Office of Inspector General
Audit Report

Survey of the Federal Aviation Administration's Integrated Product Development System

Federal Aviation Administration

Report Number: AV-2000-110
Date Issued: August 29, 2000

Memorandum

Subject: <u>ACTION</u>: Survey of the Federal Aviation Administration's Integrated Product Development System AV-2000-110

Date: August 29, 2000

From: Alexis M. Stefani
Assistant Inspector General for Auditing

Reply To
Attn Of: JA-10

To: Federal Aviation Administrator

This report presents the results of our survey of the Federal Aviation Administration's (FAA) Integrated Product Development System (IPDS). We surveyed all 1,056 FAA members of the Air Traffic Automation and the Communications, Navigation, and Surveillance teams to obtain the members' views on how well IPDS teams are functioning. The survey provided quantitative data about IPDS that we used to identify areas where FAA should strengthen team operations. We are providing this report for your information and use. In preparing this report, we provided periodic briefings to your staff and considered their comments.

Background

In 1995, Congress exempted FAA from Federal procurement rules that, according to FAA, hindered its ability to effectively modernize the air traffic control system and contributed to escalating program costs and schedule slips. In response, *FAA implemented the Acquisition Management System (AMS) in April 1996, which integrated all elements of life-cycle acquisition management into a system designed to improve the quality, reduce the time, and decrease the cost of delivering products to its customers.*

IPDS is a key concept of FAA's AMS. This team concept cuts across FAA's organizational lines and brings together various functional disciplines (such as testers, engineers, system operators, and logisticians) early and throughout the acquisition process to manage and resolve program issues. By bringing together all necessary functional disciplines earlier in the acquisition process, FAA intended to make quicker and more informed program decisions that reduced the cost and time to field new systems, improved the quality of its products, and increased the probability of operational success.

FAA's timely acquisition of new technology and equipment has become increasingly critical to aviation safety and efficiency because of the steady growth in air traffic operations and the need to replace aging equipment in the air traffic control system. FAA estimates that it will invest nearly $10.6 billion to modernize the air traffic control system during Fiscal Years 2000 through 2003. [1]

Objective and Scope

We surveyed all 1,056 FAA members of the Air Traffic Automation and the Communications, Navigation, and Surveillance teams to obtain the members' views on how well IPDS teams are functioning. We received 474 responses, a 45 percent response rate to our survey. We relied extensively on the survey data, in addition to six reviews of FAA's AMS. In addition, we reviewed FAA data for the 11 acquisition programs that FAA used to assess the effectiveness of AMS, in reducing the cost and time to field new air traffic control systems. See Exhibit A for a discussion of our survey methodology. The IPDS survey questionnaire and summary of responses are included in Exhibit B.

Results

As part of acquisition reform, FAA implemented the IPDS team concept as a key mechanism to deliver more cost-effective and timely products. By focusing on IPDS, our intent was to provide FAA feedback from its staff on how to strengthen IPDS operations. In particular, our survey should be a constructive tool for FAA management since it was the first time FAA received extensive quantitative data about IPDS team operations. The data should also serve as a benchmark to assess future improvements to IPDS team operations.

Our review indicates that IPDS team operations are not working well because FAA's culture continues to operate in a vertical management hierarchy, also called "stovepipes," which conflicts with the horizontal structure of IPDS team operations. Responses to our survey indicate that improvements to IPDS team operations are needed to address the: (1) need for additional IPDS training, (2) organizational barriers to communication, (3) lack of authority to make program decisions, and (4) perception that senior management is not fully supportive of IPDS. Consequently, IPDS has had little success in fielding more timely and cost-effective systems, which was the primary purpose of FAA's AMS.

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[1] This funding estimate includes all Facilities and Equipment funding approved in the Wendell H. Ford Aviation and Investment Reform Act for the 21st Century.

FAA's Organizational Stovepipes Have Limited the Effectiveness of IPDS Team Operations. By implementing IPDS, FAA intended to cut across organizational stovepipes to work in a team-based environment that had full life-cycle responsibilities over acquisitions. However, FAA organizational stovepipes continue to present a significant challenge to the establishment and operation of viable cross-functional teams and have limited the effectiveness of IPDS team operations. These organizational stovepipes can lead to management's reluctance to delegate responsibilities to team members and reduced communications within and among IPDS teams.

