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# *Office of Inspector General*

# *Audit Report*

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## **FAA REFORMS HAVE NOT ACHIEVED EXPECTED COST, EFFICIENCY, AND MODERNIZATION OUTCOMES**

*Federal Aviation Administration*

*Report Number: AV-2016-015*

*Date Issued: January 15, 2016*





# Memorandum

U.S. Department of  
Transportation

Office of the Secretary  
of Transportation  
Office of Inspector General

Subject: **ACTION**: FAA Reforms Have Not Achieved  
Expected Cost, Efficiency, and Modernization  
Outcomes  
Federal Aviation Administration  
Report Number AV-2016-015

Date: January 15, 2016

From: Lou E. Dixon   
Principal Assistant Inspector General  
for Auditing and Evaluation

Reply to  
Attn. of: JA-10

To: Federal Aviation Administrator

The Federal Aviation Administration (FAA) oversees all aspects of civil aviation in the United States, including operating the air traffic control system, regulating safety, improving and maintaining infrastructure, administering airport grants, and conducting research and development activities. According to FAA, there are roughly 7,000 aircraft flying in the National Airspace System (NAS) at any given time with approximately 30,000 operations occurring at core airports<sup>1</sup> each day. To guide pilots and separate aircraft through the NAS, FAA employs approximately 14,000 air traffic controllers at 317 facilities across the United States.

Over the past 2 decades, Congress has enacted legislation aimed at making FAA a performance-based organization that would operate effectively and efficiently while improving the delivery of air traffic services and expediting modernization efforts. FAA has undergone several reorganizations in an effort to improve operational efficiency, deliver enhanced services to users, expedite delivery of new technologies, and reduce the Agency's costs. The Chairman of the House Committee on Transportation and Infrastructure and the Chairman and Ranking Member of the House Aviation Subcommittee requested that we assess FAA's organizational structure, including FAA's reforms over the past 2 decades. They also requested that we examine how FAA's organizational and funding structure compares to other countries.

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<sup>1</sup> Core airports are identified as having significant levels of passengers or itinerant operations. Currently, 30 airports in the NAS are designated as a core airport.

Accordingly, our objectives were to determine whether FAA reforms implemented since 1995 have (1) resulted in improved air traffic operations and reduced Agency costs, and (2) expedited the delivery of new technologies. We conducted a second audit to compare FAA's organizational and financing structure to other Nations' structures and reported our findings in September.<sup>2</sup>

We conducted our work in accordance with generally accepted Government auditing standards. Our scope and methodology is provided in exhibit A; the organizations we visited or contacted are listed in exhibit B.

## RESULTS IN BRIEF

While FAA has implemented the provisions of past reform legislation, these efforts have not achieved anticipated cost savings and operational efficiencies. Since 1996, FAA has implemented performance-based compensation systems for its workforces, established the Air Traffic Organization (ATO), contracted out its flight service stations operations, and undertaken several reorganizations. However, costs continue to rise while operational productivity has declined. Between fiscal years 1996 and 2012, FAA's total budget grew by 95 percent, from \$8.1 billion to \$15.9 billion, and its total personnel, compensation, and benefits (PC&B) costs increased by 98 percent, from \$3.7 billion to \$7.3 billion.<sup>3</sup> FAA's disappointing reform outcomes are largely the result of the Agency's failure to take full advantage of its authorities when implementing new personnel systems, and not using business-like practices to improve its operational efficiency and cost effectiveness. For example, while FAA has implemented a cost accounting system, it does not regularly analyze the operational and cost data generated to determine if it could reduce costs or improve productivity. In addition, FAA's workforce levels have remained relatively constant over the past 2 decades, and the number of air traffic facilities the Agency operates has not changed since 2000. FAA's organizational culture, which has been resistant to change, further deters its reform efforts.

FAA's reforms have also fallen short in responding to legislation calling for improved delivery of new technologies and capabilities. While FAA reports improvements in its management of acquisitions, major projects continue to experience problems that delay the introduction of new technologies, such as performance-based navigation; postpone benefits to users; and defer the retirement of costly legacy systems. For example, the multi-billion dollar En Route

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<sup>2</sup> *There Are Significant Differences Between FAA and Foreign Countries' Processes for Operating Air Navigation Systems* (OIG Report No. AV-2015-084), September 2, 2015. OIG reports are available on our Web site at <http://www.oig.dot.gov>.

<sup>3</sup> In constant dollars, the total budget increased 41 percent, and the total PC&B costs increased by 22 percent. We used the Bureau of Labor Statistic's Employment Costs Index for Total Compensation for Civilian Workers to adjust for inflation to get the constant dollar change of FAA budget.

Automation System (ERAM) has experienced delays of nearly 4 years and cost growth of over \$400 million. To help reduce cost and schedule risks, FAA adopted a segmented approach to its major acquisitions, including those under the Agency's Next Generation Air Transportation System (NextGen)—a multibillion-dollar program intended to fundamentally transform the Nation's air traffic system. FAA now delivers systems in phases, which the Agency says improves learning and management based on identification of initial issues. However, FAA's implementation of this approach has led to unclear and inconsistent reporting on overall program costs, schedules, and benefits. Notwithstanding reforms, several underlying and systemic issues—including overambitious plans, shifting requirements, software development problems, ineffective contract and program management, and unreliable cost and schedule estimates—impact FAA's ability to introduce new technologies and capabilities that are critical to transitioning to NextGen.

We are making recommendations aimed at helping FAA improve its management of major acquisitions and better meet the outcome goals of its reforms.

## BACKGROUND

FAA was created in 1958 as an independent Agency to provide for the safe and efficient use of the NAS. In 1967, FAA became an operating administration under the Department of Transportation, and continued to oversee all aspects of civil aviation in the United States, including operating the air traffic control system, regulating safety, improving and maintaining infrastructure, administering airport grants, and conducting research and development activities.

As the Nation's economy and air capabilities grew, so did the demand for air travel, resulting in increased delays and costs to airlines, passengers, and other users of the NAS. Over the past 2 decades, Congress has granted FAA unique authorities to implement reforms that would result in increased operational efficiency, improve the Agency's acquisition practices, expedite delivery of new technologies and capabilities, and reduce the Agency's costs. These authorities include:

- **Personnel Reform.** In 1995, Congress passed legislation exempting FAA from most Federal Government personnel rules and allowed the Agency to implement a new personnel management system that provided greater flexibility in hiring, training, and compensating personnel, as well as assigning personnel to duty locations.<sup>4</sup> In 1996, additional legislation was passed

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<sup>4</sup> *Fiscal Year 1996 Department of Transportation and Related Agencies Appropriations Act*, Section 347(a), P.L. 104-50, Nov. 15, 1995.

allowing FAA to negotiate pay with its bargaining units and requiring the Agency to establish a cost accounting system.<sup>5</sup>

- **Organizational Reform.** In April 2000, Congress passed legislation requiring the appointment of a Chief Operating Officer (COO) to oversee the day-to-day operation and modernization of the air traffic control system.<sup>6</sup> In December 2000, President Clinton signed an executive order creating the ATO, led by the COO, as a performance-based organization to manage the operation of air traffic services.<sup>7</sup> The ATO began operations in 2004.
- **Acquisition Reform.** In 1995, Congress granted FAA relief from principal acquisition laws and regulations, such as the Office of Federal Procurement Policy (OFPP) Act and the Federal Acquisition Regulation (FAR), and directed FAA to develop an acquisition management system (AMS) to meet its unique needs. FAA's AMS—implemented in April 1996—was designed to be broader, less prescriptive, and more flexible than the FAR by allowing procurement officials, based on prudent discretion and sound judgment, to employ any procedures that are not captured in AMS.

AMS differs from the FAR in several important respects (see table 1).

**Table 1. Comparison of FAR and AMS Procurement Guidance**

	FAR	AMS
Scope	Procurement and contract management	Entire acquisition lifecycle, from mission analysis through disposal
Contents	Regulations carrying the force of law	Legally non-binding Agency policy and supplemental guidance
Flexibility	Deviations require the approval of the Agency head or his/her designee	Waiving AMS policy requires approval of Acquisition Executive, but anyone may waive provisions in AMS guidance with a rational basis

In 2011, FAA moved the NextGen program office out of ATO and placed it under the responsibility of an Assistant Administrator to increase visibility for the program. And in 2012, FAA initiated a major reorganization of FAA and ATO, which included creating single points of accountability for contracting officers and program managers. As part of this reorganization, FAA created an Agency-wide Program Management Office (PMO) to better manage acquisitions following approval by the Joint Research Council (JRC). In addition, FAA's Joint Resources Council began conducting quarterly acquisition briefings to keep senior executives apprised of the status of acquisitions.

<sup>5</sup> *Federal Aviation Reauthorization Act of 1996*, Sections 253 & 276, P.L. 104-264, Oct. 9, 1996.

<sup>6</sup> *Wendell H. Ford Aviation Investment and Reform Act for the 21<sup>st</sup> Century*, Section 303, P.L. 106-181, Apr. 5, 2000.

<sup>7</sup> *Air Traffic Performance-Based Organization*, Executive Order No. 13180, Dec. 7, 2000.

