STATUS OF

FAA'S MAJOR ACQUISITIONS

Federal Aviation Administration

Report Number: AV-2003-045
Date Issued: June 26, 2003

Memorandum

U.S. Department of Transportation
Office of the Secretary of Transportation
Office of Inspector General

Subject: ACTION: Status of the Federal Aviation Administration's Major Acquisitions AV-2003-045

Date: June 26, 2003

From: Alexis M. Stefani
Principal Assistant Inspector General for Auditing and Evaluation

Reply to Attn. of: JA-10:x60500

To: Federal Aviation Administrator

This is our second annual report on the Federal Aviation Administration's (FAA) major acquisitions, which are part of its modernization effort. FAA is requesting $2.9 billion for Facilities and Equipment (F&E) funding for fiscal year (FY) 2004 to increase the capacity, efficiency, security, and safety of the National Airspace System. The objective of our review was to evaluate program costs and schedules for FAA's major acquisitions, and identify key issues affecting their implementation. Exhibit A provides details on our objective, scope and methodology for performing this review.

This report covers 20 major FAA projects that have a current combined estimated cost of about $14.1 billion in F&E funds, and account for $1.2 billion requested for acquisitions in FY 2004. These projects include developing new precise satellite navigation systems, developing new weather systems for controllers, and acquiring new technologies to prevent accidents on runways and taxiways.

In 1996, Congress exempted FAA from Federal procurement rules that the agency said hindered its ability to modernize the air traffic control system. Now, after 7 years, FAA has made progress in reducing the time it takes to award contracts and progress has been made with some efforts, such as Free Flight Phase 1. However, the agency has not held managers accountable, or used the flexibilities and benefits of acquisition reform to control cost and schedule slips.

We found that cost growth, schedule delays, and performance problems continue with FAA's major acquisitions. Overall, the 20 projects we reviewed have

experienced cost growth of about $4.3 billion and schedule slips from 1 to 7 years. Billion-dollar cost growth with acquisitions is not sustainable or affordable in light of declining Trust Fund revenues. Moreover, FAA is just starting complex, billion-dollar efforts while continuing to fund projects that have been delayed for several years. If FAA does not exercise more management control over its acquisitions, existing projects will be further delayed, and new projects may not start as planned.

In light of our findings, FAA must take a number of steps to control costs of acquisitions and get as much as it can with each acquisition dollar. Therefore, we are recommending that FAA:

- Update the cost, schedule, and performance baselines[1] for many of its major acquisitions, including Standard Terminal Automation Replacement System, Integrated Terminal Weather System, Local Area Augmentation System, and Wide Area Augmentation System at a minimum. These baselines are misleading because they do not accurately reflect the true cost, schedule, or performance parameters for the projects. This process may require FAA to establish a new strategy that accelerates some projects and defers others.

- Develop—and use—performance goals for assessing progress with its major acquisitions. This should involve holding staff and contractors accountable for keeping projects within cost and schedule, as appropriate. This is a step any business that pursues advanced technologies would take.

We periodically discussed this report with various FAA program officials. On June 11, 2003, we held an exit conference with FAA's Associate Administrator for Research and Acquisitions to discuss this report and have incorporated his comments where appropriate.

RESULTS IN BRIEF

FAA has made progress with a number of acquisitions, including Free Flight Phase 1 and new information exchange systems that link FAA and airline operations centers. Progress with Free Flight builds on the successful deployment of the Display System Replacement, which provided new controller displays at

[1] For the purposes of our report, the term "baseline" refers to the cost, schedule, and performance parameters of major acquisitions.

FAA facilities that control high altitude traffic. However, other modernization programs have experienced cost, schedule, and performance problems.

Our review of 20 major acquisitions shows 14 of these projects have experienced cost growth of over $4.3 billion (from $6.8 billion to $11.1 billion), which represents significantly more than FAA's FY 2004 $2.9 billion request for modernization. Also, 13 of the 20 projects account for delays ranging from 1 to 7 years. Many of the 20 projects we reviewed—both old and new—do not have reliable cost, schedule, or performance baselines, meaning that FAA cannot effectively plan, manage programs, or meet expectations for improving the safety, security, and capacity of the National Airspace System. The following chart provides cost and schedule information on four projects largely managed since FAA was granted acquisition reform.

Program	Estimated Program Costs (Dollars in Millions)		Percent Cost Growth	Implementation Schedule		Schedule Delay
	Original	Current		Original	Current	
Wide Area Augmentation System	$892.4	$2,922.4*	227%	1998-2001	2003-TBD**	5 years
Standard Terminal Automation Replacement System	$940.2	$1,690.2	80%	1998-2005	2002-2012**	7 years
Local Area Augmentation System	$530.1	$696.1	31%	2002-TBD	2006-TBD**	4 years
Integrated Terminal Weather System	$276.1	$286.1	4%	2002-2003	2003-2008	5 years

* This includes the cost to acquire geostationary satellites.
** TBD=To Be Determined (costs and schedules are under review).

Problems with acquisition efforts have serious consequences because they result in costly interim systems, a reduction in units procured, postponed benefits (in terms of safety and efficiency), or "crowding out" other modernization projects. For example:

- The *Standard Terminal Automation Replacement System* (STARS) replaces controller and maintenance workstations with color displays, processors, and computer software. While STARS commenced operations at Philadelphia this past year, and recently received approval to deploy to other locations, it will be 2 years before STARS is deployed at FAA's

largest sites, such as Chicago and Denver. This effort has cost FAA more than $1 billion since 1996, but most of these funds were spent on developing STARS, not delivering systems.

When the STARS development schedule began slipping, FAA procured an interim system, the Common Automated Radar Terminal System (Common ARTS) for about $200 million. FAA is now operating Common ARTS (software and processors) at approximately 140 locations. During 2002, the STARS program proposed to limit the program to 73 systems at a cost of $1.33 billion (instead of $1.69 billion for 182 sites) while trying to identify ways to reduce program costs. As of May 2003, no cost savings have been confirmed, and a final decision to go to all sites has not been made.