FAA Needs to Strengthen Team Operations. Our review of IPDS indicates that FAA should strengthen team operations by addressing the following four key areas.

➢ First, FAA had not ensured that all team members were provided *training* on IPDS. One-third of team members had not received any training on how to implement IPDS team concepts. Team training is necessary to provide team members with guidelines on how IPDS teams operate and to improve the effectiveness of IPDS team operations. FAA should require IPDS team training for all team members.

➢ Second, *communication barriers* within FAA impeded the exchange of information, slowed the decision-making process, and limited the opportunity to share lessons learned among teams. About 50 percent of the respondents were dissatisfied with information exchange within the FAA.

Concerns expressed by IPDS team members in our survey about poor team communications are not new. At least six reviews completed since 1996 have cited communications problems with FAA's IPDS. Most recently, in February 2000, an FAA internal report on program baseline instability found that an underlying factor contributing to cost overruns and schedule delays was a perceived distrust among team members. In some cases, team members believed that other team members withheld information. This type of environment leads to poor decision-making and less effective team operations.

➢ Third, FAA had not delegated responsibilities to IPDS teams as intended by AMS policy. Fifty percent of the respondents stated that managers had not provided employees with the authority to make decisions, and only 39 percent stated that most decisions are made at the lowest appropriate level.

We identified two issues regarding delegating authority to make decisions that affected team operations. First, in some cases, some staff managers were unwilling to give authority to team members to represent the views of their organization. As a result, some team members needed to receive approval from their managers before supporting a team decision, which slowed the decision-

making process. Second, team members said that senior management overturned team decisions, contrary to the intent of AMS policy. This policy states that IPDS teams are normally delegated the responsibility to make all program decisions. Corporate decisions, such as budget authority and baseline decisions, are the responsibility of senior management.

While providing teams with the authority and responsibility to make decisions is a good concept, implementing this concept can be difficult. This concept assumes that management has confidence in the staff to make good program decisions and that all IPDS teams have skilled and competent staff that understand agencywide issues and priorities. Also, team responsibilities and guidelines must be clearly defined. Forty-four percent of survey respondents stated that guidelines for IPDS teams were poorly defined. In this regard, FAA should ensure that responsibilities and guidelines for IPDS teams are clearly defined and supported by senior management.

➤ Fourth, although FAA senior managers we interviewed stated that they supported IPDS, *team members believed that senior management was not supportive of IPDS*, which reduced the perceived importance of IPDS. About 50 percent of the survey respondents stated that FAA's upper management was not fully supportive of IPDS.

One reason team members may not perceive strong management support for IPDS is that FAA's senior management has not formally communicated its support and expectations for IPDS since April 1995. FAA senior management should communicate commitment and expectations to all IPDS team members on a recurring basis. This can be communicated by various methods such as speaking at events on acquisition reform, issuing policy memorandums, or speaking at leadership conferences.

IPDS Team Operations Have Made Little Impact on Reducing Cost Overruns and Schedule Delays. While we recognize that IPDS is not a panacea against cost overruns and schedule delays, IPDS teams were intended to improve the quality of products and reduce the cost and time to field new systems. Only about one-third of the survey respondents believed that IPDS had made a positive impact on providing more cost-effective, more timely, or higher quality products. Also, our analysis of FAA data for the 11 programs that FAA used to assess the effectiveness of AMS verified that IPDS teams were not providing cost-effective or timely products.

As of April 2000, these programs were averaging a 29 percent cost growth and a 17-month schedule delay from contract award to the planned commissioning of the system. Most significantly, the Wide Area Augmentation System and the Standard Terminal Automation Replacement System (STARS) programs were experiencing cost growth of 63 percent and 49 percent, respectively. Likewise, the STARS and

Operational and Supportability Implementation System programs were experiencing the longest schedule delays, with 4-year extensions from contract award to the initial commissioning of the systems. Exhibit C provides a summary of cost and schedule data for programs used to assess AMS.

