FAA's management of the modernization effort. In February 2004, FAA reorganized, transferring 36,000 employees, most of whom worked in air traffic services and research and acquisitions, to ATO.

Even with the creation of ATO, the current approach to managing air transportation is becoming increasingly inefficient and operationally

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<sup>4</sup>ATC Modernization has remained on our high-risk list since 1995. See GAO, *High Risk Series: An Update*, GAO-05-207 (Washington, D.C.: January 2005).

<sup>5</sup>P.L. 104-50, Fiscal Year 1996 Department of Transportation Appropriations Act.

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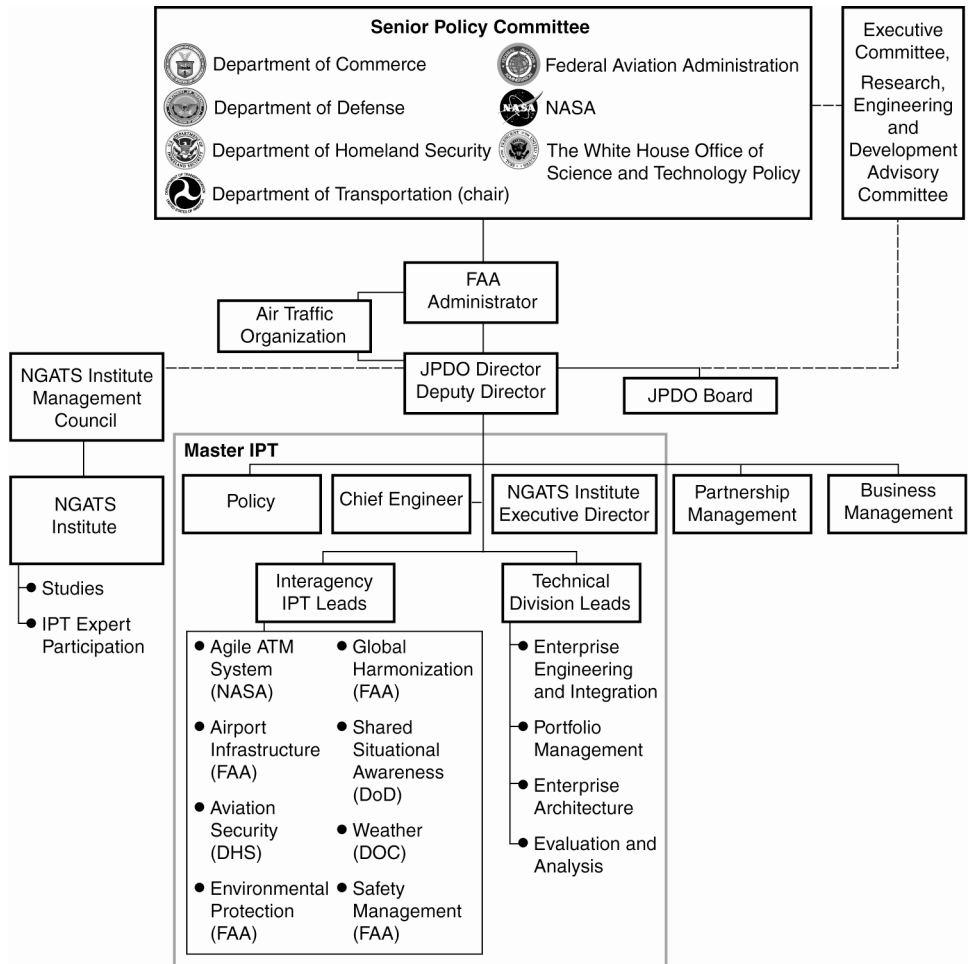
obsolete. In late 2003, Congress created JPDO<sup>6</sup> to plan NGATS, a system intended to accommodate what is expected to be three times more air traffic by 2025 than there is today. JPDO's scope is broader than traditional ATC modernization in that it is "airport curb-to-airport curb," encompassing such issues as security screening and environmental concerns. Additionally, JPDO's approach will require unprecedented collaboration and consensus among many stakeholders—federal and nonfederal—about necessary system capabilities, equipment, procedures, and regulations. Key to this collaboration will be the work of JPDO's seven partner agencies: 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. Each of these agencies will play a role in creating NGATS. For example, the Department of Defense has deployed "network centric" systems, originally developed for the battlefield, that are being considered as a framework to provide all users of the national airspace system—FAA and the Departments of Defense and Homeland Security—with a common view of that system. JPDO began its initial operations in early 2004. A Senior Policy Committee, chaired by the Secretary of Transportation and including senior representatives from each of the participating departments and agencies, provides oversight to JPDO. JPDO is located within FAA and reports to the FAA Administrator and to the Chief Operating Officer within ATO.<sup>7</sup> See figure 1.

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<sup>6</sup>P.L. 108-176, Vision 100—Century of Aviation Reauthorization Act, December 12, 2003.

<sup>7</sup>For more information on JPDO, visit [www.jpdo.aero](http://www.jpdo.aero).

**Figure 1: Organizational Chart of JPDO**



Source: JPDO.

Concurrent with JPDO’s efforts, the European Commission<sup>8</sup> is conducting a project to harmonize and modernize the pan-European air traffic management system. Known as the Single European Sky Air Traffic Management Research Programme (SESAR), the project is overseen by the European Organization for the Safety of Air Navigation (Eurocontrol).<sup>9</sup>

<sup>8</sup>The European Commission is a politically independent institution that prepares and implements legislative instruments.

<sup>9</sup>Eurocontrol is an autonomous organization established in 1963 with the intention of creating a single upper airspace in Europe.



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Eurocontrol has contracted out the work of SESAR to a 30-member consortium of airlines, air navigation service providers, airports, manufacturers, and others. The consortium is receiving 60 million euros (\$73 million)<sup>10</sup> to conduct a 2-year definition phase and produce a master plan for SESAR.

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## ATO Has Taken Steps to Improve ATC Modernization, but Challenges Remain

To improve its management of ATC modernization, ATO has taken steps toward having a more results-oriented culture; a flatter, more accountable management structure; and more businesslike management and acquisition processes. In addition, ATO is implementing recommendations we have made to address systemic factors that have contributed to cost, schedule, and performance problems with major ATC acquisitions. For the past 2 fiscal years, FAA has met its acquisition performance goals. However, FAA still faces human capital challenges, such as institutionalizing a results-oriented culture and hiring thousands of air traffic controllers during the next decade. FAA also faces challenges in keeping its major system acquisitions on track.