- The *Local Area Augmentation System* (LAAS) is a new precision approach and landing system that has enjoyed considerable industry support.[2] FAA expected to have LAAS Category I (CAT I) operational in 2004. It is now clear that this milestone cannot be met because of additional development work, evolving requirements, and unresolved issues regarding how the system will be certified as safe for pilots to use. FAA now expects LAAS (CAT I services) to be operational in late 2006. Moreover, the more demanding LAAS services (CAT II/III landings planned for 2005) are now a research and development effort with an uncertain end date. Additionally, costs schedule, and expected benefits for LAAS are under review.

- The *Integrated Terminal Weather System* (ITWS) provides air traffic managers with a 20-minute forecast of weather conditions near airports.[3] FAA initially planned to complete deployment of all 38 systems by 2003 at a cost of about $286 million, but production costs have skyrocketed from $360,000 to $1 million per system. As a result, its deployment has stretched out until 2008, and FAA cannot execute the program as intended. Absent additional funding, FAA will defer adding several planned improvements and may procure fewer systems than intended. A decision about ITWS is expected this summer.

- *Controller Pilot Data Link Communications* (data link) is a new way for controllers and pilots to communicate that is analogous to e-mail and is managed as part of the Free Flight program. FAA deferred plans for data

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[2] For additional details, see our report FAA Needs to Reset Expectations for LAAS Because Considerable Work Is Required Before It Can Be Deployed for Operational Use, Report No. AV-2003-006, December 16, 2002.

[3] For additional details, see our report Integrated Terminal Weather System: Important Decisions Must Be Made on the Deployment Strategy, Report No. AV-2003-009, December 20, 2002.

link because the approved baseline of $167 million (for 20 locations beginning in 2003) is no longer valid, and because of uncertainty about how quickly airlines will equip with new systems. FAA estimates that it would cost $237 million for eight locations—an increase of $70 million for less than half of the planned locations.

Billion-dollar cost growth with acquisitions is not sustainable or affordable in light of declining Trust Fund revenues. Further, only 60 percent of FAA's FY 2004 modernization budget of $2.9 billion will be expended for acquiring new systems; the remaining funds will be for salaries, FAA facilities, and support contracts. Four of the 20 projects we reviewed experienced cost growth ranging from 143 to 248 percent—additional cost growth of this magnitude will impact other programs and limit the number of new initiatives FAA can take on.

There are several billion-dollar projects just getting started that have potential for cost growth because of their size and complexity. FAA must fund these projects while at the same time funding programs, such as STARS, that have been delayed by several years.

- The *En Route Automation Replacement Modernization* (ERAM) will provide new software and hardware (the "nerve center") for facilities that control high altitude traffic in the United States at an estimated cost of $2.1 billion. By far, ERAM is one of the most expensive and software-intensive projects (over 1 million lines of software code), FAA has embarked on since the Advanced Automation System. FAA will spend over $260 million annually on ERAM beginning in FY 2005.

- The *Next Generation Air/Ground Communications* (NEXCOM) is a complex effort to replace all of the existing air-to-ground communications in the National Airspace System with digital systems. It involves replacing 50,000 radios with new multi-mode ones, and will require airspace users to equip with new radios. The current cost estimate of $986 million for NEXCOM reflects only the first stage of a larger program that is expected to provide more effective use of the existing radio frequency spectrum and allow the transmission of both voice and data on the same channel. Total NEXCOM costs are uncertain but will be more than the current estimate.

Cost and schedule baselines for many projects we reviewed are not reliable. Therefore, decisions are being made with unclear data about what can reasonably be accomplished or what is affordable. Given the cost growth in the acquisitions we reviewed, and the fact that FAA is just starting several complex, billion-dollar

projects, the agency needs to rethink its overall investment strategy for modernizing the National Airspace System.

FAA needs to take a number of steps to improve its overall management of its modernization effort. FAA needs to update the cost, schedule, and performance baselines for many of its major acquisitions, including STARS, ITWS, LAAS, and WAAS at a minimum. These baselines are misleading because they do not accurately reflect the true cost, schedule, or performance parameters for the projects. This process may require FAA to establish a new strategy that accelerates some projects and defers others. In addition, FAA needs to develop—and use—performance goals for assessing progress of its major acquisitions. This should involve holding staff and contractors accountable for keeping projects within cost and schedule, as appropriate. This is a step any business that pursues advanced technologies would take.

AGENCY COMMENTS AND OFFICE OF INSPECTOR GENERAL RESPONSE

On June 11, 2003, we met with the Associate Administrator for Research and Acquisitions, and staff from Air Traffic Services to obtain their oral comments to our discussion draft report. We incorporated FAA's comments where appropriate and made adjustments to this report. FAA officials from those offices generally agreed with our analysis and recommendations. We are requesting that FAA provide written comments to the final report.

ANALYSIS AND RECOMMENDATIONS

FAA's mission is to promote the safe, orderly, and expeditious flow of air traffic in the National Airspace System. To do so, FAA operates a vast network of radars, automated data processing, navigation, and communications equipment 24 hours a day, 365 days a year. FAA has spent $35 billion since the modernization began in the 1980s, and is requesting $2.9 billion for FY 2004 to modernize the National Airspace System.

We analyzed 20 major FAA acquisitions with respect to cost, schedule, and key issues that affect their implementation. These projects include new controller displays, new precise navigation and landing systems, and new weather systems that can help controllers respond to and recover from bad weather. The

20 acquisitions we reviewed represent about 70 percent of the available F&E funds allocated for air traffic control acquisitions for FY 2004.

Progress has been made over the last several years with FAA acquisitions, including the Free Flight Phase 1 initiative which introduced, among other things, new automated controller tools. However, we found that a wide range of acquisitions are experiencing cost, schedule, and performance problems.

Our review of 20 major acquisitions shows 14 projects have experienced cost growth of over $4.3 billion (from $6.8 billion to $11.1 billion), which represents substantially more than FAA's FY 2004 $2.9 billion request for modernization. Also, 13 of the 20 projects account for delays ranging from 1 to 7 years. Exhibit B provides details of cost and schedule variances for 17 projects, while Exhibit C provides cost and schedule data of 3 projects just getting started.