Recommendations

To strengthen IPDS team operations, we recommend that FAA:

> ➢ Implement an IPDS improvement program that strengthens team operations in the areas of IPDS training, team communications, and delegating authority and responsibility to make program decisions.
> ➢ Reemphasize senior management support for IPDS by communicating that support to all team members on a recurring basis.
> ➢ Periodically assess progress to improve IPDS, using our survey results as a benchmark, and take further actions as needed.
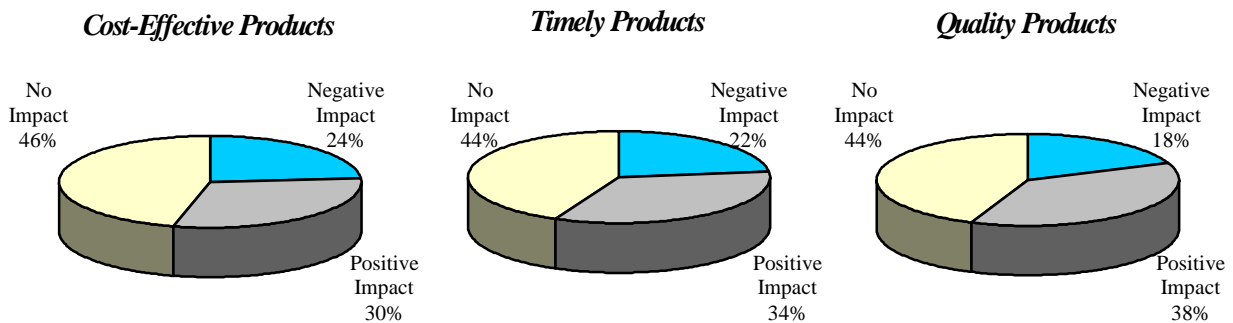
Finding and Recommendations

Our review of IPDS indicates that team operations are not working well because FAA's culture continues to operate in a vertical management hierarchy, also called "stovepipes," which conflicts with the horizontal structure of IPDS team operations. Responses to our survey indicate that improvements to IPDS team operations are needed to address the: (1) need for additional IPDS training, (2) organizational communication barriers, (3) lack of authority to make program decisions, and (4) perception that senior management is not fully supportive of IPDS. Consequently, FAA has had little success in fielding more timely and cost-effective systems, which was the primary purpose of AMS.

IPDS Team Operations Are Not Working Well

When properly implemented, IPDS is a good team concept that can provide valuable benefits in fielding more cost-effective and timely products that satisfy customers' needs. To its credit, FAA has implemented 13 Integrated Product Teams (IPT) and 40 Product Teams (PT) within the Air Traffic Automation, and the Communications, Navigation, and Surveillance Integrated Management Teams. However, survey responses we received from members of these teams indicate that IPDS team operations are not working well. *Only about one-third of respondents thought that IPDS had made a positive impact on providing more cost-effective, more timely, or higher quality products, which were the primary goals of FAA's AMS.* The following chart summarizes the survey responses on these three issues.

Impact of IPDS on Fielding Cost-Effective, Timely, and Quality Products

Cost-Effective Products

No Impact 46%
Negative Impact 24%
Positive Impact 30%

Timely Products

No Impact 44%
Negative Impact 22%
Positive Impact 34%

Quality Products

No Impact 44%
Negative Impact 18%
Positive Impact 38%

Concerns expressed by IPDS team members in our survey are not new. Recent reviews of AMS by FAA and the independent consulting firm of Booz-Allen and Hamilton concluded that IPDS has not provided the expected benefits thus far. In May 1999, FAA reported that after 3 years of acquisition reform, the new AMS processes, such as IPDS, have had little impact on program results. In July 1999, Booz-Allen and Hamilton's assessment of AMS found that not all IPDS team members adequately participated in the early acquisition phases. The assessment stated that without the early buy-in from operations and support organizations in the product development process, FAA cannot achieve its goals of timely and cost-effective acquisitions.

FAA's Organizational Stovepipes Have Limited the Effectiveness of IPDS Team Operations

FAA has historically worked in a vertical management hierarchy, also called "stovepipes," where individuals have functional responsibilities to their FAA organization. These stovepipes result in a management approach that does not fully consider the talents and expertise of all stakeholders in making program decisions. By implementing IPDS, FAA cut across organizational stovepipes to work in a team-based environment that had full life-cycle responsibilities over acquisitions. However, these organizational stovepipes continue to present a significant challenge to establishing and operating viable cross-functional teams.

We compared survey responses of two FAA organizations, the Office of Research and Acquisitions (ARA) and the Office of Air Traffic Services (ATS), to assess whether FAA organizational stovepipes impact team member perceptions of IPDS. In a typical team, ARA team members represent the technical program management staff, and ATS team members represent the air traffic system operators and maintenance technicians. The following chart summarizes the significant differences in ARA and ATS survey responses to important IPDS concepts.