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## ATO Has Begun Efforts to Transform Its Culture, Structures, and Processes to Operate More Efficiently as a PBO

ATO is working to establish the results-oriented organizational culture, structures, and processes that are generally associated with a PBO. FAA, through ATO, has established a strategic goal to become a results-oriented organization. One key element of ATO's strategy is to identify core values and track employees' attitudes about those values to monitor cultural change.<sup>11</sup> To implement this element, ATO has identified multiple core values: integrity and honesty, accountability and responsibility, commitment to excellence, commitment to people, and fiscal responsibility. ATO is using FAA Employee Attitude Survey data to determine employee attitudes toward these values and has developed a baseline of employee attitudes for use in monitoring changes in attitudes over time.<sup>12</sup> Another key element of ATO's strategy is to establish a viable,

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<sup>10</sup>A portion of this funding is in-kind services from Eurocontrol. To convert euros to U.S. dollars, we used 1.2098, the foreign exchange rate for March 21, 2006, as published in *The Washington Post*.

<sup>11</sup>FAA, *Employee Attitudes Within the Air Traffic Organization* (Washington, D.C.; December 2004).

<sup>12</sup>Because the most recent FAA Employee Attitude Survey was conducted in September 2003, prior to the formation of ATO, FAA combined survey data from the FAA organizations that were merged into the ATO.

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stable, and sustainable organization that can transcend changes in leadership.

In our past work, we noted that FAA's acquisitions workforce did not have an organizational culture and structure that supported the acquisition and deployment of sophisticated technology on the scale used in the national airspace system.<sup>13</sup> For example, acquisitions were impaired because employees and managers acted in ways that did not reflect a strong commitment to mission focus, accountability, adaptability, and coordination. Specifically, officials performed little or no mission needs analysis, made unrealistic cost and schedule estimates, and moved to producing systems before completing their development. We also reported that accountability was not well defined or enforced for decisions on requirements and contract oversight. Additionally, vertical lines of authority impaired communication across organizations that needed to coordinate, particularly the acquisitions and operations areas of FAA. Finally, we reported that FAA's culture of conservatism and conformity rewarded employees for simply following the rules rather than considering innovation. We recommended that FAA develop a strategy for cultural change. Although FAA responded to our recommendation by developing a cultural change strategy and some other related initiatives, these initiatives were neither fully implemented nor sustained.

ATO has put a new management structure in place and established more businesslike management and acquisition processes. ATO is structured as a discrete management unit within FAA and is headed by a Chief Operating Officer (COO), who is appointed to a 5-year term. It has become a flatter organization, with fewer management layers. As a result, managers are in closer contact with the services they deliver. ATO is also taking some steps to break down the vertical lines of authority, or organizational stovepipes, that we found hindered communication and coordination across FAA. For example, the COO holds daily meetings with the managers of ATO's departments and holds the managers collectively responsible for the success of ATO through the performance management system. According to the COO, the daily meetings have been a revelation for some managers who were formerly only focused on and responsible for their own departments.

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<sup>13</sup>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).

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ATO has begun to revise its business processes to increase accountability. For example, it has recently established a cost accounting system and made the units that deliver services within each department responsible for managing their own costs. Thus, each unit manager develops an operating budget and is held accountable for holding costs within specific targets. Managers track the costs of their unit's operations, facilities and equipment, and overhead and use this information to determine the costs of the services their unit provides. Managers are evaluated and rewarded according to how well they hold their costs within established targets. Our work has shown that it is important, when implementing organizational transformations, to use a performance management system to assure accountability for change.<sup>14</sup>

Finally, ATO is revising its acquisition processes, as we recommended,<sup>15</sup> and taking steps to improve oversight, operational efficiency, and cost control. To ensure executive-level oversight of all key decisions, FAA plans to revise its Acquisition Management System to incorporate key decision points in a knowledge-based product development process by June 2006. Moreover, as we have reported, ATO formed an executive council to review major acquisitions before they are sent to FAA's Joint Resources Council.<sup>16</sup> To better manage cost growth, this executive council also reviews project breaches of 5 percent or more in cost, schedule, or performance. FAA has issued guidance on how to develop and use pricing, including guidelines for disclosing the levels of uncertainty and imprecision that are inherent in cost estimates for major ATC systems. Additionally, ATO has begun to base funding decisions for system acquisitions on a system's expected contribution to controlling operating costs. Finally, FAA is creating a training framework for its acquisition workforce that mirrors effective human capital practices that we have identified, and the agency is taking steps to measure the effectiveness of its training.

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<sup>14</sup>GAO, *Results-Oriented Cultures: Implementation Steps to Assist Mergers and Organizational Transformations*, [GAO-03-669](#) (Washington, D.C.: July 2, 2003).

<sup>15</sup>GAO, *Air Traffic Control: FAA's Acquisition Management has Improved, but Policies and Oversight Need Strengthening to Help Ensure Results*, [GAO-05-23](#) (Washington, D.C.: Nov. 12, 2004).

<sup>16</sup>The Joint Resources Council is an FAA body responsible for approving and overseeing major system acquisitions.

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## ATO Has Begun to Address Systemic Causes of Delays and Cost Overruns in ATC Modernization

ATO has begun taking actions to address systemic factors that our work has shown contribute individually or collectively to schedule delays or cost overruns in major system acquisitions. Such factors include funding acquisitions at lower levels than called for in agency planning documents, not considering all information technology investments as a complete portfolio, not adequately defining a system's requirements or understanding software complexity, and not adequately considering customer needs in a system's functional and performance requirements.

*Funding acquisitions at lower levels than called for in agency planning documents.* When FAA initiates a major system acquisition, it estimates, and its top management approves, the funding plan for each year. However, when budget constraints do not allow all system acquisitions to be fully funded at the previously approved levels, FAA must decide which programs to fund and which to cut, according to its priorities. When a system acquisition does not receive the annual funding called for in its planning documents, the acquisition may fall behind schedule. This may also postpone the benefits of the new system and can require FAA to continue operating and maintaining the older equipment that the acquisition is intended to replace. For example, reduced funding was one factor that caused FAA to reduce the initial deployment of its ASR-11 digital radar system from 111 systems to 66 systems, as well as defer decisions on further deployment pending additional study. In the meantime, FAA will have to continue maintaining the aging analog radars that the new system was intended to replace. To address this issue, we recommended that, to help ensure key administration and congressional decision makers have more complete information, FAA identify and annually report which activities under the ATC modernization program have had funding deferred, reduced, or eliminated, and provide detailed information on how those decisions have affected FAA's ability to modernize the ATC system and related components in the near, mid, and longer term.<sup>17</sup> Such information would make clear how constrained budgets will affect modernization of the national airspace system and how FAA is working to live within its means. According to FAA, the agency intends to better inform Congress in the future by providing information in its capital investment plan, submitted to Congress annually with the President's Budget, that will identify changes from the preceding year.

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<sup>17</sup>GAO, *The National Airspace System: FAA Has Made Progress but Continues to Face Challenges in Acquiring Major Air Traffic Control Systems*, [GAO-05-331](#) (Washington, D.C.: June 10, 2005).