## **FAA HAS IMPLEMENTED REFORMS, BUT COSTS CONTINUE TO INCREASE AND OPERATIONAL PRODUCTIVITY HAS DECREASED**

FAA has implemented the requirements of past reform legislation, including introducing new compensation systems for its employees and establishing the ATO. It has also completed several reorganizations and implemented cost-cutting measures in an attempt to improve its internal operations and reduce costs. However, since 1996 the Agency's total budget, operations budget, and compensation costs have doubled while operational productivity at its network of air traffic facilities has decreased substantially. These disappointing outcomes are due primarily to the fact that FAA's new personnel systems do not leverage the flexibilities Congress provided other than increased pay, its failure to use business-like practices in managing the Agency, and an ingrained organizational culture resistant to change.

### **FAA Has Taken Steps To Implement Reform Legislation Provisions**

Since receiving its personnel and organizational reform authorities, FAA has taken several steps to implement them. In 1996, FAA implemented the Core Compensation System to replace the traditional Federal grade and step base pay method. The system is performance based, consists of pay bands based on specific job categories, and provides for two annual pay increases based on organizational and individual performance:

- **Organizational Success Increase (OSI)** is an annual base pay increase based on how well the Agency is achieving 30 targeted organizational goals related to safety, efficiency, modernization, and other areas. The OSI equals the Federal comparability increase plus 1 percent. For example, in fiscal year 2013, FAA achieved 27 of its 30 performance goals and awarded a 2 percent OSI (1 percent general increase plus 1 percent).
- **Superior Contribution Increase (SCI)** is an additional base pay increase designed to identify the highest contributing employees in the areas of collaboration, customer service, and impact on organizational success. FAA employees may be eligible for the OSI and one of two levels of the SCI—SCI-1 and SCI-2<sup>8</sup>—which, respectively, equal 1.8 percent and 0.6 percent of base salary, and target approximately 20 percent and 45 percent of eligible employees.

FAA has also negotiated collective bargaining agreements (CBA) with the National Air Traffic Controllers Association (NATCA) and seven other bargaining

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<sup>8</sup> If payment of an annual increase causes an employee's base salary to exceed the band maximum, the employee will receive a lump sum payment.

units that cover 80 percent of ATO employees. In 1998, FAA's first negotiation under personnel reform took place with NATCA, its largest labor force, which included a new pay system based on the complexity of the operations controllers manage as well as the volume of air traffic they control. The negotiation resulted in higher compensation for employees in exchange for commitments to increase productivity and job flexibility. FAA has negotiated a total of four CBAs with NATCA (1998, 2003, 2006, and 2009).

FAA also carried out multiple reorganizations to flatten its organizational structure and improve its efficiency. In fiscal year 2006, the COO restructured ATO's administrative and support functions and reduced nine regional service area offices within the En Route, Terminal, and Technical Operations groups into three new service centers (Eastern, Central, and Western). Also, as part of its Foundation for Success initiative, in 2012 FAA created Deputy COO and Chief of Staff positions in the Office of the COO and merged the terminal and en-route services units to form the Air Traffic Service Unit under a single vice president. During this same timeframe, FAA eliminated four Senior Vice Presidents by transferring Finance, Information Technology, and Acquisitions to a new Shared Services Organization and combined the safety and technical training services units into one unit. Although the Office of Finance and Management is not part of ATO, the creation of the Shared Services Organization eliminated duplicate staff and reduced the Agency's administrative overhead expenses by consolidating leases and implementing new processes for purchasing equipment and supplies (see exhibit C).<sup>9</sup>

Last, FAA has taken steps to reduce its costs. For example, in February 2005, FAA awarded a 10-year contract to Lockheed Martin to operate flight service stations in the continental United States, Puerto Rico, and Hawaii. FAA estimated that it would achieve approximately \$2 billion in cost savings over the 10-year life of the contract.<sup>10</sup> The Agency also implemented a broad-based set of initiatives intended to reduce costs such as communication and travel. FAA estimated that these initiatives would save \$114 million between fiscal years 2010 and 2013.

### **FAA's Reforms Have Not Slowed Cost Growth or Improved Operational Productivity**

Despite the Agency's reform efforts to improve its organizational structure and reduce cost, these reforms have not slowed the Agency's cost growth or improved its operational productivity. Between fiscal years 1996 and 2012, FAA's total

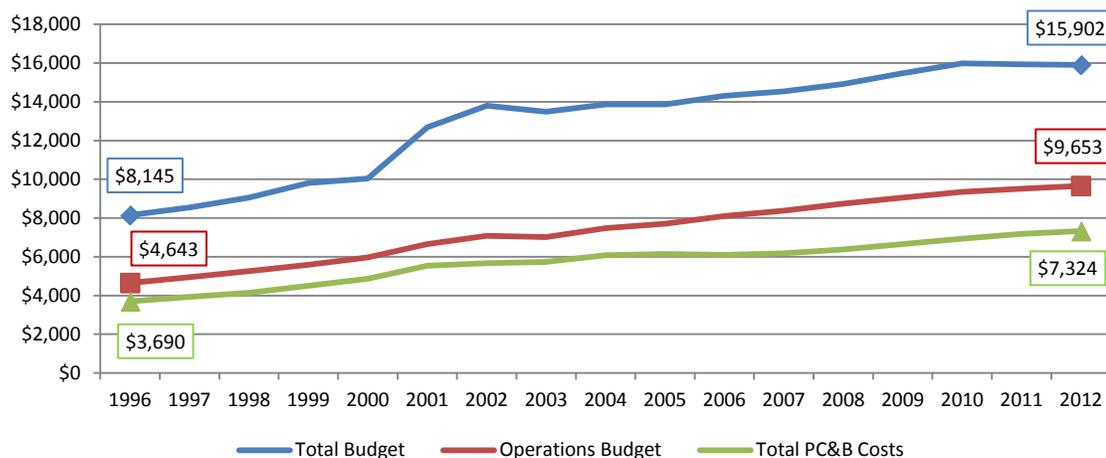
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<sup>9</sup> During fiscal years 2012 and 2013, the Office of Finance and Management helped the Agency achieve documented cost savings of \$93.8 million.

<sup>10</sup> We are currently conducting a review of FAA's Flight Service Stations Program and will determine whether FAA achieved the anticipated cost savings and avoidance.

budget grew 95 percent,<sup>11</sup> its operations account increased by 108 percent, and its total personnel compensation and benefits (PC&B) costs grew 98 percent (see figure 1).<sup>12</sup>

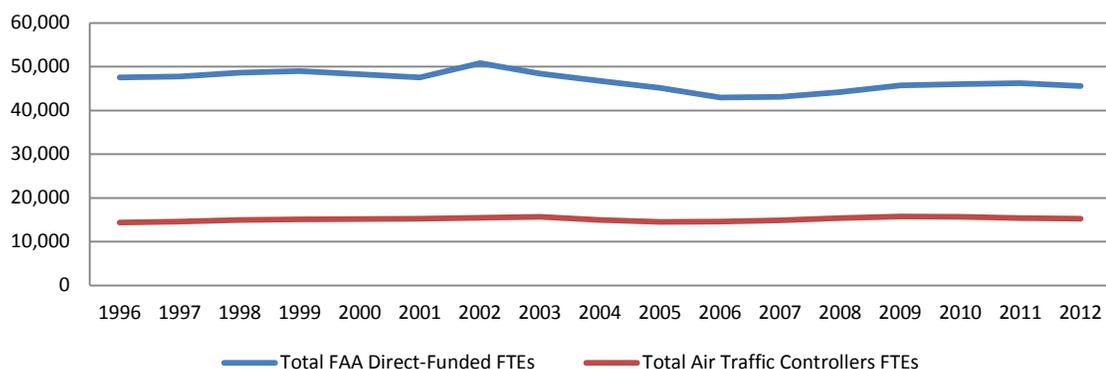
**Figure 1. FAA's Total Budget, Operations Budget, and Total PC&B Costs, Fiscal Years 1996 Through 2012 (Dollars in Millions)**



Source: OIG analysis of FAA data

FAA's workforce remained relatively constant. Between fiscal years 1996 and 2012, the Agency's total number of full-time equivalent (FTE) decreased by 4 percent, from 47,508 to 45,567, while its controller workforce ranged from 14,360 FTEs to 15,770 FTEs (see figure 2).

**Figure 2. FAA's Total Number of Direct-Funded FTEs and Air Traffic Controllers FTEs, Fiscal Years 1996 Through 2012**



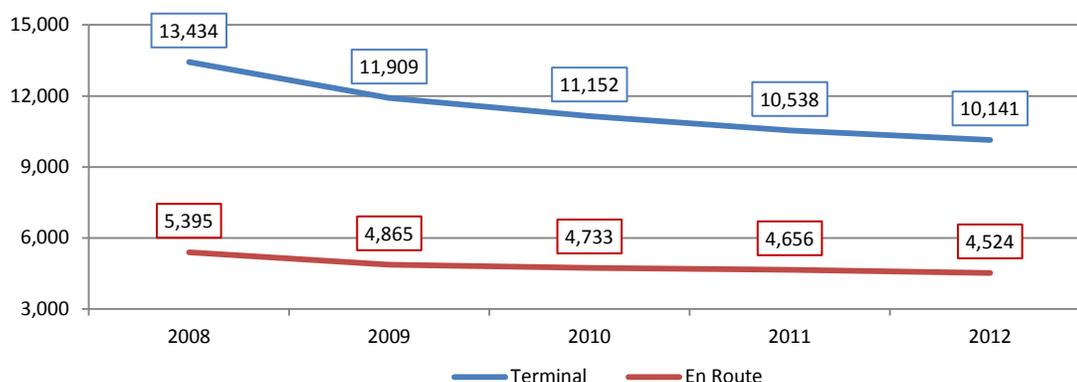
Source: OIG analysis of FAA data

<sup>11</sup> In 2000, Congress passed legislation that significantly increased funding for the Airport Improvement Program and Facilities and Equipment.