FAA's ARA and ATS Lines of Business Have Different Opinions of IPDS

Questions	Percent of ARA Positive Responses	Percent of ATS Positive Responses	Percent Difference
My team's leadership is effective	55%	31%	**24%**
I received team-related training as an IPDS team member	78%	51%	**27%**
Disputes are resolved within my team	55%	35%	**20%**
All functional areas and organizations that impact major decisions are represented on the team	72%	56%	**16%**
I am satisfied with the ease of communication with other team members	61%	45%	**16%**

As the comparison shows, significant differences exist between ARA and ATS responses in critical IPDS team concepts such as team leadership, training, resolving disputes, team composition, and team communications. In our opinion, these differences limit the effectiveness of IPDS team operations.

Improvements to IPDS Team Operations Are Needed to Realize the Full Benefits of AMS

Our survey results indicate that FAA needs to do more to strengthen IPDS team operations to make a positive impact on providing more cost-effective and timely products that satisfy customer needs. Responses to the survey indicate that improvements are needed to address the: (1) need for additional team training, (2) organizational barriers to communication, (3) lack of authority to make program decisions, and (4) perception that senior management is not fully supportive of IPDS.

Additional IPDS Training Is Needed. When any new process such as IPDS is implemented, training is essential to its success. Our survey found that 33 percent of all respondents did not receive any IPDS training. In some FAA organizations, such as ATS, only half the team members received IPDS training. In addition, 93 percent of respondents told us they needed additional training. The following chart summarizes the five most requested training needs.

> **W**e make no investment in our employees once they are in their jobs.
>
> IPDS team member
> responding to the OIG survey

Five Most Requested Training Needs for IPDS Team Members

Percent of Respondents Stating Additional Training Is Needed
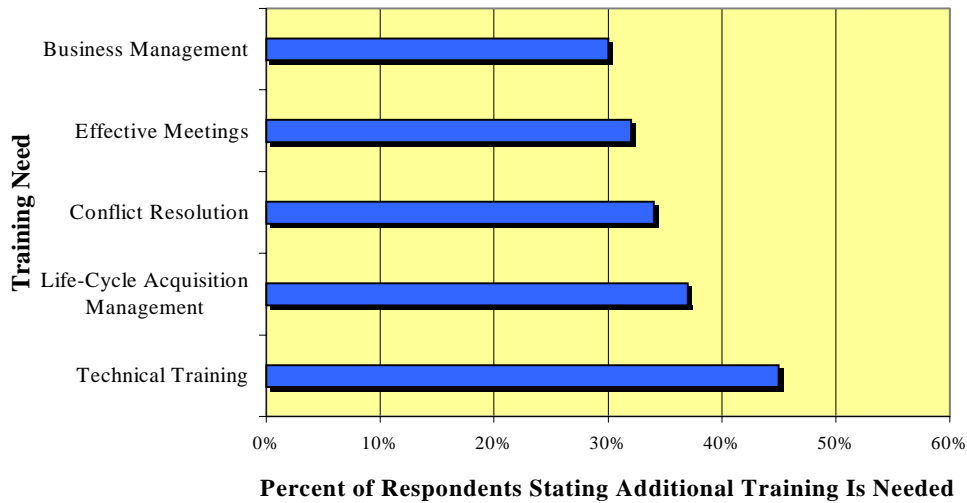
Although IPDS training *should* be required for all team members, FAA does not require IPDS team training. Occasionally, training is necessary to provide team members with guidelines on how IPDS teams operate and to improve the effectiveness of IPDS team operations. FAA should ensure that IPDS team training is provided to all team members and consider the training needs identified in our survey results in developing an IPDS training curriculum to improve team skills.

Communication Barriers Impede Progress to More Timely Fielding of Systems.
Our results indicate that the lack of communications within the FAA limited the

IPDS works and can continue to work by breaking down the barriers that divide us.