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*Not considering all information technology investments as a complete portfolio.* We pointed out that FAA does not evaluate projects beyond the first 2 years of service to ensure that they are aligned with organizational goals.<sup>18</sup> Consequently, the agency could not ensure that projects with a longer service history, totaling about \$1.3 billion per year, were still aligned with FAA's strategic plans and business goals and objectives. We recommended that FAA include these projects in its investment portfolio management for review. FAA's current version of its Acquisition Management Policy calls for periodic monitoring of in-service systems to collect and analyze performance data to use as the basis for sustained deployment. However, we have not yet evaluated FAA's implementation of this policy.

*Not adequately defining a system's requirements or understanding software complexity.* Inadequate or poorly defined requirements may contribute to the inability of system acquisitions to meet their original cost, schedule, or performance targets, since developing or redefining requirements as an acquisition progresses takes time and can be costly. In addition, unplanned development work may occur when the agency misjudges the extent to which a commercial-off-the-shelf or nondevelopmental item, such as one procured by another agency, will meet FAA's needs. For example, FAA sought to use an Army radio as the core of a new digital ATC communication system, but found that the radio did not meet established interference requirements, which contributed to schedule delays. When FAA underestimates the complexity of software development or misjudges the difficulty of modifying available software to fulfill its mission needs, acquisitions may take longer and cost more than expected. FAA's acquisition of the Local Area Augmentation System (LAAS)—a system that would allow precision instrument approaches and landings in all weather conditions—is a case in point. FAA underestimated LAAS's software complexity because it inadequately assessed the system's technology maturity. In particular, the agency misunderstood the potential for radio interference through the atmosphere, which could limit LAAS's operations. The technical difficulties encountered with LAAS, among other things, led FAA to suspend this acquisition. To reduce these risks, FAA has developed and applied a process improvement model to a number of acquisition projects. This model is used to assess the maturity of FAA's

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<sup>18</sup>GAO, *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).

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software and systems capabilities. As we reported, this approach has resulted in enhanced productivity, higher quality, greater ability to predict schedules and resources, better morale, and improved communication and teamwork.<sup>19</sup> However, FAA did not mandate the use of the model throughout the organization. In response to our recommendation that FAA institutionalize the model's use throughout the organization, FAA has begun developing a requirement that acquisition projects have process improvement activities in place before seeking approval from FAA's investment review board.

*Not adequately considering customer needs in a system's functional and performance requirements.* We reported that FAA was not applying best practices used in Department of Defense and commercial product development. Best practices include balancing customer needs with available resources. According to FAA, the agency is now including in its acquisition guidance a requirement that top-level functional and performance requirements reflect the needs of the customer.

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### FAA Met Its Acquisition Performance Goal for the Second Consecutive Year, but Use of Revised Milestones Does Not Provide Consistent Benchmarks

FAA has now met its acquisitions performance goal 2 years in a row. The goal for fiscal years 2004 and 2005 was to have 80 percent of its system acquisitions on schedule and within 10 percent of budget. The goal gradually increases to 90 percent by fiscal year 2008. The increase will make FAA's acquisition performance goal consistent with targets set in the Department of Transportation's strategic plan and will comply with the Federal Acquisition Streamlining Act of 1994.

Having such a goal is consistent with the President's Management Agenda, which calls for a commitment to achieve immediate, concrete, and measurable results in the near term, and meeting this goal is a positive step toward better acquisition management. However, if the milestones for an acquisition have changed over the years to reflect changes in its cost and schedule, then using those revised milestones may not provide a complete picture of the acquisition's progress over time. For example, the milestones for 3 of the 16 major system acquisitions that we reviewed in detail during 2004 and 2005 were being revised to reflect cost or schedule changes during 2005. These revised milestones, together with revised targets for meeting them, will become the new milestones for fiscal year

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<sup>19</sup>GAO, *Air Traffic Control: System Management Capabilities Improved, but More Can Be Done to Institutionalize Improvements*, GAO-04-901 (Washington, D.C.: Aug. 20, 2004).

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2006. While revising milestones and targets that are no longer valid is an appropriate management action, using revised rather than original targets for measuring performance does not provide a consistent benchmark over time. The extent to which an acquisition meets its annual performance targets is one measure of its performance and should be viewed together with other measures, such as its progress against original and revised baselines. The variance reports provided to the FAA Administrator and to Congress may also be useful in evaluating an acquisition's performance.<sup>20</sup>

Since fiscal year 2003, the number of acquisition programs measured by FAA has varied from 31 to 42. According to FAA, the number varies from year to year, in part, because some programs reach completion and others are initiated. The programs that are selected each fiscal year represent a cross section of ATO programs, including investments in new capabilities and others that are ready for use without modification. FAA's Portfolio of Goals, which provides supplementary information on the agency's performance goals, asserts that no bias exists in the selection of milestones for performance review, but does not state the basis for this conclusion. The portfolio also states that the milestones selected represent the program office's determination of the efforts that are "critical" or important enough to warrant inclusion in the acquisition performance goal for the year. However, we have not conducted a detailed examination of the reliability and validity of FAA's metrics for its acquisition program performance.

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## ATO Faces Human Capital Challenges in Creating a More Results-Oriented Culture and Hiring and Training Thousands of Air Traffic Controllers

ATO faces a challenge in sustaining and institutionalizing management focus on its transformation to an effective PBO and a results-oriented culture. Our work has shown that successful transformations and the institutionalization of change in large public and private organizations can take 5 to 7 years or more to fully implement.<sup>21</sup> To ensure that FAA's focus on cultural change does not diminish as it did in the past, we recommended that FAA provide sustained oversight of efforts to achieve a more results-oriented workforce culture, including periodically monitoring the agency's progress against baseline data.<sup>22</sup> As discussed, ATO has

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<sup>20</sup> According to FAA, the agency tracks acquisition program performance from its original baseline or any subsequently approved baselines approved by the Joint Resource Council, and reports variances to the Administrator and to Congress as required.

<sup>21</sup> [GAO-03-669](#).

<sup>22</sup> [GAO-06-154](#).



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established a baseline of employee attitudes for use in monitoring cultural change, and similar long-term management attention will be needed to conduct this monitoring and assess ATO's progress toward becoming a PBO.