<sup>12</sup> In constant dollars, the total budget increased 41 percent, the Operations account increased 52 percent, and PC&B accounts increased 22 percent.

Further, the changes in work rules that FAA and NATCA negotiated in 1998 have not increased productivity or reduced the Agency's operating costs as intended. In July 2014, we reported that FAA's operational productivity had significantly decreased while the controller workforce remained relatively constant. Between fiscal years 2000 and 2012, FAA's air traffic operations dropped 23 percent. Also, between fiscal years 2008 and 2012, air traffic activities per controller dropped 25 percent at terminal facilities and 16 percent at en-route facilities—a trend we reported in July 2014.<sup>13</sup> (See figure 3.) Moreover, according to one study, FAA's unit cost of service has increased by 71 percent since 1997, due largely to a decline in operations with no offsetting decline in operating expenses.<sup>14</sup>

**Figure 3. Activities Per Controller at En-Route<sup>a</sup> and Terminal<sup>b</sup> Facilities, Fiscal Years 2008 Through 2012**



Source: OIG analysis of FAA data

<sup>a</sup> Activities at en-route facilities are measured by the number of instrument flight rule hours.

<sup>b</sup> Activities at terminal facilities are measured by the number of take offs and landings controllers monitor.

In addition, FAA's air traffic facility footprint has remained essentially unchanged at 317 air traffic facilities, and the Agency has not taken advantage of opportunities to reduce its facility costs. Notably, since 2000 the Agency has not converted any of its FAA-operated towers to the Federal Contract Tower Program—despite its recognition of potential cost savings. As we reported in 2012, a contract tower costs on average about \$1.5 million less to operate than a comparable FAA tower, mainly due to lower staffing and salary levels.<sup>15</sup>

<sup>13</sup> *FAA Lacks the Metrics and Data Needed To Accurately Measure the Outcomes of Its Controller Productivity Initiatives* (OIG Report No. AV-2014-062), July 9, 2014.

<sup>14</sup> *Options for FAA Air Traffic Control Reform*, testimony of Dorothy Robyn before the House Committee on Transportation and Infrastructure, Subcommittee on Aviation, Mar. 24, 2015.

<sup>15</sup> *Contract Towers Continue To Provide Cost-Effective and Safe Air Traffic Services, but Improved Oversight of the Program Is Needed* (OIG Report No. AV-2013-009), Nov. 5, 2012.

FAA has also missed opportunities to complete large-scale facility consolidations that would:

- maximize operations,
- improve the flow of air traffic,
- achieve benefits from airspace redesign,
- eliminate the artificial airspace boundaries imposed by the current air traffic facility network,
- improve internal operations,
- reduce the current footprint of facilities requiring new equipment or upgrades,
- avoid the cost of maintaining aging facilities, and
- facilitate the transition to NextGen capabilities.

Moreover, in 2012, we reported that three large-scale terminal radar approach control (TRACON) facility consolidations did not realize the operational efficiencies FAA expected because consolidation costs exceeded original estimates,<sup>16</sup> facilities were delayed in opening, and operational efficiencies were not achieved.<sup>17</sup> FAA has abandoned a plan to build large, integrated air traffic facilities (combined en-route/TRACON facilities).

### **FAA Has Not Effectively Leveraged Its Reform Flexibilities and Adopted Business Practices**

FAA has used its personnel reform authorities to change and expand the number of pay systems for its workforce. However, while Congress exempted FAA from most Title 5 laws and regulations, FAA has not leveraged these personnel reform flexibilities. Many of its personnel policies—such as those related to premium pay, leave, and the grievance process—continue to mirror Federal rules. FAA’s flexibility has been limited in part by the Agency’s unionized workforce, which has negotiated that benefits and other personnel matters be in line with Federal regulations, and other Title 5 requirements that FAA must follow, such as veteran preference. According to a senior FAA Human Resources official, the only difference between FAA’s personnel system and the rest of the Federal Government’s is compensation (see exhibit D).

Moreover, FAA has not implemented basic business practices to oversee its operations and make business-like decisions. For example, our reviews of two small TRACON consolidations showed that FAA did not produce comprehensive business cases that provided a clear picture of the total costs and potential benefits

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<sup>16</sup> For example, the construction costs for the Northern California Consolidated TRACON were 45 percent higher than originally estimated.

<sup>17</sup> *The Success of FAA’s Long-Term Plan for Air Traffic Facility Realignment and Consolidations Depends on Addressing Key Technical, Financial, and Workforce Challenges* (OIG Report No. AV-2012-151), July 17, 2012.

for those realignment efforts.<sup>18</sup> As a result, FAA had to rethink and indefinitely postpone planned consolidations. In addition, FAA does not have a centralized database to track controller requests for transferring to other air traffic facilities. Rather, FAA's nine regional offices separately track these requests and do not communicate with one another. This has resulted in confusion regarding controller transfers, such as multiple facility managers selecting the same controller to work at their facility.

While FAA has implemented systems to operate more like a business, such as a cost accounting system, it does not regularly analyze the operational and cost data generated by these systems to determine if it could reduce costs or improve productivity. We recently reported that since 1998 FAA has implemented a series of initiatives intended to increase controller productivity, reduce operating costs, and improve training and hiring practices. However, FAA has been unable to demonstrate the results of many of these initiatives largely because it did not establish detailed baseline metrics or quantifiable goals for many of them. We also found that FAA does not systematically collect or analyze controller workforce data to reduce cost or improve productivity, and FAA officials could not agree on which metrics are appropriate to measure controller productivity.

Finally, several FAA officials and users noted that while FAA successfully maintains one of the safest, most complex systems in the world, the Agency places limited focus on factors such as cost efficiency or productivity enhancement. This mindset also encourages managers to go with the "status quo" when making cost and operational decisions regarding the NAS, such as ineffectively using overtime at air traffic facilities.

## **MANAGEMENT PROBLEMS CONTINUE TO IMPACT FAA'S EFFORTS TO DELIVER NEW TECHNOLOGIES AND CAPABILITIES**

FAA reports that acquisition and organizational reforms have improved the delivery of technologies and capabilities on newer acquisitions. However, several programs—including some critical to the transition to NextGen—remain over budget and behind schedule due to overambitious plans, unresolved requirements, software development problems, ineffective contract management, and unreliable cost and schedule estimates. These persistent management weaknesses delay the introduction of new technologies and capabilities, such as trajectory-based operations; postpone user benefits; and defer the retirement of costly legacy systems.

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<sup>18</sup> *Letter to the Idaho Congressional Delegation Regarding the Review of FAA's Business Case for Moving Terminal Radar Approach Control Services from Boise, Idaho to Salt Lake City, Utah* (OIG Project ID CC-2009-099), June 30, 2010; *Letter to Congressman Neugebauer Regarding FAA's Decision To Realign the Abilene, TX TRACON Functions Into the Dallas/Ft. Worth TRACON* (OIG Project ID CC-2012-012), Jan. 17, 2013.

## **FAA Reports Improved Performance, but It Does Not Account for Long-Term Cost and Schedule Performance Results**

FAA reports that between 2004 and 2012, its major acquisitions<sup>19</sup> were 1 percent under budget and 11 percent behind schedule, indicating major improvements from before 2004, when FAA's major acquisitions were 38 percent over budget and 25 percent behind schedule.<sup>20</sup> Indeed, FAA data show that with some exceptions, such as ERAM and Runway Status Lights (RWSL), FAA has curtailed cost growth and schedule slips by taking a more incremental, or segmented, approach toward its major acquisitions.<sup>21</sup> FAA's annual acquisition performance reports though fiscal year 2013 also show that the acquisitions FAA baselined since 2009 have stayed closer to initial cost and schedule estimates than programs baselined before 2009.

While segmenting acquisitions can help agencies better manage and move programs forward, FAA only reports on the progress of acquisition segments with active baselines; in other words, FAA does not report performance on past segments. As a result, FAA's reporting masks many past cost, schedule, and other performance problems and, ultimately, total acquisition cost, schedule, and technical capabilities. This was the case with FAA's terminal modernization efforts. FAA began implementing the Standard Terminal Automation Replacement System (STARS) in 1996 with the goal of replacing all 172 of the Agency's terminal automation systems for \$940 million by 2005. At the same time, FAA began developing another system, Common Automated Radar Terminal System (CARTS), to address critical terminal Air Traffic Controller (ATC) needs at the largest ATC sites that could not be addressed by STARS immediately. Several years into the program, STARS experienced cost increases and delays, and in 2004, FAA split its STARS program into three phases, renamed the program Terminal Automation Modernization and Replacement (TAMR), and added over \$1.3 billion for technology refresh and other enhancements. In 2010, FAA decided to replace the remaining CARTS systems in use with STARS, and split the third phase of TAMR into two segments: Segment 1, initiated in 2011, will replace CARTS systems at the largest terminal facilities with STARS, while Segment 2, initiated in 2012, will implement STARS at facilities with smaller traffic volumes.<sup>22</sup> Although FAA reports STARS segments since 2004 as on cost and schedule, it does not report significant cost increases and delays associated with earlier program segments. As shown in table 2, it is difficult to compare TAMR's \$3.7 billion program to STARS's original \$940 million baseline and to

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<sup>19</sup> FAA designates certain acquisitions as "major" based on factors such as cost, complexity, and importance to the NAS. Major acquisitions represent about 90 percent of the value of FAA's F&E acquisition portfolio.