IPDS team member
responding to the OIG survey

effectiveness of IPDS team operations. Fifty-eight percent of respondents stated that information did not flow freely up and down the organization, and 47 percent did not agree that information flowed freely across the organization. Also, 47 percent of respondents were dissatisfied with the information received from other teams. The following charts show the survey responses to questions on the effectiveness of communications within the FAA.
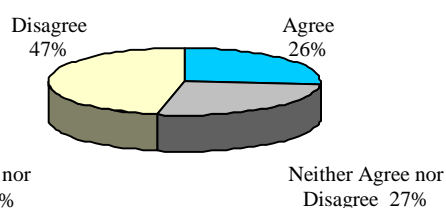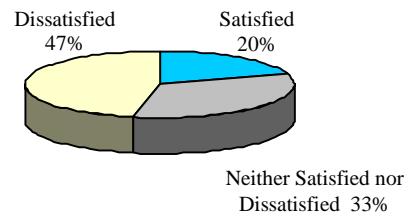
Information Flows Freely Up and Down the Organization
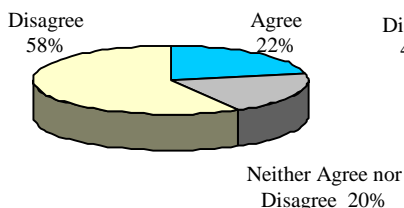
Information Flows Freely Across the Organization

Satisfaction With Information Received From Other Teams

Disagree 58% | Agree 22% | Neither Agree nor Disagree 20%

Disagree 47% | Agree 26% | Neither Agree nor Disagree 27%

Dissatisfied 47% | Satisfied 20% | Neither Satisfied nor Dissatisfied 33%

Over the past several years, internal and external observers of FAA have generally agreed that poor communications have reduced coordination, increased system costs, and delayed the implementation of new systems. Most recently, in February 2000, an FAA internal report on program baseline instability found that a perceived distrust among team members was an underlying factor contributing to cost overruns and schedule delays. In some cases, team members believed that other team members withheld information. *This type of environment prevents informed decision-making, slows down the decision-making process, and limits the opportunity to share lessons learned.*

Management Had Not Delegated Responsibilities to Team Members to Make Program Decisions. Fifty percent of the respondents stated that managers had not fully 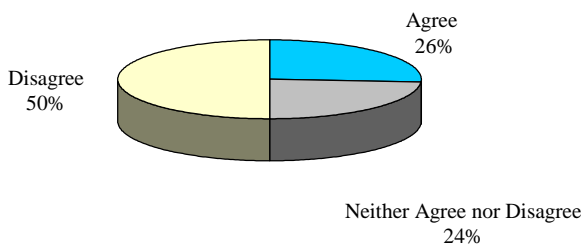delegated authority and responsibility, also called empowerment, to make program decisions. *Team members who are not empowered slow decision-making because they must seek organization management approval before supporting a team decision.* Conversely, when team members are empowered, program decisions can be made

> **I**n my view, most managers don't want to delegate power, because by doing so they feel that they lessen their own power. Their focus doesn't seem to be on making the FAA into a top-notch organization.
>
> IPDS team member
> responding to the OIG survey

more quickly by not having to consult with the vertical organizations before making team decisions. Only 39 percent of the respondents stated that most decisions are made at the lowest appropriate level. The following chart summarizes the survey responses regarding team empowerment and decision-making.
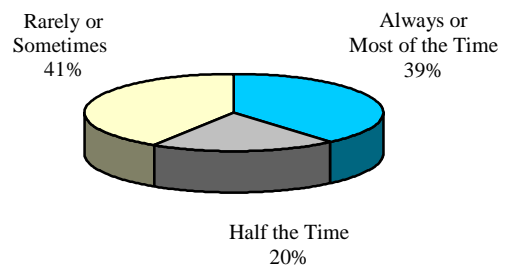
Managers Fully Empower Employees

Agree
26%

Disagree
50%

Neither Agree nor Disagree
24%

Decisions Are Made at the Lowest Appropriate Level

Rarely or Sometimes
41%

Always or Most of the Time
39%

Half the Time
20%

We identified two issues regarding delegating authority to make decisions that affected team operations. First, some staff managers were unwilling to give authority to team members to represent the views of their organization. As a result, some team members needed to receive approval from their managers before supporting a team decision, which slowed the decision-making process.

Second, team members expressed concern that senior management overturned team decisions, contrary to the intent of AMS policy. This policy states that IPDS teams are normally delegated the responsibility to make all program decisions. Corporate decisions, such as budget authority and baseline decisions, are the responsibility of senior management. In a recent internal review of program cost and schedule baselines, FAA cited the lack of team empowerment as an underlying cause for program cost overruns and schedule delays. FAA employees expressed considerable frustration that, in some cases, senior management made decisions without consent or approval of the team. FAA's review concluded that this type of cultural environment leads to a lack of accountability and unwillingness to accept responsibility for program outcomes.