FAA also faces the challenge of hiring and training thousands of air traffic controllers during the coming decade. According to its controller staffing plan, FAA expects to lose about 11,000 air traffic controllers due to voluntary retirements or mandatory retirements at age 56, as well as other reasons.<sup>23</sup> These retirements stem from the 1981 controller strike, when President Ronald Reagan fired over 10,000 air traffic controllers and FAA then had to quickly rebuild the controller workforce. From 1982 through 1991, FAA hired an average of 2,655 controllers per year. These controllers will become eligible for retirement during the next decade. To replace these controllers, as well as those who will leave for other reasons, and to accommodate forecasted increases in air traffic, FAA's plan calls for hiring a total of 12,500 new controllers over the next 10 years.<sup>24</sup>

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### FAA Faces Challenges in Ensuring Stakeholder Involvement in Major System Acquisitions and Keeping Acquisitions on Schedule and within Budget

Adequately involving stakeholders in a system's development is important to ensure that the system meets users' needs. In the past, air traffic controllers were permanently assigned to FAA's major system acquisition program offices and provided input into air traffic control modernization projects. In June 2005, FAA terminated this arrangement because of budget constraints. According to FAA, it now plans to obtain the subject-matter expertise of air traffic controllers or other stakeholders as needed in major system acquisitions. It remains to be seen whether this approach will be sufficient to avoid problems such as FAA experienced when inadequate stakeholder involvement in the development of new air traffic controller workstations (known as the Standard Terminal Automation Replacement System (STARS)) contributed to unplanned work, which, in turn, led to significant cost growth and schedule delays.<sup>25</sup>

Three systems—all communications-related—missed the fiscal year 2005 acquisition performance goal for schedule. According to FAA, the \$310

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<sup>23</sup>FAA, *A Plan for the Future: The Federal Aviation Administration's 10-Year Strategy for the Air Traffic Control Workforce* (Dec. 21, 2004).

<sup>24</sup>Since issuing its controller staffing plan, FAA has achieved productivity gains that have reduced the need to hire about 460 air traffic controllers.

<sup>25</sup>[GAO-05-331](#).



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million FTI acquisition, which is replacing costly existing networks of separately managed systems and services by integrating advanced telecommunications services, was behind schedule because initial plans did not allow sufficient time for installations. To complete the installations in fiscal year 2008, as originally scheduled, FAA initiated a plan to put the program back on schedule and has met the plan's milestones since August 2005. Two other communications acquisition programs also missed the acquisition performance goal for schedule—the \$325 million Next Generation Air-to-Ground Communication system, segment 1A, which replaces analog communication systems with digital systems, and the \$85 million Ultra High Frequency Radio Replacement, which replaces aging equipment used to communicate with Department of Defense aircraft. According to an FAA official, as the agency assessed its priorities for fiscal year 2005, a decision was made that these programs would receive fewer resources. The resources that were then available were not sufficient to allow the programs to meet established milestones.

To the extent that delays in FTI persist, FAA will lose the cost savings that the system was expected to produce. The Department of Transportation's Office of the Inspector General has reported that FAA did not realize \$32.6 million in anticipated operating cost savings in fiscal year 2005 because of the limited progress made in disconnecting legacy circuits. The office also reported that without a nearly tenfold increase in its rate of transferring service to FTI and disconnecting legacy circuits, FAA stands to miss out on an additional \$102 million in cost savings in fiscal year 2006. As an alternative to continuing the current FTI program, some experts have suggested that FAA consider outsourcing this activity, as it recently did for its flight service stations.<sup>26</sup>

In summary, ATO has made a number of promising moves toward becoming a results-oriented organization, and we view ATO's efforts to improve its culture, management, and acquisitions process as positive steps. However, ATO has been established for only slightly more than 2 years. Work remains to ensure that these processes become institutionalized. Although it is still too early to evaluate the effectiveness of many of these steps, we are monitoring ATO's progress. As ATO moves forward, it will play a key role in implementing NGATS, as planned by JPDO. I will now discuss the status of JPDO's planning efforts.

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<sup>26</sup>In February 2005, FAA awarded a contract for the operation of its flight service stations.

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## JPDO Has Made Progress in Planning for NGATS, but Faces Challenges and Opportunities in Several Areas

JPDO has engaged in practices that facilitate collaboration among its partner agencies, but faces challenges in continuing to leverage resources from these agencies and in defining the roles and responsibilities of the various entities involved. JPDO has been structured to involve both federal and nonfederal stakeholders, but maintaining the support of nonfederal stakeholders over the long term and soliciting the participation of some stakeholders may prove difficult. JPDO is using a reasonable process for technical planning, but several key technical planning activities remain. Lastly, JPDO is including efforts toward global harmonization in its planning for NGATS, but other opportunities for cooperation have not been fully explored.

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## JPDO Has Begun to Facilitate Collaboration among Federal Agencies, but Faces Challenges in Continuing to Leverage Resources and in Defining Roles and Responsibilities

Our work to date shows that JPDO is facilitating the federal interagency collaboration that is central to its mission and legislative mandate. According to our research, agencies must have a clear and compelling rationale for working together to overcome significant differences in their missions, cultures, and established ways of doing business. In developing JPDO's integrated plan,<sup>27</sup> the partner agencies agreed to a vision statement and eight strategies that broadly address the goals and objectives for NGATS. These strategies formed the basis for JPDO's eight integrated product teams (IPT), and various partner agencies have taken the lead on specific strategies. Our research has also shown that it is important for collaborating agencies to include the human, technological, and physical resources needed to initiate or sustain their collaborative effort. To leverage human resources, JPDO has staffed the various levels of its organization with partner-agency employees, many of whom work part time for JPDO. To leverage technological resources, JPDO conducted an interagency program review of its partner agencies' research and development programs to identify work that could support NGATS. Through this process, JPDO identified early opportunities that could be pursued during fiscal year 2007 to produce tangible results for NGATS,

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<sup>27</sup>The Vision 100 Act called for JPDO to create and carry out an integrated plan for NGATS. This integrated plan was developed by the partner agencies and submitted to Congress on December 12, 2004.

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such as the Automatic Dependent Surveillance-Broadcast (ADS-B)<sup>28</sup> program at FAA.

However, while JPDO's legislation, integrated plan, and governance structure<sup>29</sup> provide the framework for institutionalizing collaboration among multiple federal agencies, JPDO is fundamentally a planning and coordinating body that lacks authority over the key human and technological resources needed to continue developing plans and system requirements for NGATS. Consequently, the ability to continue leveraging resources of the partner agencies will be critical to JPDO's success. However, beginning around 2008, JPDO expects a significant increase in its IPTs' workloads. JPDO officials told us that although the partner agencies have not yet expressed concerns over the time that their employees spend on JPDO work, it remains to be seen whether agencies will be willing to allow their staff to devote more of their time to JPDO. In addition, JPDO anticipates needing more agency resources to plan and implement demonstrations of potential technologies to illustrate some of the early benefits that could be achieved from the transformation to NGATS.

This challenge of leveraging resources arises, in part, because the partner agencies have a variety of missions and priorities other than supporting NGATS. NASA, for example, while conducting key aeronautical and safety research relevant to NGATS, nonetheless has other competing missions. Recently, NASA's management determined that for the agency to meet its other mission needs, it would not develop new aviation technologies to the extent that it had in the past. As a result, additional development costs related to NGATS will have to be borne by JPDO, industry, or some combination.