<sup>20</sup> "System Acquisition Baseline Performance 2004-2012," p. 8.

<sup>21</sup> Shortly after creating ATO, FAA began breaking down many of its acquisitions into segments—each with its own cost, schedule, and performance baselines—in an attempt to better manage risk.

<sup>22</sup> FAA currently plans to install STARS at fewer than 172 sites.

amounts associated with subsequent segments. FAA plans to rebaseline STARS again to account for additional cost growth associated with completing 11 large TRACON sites.

**Table 2. Evolution of FAA’s STARS Segmented Efforts Since 1996, Dollars in Millions**

Year	FAA Action	Baseline Cost Estimate	
		Original	Revised
1996	FAA establishes baseline and awards contract for STARS development and deployment at 172 TRACONS and towers by 2005	\$940	\$940
1998-2003	STARS encounters cost overruns and delays		\$1,690
2004	FAA initiates 3-phased TAMR approach for STARS implementation		\$2,770 <sup>a</sup>
2007	Phase 1 complete: STARS deployed at 47th site		\$2,719 <sup>b</sup>
2008	Phase 2 complete: STARS deployed at 5 new sites	\$57 <sup>c</sup>	\$2,776
2010	FAA splits Phase 3 into 2 segments and decides to deploy STARS at remaining sites		
2011	Segment 1 – FAA plans to deploy STARS at 11 large TRACONS	\$438	\$3,214
2012	Segment 2 – FAA plans to deploy STARS at 97 small sites	\$463	\$3,676
2015	FAA requests additional funding from Congress to complete the 11 large TRACONS, initially baselined in 2011	\$32	\$3,708

Source: OIG analysis of FAA data

<sup>a</sup> Includes costs for technology refresh and “terminal enhancements” not previously included in the program baseline that FAA expects to spend through fiscal year 2030.

<sup>b</sup> In 2009, FAA updated its cost estimate for Phase 1 and now expects to spend \$51 million less on Phase 1 through fiscal year 2035.

<sup>c</sup> In addition to deploying STARS at 5 locations for \$57 million, Phase 2 also included \$83 million in technology refresh and enhancements to FAA’s legacy terminal automation system. The total cost of Phase 2 was \$140 million.

FAA similarly did not report how major changes to the scope of its Airport Surveillance Radar Model 11 (ASR-11) program affect overall cost and schedule performance. In 2013, FAA reported that it completed procurement of ASR-11 systems at 24 percent under the program’s original cost baseline of \$916 million—and, as a result, its major acquisitions were 1 percent under budget between 2004 and 2012. However, the report does not mention that FAA reduced the number of ASR-11 systems purchased from 112 to 66. In other words, on a per-unit basis, acquisition costs actually increased by 31 percent, and nearly half the sites did not receive the technology.

The segmented acquisition of NextGen transformational programs further illustrates how FAA’s management and reporting of segments can obscure unresolved technical issues as well as potential cost increases and delays in delivering capabilities. For example, although FAA reported that it completed the Automatic Dependent Surveillance–Broadcast (ADS-B) ground infrastructure

largely on-budget and on-schedule, there are many unknowns that impact the success of the program:

- Services to pilots and controllers are limited because FAA has yet to complete planned modernization of systems that controllers rely on to manage air traffic.
- Problems related to the display of ADS-B data on FAA's air traffic control automation systems at four test sites—including dropped signals—remain unresolved. For example, at the Louisville and Philadelphia sites, ADS-B dropped or never displayed targets—electronic indicators of an aircraft's current location on controller displays. In addition, ADS-B targets would split on controller displays, resulting in false alerts about potential separation losses between aircraft.
- The \$6.6 billion costs of the current portion of the program, which includes program investments made through 2013, are now expected to outweigh the projected program benefits by \$588 million.

### **Ongoing Major Acquisitions Include Programs With Similar Performance Shortfalls**

Eight of 15 major system acquisitions that were ongoing as of September 30, 2013,<sup>23</sup> had cost increases and 8 had schedule delays. Some of these increases and delays are not captured in FAA's current reporting, because the Agency stopped including metrics on closed baselines. Overall, ongoing major system acquisitions experienced a cumulative cost increase of \$3.8 billion beyond FAA's original estimates,<sup>24</sup> and delays ranging from 7 to 174 months, with an average delay of 51 months.<sup>25</sup>

About \$3.1 billion of the \$3.8 billion cost increases for the eight systems are associated with STARS and Wide Area Augmentation System (WAAS)<sup>26</sup>—FAA's oldest active major acquisitions. These programs were initiated in the late 1990s, but FAA was still either delivering systems or performing technical refresh for these systems at the time of our review. About \$1.46 billion of the STARS and WAAS increase is associated with overruns to initial cost baselines, and

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<sup>23</sup> To evaluate the effectiveness of FAA's reforms on current acquisitions, we limited our review to all major acquisition systems that were active as of September 30, 2013—which was the latest fiscal year with available information at the time we started our audit (see exhibit E).

<sup>24</sup> In February 11, 2009, testimony before the House of Representative's Committee on Transportation and Infrastructure, we reported that 6 of 18 major acquisitions had experienced cost growth of nearly \$4.7 billion and schedule delays of 1 to 12 years.

<sup>25</sup> In February 2012, GAO reported a \$4.2 billion overall cost increase for 11 FAA programs, *Management Challenges Associated with Program Costs and Schedules Could Hinder NextGen Implementation*, GAO-12-223, Feb.16 2012.

<sup>26</sup> WAAS is principally used by general, not commercial, aviation.

\$1.67 billion was due to technology refreshment and system enhancement costs.<sup>27</sup> STARS is still active, well beyond its original anticipated completion date, and WAAS was delayed by about 7 years.<sup>28</sup>

While FAA's ongoing major acquisitions that were initiated around the time or since the creation of the ATO have not experienced the same degree of performance issues as STARS and WAAS, six of these programs experienced cost increases and schedule delays. Specifically, their combined cost increase is about \$692 million—of which \$539 million was associated with overruns to initial cost baselines and \$153 million was due to technology refreshment and system enhancement costs—and delays averaged 25 months.

### **Persistent Management Weaknesses Underlie Cost, Schedule, and Performance Problems in Delivering New Technologies and Expected Benefits**

Since the formation of ATO, FAA has made important progress in reducing the scope of cost, schedule, and performance problems when delivering new technologies. Nevertheless, persistent management weaknesses—some bearing close similarity to problems FAA experienced during and after the transition to AMS—still drive cost, schedule, and performance problems in FAA's major acquisitions, including transformational NextGen programs. Since acquisition reform, we and the Government Accountability Office (GAO) have reported on acquisitions that have encountered poor outcomes due to:

- **Unstable requirements.** Unclear and changing program requirements have led to unplanned work, resulting in cost increases and delays. As recently as last year, we reported that FAA had not stabilized many requirements for STARS, which began in 1996. This instability imperils the timely replacement of legacy automation systems at some of the busiest TRACONs in the NAS<sup>29</sup>—the 11 TRACONs FAA rebaselined in 2011.
- **Underestimating software development complexities.** In 2012, we reported that software failures during the testing and deployment of ERAM, FAA's new system for managing high-altitude air traffic, delayed the introduction of that

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<sup>27</sup> In a November 18, 2014, testimony before the House Committee on Transportation and Infrastructure on FAA's efforts to modernize the NAS, we reported performance data for the 15 major acquisition programs (including all segments) that were ongoing as of September 30, 2013. At that time, we reported that 8 of the 15 programs included cost increases amounting to about \$4.9 billion. We are adjusting the cost increase amount to \$3.8 billion to better account for and differentiate technology refresh costs for STARS and WAAS and to include information received from FAA relating to actual expenditures on WAAS from all program phases through 2013.

<sup>28</sup> WAAS continued to enhance and add technical refresh costs at the time of our review. For example, FAA has extended the WAAS lifecycle and now plans to spend \$1.2 billion more on technology refreshment through 2044. We limited our computation of costs increases for WAAS to amounts actually incurred through 2013.

<sup>29</sup> *Management Advisory on Weaknesses With Site-Specific Deployment Requirements and Specialist Training for STARS*, Aug. 14, 2014.

system and contributed to cost overruns that exceeded \$400 million.<sup>30</sup> Historically, FAA has committed to overambitious testing schedules involving simultaneous development and deployment that became untenable when technical difficulties with software arose. For WAAS, we previously reported that FAA encountered complex hardware and software problems early on, including the loss of the WAAS satellite signal for 100 minutes and the failure of WAAS safety processors to notify pilots when the WAAS signal was transmitting misleading—and potentially hazardous—information and thus should not be used.<sup>31</sup> Efforts to resolve this issue required FAA to spend millions of dollars more than planned and prevented the introduction of even partial WAAS capabilities for about 4 years.