Cost and schedule variances in 17 of the 20 acquisitions we reviewed are the result of unstable requirements, complex software development, human factors concerns, and problems in certifying new systems as safe for pilots to use. Problems with cost growth, schedule slips, and performance shortfalls have serious consequences—they result in costly interim systems, a reduction in units procured, postponed benefits (in terms of safety and efficiency), or "crowding out" other projects. Exhibit D provides the cost, schedule, and status of the 20 major acquisitions we reviewed in detail.

FAA Needs to Update Cost, Schedule, and Performance Baselines for Its Major Acquisitions

Our work shows that many acquisitions—both old and new—do not have reliable cost estimates or schedules, and have experienced performance problems. Problems are traceable to a number of factors, including poorly defined cost estimates, changing requirements, and complex and substantial software development, as shown in the following examples.

- WAAS, a new satellite-based navigation system, has experienced a long history of uncertainty regarding how much the new system will cost, when it will be delivered, and what benefits can be obtained. FAA now plans to have WAAS operational in July 2003, but additional work will be required to expand WAAS coverage (through additional ground stations). WAAS was intended to provide Category I[4] performance to the majority of the Nation's airports, but will provide something less than promised when the

[4] Category I precision approach has a 200-foot ceiling/decision height and visibility of ½ mile.

system is deployed. FAA needs to make a downward adjustment in the $2.9 billion WAAS cost estimate to reflect the fact the agency will not pursue Category I performance.

- STARS replaces controller and maintenance workstations with color displays, processors, and computer software. While STARS commenced operations at Philadelphia this past year, and recently received approval to deploy to other locations, it will be 2 years before STARS can be deployed at FAA's largest sites, such as Chicago and Denver. The program has cost FAA more than $1 billion since 1996. Most of these funds were spent on developing STARS, not delivering systems. When the STARS development schedule began slipping, FAA procured an interim system, Common ARTS, for about $200 million. FAA is now operating Common ARTS (software and processors) at approximately 140 locations.

  In FY 2002 alone, FAA reprogrammed over $40 million from other modernization efforts (data link communications, oceanic modernization, and instrument landing systems) to pay for cost increases with STARS. As a result of these cost and schedule problems, in March 2002 FAA officials proposed scaling back the program from 182 systems for $1.69 billion to a revised estimate of 73 systems for $1.33 billion. No final decision has been made, and FAA is currently reevaluating how many STARS systems it can afford. FAA officials must make a smart business decision on how to complete terminal modernization in the most cost-effective manner possible.

- ITWS provides air traffic managers with a 20-minute forecast of weather conditions near airports. FAA initially planned to complete deployment of all 38 systems by 2003 at a cost of about $286 million, but production costs have skyrocketed from $360,000 to $1 million per system. FAA cannot execute the program as intended and, absent additional funding, will defer adding several planned improvements and may procure fewer systems than intended. A decision about ITWS is expected this summer.

- LAAS is a new precision approach and landing system. FAA officials expected to have Category I services operational in 2004. It is now clear that this milestone cannot be met because of additional development work, evolving requirements, and unresolved issues regarding how the system will be certified as safe for pilots to use. Moreover, the more demanding

Category II/III[5] services (planned for 2005) are now a research and development effort with an uncertain end date. This means that benefits associated with the new precision approach and landing system will be postponed. FAA needs to reset expectations with respect to how much the system will cost, when it will be delivered, and benefits that can be obtained.

Another project that warrants attention is the *Advanced Technologies and Oceanic Procedures* (ATOP) program, which will modernize equipment at facilities that manage air traffic principally over the Atlantic and Pacific Oceans. Since 1995, FAA has spent over $300 million to modernize its oceanic facilities, but past efforts met with little success due to, among other things, poor contractor performance.

Under a new initiative, in June 2001 FAA awarded a $217 million contract for ATOP to provide oceanic systems in Anchorage, New York, and Oakland. However, since the contract was awarded, the contractor has experienced delays primarily due to problems completing software development and testing. FAA and the contractor planned to rely extensively on non-developmental software, but additional software development was needed to meet agency requirements. The contractor is 10 months behind schedule, and FAA is reassessing when the first site will be operational in Oakland. To date, schedule delays have not resulted in cost growth because this is a fixed price contract. To control costs with this acquisition, FAA needs to keep requirements stable.

FAA needs to update the cost, schedule, and performance baselines of its major acquisitions. FAA's own Acquisition Management System states that reliable cost, schedule, and performance baselines are essential to effectively plan and manage the modernization effort.

There is little room for continued cost growth or schedule slippage. This is because funding for the modernization account as outlined in the Administration's reauthorization proposal will remain essentially flat over the next several years. Moreover, only 60 percent of FAA's FY 2004 request for Facilities and Equipment is expected to be spent specifically on acquiring new air traffic control systems, whereas the remaining funds are requested for FAA facilities, mission support (i.e., support contracts), and personnel expenses. Figure 1 illustrates FAA's FY 2004 request for the modernization account.

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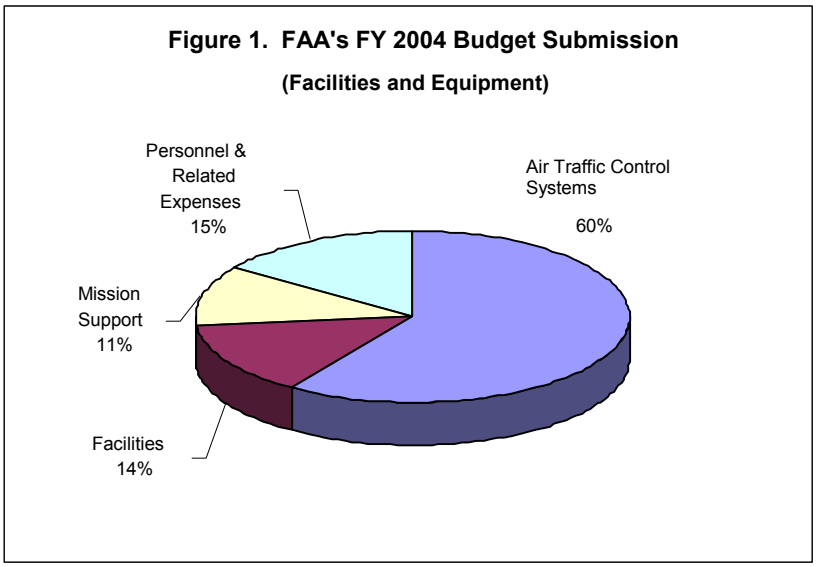
[5] Category II precision approach has a 100-foot ceiling/decision height and visibility of ¼ mile, and Category III precision approach and landing has a decision height less than 100 feet and visibility down to the airport surface.