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<sup>28</sup>ADS-B is a surveillance technology that transmits an aircraft's identity, position, velocity, and intent to other aircraft and to ATC systems on the ground, thereby enabling pilots and controllers to have a common picture of airspace and traffic. By providing pilots with a display that shows the location of nearby aircraft, the system enables pilots to collaborate in decision making with controllers, safely allowing reduced aircraft separation and thereby increasing NAS capacity.

<sup>29</sup>Some of JPDO's governance structure was determined by Vision 100, which directed the Secretary of Transportation to establish a Senior Policy Committee and set forth the membership of this committee. In addition, JPDO has established a Board of Directors, a Master IPT, and several divisions.

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JPDO also faces the challenge of clearly defining its partner agencies' roles and responsibilities. Our work has shown that collaborating agencies should work together to define and agree on their respective roles and responsibilities, including how the collaboration will be led. In JPDO's case, there is no formal, long-term agreement on the partner agencies' roles and responsibilities in creating NGATS. According to JPDO officials, a memorandum of understanding that would define the partner agencies' relationships was being developed as of August 2005, but has not yet been completed.

Defining roles and responsibilities is particularly important between JPDO and ATO, because both organizations have responsibilities related to planning the national airspace system's modernization. ATO has primary responsibility for the ATC system's current and near-term modernization, while JPDO has responsibility for planning and coordinating a transformation to NGATS over the next 20 years. The roles and responsibilities of each office are currently being worked out. ATO now plans to expand its Operational Evolution Plan so that it applies FAA-wide and represents FAA's piece of JPDO's overall NGATS plan.<sup>30</sup> As the roles and responsibilities of the two offices become more clearly defined, there is also a need to better communicate these decisions to stakeholders.

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**JPDO Is Structured to Involve Federal and Nonfederal Stakeholders, but Faces a Challenge in Soliciting and Maintaining Support over the Long Term**

JPDO has structured itself to involve federal and nonfederal stakeholders throughout its organization. Our work has shown that involving stakeholders can, among other things, increase their support for a collaborative effort. Federal stakeholders from the partner agencies serve on JPDO's Senior Policy Committee, board, and IPTs. Nonfederal stakeholders may participate through the NGATS Institute (the Institute). Through the Institute, JPDO obtained the participation of over 180 stakeholders from over 70 organizations for the IPTs. The NGATS Institute Management Council, composed of top officials and representatives from the aviation community, oversees the policy and recommendations of the Institute and provides a means for advancing consensus positions on critical NGATS issues.

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<sup>30</sup>Currently, FAA's Operational Evolution Plan monitors how NAS capacity will change over a rolling 10-year planning horizon depending on numerous variables, such as the demand for air travel, the completion of new runways, and the availability of new ATC systems.

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Although JPDO has developed the mechanisms for involving stakeholders and brought stakeholders into the process, it faces challenges in sustaining nonfederal stakeholders' participation over the long term. Much as with the federal partner agencies, JPDO has no direct authority over the human, technical, or financial resources of its nonfederal stakeholders. To date, these stakeholders' investment in NGATS has been through their part-time, pro bono participation on the IPTs and the NGATS Institute Management Council.<sup>31</sup> The challenge for JPDO is to maintain the interest and enthusiasm of these nonfederal stakeholders, which will have to juggle their own multiple priorities and resource demands, even though some of the tangible benefits of NGATS may not be realized for several years. For example, stakeholders' support will be important for programs such as System Wide Information Management (SWIM),<sup>32</sup> which is a prerequisite to future benefits, but may not produce tangible benefits in the near term.

In the wake of past national airspace modernization efforts, JPDO also faces the challenge of convincing nonfederal stakeholders that the government is financially committed to NGATS. While most of FAA's major ATC acquisition programs are currently on track, earlier attempts at modernizing the national airspace system encountered many difficulties. In one instance, for example, FAA developed a datalink communications system that transmitted scripted e-mail-like messages between controllers and pilots. One airline equipped its aircraft with this new technology, but because of funding cuts, FAA ended up canceling the program. In a similar vein, we have reported that some aviation stakeholders expressed concern that FAA may not follow through with its airspace redesign efforts and are hesitant to invest in equipment unless they are sure that FAA's efforts will continue. One expert suggested to us that the government might mitigate this issue by making an initial investment in a specific technology before requesting that airlines or other industry stakeholders purchase equipment.

In addition to maintaining stakeholder involvement, JPDO faces challenges in obtaining the participation of all stakeholders. In particular,

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<sup>31</sup>Nonfederal stakeholders' participation varies from approximately 10 percent to 25 percent of their time per week on the IPTs and involves approximately one meeting per month for members of the council.

<sup>32</sup>SWIM is expected to help transition the NAS to network-centric operations by providing the infrastructure and associated policies and standards to enable information sharing among all authorized NAS users, such as the airlines, other government agencies, and the military.

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JPDO does not involve current air traffic controllers, who will play a key role in NGATS. The current air traffic control system is based primarily on the premise that air traffic controllers direct pilots to maintain safe separation between aircraft. In NGATS, this premise could change and, accordingly, JPDO has recognized the need to conduct human factors research on such issues, including how tasks should be allocated between humans and automated systems, and how the existing allocation of responsibilities between pilots and air traffic controllers might change. The input of current air traffic controllers who have recent experience controlling aircraft is important in considering human factors and safety issues, as our work on STARS has shown.

However, as mentioned, no current air traffic controllers are involved in NGATS. In June 2005, FAA terminated its liaison program through which air traffic controllers had been assigned as liaisons to its major system acquisition program offices. This included the liaison assigned to JPDO. Since that time, the National Air Traffic Controllers Association (NATCA), the labor union that represents air traffic controllers, has not been a participant in planning NGATS. Although the NGATS Institute Management Council includes a seat for the union, a NATCA official told us that the union's head had been unable to attend the council's meetings. According to JPDO officials, the council has left a seat open in hopes that the controllers will participate in NGATS after a new labor-management agreement between NATCA and FAA has been settled.

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### **JPDO Is Using a Reasonable Process for Technical Planning, but Has Not Yet Completed Key Activities**

To conduct the technical planning needed to develop NGATS, JPDO is using an iterative process that appears to be reasonable given the complexity of NGATS. Two fundamental pieces of this technical planning are modeling and developing an enterprise architecture (a tool, or blueprint, for understanding and planning complex systems).