- **Insufficient efforts to assess and mitigate risks.** Prior to awarding the \$859-million Air Traffic Controller Optimum Training Solution (ATCOTS) contract, FAA determined there was a 60- to 80-percent likelihood that the successful bidder would not meet FAA’s training needs with the limited staff hours proposed. However, FAA did not require the contractor to address this issue prior to award, and FAA had to spend millions of dollars more than expected to make up for the shortfall in contracted resources. Ultimately, 1 year of contract performance was lost due to cost overruns, while FAA experienced a 41 percent increase in the time needed to train new controllers.<sup>32</sup>
- **Basing investment decisions on incomplete information.** FAA’s JRC has “conditionally approved” investment decisions, allowing system acquisitions to proceed even though potentially critical information has not been reviewed. For example, the JRC approved a final investment decision for the RWSL program before the program manager received site engineering reports from the contractor or FAA had completed negotiating memorandums of agreement with the airports receiving RWSL systems. Subsequent construction issues and unplanned requests from airport authorities led to delays, cost increases, and the indefinite deferral of installing RWSL systems at six airports. In 2012, GAO evaluated FAA’s major acquisitions and reported that while ADS-B, Collaborative Air Traffic Management Technologies (CATMT),<sup>33</sup> System Wide Information Management (SWIM),<sup>34</sup> and WAAS had some characteristics of high-quality and reliable cost estimates—well documented,

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<sup>30</sup> *Weaknesses in Program and Contract Management Contribute to ERAM Delays and Put Other NextGen Initiatives at Risk* (OIG Report No. AV-2012-179), Sept. 13, 2012.

<sup>31</sup> *Observations on FAA’s Satellite Navigation Efforts* (OIG Report No. CC-2000-277), July 29, 2000.

<sup>32</sup> *FAA’s Air Traffic Controller Optimum Training Solution Program: Sound Contract Management Practices Are Needed To Achieve Program Results* (OIG Report No. AV-2010-126), Sept. 30, 2010; *FAA Needs To Improve ATCOTS Contract Management To Achieve Its Air Traffic Controller Training Goals* (OIG Report No. ZA-2014-018), Dec. 18, 2013.

<sup>33</sup> CATMT will provide new functionality to the existing Traffic Flow Management System (TFMS) such as automated reroutes and improved data exchanges between ATC facilities.

<sup>34</sup> SWIM will provide an information technology infrastructure to enable the multiple NAS systems to share information such as airport operational status, flight data, and weather information.

comprehensive, accurate, and credible—none of the programs adhered closely enough to those characteristics to create a reliable cost estimate.<sup>35</sup>

Cost increases and delays in FAA’s major acquisitions also have significant consequences across FAA—they postpone other investments, reduce the number of systems that can be procured, and delay the retirement of costly legacy systems and much needed safety improvements.

Exhibit F lists common program and contracting weaknesses that have hampered cost, schedule, and performance for FAA’s acquisitions since implementing reforms.

### **AMS Has Gaps in Guidance and Has Not Resolved FAA’s Underlying Acquisition Management Problems**

As directed by Congress, FAA implemented AMS in 1996 and believed that its flexibility would provide rapid results towards addressing the problems that FAA had encountered on earlier acquisitions. According to FAA’s Administrator at the time, FAA’s goal for AMS was to cut acquisition costs by 20 percent and acquisition schedules by 50 percent within 3 years.<sup>36</sup> Yet between 1996 and 2004, major system acquisitions averaged 38 percent over budget and 25 percent behind schedule—consistent with FAA’s performance prior to AMS.<sup>37</sup>

FAA officials told us that several attributes of AMS—particularly its larger scope including the acquisition lifecycle rather than simply a procurement system, the flexibility it affords, and the ease of communicating with vendors it provides—have contributed to positive acquisition results. In light of the many organizational and program management changes that FAA has made over the years, it is difficult to precisely determine the effect that FAA’s switch from the FAR to AMS has had on its ability to deliver acquisitions on budget and on schedule. Nevertheless, it is worth noting that the FAR offers agencies flexibility when needed<sup>38</sup> and allows for a wide variety of communication with vendors throughout the acquisition process.<sup>39</sup> In addition, other Federal agencies, such as the Department of Defense (DOD), maintain separate life cycle management guidance, such as the DOD

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<sup>35</sup> GAO also stated that the schedules for the four programs were unreliable because none met or substantially met all best practices for developing a reliable schedule, including performing a risk schedule analysis. See *Management Challenges Associated with Program Costs and Schedules Could Hinder NextGen Implementation* Report No. GAO-12-223, Feb. 16, 2012.

<sup>36</sup> *Federal Aviation Administration Research, Engineering, and Development Fiscal Year 1997 Authorization and Management Reform: Hearing Before the Subcommittee on Technology of the Committee on Science, U.S. House of Representatives* (Statement of Administrator David R. Hinson), Apr. 18, 1996.

<sup>37</sup> FAA Capital Budgets Office, “System Acquisition Baseline Performance 2004-2012,” p. 1 states that the previous acquisition system had cost overruns “greater than 38 percent” and delays of 25 percent.

<sup>38</sup> See FAR 1.4 “Deviations from the FAR.”

<sup>39</sup> OFPP Memorandum “‘Myth-Busting’: Addressing Misconceptions to Improve Communication with Industry during the Acquisition Process,” Feb. 2, 2011.

Product Support Managers Guidebook, while still adhering to a FAR-based procurement system.

While we agree that AMS is not as voluminous as the FAR and offers a considerably condensed version of acquisition policy and guidance, we have previously identified gaps in AMS that negatively impacted acquisitions (see table 3).

**Table 3. Recent OIG Reports and Findings Related to AMS**

<b>Audit Focus</b>	<b>Finding</b>
<b><i>Weaknesses in Program and Contract Management Contribute To ERAM Delays and Put Other NextGen Initiatives at Risk (OIG Report No. AV-2012-179), Sept. 13, 2012</i></b>	
Replacing hardware and software at facilities that manage high altitude traffic	AMS does not sufficiently define “Government acceptance” or provide program managers direction for accepting large software intensive programs, which contributed to accepting immature software and increased development costs for ERAM.
<b><i>FAA’s Contracting Practices Are Insufficient To Effectively Manage Its Systems Engineering 2020 Contracts (OIG Report No. ZA-2012-082), Mar. 28, 2012</i></b>	
FAA’s multibillion-dollar systems engineering contracts	AMS guidance on the use of contractor past performance as a pre-award evaluation factor was so broad as to allow for evaluations that did not actually consider the quality of contractors’ past work.
<b><i>FAA Must Strengthen Its Cost and Price Analysis Processes To Prevent Overpaying for Noncompetitive Contracts (OIG Report No. ZA-2011-089), May 19, 2011</i></b>	
Noncompetitively awarded contracts	AMS lacked clear guidance on when pricing on a prior contract is acceptable as a method of determining price-reasonableness for a new award.
<b><i>Audit of the Federal Aviation Administration’s RESULTS National Contracting Service (OIG Report No. FI-2006-072), (Sept. 21, 2006)</i></b>	
FAA support services contracts	AMS did not have uniform processes for conducting periodic reviews of contracting offices or ensuring that contracting offices were complying with AMS.

### **FAA Does Not Follow Office of Management and Budget (OMB) Guidance for Major Acquisitions**

FAA attempted to acquire or is acquiring individual major investment systems for air traffic modernization—including WAAS, STARS, ERAM, and ADS-B—in one “grand design” approach to deliver capabilities over many years instead of over shorter increments. For example, FAA attempted to cover the first 18 years of ADS-B’s 28-year lifecycle through one contract award. In contrast, OMB

guidance recommends dividing large acquisitions into a series of shorter term contracts, task orders, or segments that deliver these capabilities in discrete increments, each of which is separately priced and not dependent on any subsequent increment. This reduces the risk of potential adverse consequences on the overall project by isolating errors and refining requirements. In addition, the Federal Chief Information Officer (CIO) recommends use of modular contracting, an incremental contracting approach for new investments. Modular contracting emphasizes acquiring IT investments in contractual increments, each of which produces a measurable result towards delivering the functionality for the investment. The Federal CIO requires that IT programs must deploy working business functionality within 18 months. However, AMS does not address such concepts, and FAA's large programs have been plagued by problems and uncertainties.

Finally, FAA has not updated AMS to keep pace with its increasingly complex acquisitions. Major programs like NextGen require managing a large portfolio of interdependent systems rather than one system. While FAA amended AMS to address the importance of portfolio management, AMS continues to lack detailed guidance on how to implement and apply portfolio management concepts. The lack of an acquisition roadmap for NextGen's portfolio has contributed to delayed decisions on individual systems, impacting other NextGen projects and, ultimately, the program's progress. For example, our recent audits of ADS-B have found that FAA was unable to use the ADS-B signal at some air traffic control facilities after the ADS-B ground infrastructure and acceptance testing was completed because the facilities did not have needed equipment to use the signal.

During the course of our audit, FAA appointed two consecutive FAA Acquisition Executives (FAE). The first FAE stated that FAA was in the process of establishing an 18-month Government and industry-wide action team to identify AMS strengths and weaknesses, review industry best practices, and consider amendments or additional coverage in AMS. The current FAE has stated that FAA decided that, after 20 years, it is a good time to determine how to improve AMS.

## **CONCLUSION**

The reform authorities FAA received 2 decades ago were intended to provide the flexibilities needed to resolve longstanding weaknesses in its programs and acquisitions and, ultimately, to bring costs and schedules under control. While FAA has taken some actions that make use of these flexibilities, it continues to experience many of the same planning and management problems associated with implementing new programs and introducing new technologies, including projects critical to implementing NextGen. FAA has been slow to adopt acquisition best practices to manage its contracts, such as clearly defining requirements, using

modular contracting on software development, and applying the results of risk assessments to positively affect acquisition outcomes. FAA's practice of limiting its progress reports to active baselines further undermines efforts to determine how much programs will ultimately cost, when they will be delivered, and what capabilities they will provide. Until FAA takes action to more fully leverage its reform authorities, it will not achieve the large-scale cost savings, efficiencies, and productivity enhancements envisioned to meet the Nation's future aviation needs.