Historically, FAA acquisitions have experienced considerable cost growth and schedule slips. As shown in Exhibit B, 4 of the 20 acquisitions have experienced cost growth ranging from 143 to 248 percent. Any further cost growth in these or other projects will result in FAA lengthening the implementation schedules and postponing benefits (as occurred with ITWS and STARS).

Billion-Dollar Projects Early in the Acquisition Phase That Need Attention

A key focus for FAA must be effective cost controls for programs just getting started that are high risk efforts because of their size, complexity, and level of developmental work required, such as ERAM and NEXCOM.

- ERAM, with an estimated cost of $2.1 billion, is critical because it will replace aging Host computer hardware and software (the central nervous system) for facilities that manage high altitude air traffic. It is one of the most expensive, software-intensive acquisitions FAA has embarked on since the Advanced Automation System. FAA will spend over $260 million annually on ERAM beginning in FY 2005.

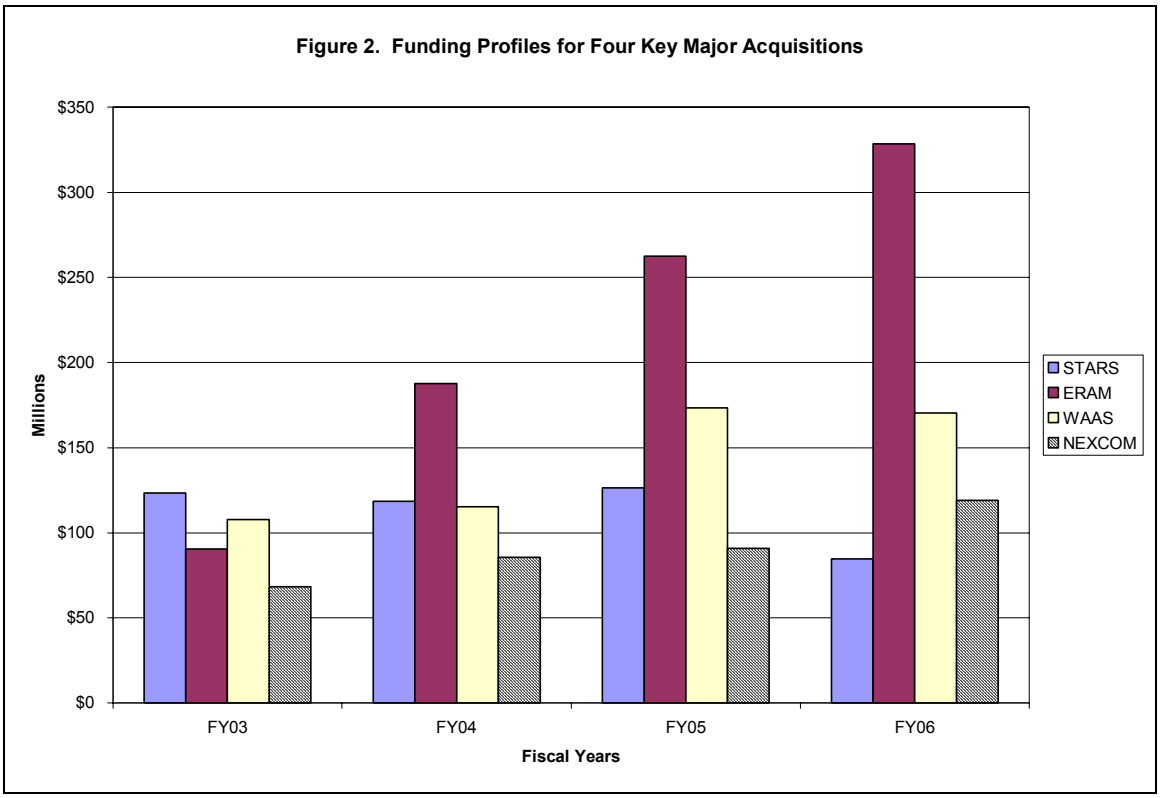
  FAA awarded a contract for ERAM in December 2002. ERAM is a high risk effort and will require sustained management attention because of its size, complexity, and the fact that it involves over 1 million lines of software code. FAA officials told us that progress and problems with ERAM will affect many efforts, including new controller tools, data link,

planned upgrades for the Display System Replacement, and airspace redesign efforts. We intend to initiate a review of ERAM later this year.

- NEXCOM is a complex effort to replace all of the existing air-to-ground communications in the National Airspace System with digital systems. It involves replacing 50,000 radios with new multi-mode ones, and will require airspace users to equip with new radios. The current cost estimate of $986 million for NEXCOM reflects only the first stage of a larger program that is expected to provide more effective use of the existing radio frequency spectrum and allow the transmission of both voice and data on the same channel. Total NEXCOM costs are uncertain, but will be more than the current estimate of $986 million.

  NEXCOM has been controversial with the airlines because of timing issues and concerns about FAA's preferred technology. Key issues focus on (1) timing of moving forward with a NEXCOM rulemaking that will require airspace users to equip with new radios; (2) examining linkages with other programs, including data link; and (3) harmonizing efforts for new communications with other countries that are also revamping their air traffic communications.

Continued cost growth could also impact or "crowd out" future projects. As Figure 2 shows, cost control is essential because FAA must fund a number of new complex initiatives while moving forward with ongoing efforts, such as STARS and WAAS that have been delayed for several years.