While providing teams with the authority and responsibility to make decisions is a good concept, implementing this concept can be difficult. This concept assumes that management has confidence in the staff to make good program decisions and that all IPDS teams have skilled and competent staff that understand agency-wide issues and priorities. Also, team responsibilities and guidelines must be clearly defined. Forty-four percent of survey respondents stated that guidelines for IPDS teams were poorly defined. In this regard, FAA should ensure that responsibilities and guidelines for IPDS teams are clearly defined and supported by senior management.

Team Members Perceive a Lack of Senior Management Support for IPDS. Senior management support is critical to IPDS. A representative from the Department of Defense, which has implemented an IPT concept, stated that *the single most important element to implementing IPTs is to ensure that team members understand that senior management is supportive and committed to IPTs.* Also, effective senior management support needs to be a continuous process. About 50 percent of the respondents to our survey perceived that FAA's senior management is not fully supportive of IPDS. Also, some team members provided comments that IPDS was just another process change to cover up past mistakes. The following chart summarizes IPDS team members' perceptions of various levels of management support for IPDS.
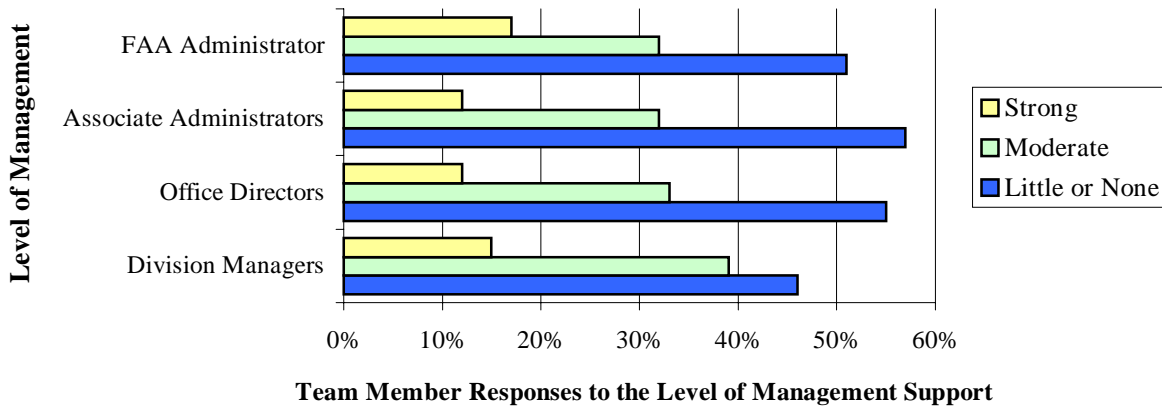
> **T**he IPDS System has the infrastructure to be very efficient and effective when used properly. I believe that IPDS lacks total buy-in and commitment from upper level management thus making IPTs less effective.
>
> IPDS team member
> responding to the OIG survey

Management Support for IPDS

Team Member Responses to the Level of Management Support

One reason team members may not perceive strong management support for IPDS is that FAA's senior management has not formally communicated its support and expectations for IPDS since April 1995. At that time, four FAA Associate Administrators signed a memorandum of agreement supporting IPDS. Since then, all of the stakeholders who signed this agreement have vacated their positions. Also, FAA's IPDS Working Group, which is responsible for implementing and improving IPDS team operations, is located within FAA's ARA organizational structure and has little authority to develop and implement IPDS across FAA. This further reduces the visibility and the perceived importance of IPDS.

Effective implementation of IPDS requires executive management involvement and direction. FAA senior management could further improve the perception of support for IPDS by communicating commitment and expectations to all IPDS team members on a recurring basis. This can be communicated by various methods such as speaking at events on acquisition reform, issuing policy memorandums, or speaking at leadership conferences.

Current IPDS Team Operations Have Made Little Impact on Reducing Cost Overruns and Schedule Delays

Even though IPDS should help FAA field more cost-effective and timely products, it is not a panacea or guarantee for success. Our review of 11 programs that FAA is using to assess the effectiveness of AMS found that FAA is not providing cost-effective or timely products. As of April 2000, these programs were averaging a 29 percent cost growth and a 17-month schedule delay from contract award to initial commissioning of the system. Six of these programs were experiencing significant cost growth or schedule delays, as shown in the following chart.