## **RECOMMENDATIONS**

To improve its management of major acquisitions and better meet the goals of its reforms, we recommend that the Agency:

1. Identify and implement Agency-wide cost-saving initiatives and develop appropriate timelines and metrics to measure whether the initiatives are successful.
2. When reporting on major acquisitions, identify the current estimated costs for each acquisition system, including all segments. Separately identify cumulative amounts for acquisition costs, technical refresh, and other enhancements in order to identify the total baselined/rebaselined costs for each system and account for the way funds are being used when reporting to managers, Congress, and other stakeholders.
3. Review and identify Federal and industry best practices and guidance from OMB and the Federal CIO that may be incorporated into AMS for acquiring major capital investments and IT systems, including the use of successive contracts that are separately priced and the use of modular concepts when planning and purchasing IT, and determine which are appropriate for incorporation into AMS.

## **AGENCY COMMENTS AND OFFICE OF INSPECTOR GENERAL RESPONSE**

We provided FAA with our draft report on October 28, 2015, and received its response on December 7, 2015, which is included as an appendix to this report. FAA concurred with all three recommendations. FAA also requested that we close recommendation 1, stating that the Agency has met the intent of the recommendation and that it will continue to identify and implement Agency-wide cost-saving initiatives for fiscal year 2016. However, this recommendation will remain open, pending the documented results and other benefits of FAA's initiatives, including the results of its fiscal year 2016 cost-saving Organizational Success Measures. We request that FAA provide us with a target date for when it expects to report these results. We consider recommendation 1 open and

unresolved pending receipt of this information. For recommendations 2 and 3, FAA proposed appropriate actions and timeframes for completion, and we consider them resolved but open pending completion of the planned actions.

We appreciate the courtesies and cooperation of FAA representatives during this audit. If you have any questions concerning this report, please call me at (202) 366-0500 or Bob Romich, Program Director, at (202) 366-6478.

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cc: DOT Audit Liaison, M-1  
FAA Audit Liaison, AAE-100

## **EXHIBIT A. SCOPE AND METHODOLOGY**

We conducted our work from January 2014 to October 2015 in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

First, we determined what reforms FAA has implemented since 1995 by reviewing applicable laws, regulations, and executive orders. We also reviewed prior OIG and GAO audit reports and interviewed FAA officials from the Air Traffic Organization (ATO), the Office of Finance and Management, Human Resource Management, and Office of Chief Counsel. We spoke to officials from National Air Traffic Controllers Association's (NATCA) Headquarters, Airlines for America, National Business Aviation Association (NBAA), and Aircraft Owner and Pilots Association (AOPA).

To determine whether FAA reforms implemented since 1995 have resulted in improved air traffic operations, we analyzed the number and types of FAA air traffic facilities between January 1995 and the end of fiscal year 2013 from Office of Financial Services. We used relevant and reliable productivity data (previously received and independently validated during another OIG audit)<sup>40</sup> such as Labor Obligations, Controller Payroll, Certified Professional Controller (CPC) and Certified Professional Controller in Training (CPC-IT) Combined Payroll, etc. for all 315 air traffic facilities and 5 fiscal years (2008 to 2012) from FAA's Shared Service officials. In addition, we analyzed end of year staff and PC&B data for air traffic controller workforce and PASS Technician from fiscal year 2007 to fiscal year 2013. We tested the reliability of FAA's data by extracted pay information from DOT's Financial Reporting System (Delphi), and DOT's Federal Pay and Personnel System (FPPS). We compared the Delphi and FPPS data to the FAA reported data for air traffic controller and PASS Technician workforce and concluded that FAA's data were within +/- 3 percent. Last, we interviewed officials from FAA's ATO Air Traffic Control Facilities directorate to get an update on FAA's progress on facility consolidations.

To determine whether FAA reforms implemented since 1995 have resulted in reduced Agency costs, we analyzed the following historical FAA budget, personnel, compensation & benefit (PC&B), full-time equivalent (FTE), end of year staff, and Airport and Airways Trust Fund data:

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<sup>40</sup> *FAA Lacks the Metrics and Data Needed To Accurately Measure the Outcomes of Its Controller Productivity Initiative* (OIG Report No. AV-2014-062), July 9, 2014.

- Actual budget amounts by FAA appropriation accounts (Operations, Facilities & Equipment (F&E), Research, Engineering & Development (RE&D), and Grants-in-Aid for Airport (AIP) between fiscal years 1996 and 2014 from FAA's Office of Financial Services and actual amounts found in the *Fiscal Year 1998 to Fiscal Year 2014 FAA's President's Budget Submissions*.
- FAA PC&B and direct funded FTEs by appropriation account between fiscal years 1996 and 2012 found in the *Fiscal Year 1998 to Fiscal Year 2014 FAA's President's Budget Submissions*.
- FAA Air Traffic Controller (ATC) PC&B amounts between fiscal years 1998 and 2013 from FAA's Office of Labor Analysis.
- FAA ATO end of year staff and PC&B obligations for controllers, technical, and safety workforces between fiscal years 1998 and 2013 from FAA's Office of Management Services. (Note: FAA was unable to provide end of year staff data for fiscal year 2003 due to a change in fiscal year 2005 budget submission format and the fact that detailed PC&B obligations by workforce category was not available between fiscal years 1999 and 2004.)
- FAA's Airport and Airway Trust Fund total actual revenue, cash balance, and uncommitted balance between 1992 and 2013 and tax revenues by account between fiscal years 1998 and 2013 from U.S. Treasury Income Statements.

To determine the constant dollar change of FAA's budget from fiscal year 1996 to fiscal year 2012, we converted nominal (current) values to real values. We used the Bureau of Labor Statistic Employment Cost Index (ECI Price Deflator) for Total Compensation for Civilian Workers for the months of December as the basic of the adjustment for PC&B. A similar process was used to convert FAA operations and total budgets to constant dollars using the Office of Management and Budget (OMB) Total Non-Defense Composite Outlay Deflator.

To determine whether FAA reforms implemented since 1995 have resulted in expedited and cost-effective delivery of new technologies, we examined how closely FAA's current major acquisitions have tracked to their initial cost and schedule estimates, the reasons for program cost overruns or delays, and evaluated the impact FAA's AMS has had on the Agency's management of acquisitions.

To assess the extent to which FAA's major acquisitions had experienced changes in their estimated costs and schedules since they were initiated, we considered the performance of acquisitions currently underway when we initiated our audit. We limited our review to acquisitions for which FAA had established cost and schedule baselines, had at least one segment active as of September 30, 2013,<sup>41</sup>

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<sup>41</sup> We treated programs that were completed in fiscal year 2013 as active.

and that FAA had designated as major.<sup>42</sup> We then compared the acquisitions' original cost and schedule baselines with the estimates that were current as of September 30, 2013, using information obtained from FAA's annual acquisition baseline performance reports, Capital Investment Plans, records of FAA's Joint Resources Council decisions, acquisition planning documents, interviews with FAA officials, and historical acquisition data provided by FAA staff. For acquisition programs that involved completed segments, we assessed whether there were variances between initial cost and schedule estimates and final cost and schedule values and added those data to the cost and schedule information for the active segment or segments. Some of the acquisition programs we assessed consisted of segments that FAA has designated as both major and non-major acquisitions; we included all segments in our calculations so long as FAA had designated that a major segment of the acquisition was still active as of September 30, 2013. We excluded segments initiated after September 30, 2013, from our computations of cost increases and delays.

To identify reasons that acquisitions experienced cost overruns or delays, we reviewed past reporting by OIG and GAO on FAA's acquisitions and overall acquisition performance.

To assess FAA's approaches for reporting on acquisitions and breaking acquisitions into segments, we interviewed personnel from FAA's Office of Acquisition Policy and Oversight and Office of Budget and Programs and Program Management Office and reviewed OIG and GAO reports addressing FAA's acquisitions.

To assess the impact of AMS on FAA's ability to improve delivery of new technologies, we examined the history of AMS by reviewing transcripts of congressional hearings before and shortly after FAA's implementation of AMS and interviewed FAA's Acquisition Executive and other senior officials in FAA's Office of Acquisitions and Business Services. We also compared provisions of AMS to the FAR and guidance on best practices for acquisitions in the Federal Government and reviewed past reporting by OIG and GAO.

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<sup>42</sup> A list of acquisitions we reviewed can be found in Exhibit E.