Source: FAA's Capital Investment Plan, Detailed Financial Baseline, January 23, 2003, and ERAM Final Investment Decision, June 12, 2003

FAA expects to spend $1.8 billion on these four projects alone between FYs 2004 and 2006. This is exclusive of efforts to move forward with other programs, such as a $270 million additional upgrade to controller displays at facilities that control high altitude traffic, and efforts to improve runway safety. Successfully managing the execution of these complex efforts in this time period will require a level of cost control heretofore unseen by FAA since it began the modernization effort in the early 1980s.

Many cost and schedule baselines for the 20 projects reviewed are not reliable. For example, a number of projects are operating on baselines established almost 4 years ago. We note that WAAS and LAAS baselines were agreed to in September 1999. As a result, it is unclear what reasonably can be accomplished or what is affordable.

As we noted in our report on the top management issues facing the Department of Transportation, FAA can take a number of steps to improve how it manages the

acquisition of new systems.[6] FAA needs to strengthen contract oversight, make greater use of Defense Contract Audit Agency audits, and institute cost control mechanisms for software-intensive contracts. FAA is taking steps to address these concerns, but continued attention to these matters is needed.

FAA also needs to develop performance goals to assess progress with major acquisitions. FAA has established performance goals (number of flights delayed) for its Air Traffic Services but has not done so for its major acquisitions. In its FY 2004 budget request, one of FAA's goals for improving mission support— to achieve 80 percent of designated cost and schedule estimates for critical programs—would serve as a useful starting point for developing performance goals for major acquisitions. FAA is just beginning to develop performance goals for major acquisitions, and agency officials told us that much work remains before they can be used for tracking progress with major acquisitions and making investment decisions. Developing performance goals for acquisitions is a step any business pursuing advanced technologies would take, and it is consistent with FAA's Acquisition Management System.

RECOMMENDATIONS

FAA must take steps to control costs of acquisitions and get as much as it can with each acquisition dollar. Therefore, we recommend that FAA:

1. Update the cost, schedule, and performance baselines for many of its major acquisitions, including STARS, ITWS, LAAS, and WAAS at a minimum. These baselines are misleading because they do not accurately reflect the true cost, schedule, or performance parameters for the projects. This process may require FAA to establish a new strategy that accelerates some projects and defers others.

2. Develop—and use—performance goals for assessing progress with its major acquisitions. This should involve holding staff and contractors accountable for keeping projects within cost and schedule, as appropriate.

[6] For additional details, see Top Management Challenges, Department of Transportation, PT-2003-012, January 21, 2003.

AGENCY COMMENTS AND OFFICE OF INSPECTOR GENERAL RESPONSE

On June 11, 2003, we met with the Associate Administrator for Research and Acquisitions, and staff from Air Traffic Services to obtain their oral comments to our discussion draft report. We incorporated FAA's comments where appropriate and made a number of adjustments to the report. Based on FAA's comments, we adjusted the estimated cost of ERAM to reflect the most current baseline ($2.1 billion) that was established earlier this month. FAA officials from those offices generally agreed with our analysis and recommendations.

ACTION REQUIRED BY FAA

In accordance with Department of Transportation Order 8000.1C, we would appreciate receiving your written comments within 30 days. If you concur with our recommendations, please indicate for each recommendation the specific actions taken or planned and target dates for completion. If you do not concur, please provide your rationale. Furthermore, you may provide alternative courses of action that you believe would resolve the issues presented in this report. If you have any questions concerning this report, please contact me at (202) 366-1992, or David A. Dobbs, Assistant Inspector General for Aviation Audits, at (202) 366-0500.

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EXHIBIT A. AUDIT OBJECTIVE, SCOPE AND METHODOLOGY

We performed our review of FAA's major acquisitions from December 2002 through May 2003. The objective of our review was to evaluate program costs and schedules, and identify key issues affecting the successful implementation of 20 major acquisitions. These 20 acquisitions are instrumental in FAA's efforts to modernize the National Airspace System. We focused primarily on project funding from the Facilities and Equipment Account—not total life-cycle costs. This review was performed in accordance with Government Auditing Standards as prescribed by the Comptroller General of the United States.

We collected cost and schedule information for the 20 acquisitions from the inception of the individual acquisitions through February 2003. In addition, we reviewed key program documents such as acquisition plans, program baselines, and prime contracts (and contract modifications) for each acquisition reviewed. We spoke with key personnel responsible for developing and implementing these projects. We also evaluated monthly program status reports, team meeting minutes, and Joint Resources Council (a key agency decisionmaking body) decisions to help us identify and track key issues affecting implementation of the acquisitions.

EXHIBIT B. COST AND SCHEDULE VARIANCES FOR EXISTING PROGRAMS

Program (Defined in Exhibit D)	Estimated Program Costs (Dollars in Millions)		Percent Cost Growth	Implementation Schedule		Schedule Delay
	Original	Current		Original	Current	
NIMS	$100.8	$350.9	248%	1997-2000	2001-2005	5 years
WAAS	$892.4	$2,922.4*	227%	1998-2001	2003-TBD**	5 years
AMASS	$59.8	$146.0	144%	1994-1996	2001-2003	7 years
NEXCOM	$406.0	$986.4	143%	2002-2008	2002-2010	2 years
STARS	$940.2	$1,690.2	80%	1998-2005	2002-2012**	7 years
OASIS	$174.7	$251.0	44%	1998-2001	2002-2005	4 years
ASAS	$207.6	$296.1	43%	1982-Ongoing	1982-Ongoing	N/A***
LAAS	$530.1	$696.1	31%	2002-TBD	2006-TBD**	4 years
ADS-B	$215.1	$268.4	25%	2001-TBD	2001-2012	N/A
ASR-11	$743.3	$916.2	23%	2000-2005	2003-2010	5 years
WARP	$126.4	$152.7	21%	1999-2000	2002-2003	3 years
ASDE-X	$424.3	$505.2	19%	2003-2007	2003-2007	N/A
ITWS	$276.1	$286.1	4%	2002-2003	2003-2008	5 years
ATCBI-6	$281.8	$289.6	3%	2000-2004	2002-2007	3 years
FTI	$205.5	$205.7	N/A	2002-2008	TBD	1 year
FFP1	$726.9	$695.5	N/A	1998-2002	1998-2002	Completed
FFP2	$546.2	$510.5	N/A	2003-2005	2003-2006	1 year
Total	**$6,857.2**	**$11,169.0**				**1 to 7 years**