JPDO has formed an Evaluation and Analysis Division (EAD), composed of FAA and NASA employees and contractors, to assemble a suite of models that will help JPDO refine its plans for NGATS and iteratively narrow the range of potential solutions. For example, EAD has used modeling to begin studying how possible changes in the duties of key individuals, such as air traffic controllers, could affect the workload and performance of others, such as airport ground personnel. NGATS could shift some tasks now done by air traffic controllers to pilots. However, EAD has not yet begun to model the effect of this shift on pilots' performance because, according to an EAD official, a suitable model has not yet been incorporated into the modeling tool suite. According to EAD,

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addressing this issue is difficult because data on pilot behavior are not readily available to use in creating such models. Furthermore, EAD has not studied the training implications of various NGATS-proposed solutions because further definition of the concept of operations for these solutions has not been completed. As the concept of operations matures, it will be important for air traffic controllers and other affected stakeholders to provide their perspectives on these modeling efforts. In addition, as the concept of operations and plans for sequencing equipment matures, EAD will be able to study the extent to which new air traffic controllers will have to be trained to operate both the old and the new equipment.

To develop an enterprise architecture, JPDO has taken several important first steps and is following several effective practices that we have identified for enterprise architecture development. However, JPDO's enterprise architecture is currently a work in progress. Development of the NGATS enterprise architecture is critical to JPDO's planning efforts, and many of JPDO's future activities will depend on the robustness and timeliness of its architecture development. The enterprise architecture will describe ATO's operation of the current national airspace system, JPDO's plans for the NGATS, and the sequence of steps needed to transition between them. The enterprise architecture will provide the means for coordinating among the partner agencies and private sector manufacturers, aligning relevant research and development activities, integrating equipment, and estimating system costs.

To date, JPDO has formed an Enterprise Architecture Division and plans to have an early version of the architecture by the end of fiscal year 2006. The office has established and filled a chief architect position and established an NGATS Architecture Council composed of representatives from each partner agency's chief architect office. This provides the organizational structure and oversight needed to develop an enterprise architecture. JPDO's phased "build a little, test a little" approach for developing and refining its enterprise architecture is similar to a process that we have advocated for FAA's major system acquisition programs. In addition, this phased development process will allow JPDO to incorporate evolving market forces and technologies in its architecture and thus better manage change.

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## JPDO Is Planning for Global Harmonization as Part of the NGATS Effort, but Additional Cooperative Activities Have Not Been Fully Explored

Global harmonization is one of the important strategies underlying NGATS, and JPDO has started to plan for harmonization. JPDO officials said they recognize the need to work toward the global harmonization of systems and have met with officials from various parts of the world, including China, East Asia, and Europe, to assess the potential for cooperative NGATS demonstrations. JPDO has a global harmonization IPT, led by managers from ATO's International Operations Planning Services International and FAA's Office of International Aviation. The IPT's mission is to harmonize equipment and operations globally and advocate for the adoption of U.S.-preferred transformation concepts, technologies, procedures, and standards. The harmonization IPT finalized its charter in March 2006 and is working to develop an international strategy and outreach plan. In addition to external efforts, the harmonization IPT plans to work as a crosscutting IPT that will raise awareness of global interoperability and standards issues within the other IPTs as they consider product development.

JPDO officials have noted the need to work toward harmonization with the Single European Sky Air Traffic Management Research Programme (SESAR), a major initiative to modernize the airspace system of the European Union. Eurocontrol has been designated to conduct SESAR to both modernize and integrate European air traffic management systems. While similar in many respects to the NGATS planning effort, Eurocontrol has contracted with an industry consortium to conduct the 2-year planning phase of the project.

According to several European officials with whom we spoke, global harmonization (and harmonization with the U.S. system specifically) is considered to be a key ingredient for the success of SESAR. Several of these officials said that although the European organization invited JPDO to participate as a full member in SESAR and the organization has indicated its willingness to have reciprocal participation with the United States, personnel exchanges are just beginning to occur. JPDO officials recognize the importance of cooperative efforts and noted that if Europe and the United States were to implement different and incompatible standards and technologies, there could be a major adverse impact on airlines that serve international markets. Nonetheless, these officials point out that JPDO, as a U.S. government entity, could not participate as a member in a private industry effort like the SESAR consortium. FAA is, however, a member of the European Commission's Industry Consultation Body, which provides advice to SESAR. The JPDO officials also said personnel exchanges and other cooperative activities, such as information exchanges and a joint working group on technical standards, are now



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being conducted under a memorandum of cooperation between FAA and Eurocontrol.

While FAA and the harmonization IPT are planning cooperative activities, our research has identified several other areas where cooperation does not appear to be fully developed. For example, the SESAR and NGATS initiatives, despite their similarities, do not have coordination activities such as peer reviews of relevant research, cooperation on safety analysis (such as through the pooling of accident data), or validation of technologies. It is possible that greater cooperation and exchange between NGATS and SESAR might develop once planning has progressed to the development and validation stage.

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## ATO and JPDO are Working to Address Funding Challenges

In the face of rising operating costs, ATO has implemented a number of cost control initiatives. Savings realized from ATO efforts to control costs could be used for modernization efforts, including the development of NGATS. Funding flexibility could also help to address these challenges. In addition to the cost savings efforts initiated by ATO, JPDO is identifying potential ways to leverage available resources to support initial NGATS initiatives.

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## ATO Has Begun to Take a Number of Steps to Address Rising Operating Costs

To address rising operating costs and improve performance, ATO has developed a formal cost control program that includes completing the development of a cost accounting system and using information from the system to conduct activity value analysis—that is, to assess the value of its products and services to its customers. The cost control program also includes conducting annual business case reviews, primarily for its capital programs, and assisting Congress in identifying funding priorities. To control costs, ATO is decommissioning and consolidating ATC facilities, improving its contract management, pursuing cost reduction opportunities through outsourcing, and avoiding or reducing personnel costs through workforce attrition and efficiency gains.

ATO has made significant progress in developing its cost accounting system.<sup>33</sup> In doing so, ATO is addressing our long-standing concern that

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<sup>33</sup>FAA is using its cost accounting system to potentially allocate costs of its services to users to better align its costs with revenues through a new funding mechanism. GAO is currently examining this effort as part of an ongoing study examining FAA financing options.

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FAA lacked the cost information necessary for decision making and could not adequately account for its activities and major projects, such as its ATC modernization programs. ATO officials have also noted that the system will enhance their ability to accurately determine the costs of providing specific services or products and to compare those costs with the value provided to the organization's customers. This information will be valuable in prioritizing activities and weighing the costs and benefits of various courses of action when developing and supporting proposed budgets. It will also allow FAA to base funding decisions for system acquisitions on their contribution to reducing the agency's operating costs. These efforts facilitate ATO's activity value analysis, through which ATO determines (1) the costs of the products and services provided, (2) the factors that affect the costs, and (3) the value of these products and services, as perceived by ATO's customers. By comparing the costs of providing services with their value to customers, ATO officials expect the process to help them eliminate activities with low customer value and determine ways to reduce the costs of activities with high customer value.