## **EXHIBIT B. ORGANIZATIONS VISITED OR CONTACTED**

### **Federal Aviation Administration**

#### **Headquarters**

Office of the Administrator  
Office of Acquisitions and Business Services  
Office of the Chief Counsel  
Office of Finance and Management  
Office of Human Resources  
Office of Policy, International Affairs, and Environment

#### **Air Traffic Organization**

Office of Air Traffic Control Facilities  
Office of Management Services  
Office of Mission Support Services  
Program Management Organization

#### **FAA Technical Center**

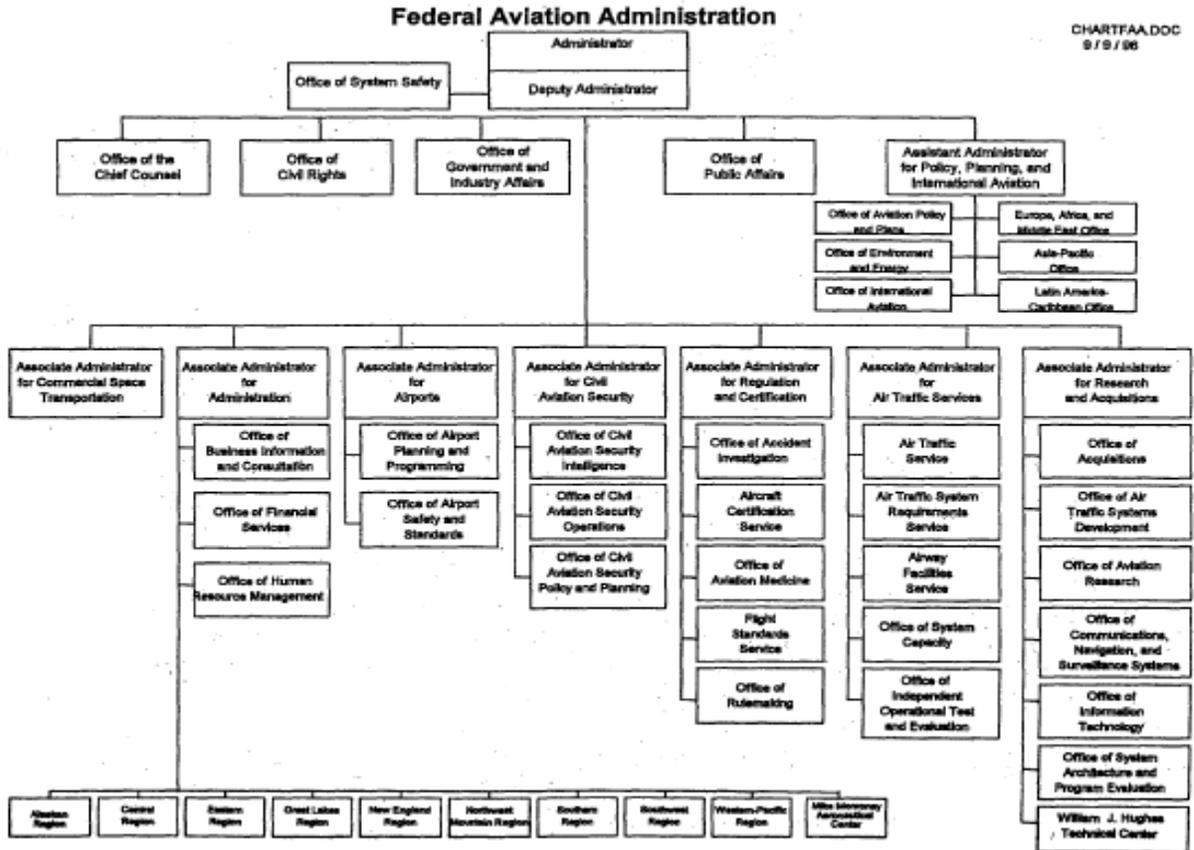
FAA William J. Hughes Technical Center, Atlantic City, NJ

### **Industry Groups/International Organizations**

Airlines for America (A4A)  
Aircraft Owners and Pilots Association (AOPA)  
Business Roundtable  
National Air Traffic Controllers Association (NATCA)  
National Business Aviation Association (NBAA)