* This includes the cost to acquire geostationary satellites.
** Costs and schedules are under review.
*** Not applicable

EXHIBIT C. ESTIMATED COSTS AND SCHEDULE FOR NEW PROGRAMS

Program (Defined in Exhibit D)	Estimated Program Costs (Dollars in Millions)	Implementation Schedule
ERAM	$2,154.6	2009-2010
ATOP	$548.2	2004-2006
ECG	$315.1	2003-2005
Total	**$3,017.9**	

EXHIBIT D. STATUS OF FAA'S MAJOR ACQUISITIONS (AS OF MAY 2003)

Program Name, Description, Purpose, and Contractor Name	Original Program Cost Estimate	Current Program Cost Estimate	Original Deployment Schedule	Current Deployment Schedule	Status and Key Issues Affecting Implementation
Standard Terminal Automation Replacement System (STARS): Replaces controller and maintenance workstations with color displays, processors, and computer software at terminal air traffic control facilities. STARS requires digital radar data input. **Contractor: Raytheon**	$940.2 Million	$1.7 Billion (costs are under review)	Start: 1998 Finish: 2005	Start: 2002 Finish: 2012	STARS commenced operations in Philadelphia this past year. Since 1996, FAA has spent more than $1 billion on STARS, including $239.7 million on an alternative, the *Common Automated Radar Terminal System (Common ARTS).* Additional development work is required before STARS can replace Common ARTS throughout the National Airspace System (NAS). During 2002, the STARS program proposed to limit the program to 73 systems at a cost of $1.33 billion (instead of $1.7 billion for 182 sites). No final decision has been made.
Wide Area Augmentation System (WAAS): Provides the augmentation needed to make the Global Positioning System (GPS) fully usable for en route, terminal, and non-precision approaches. **Contractor: Raytheon**	$892.4 Million	$2.9 Billion (costs are under review)	Start: 1998 Finish: 2001 Airspace users must equip to obtain benefits.	Start: 2003 Finish: To be determined	After several years of delay and vexing technical problems, FAA now plans to begin providing WAAS initial service in July 2003. However, WAAS will not provide Category I services as originally planned. A key issue for WAAS is acquiring additional geostationary satellites (at a cost of $1.3 billion) to improve the WAAS signal in space. FAA recently awarded a contract for one additional satellite. FAA needs to make a downward adjustment in WAAS costs to reflect that it will not pursue Category I performance.

Program Name, Description, Purpose, and Contractor Name	Original Program Cost Estimate	Current Program Cost Estimate	Original Deployment Schedule	Current Deployment Schedule	Status and Key Issues Affecting Implementation
Local Area Augmentation System (LAAS): LAAS is a new precision approach and landing system that is expected to boost airport arrival rates under all weather conditions. It provides the augmentation needed at 160 airports to make GPS fully usable for Categories I, II, and III precision approaches at selected airports. **Contractor: Honeywell**	$530.1 Million	$696.1 Million (costs are under review)	Start: 2002 Finish: To be determined Airspace users must equip to obtain benefits.	Start: 2006 Finish: To be determined	FAA is working to reset LAAS cost, schedule, and performance goals. FAA intended to have LAAS (Category I) operational in 2004. It is now clear that this milestone cannot be met because of additional development work, evolving requirements, and unresolved issues regarding how the new system will be certified as safe for pilots to use. Moreover, the more demanding Category II/III service (planned for 2005) is now a research and development effort with an uncertain end date.
Integrated Terminal Weather System (ITWS): Acquires and integrates weather data from multiple sensors, and provides traffic management units with a graphic display of weather information that needs no meteorological interpretation. **Contractor: Raytheon**	$276.1 Million	$286.1 Million	Start: 2002 Finish: 2003	Start: 2003 Finish: 2008	ITWS is an important acquisition because it provides traffic managers with 20-minute forecasts of weather conditions to improve the safety and efficiency of terminal airspace operations. The first production system became operational in Kansas City on April 10, 2003. Production costs have skyrocketed from $360,000 to $1.1 million per system. FAA intends to extend the deployment schedule through 2008—a 5-year delay—and may procure fewer systems than planned.

Exhibit D. Status of FAA's Major Acquisitions (as of May 2003)

Program Name, Description, Purpose, and Contractor Name	Original Program Cost Estimate	Current Program Cost Estimate	Original Deployment Schedule	Current Deployment Schedule	Status and Key Issues Affecting Implementation
Next Generation Air/Ground Communications (NEXCOM): Replaces existing analog radios and related equipment with digital systems, including multi-mode radios. It is a multi-segmented program expected to meet the radio frequency needs of the NAS well past 2030. Later phases of NEXCOM are expected to allow the exchange of both voice and data communication on the same channel within the existing frequency spectrum. **Contractor: ITT**	$406 million	$986.4 million	Start: 2002 Finish: 2008 (key site) NEXCOM will require users to equip with new radios.	Start: 2002 Finish: 2010	NEXCOM is a complex and ambitious undertaking because it replaces all of the existing air/ground communications in the NAS, including 6,000 radios in NEXCOM's initial phase. New multi-mode radios have been installed in Jacksonville Center, have performed satisfactorily in tests, and are in daily use. FAA is working with industry to develop a plan (and related business case) for moving forward. Cost growth to date is primarily associated with the additional software and hardware requirements. *We note that the current cost estimate of $986.4 million only reflects the initial phase of the effort and much work remains to get accurate cost estimates for remaining segments.*
NAS Infrastructure Management System (NIMS): Provides a centralized management system to improve the services provided to the NAS, as well as to operate and maintain the facilities, systems, and equipment that comprise the NAS infrastructure, such as communications equipment, radars, and navigation aids. **Contractor: Digicom**	$100.8 Million	$350.9 Million	Start: 1997 Finish: 2000	Start: 2001 Finish: 2005 (under review)	FAA believes NIMS is an important effort to help the agency maintain and support many elements of the NAS such as radars. NIMS costs have increased by $250 million. Cost increases are attributable to increased requirements adopted in 2000. FAA has reprogrammed funds for NIMS to other projects. FAA intends to rebaseline the NIMS (principally Phase 2) cost and schedule later this year.