ATO expects business case reviews of its capital programs to reduce its ATC modernization costs by about \$62 million in fiscal year 2007 and by nearly \$400 million by fiscal year 2008. Over the last 2 years, ATO conducted business case reviews of 81 programs, including 67 capital programs and 14 operations programs. Through these annual reviews, ATO examines each program to ensure that its funding is justified, and if ATO determines that the funding is not justified, it may terminate or restructure the program. To date, ATO has terminated or restructured 6 programs after reviewing the business cases for them, including its Medium Intensity Airport Weather System (MIAWS) program. ATO canceled this program's \$4 million spending request.<sup>34</sup> ATO also reduced the funding for a radar replacement program after reviewing its business case and identifying opportunities to conduct more effective maintenance rather than replace radars. Through these combined efforts, FAA expects to reduce costs by \$32 million in fiscal year 2007.

ATO is working with Congress to discuss proposed projects and maximize capital funds, as we previously recommended.<sup>35</sup> ATO reported that

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<sup>34</sup>MIAWS was intended to provide real-time displays of storm positions and estimated storm tracks for airports and airlines.

<sup>35</sup>GAO, *National Airspace System: FAA Has Made Progress but Continues to Face Challenges in Acquiring Major Air Traffic Control Systems*, GAO-05-331 (Washington, D.C.: June 10, 2005).

Congress designated approximately \$300 million for specific projects in fiscal years 2003 and 2004. In fiscal year 2005, according to ATO, designated projects totaled almost \$430 million. In fiscal year 2006, ATO staff met with Senate offices to provide input on projects,<sup>36</sup> and the value of the congressionally designated projects declined, as indicated in table 1.

**Table 1: Congressionally Designated Projects for ATO, Fiscal Years 2003 through 2006**

Dollars in millions

	Fiscal year							
	2003		2004		2005		2006	
	Amount	Amount	Percentage change from prior year	Amount	Percentage change from prior year	Amount	Percentage change from prior year	
<b>Total</b>	<b>\$295,905</b>	<b>\$282,280</b>	<b>-4.6%</b>	<b>\$429,160</b>	<b>52.0%</b>	<b>\$245,800</b>	<b>-42.7%</b>	

Source: GAO analysis of ATO data.

ATO has saved about \$84 million to date through initiatives to control its costs. For example, ATO has begun to decommission ground-based navigational aids, such as compass locators, outer markers and nondirectional radio beacons, and to close related ATC facilities as it transitions to a satellite-based navigation system. In fiscal year 2005, ATO decommissioned 177 navigational aids for a savings of \$2.9 million. However, ATO has thousands of navigational aids in use, many of which could be decommissioned during the transition to NGATS. Consolidating ATC facilities, including terminal radar approach control (TRACON) facilities and air traffic control centers, can also save costs. According to one estimate, undertaking all of these actions could save ATO approximately \$600 million per year. We have also found, in researching cost control efforts undertaken by international air navigation service providers, that consolidating regional administrative offices offers additional potential cost savings.

While efforts to decommission navigational aids and close ATC facilities offer potential savings, we found that ATO lacks a consistent process for identifying the costs and benefits associated with these efforts. For example, although ATO reported saving \$2.9 million in fiscal year 2005 by decommissioning 177 navigational aids, its report did not offset these

<sup>36</sup>The House of Representatives did not have any designated projects for FAA for fiscal year 2006.

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savings with the costs of decommissioning activities, such as real property disposition (including buildings or real property leases, standby power systems, and fuel storage tanks), site cleanup, and restoration. Experts estimate that the costs of decommissioning all possible navigational aids and conducting the needed environmental remediation could total about \$300 million. Opportunities may exist for ATO to reuse these sites to reduce or eliminate environmental cleanup costs. For example, sites could be used for cell phone towers, generating about \$100,000 per year in revenue per site. Other sites could be leased as warehouses. Together, these efforts could potentially save FAA up to \$14 million per year. However, without a transparent and verifiable process for determining both the costs and benefits, it remains difficult to accurately determine financial savings.

As ATO proceeds with these efforts, stakeholders caution that decommissioning navigational aids and closing facilities should entail comprehensive risk mitigation to ensure that ATO retains adequate safety levels. This includes risk prevention, which focuses on elements that the agency can prevent, and risk recovery, which recognizes that some events cannot be prevented and the system must recover from them. It is important that facility closures happen within the context of a logical, well-documented, and reasoned process in consultation with congressional oversight committees. Any process to determine closures or consolidations should use consistent, accurate data collection and a common analytical framework to ensure the integrity of the process.

ATO is also attempting to examine existing service contracts to better control costs. For example, it has saved about \$2 million by renegotiating task orders and modifying contracts for technical assistance provided by contractors that manage facilities and equipment projects. According to ATO, these renegotiations did not affect the associated programs. In addition, ATO has saved about \$1 million to date by negotiating cell phone contracts with four large service providers. Formerly, ATO employees arranged individual plans for their work cell phones. ATO also entered into a new contract with natural gas and electricity providers at its Technical Center that has saved about \$358,000 to date. Lastly, through a strategic sourcing initiative, it has newly negotiated purchasing deals for support services, including printing and mail services, office equipment and supplies, and information technology hardware and software.

As another cost-saving measure, ATO is exploring opportunities for outsourcing work that is now performed by the government. Under the Office of Management and Budget's Circular A-76 (Revised), federal

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agencies can compete with and rely on the private sector to enhance productivity. Recently, FAA contracted with Lockheed Martin to operate its flight service stations. According to FAA, this contract will cost approximately \$2.2 billion less over 10 years than FAA would have had to pay to operate the stations itself. FAA's estimate includes the savings it expects to realize as the contractor assumes the costs of providing the services and paying their utility and maintenance costs. FAA is currently working to identify other opportunities to reduce costs through the A-76 process. Some experts have suggested that the time may be right for FAA to examine opportunities to contract out the ground portion of its FTI program, through which FAA is replacing air-ground telecommunications networks. According to these experts, this approach could save FAA up to \$130 million a year beginning in fiscal year 2008. The FTI program is not expected to provide financial savings until fiscal year 2010; however, the savings might take longer to be realized because the program is falling behind schedule.