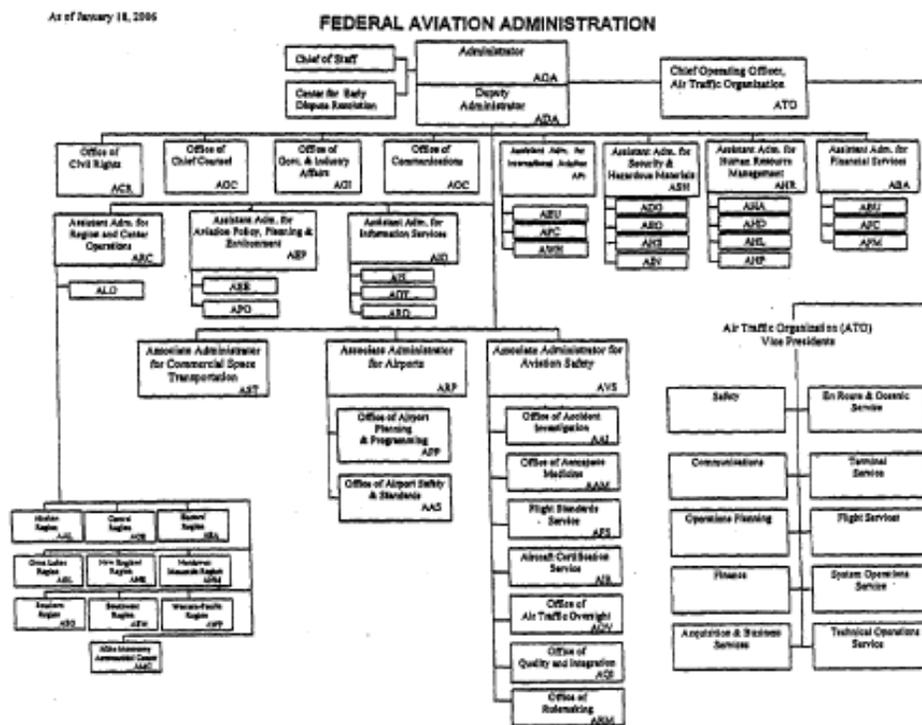
# EXHIBIT C. CHANGES TO FAA ORGANIZATIONAL STRUCTURE

## FAA Organizational Structure as of September 1996



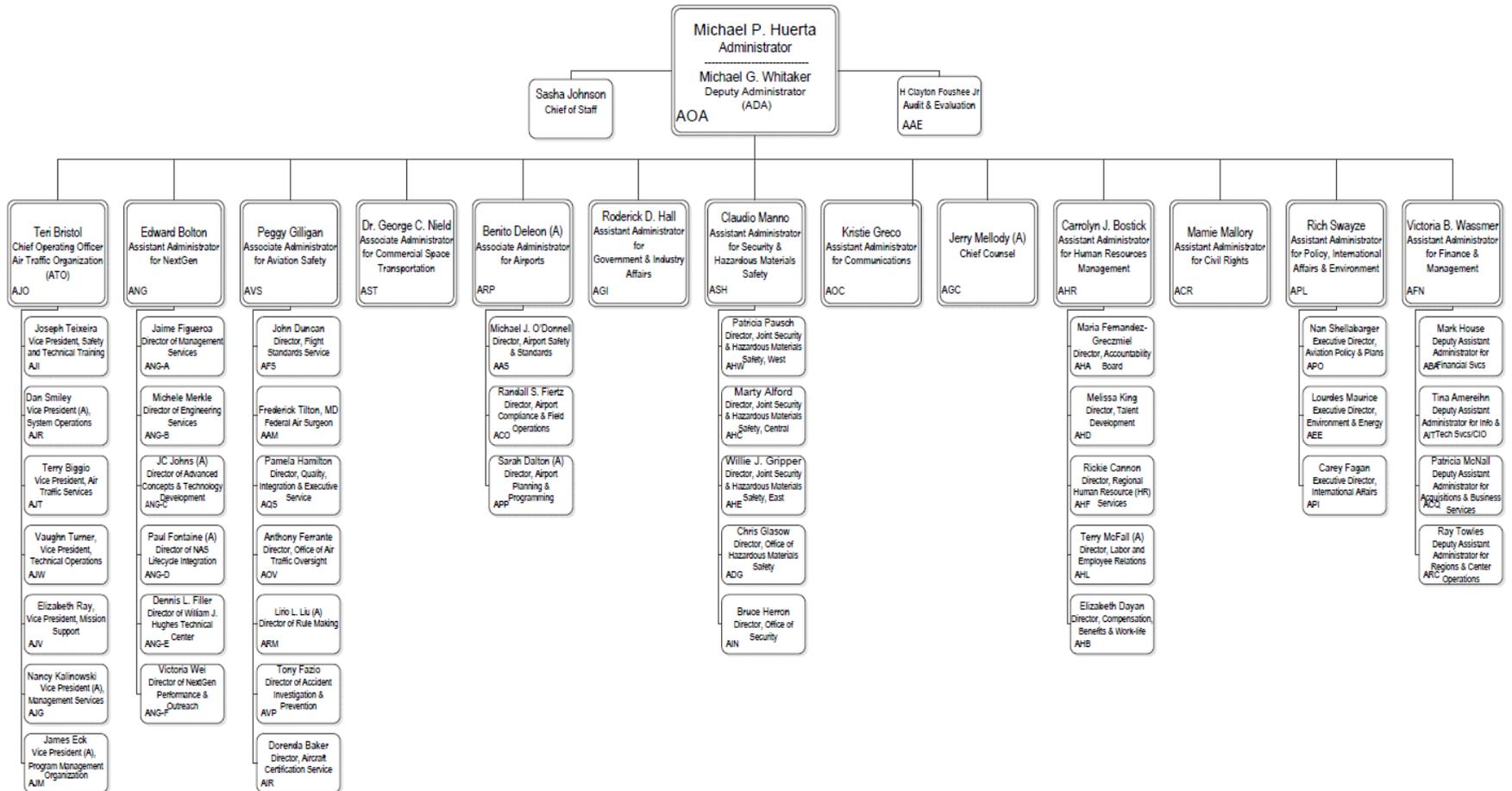
Source: FAA

# FAA Organizational Structure as of January 2006



Source: FAA

# FAA Organizational Structure as of February 2015



Source: FAA

## EXHIBIT D. FAA'S PERSONNEL MANAGEMENT SYSTEM COMPARED TO OTHER FEDERAL AGENCIES

Entitlement	FAA's Personnel Management System	Title 5
<b>Appointment</b>	Excepted Service	Competitive Service
<b>Personnel Policies and Procedures</b>	Exempt from OPM rules and regulations, except certain provisions of Title 5	Covered by OPM rules and Title 5 regulations
<b>Tenure</b>	1 year of permanent service	3 years of career conditional service
<b>Probationary Period</b>	1 year of service	Same
<b>Interchange Agreement</b>	Permanent employees who have completed the probationary period may transfer to any other Federal agency	Same
<b>Pay</b>	<ul style="list-style-type: none"> <li>• Broad pay bands</li> <li>• Union negotiated pay</li> <li>• OPM General Schedule (GS) pay for bargaining unions that have not negotiated pay</li> <li>• OPM Wage Grade (WG) schedule for hourly rate employees</li> </ul>	Government-wide GS and WG pay schedules
<b>Annual Pay Increase</b>	<ul style="list-style-type: none"> <li>• FAA Administrator determines OSI based on Agency performance</li> <li>• Supervisors determine SCI based on individual contributions</li> <li>• Union negotiated annual increases</li> </ul>	Legislation determines yearly cost of living allowance pay increase
<b>Locality Pay</b>	Legislation determines	Same
<b>Sick Leave Earned</b>	4 hours per pay period	Same
<b>Annual Leave Earned Per Pay Period</b>	<ul style="list-style-type: none"> <li>• Less than 3 years of service: 4 hours</li> <li>• 3 to less than 15 years of service: 6 hours</li> <li>• 15 or more years of service: 8 hours</li> </ul>	Same
<b>Retirement</b>	Civil Service Retirement System (CSRS) or Federal Employees Retirement System (FERS)	Same
<b>Thrift Savings Plan</b>	Eligible to participate	Same
<b>Health Benefits</b>	Federal Employees Health Benefits (FEHB)	Same
<b>Life Insurance</b>	Federal Employees Group Life Insurance (FEGLI)	Same
<b>Family Medical Leave Act</b>	Coverage under Title 1	Similar coverage
<b>Voluntary Leave Transfer Program</b>	May donate and receive annual and sick leave	May donate and receive annual leave only
<b>Unions</b>	Right to establish and represent	Same
<b>Grievance Process</b>	Union negotiated; guaranteed fair treatment policy for non-bargaining unit employees	Union negotiated
<b>Equal Employment Opportunity Commission</b>	Covered	Same
<b>Merit System Protection Board Appeal Right</b>	Veterans are covered after 1 year of service; all others covered after 2 years of service	Covered after 1 year of service
<b>Veterans' Preference</b>	Affords certain veterans hiring preferences	Similar coverage

Source: OIG analysis

## EXHIBIT E. 15 MAJOR FAA ACQUISITIONS AS OF SEPT. 30, 2013

Active Major Program and Description	
STARS/ TAMR	Upgrades the technology necessary to support air traffic control management within the terminal environment.
WAAS	Provides more accurate aircraft position information to facilitate more direct flight paths and precision approaches to airports.
NEXCOM	Replaces the aging air-to ground analog radios which allow direct voice communication between air traffic controllers and pilots.
ERAM	Replaces and significantly enhances the existing hardware and software at facilities which manage high-altitude air traffic.
CATMT	Provides new functionality to the existing Traffic Flow Management System (TFMS) such as automated reroutes and improved data exchanges between air traffic control facilities.
SASO	Improves, standardizes and automates the FAA's safety oversight system, inspection policies and processes.
ADS-B	Enables aircraft to continually broadcast flight data such as position, air speed, and altitude to air traffic controllers and other aircraft.
RCISS	Provides the IT infrastructure so Office of Aviation Safety will have safety data needed to assess safety factors in real-time.
FSIAR	Acquires turboprop aircraft to replace older aircraft used by Aviation Safety Inspectors.
SWIM	Provides an information technology infrastructure which will enable the multiple systems that make up the NAS to share information.
RWSL	Integrates a light warning system to provide a visual signal indicating to pilots and vehicle operators that it is unsafe to enter, cross or begin takeoff on a runway.
TBFM	Will manage demand-capacity more efficiently.
LCSS	Modernizes the FAA's supply chain by replacing the 20 year old Logistics and Inventory System.
FSRM 2	Implements standardized facility protective measures at all FAA staffed facilities.
DataComm	Will provide data communications between air traffic controllers and aircraft.

## EXHIBIT F. CONTRACT AND PROJECT MANAGEMENT WEAKNESSES IMPACTING OUTCOMES IN FAA'S MAJOR ACQUISITIONS

Acquisition Weakness	ERAM	ATCOTS	STARS/ TAMR	ADS-B	SWIM	RWSL	WAAS
Unclear requirements	●	●	●	●	●	●	
Stakeholders not involved	●	●	●				
Software development issues	●		●				●
Inadequate cost estimates		●	●		●	●	●
Poor contractor oversight	●	●					
Inadequate cost tracking or EVM	●	●					●
Ineffective use of incentive awards	●	●		●			
Undefinitized scope and costs	●						●
Inadequate risk assessments	●	●					
Inadequately structured contract	●	●		●			
No modular contracting or OMB guidance not followed	●			●			●
High turnover of contracting and program staff	●	●					
Inadequately maintained contract files	●	●					
Testing problems	●		●	●			

Source: OIG analysis

**EXHIBIT G. MAJOR CONTRIBUTORS TO THIS REPORT**

<b>Name</b>	<b>Title</b>
Robert Romich	Program Director
Terrence Letko	Senior Technical Advisor
Frank Danielski	Project Manager
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Tasha Thomas	Project Manager
My Phuong Le	Senior Analyst
Aaron Malinoff	Senior Analyst
Michael Broadus	Analyst
Mi Hwa Button	Analyst
Zachary DesJardins	Analyst
Audre Azuolas	Writer-Editor

## APPENDIX. AGENCY COMMENTS



# Federal Aviation Administration

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## Memorandum

Date: December 7, 2015

To: Matthew E. Hampton, Assistant Inspector General for Aviation Audits

From: H. Clayton Foushee, Director, Office of Audit and Evaluation, AAE-1 

Subject: Federal Aviation Administration's (FAA) Response to Office of Inspector General (OIG) Draft Report: FAA Reforms and Modernization Outcomes

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The FAA is committed to reducing costs and increasing efficiency to the extent possible, and given factors within the Agency's control. FAA reform statutes have facilitated progress in many areas articulated in the OIG draft report. The Department has seen lower cost growth than many other agencies and departments.<sup>1</sup> By leveraging the reforms provided in 1996, the Agency has been effective at controlling cost growth by implementing numerous initiatives that have successfully reduced costs. Examples include the creation of the Air Traffic Organization (ATO); consolidating ATO's regional services from nine regional offices to three service areas; contracting Flight Service Stations; and the creation in FY 2012 of the ATO Program Management Organization, the ATO Management Services organizations and the Office of Finance and Management. These structural improvements have reduced operating costs and improved both the FAA's efficiency and effectiveness.

Since 2004, the FAA has taken on and delivered some of the most complex and demanding programs such as the Standard Terminal Automation Replacement System (STARS); EnRoute Automation Modernization (ERAM), Wide Area Augmentation System (WAAS); and NextGen programs such as Automatic Dependent Surveillance–Broadcast (ADS-B), all while implementing the initiatives that were aimed at controlling costs. Moreover, the Agency is continually mandated to comply with new requirements.

Since 2001, terrorist attacks and dramatic increases in worldwide information system attacks have imposed numerous additional requirements for systems security as well as physical and logistical security, which have significantly increased the FAA's costs. Looking ahead, the regulatory demands associated with rapidly growing Unmanned Aircraft Systems and Commercial Space industries will have major budget impacts.

The FAA continually looks for ways to improve the Acquisition Management System (AMS) through systematic and periodic updates to reflect the changes in the marketplace that are the

<sup>1</sup> Source: Budget for the US Government Fiscal Year 2016, Historical Table 5.2

result of Congressional action, or that are incurred as the result of Executive Orders. As noted in the OIG draft report, the FAA has made significant progress in managing the cost and schedule of Agency programs since 2004 through a segmented approach to program management. This approach, which is aligned with the Office of Management and Budget guidance, assists the FAA in reporting costs through the various stages of an acquisition in a more manageable and meaningful way.

In reviewing the recommendations contained in the report, the FAA offers the following observations:

- Regarding recommendation 1, the FAA already includes agency-wide cost savings in its Organizational Success Measures and will continue to identify and implement Agency-wide cost-saving initiatives for FY2016. These initiatives are tracked and reported to the FAA's Chief Financial Officer on a monthly basis.
- Pertaining to recommendation 2, the FAA already provides much of the information recommended by the OIG in the Annual FAA System Acquisition Baseline Performance Report. However, the Agency will enhance this report to include the recommended acquisition information, and this updated information will be included in the 2015 FAA System Acquisition Baseline Performance Report.
- Regarding recommendation 3, the FAA will review Federal and industry best practices for acquiring major capital investments and Information Technology systems. This review will include the use of successive contracting and the use of modular concepts. The FAA will conduct this review over the upcoming calendar year and based on the findings, will determine what changes, if any, to incorporate into AMS.

The Agency concurs with all three OIG recommendations, as written. We believe the FAA has already met the intent of recommendation 1 and request it be closed, as implemented. For the remaining recommendations, the FAA plans to complete actions for recommendation 2 by February 29, 2016, and by January 31, 2017 for recommendation 3. The Agency appreciates the opportunity to offer additional perspectives on the OIG draft report. Please contact H. Clayton Foushee at (202) 267-9000 if you have any questions or require additional information regarding these comments.