Exhibit D. Status of FAA's Major Acquisitions (as of May 2003)

Program Name, Description, Purpose, and Contractor Name	Original Program Cost Estimate	Current Program Cost Estimate	Original Deployment Schedule	Current Deployment Schedule	Status and Key Issues Affecting Implementation
Operational and Supportability Implementation System (OASIS): Replaces the current Model One Full Capacity (M1FC) system at the 61 Automated Flight Service Stations and will provide an integrated system that will increase operational capabilities such as Flight Data Processing and Weather Graphics. **Contractor: Harris Corp.**	$174.7 Million	$251 Million	Start: 1998 Finish: 2001	Start: 2002 Finish: 2005	FAA has conducted operational readiness demonstrations at two sites (Anderson, South Carolina, and Seattle, Washington). In our December 2001 report, we estimate that FAA could realize cost savings of nearly $500 million over the 7-year OASIS lease by consolidating Flight Service Stations now while OASIS is in the early stages of deployment. Based on our recommendation, FAA is conducting a review of Flight Service Station functions in accordance with the Office of Management and Budget Circular A-76.
Airport Surveillance Radar (ASR-11): Replaces aging analog radar at small terminal facilities with digital radar. ASR-11 can be used by Common ARTS and STARS. This is a joint effort with the Department of Defense. **Contractor: Raytheon**	$743.3 Million	$916.2 Million	Start: 2000 Finish: 2005	Start: 2003 Finish: 2010	ASR-11 program costs have grown by $172.9 million and the schedule was delayed by 3 years due to technical problems. This past year, FAA made a number of improvements and commenced operational testing. FAA's key issue is to successfully complete independent testing in preparation for an in-service decision. FAA plans to make a determination on the suitability of the radar for deployment throughout the NAS in July 2003.

Exhibit D. Status of FAA's Major Acquisitions (as of May 2003)

Program Name, Description, Purpose, and Contractor Name	Original Program Cost Estimate	Current Program Cost Estimate	Original Deployment Schedule	Current Deployment Schedule	Status and Key Issues Affecting Implementation
Airport Surface Detection Equipment-X (ASDE-X): Provides surveillance equipment to prevent runway incursions at a large number of airports. Implementation of these systems will improve controller situational awareness of the airport movement area. **Contractor: Sensis Corp and Raytheon**	$424.3 Million	$505.2 Million	Start: 2003 Finish: 2007	Start: 2003 Finish: 2007	ASDE-X is an important safety initiative, initially designed to provide a low-cost alternative to FAA's existing ASDE-3 radar systems. The program now includes ASDE-X product improvement upgrades that combine the 25 initial and 8 ASDE-3 sites. FAA is scheduled to deploy the first system in August 2003.
Automatic Dependent Surveillance-Broadcast (ADS-B): ADS-B is an air-to-air, air-to-ground communications, navigation and surveillance technology that relies on the GPS to broadcast the positions of properly equipped aircraft and surface vehicles. It is part of the *Safe Flight 21 Program*, and is focused on initiatives in the Ohio River Valley and Alaska. **Contractor: UPS Aviation Technologies**	$215.1 Million (Part of Safe Flight 21)	$268.4 Million	Start: 2001 (Limited deployment to Bethel, Alaska) Finish: To be determined	Start: 2001 Finish 2012 (NAS-wide).	FAA has initiated ADS-B demonstration projects in Alaska and the Ohio River Valley. Progress has been made, but considerable human factors work remains for both controllers and pilots. Airspace users must equip to obtain benefits. ADS-B is now a key element in other FAA programs, including the Airport Surface Detection Equipment-X effort, which will help prevent accidents on runways.

Airspace users must equip to obtain benefits.

Exhibit D. Status of FAA's Major Acquisitions (as of May 2003)

Program Name, Description, Purpose, and Contractor Name	Original Program Cost Estimate	Current Program Cost Estimate	Original Deployment Schedule	Current Deployment Schedule	Status and Key Issues Affecting Implementation
Free Flight Phase 2 (FFP2): Geographically expands the deployment of the User Request Evaluation Tool and Traffic Management Advisor Single Center to additional locations. It introduces Controller Pilot Data Link Communications and accelerates research in several areas. **Contractor: Various**	$546.2 Million	$510.5 Million	Start: 2003 Finish: 2005 Data link will require airspace users to equip to obtain benefits.	Start: 2003 Finish: 2006	FAA has decided to defer plans for expanding Controller Pilot Data Link Communications from one facility in Miami to other locations because the approved baseline of $167 million is no longer valid, and because of uncertainty about how quickly airspace users will purchase and install new avionics.
Aviation Safety Analysis System (ASAS): ASAS is a program providing a variety of information technology hardware and software solutions in support of the five components of Aircraft Certification and Regulation activities (Flight Standards, Aviation Medicine, Rulemaking, Aircraft Certification, and Accident Investigations). **Contractor: Various**	$207.6 Million	$296.1 Million	Start: 1982 Finish: Ongoing	Start: 1982 Finish: Ongoing	ASAS has functioned as an umbrella funding mechanism for a variety of information technology projects within the office of Aircraft Certification and Regulation. ASAS funds in 2003 will be for 24 different projects/systems.