ATO is working to control personnel costs through both attrition and improved productivity. According to ATO, these efforts have saved about \$67 million from the beginning of fiscal year 2005 to date. For example, ATO has saved about \$44 million from the attrition of both nonsafety and Flight Service staff. ATO further expects efficiencies and lower training costs to allow a 10 percent reduction in the controller workforce over the next decade. These efficiencies include relying on part-time employees and job-sharing arrangements, implementing split shifts, and improving the management of overtime through an optimal mix of increased staffing and overtime hours to meet workload demands. Through gains in air traffic controllers' productivity, ATO has reduced its hiring requirements by about 460 controller positions, thereby avoiding salary costs of about \$23 million, according to ATO. In addition, ATO is considering the feasibility of saving air traffic controller training costs by allowing graduates of its Air Traffic Collegiate Training Initiative (CTI) to bypass the FAA Academy, where FAA provides initial qualification training to new hires.<sup>37</sup> According to an FAA Academy official, the proposal to allow these graduates to bypass the academy is being considered as part of a comprehensive review of the Collegiate Training Initiative that will be

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<sup>37</sup>Graduates of schools participating in the Collegiate Training Initiative have college degrees, a broad knowledge of the aviation industry, a basic level of training in air traffic control, and a demonstrated interest in the field. The Department of Transportation Inspector General reported that course work in these collegiate programs duplicates a portion of the academy-provided training.

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completed this fall. We had previously identified this effort as offering potential savings.<sup>38</sup>

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## ATO Faces Challenges in Funding NGATS

As the organization primarily responsible for implementing NGATS, ATO will face substantial funding requirements beyond those needed to maintain the current system. Funding constraints have required ATO to carefully scrutinize capital projects and defer or eliminate funding for systems that could support NGATS, such as a precision-landing system augmented by satellites (LAAS), a digital e-mail-type communication system between controllers and pilots (CPDLC), and the next generation air/ground communication system (NEXCOM).

Although the cost of NGATS is not yet known, JPDO and ATO are collaborating in developing rough near-term funding requirements for NGATS's concept definition and development for major categories of air traffic control functions such as automation, communications, navigation, surveillance, and weather. While these funding requirements are not in FAA's current 5-year spending plan, they could be included once JPDO presents, and FAA accepts, business cases, according to an FAA official.

JPDO has identified some key factors that will drive NGATS costs. One of the drivers is the technologies expected to be included in NGATS. Some of these are more complex and thus more expensive to implement than others. A second driver is the sequence in which NGATS technologies will replace the technologies now in use. A third driver is the length of time required to transition to NGATS, since a longer transition period would impose higher costs. JPDO held the first in a series of investment analysis workshops to determine the basis for developing future NGATS cost estimates on April 25 and 26, 2006. This first workshop focused on recommendations from commercial and business aviation, equipment manufacturers, and systems developers.

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<sup>38</sup>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).

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## Resources Available to Support NGATS Could Be Enhanced through Leveraging and Funding Flexibility

Resources available to support NGATS could be enhanced to the extent that JPDO leverages other partner agency resources. JPDO has already moved in this direction by conducting a review of its partner agencies' research and development programs to identify ongoing work that could support NGATS and the potential for more effective interagency collaboration. Through this process, for example, JPDO successfully requested that FAA pursue funding to accelerate development of ADS-B and SWIM, which are two key systems identified for NGATS. However, JPDO officials told us that, while FAA did receive a funding increase for those systems, FAA did not receive the full amount it had requested. As noted, our past work on FAA's national airspace modernization program has shown that receiving fewer resources than planned was one factor that contributed to delays in implementing technologies and significant cost increases.

To further leverage resources for NGATS, JPDO has issued guidance to its partner agencies identifying areas that JPDO would like to see emphasized in the agencies' fiscal year 2008 budget requests. JPDO is also working with the Office of Management and Budget to develop a systematic means of reviewing partner agency budget requests so that the NGATS-related funding in each request is easily identified. This includes a review of budgets submitted by the Department of Homeland Security for efforts by the Transportation Security Administration, and the Department of Commerce for efforts by the National Oceanic and Atmospheric Association. Such a process would help the Office of Management and Budget consider NGATS as a unified program rather than as disparate line items distributed across several agencies' budget requests.

Further enhancement to NGATS funding could be achieved by ATO utilizing its existing funding flexibility. Under existing law, ATO has a 3-year spending authority for Facilities and Equipment funds. It also has discretion to shift as much as 10 percent of a given program's funds over a fiscal year. This is important, since annual expenditures for several large capital projects will soon be trending downward.<sup>39</sup> Concurrently, FAA is working to conduct business case reviews of existing capital projects on an annual basis. These combined efforts could potentially yield hundreds of millions of dollars to pursue initial NGATS projects.

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<sup>39</sup>ATO expects that by fiscal year 2008, spending for its En Route Modernization (ERAM), Oceanic Services, Standard Terminal Automation Replacement System (STARS), Airport Surveillance Radar-Model 11 (ASR-11), and FAA Telecommunications Infrastructure programs should begin trending downward.

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## Concluding Observations

ATO has put mechanisms in place to change the culture and business processes that have plagued the past modernization efforts of FAA. ATO's new cost accounting system and management practices are important steps toward improved accountability. Similarly, it has taken steps, in response to our recommendations, to improve its acquisition processes. However, as I mentioned, ATO faces challenges in sustaining and furthering its transformation to a results-oriented culture, and in many cases, it is still too early to judge the long-term success of these attempts at fundamental organizational change. ATO must continue to measure its progress and work to change the culture at all levels of the organization, as our work has shown that these types of transformations can sometimes take close to a decade to truly become entrenched within the organization. We believe that, overall, ATO is moving in the right direction, and we will continue to monitor its progress.

We also believe that JPDO is moving in the right direction in creating an organizational structure that facilitates the federal interagency collaboration that must occur for the office to be successful in its mission. JPDO is working to leverage the various human, technological, and financial resources of its partner agencies. This is key given the coordinating role of JPDO and its lack of authority over key resources needed to continue developing the NGATS plan. However, because of this lack of authority, JPDO could be challenged to maintain partner agency and stakeholder commitment to the NGATS effort in the long term. Also, much of the NGATS planning and implementation depends on the development of the NGATS enterprise architecture. Although JPDO has said that a version of the enterprise architecture will be completed later this year, the architecture will require further refinement and commitment from the partner agencies into the future.

Transforming the national airspace system to accommodate what is expected to be three times the current amount of traffic by 2025, providing adequate security and environmental safeguards, and doing these things seamlessly while the current system continues to operate, will be an enormously complex undertaking. Both ATO and JPDO have been given difficult tasks in a difficult budgetary environment. Going forward, efforts to control costs and leverage resources will become even more critical. Success also depends on the ability of ATO and JPDO to define their roles and form a collaborative environment for planning and implementing the next generation system.

Mr. Chairman, this concludes my statement for the record.



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## Contact and Staff Acknowledgments

For further information on this statement for the record, please contact Gerald Dillingham at (202) 512-2834 or [dillinghamg@gao.gov](mailto:dillinghamg@gao.gov). Individuals making key contributions to this statement include Nabajyoti Barkakati, Christine Bonham, Jay Cherlow, Elizabeth Eisenstadt, Colin Fallon, David Hooper, Heather Krause, Elizabeth Marchak, Maren McAvoy, Edmond Menoche, Faye Morrison, Richard Scott, Sarah Veale, and Matthew Zisman.

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