Exhibit D. Status of FAA's Major Acquisitions (as of May 2003)

Program Name, Description, Purpose, and Contractor Name	Original Program Cost Estimate	Current Program Cost Estimate	Original Deployment Schedule	Current Deployment Schedule	Status and Key Issues Affecting Implementation
Air Traffic Control Beacon Interrogator (ATCBI-6): A ground-based system that interrogates transponders, receives and processes replies from transponders, determines the range and direction to/from aircraft, and forwards the information to appropriate air traffic control automation systems. Replies from aircraft provide transponder identification and altitude data, which are displayed on the controller's screen. **Contractor: Raytheon**	$281.8 Million	$289.6 Million	Start: 2000 Finish: 2004	Start: 2002 Finish: 2007	The ATCBI-6 will replace aging ATCBI equipment (Models 4 and 5) to maintain ground surveillance and decrease supportability costs. The first ATCBI-6 was commissioned in July 2002. According to FAA, the agency may shift funds from ATCBI-6 to other higher priority efforts, which would cause implementation delays to 2007.
Airport Movement Area Safety System (AMASS): Provides software enhancement for the Airport Surface Detection Equipment (ASDE-3) radar designed to monitor airport surface traffic and alert air traffic controllers to potential collisions on the runways. **Contractor: Northrup/Grumman**	$59.8 Million	$146 Million	Start: 1994 Finish: 1996	Start: 2001 Finish: 2003	FAA has been developing AMASS since 1991. Overall, AMASS is 7 years behind its original schedule estimate and $86 million over its original cost projections made in 1993. FAA reports that 27 of 37 planned operational systems have been commissioned. Based on a DOT/OIG recommendation, FAA issued a revised schedule with the last system projected to be commissioned in the 4th quarter of 2003.

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Program Name, Description, Purpose, and Contractor Name	Original Program Cost Estimate	Current Program Cost Estimate	Original Deployment Schedule	Current Deployment Schedule	Status and Key Issues Affecting Implementation
Weather and Radar Processor (WARP): Provides en route meteorologists and air traffic controllers with more accurate graphic weather products to help identify weather conditions that may adversely impact air traffic control and aircraft operations. **Contractor: Harris Corp.**	$126.4 Million	$152.7 Million	Start: 1999 Finish: 2000	Start: 2002 Finish: 2003	FAA completed deployment of WARP on controller displays in the continental United States in December 2002. FAA intends to install the last WARP in Alaska later this year, which is 3 years later than planned. Program delays were primarily due to the additional time needed to resolve air traffic controller human factor concerns and fix software development problems found during testing.
Free Flight Phase 1 (FFP1): Provides new information-exchange systems (Collaborative Decision-Making and Surface Movement Advisor) and automated controller tools (Center TRACON Automation System and User Request Evaluation Tool). *This is a limited deployment.* **Contractor: Various**	$726.9 Million (Limited Deployment)	$695.5 Million	Start: 1998 Finish: 2002 Completed	Start: 1998 Finish: 2002	FFP1 reflects FAA's "build a little, test a little, and deploy a little" approach to acquisitions. The FFP1 program is complete, except for one User Request Evaluation Tool site. By far, the most cost-effective FFP1 initiative has been *Collaborative Decision-Making*, which linked FAA's command center and airline operations centers and allowed for greater exchange of information. Program costs reflect costs for limited deployment at select locations and sustaining those locations through FY 2007.

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Program Name, Description, Purpose, and Contractor Name	Original Program Cost Estimate	Current Program Cost Estimate	Original Deployment Schedule	Current Deployment Schedule	Status and Key Issues Affecting Implementation
En Route Automation Modernization (ERAM): Replaces the Host computer hardware and software, including the Host backup system, and associated support infrastructure. **Contractor: Lockheed/Martin and Raytheon**	$2,154.6 Billion	$2,154.6 Billion	Start: 2009 Finish: 2010	Start: 2009 Finish: 2010	ERAM is a critical effort because it will upgrade hardware and software (i.e, "the central nervous system") for facilities that control high altitude air traffic. FAA awarded the prime contract to Lockheed/Martin in December 2002, with Raytheon as a major subcontractor. While just getting started, this is a high risk program because of its size, the amount of software involved (over 1 million lines of software code), and development needed for some functions to enhance the flow of air traffic.
Advanced Technologies and Oceanic Procedures (ATOP): Modernizes FAA facilities that are responsible for managing large segments of airspace over the Atlantic and Pacific Oceans. FAA plans call for an integrated system for flight data processing, detecting conflicts between aircraft, data link, and surveillance capabilities. **Contractor: Lockheed/Martin**	$548.2 Million	$548.2 Million	Start: 2004 Finish: 2006	Start: 2004 Finish: 2006	In June 2001, FAA awarded a $217 million fixed price contract to Lockheed/Martin to provide oceanic systems in Anchorage, New York, and Oakland. The contractor has experienced significant problems completing software development and testing. The contractor is 10 months behind the contract schedule. Because this is a fixed price contract, the schedule delays have not had a cost impact on FAA at this time.

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Program Name, Description, Purpose, and Contractor Name	Original Program Cost Estimate	Current Program Cost Estimate	Original Deployment Schedule	Current Deployment Schedule	Status and Key Issues Affecting Implementation
En Route Communications Gateway (ECG): ECG will replace the existing communications gateway at 20 en route facilities that control high altitude air traffic. The program is important to provide a more robust infrastructure to support future en route systems, such as the En Route Automation Modernization program. **Contractor:** **Lockheed/Martin**	$315.1 Million	$315.1 Million	Start: 2003 Finish: 2005	Start: 2003 Finish: 2005	ECG is one of the first initiatives aimed at modernizing en route automation. At this time, the program is on schedule; however, according to FAA officials, the agency may reduce ECG funding to support other high priority programs, which could delay the program.
FAA Telecommunications Infrastructure (FTI): FTI is designed to phase out older telecommunications systems and replace them with one provider responsible for operating and maintaining the network. **Contractor:** **Harris Corporation**	$205.5 Million (Operations and Maintenance cost is estimated to be $1.7 Billion.)	$205.7 Million (Operations and Maintenance cost is estimated to be $3.5 Billion.)	Start: 2002 Finish: 2008	To be determined	The FTI program is key to FAA's efforts to transition from supporting multiple networks to a single network. The bulk of FTI will be funded through FAA's Operations account—the cost estimate for Operations and Maintenance has increased by $1.8 billion (from $1.7 billion to $3.5 billion). FAA is in the process of rebaselining the program, and decisions regarding cost and schedule for FTI are not expected until later this year.

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