Major Cost Growth or Schedule Delays of Programs Using AMS

Program	Planned Program Costs [1] (in millions)	Cost Growth (in millions)	Percent Cost Growth	Planned Months to Commission System [2]	Months of Schedule Delay
Wide Area Augmentation System	$1,006.6	$632.6 [3]	63 %	48	14
Standard Terminal Automation Replacement System	940.2	462.4	49 %	28	49
Operational and Supportability Implementation System	174.7	74.8	43 %	12	48
Local Area Augmentation System	586.5	134.8	23 %	N/A [4]	N/A [4]
Air Traffic Control Beacon Interrogator	282.8	0	0 %	20	27
National Airspace System Infrastructure Management System	100.8	(40.5) [5]	(40 %)	24	18

[1] Planned program costs include funding from the Facility and Equipment and Research, Engineering, and Development accounts.

[2] The planned months to commission a system was measured from the time of contract award to initial commissioning of the system. Commissioning of a system is done after all testing, deployment and system familiarization activities are completed. Our data are based on the acquisition program baseline in effect at the time FAA began tracking cost and schedule performance under AMS.

[3] We did not include $1.339 billion of funding that was transferred from the Operations account to the Facility and Equipment account.

[4] FAA did not measure the schedule baseline for commissioning this program in its analysis.

[5] This program was rebaselined and the scope of work was reduced. The program was experiencing more than a 50 percent cost growth before FAA rebaselined the program.

Four of the programs had cost growth ranging from 23 to 63 percent. Most significantly, the Wide Area Augmentation System and the Standard Terminal Automation Replacement System (STARS) programs were experiencing cost growth of 63 percent and 49 percent, respectively. Likewise, five programs were experiencing significant schedule delays ranging from 14 months to 49 months. The STARS and Operational and Supportability Implementation System programs were experiencing the longest schedule delays, with 4-year extensions from contract award to the initial commissioning of the systems. Exhibit C provides a summary of cost and schedule data for programs used to assess AMS.

Over the past several years, our reviews of FAA major air traffic control modernization systems have identified problems with software development, human factors, and unrealistic program schedules that caused major cost growth and schedule delays. Furthermore, in February 2000, an FAA internal report on program baseline instability found that three underlying factors contributing to these problems were:

- upper management making program acquisition strategy and funding decisions without considering team input,
- parent organizations overturning decisions of team representatives, and
- team members perceiving distrust within teams.

FAA's conclusions are consistent with the responses to our survey.

Much Work Remains to Strengthen Team Operations

FAA implemented IPDS to increase the effectiveness and efficiency of FAA's efforts to modernize the air traffic control system. When properly implemented, IPDS is a good team concept that can provide valuable benefits in fielding more cost-effective and timely products that satisfy customer needs. In our opinion, much work remains to strengthen IPDS team operations before FAA can achieve the full benefits from IPDS.

Improvements are needed to ensure that all IPDS team members receive team training, break down communication barriers, clearly define responsibilities and guidelines for IPDS teams, and communicate ongoing senior management support for IPDS to team members. In addition, FAA should periodically assess its progress to improve IPDS team operations, using our survey results as a benchmark, and take further actions as needed.

Recommendations

To ensure that FAA achieves the full benefits from implementing the IPDS, we recommend that FAA:

1. Develop an IPDS improvement program that identifies specific actions to strengthen team operations in the areas of IPDS team training, communications, and delegating authority to make program decisions.

2. Reemphasize senior management support for IPDS and communicate that support to all team members on a recurring basis.

3. Periodically assess its progress to improve IPDS team operations, using our survey results as a benchmark, and take further actions as needed.

Management Position

On June 5, 2000, we briefed FAA's Associate Administrator for Research and Acquisitions and Director, Office of Independent Operational Test and Evaluation, on the results of our review. The FAA officials agreed that FAA needs to improve IPDS team operations. The officials stated that the survey results are valuable to FAA because they provide independently gathered quantitative data about IPDS team operations that can be used as a benchmark to assess future improvements to IPDS. However, the FAA officials stated that FAA is a complex organization and implementing any new process, such as IPDS, can take time before the full benefits are achieved.

Action Required

In accordance with Department of Transportation Order 8000.1C, we would appreciate receiving your written comments within 30 days. If you concur with our finding and recommendations, please indicate for each recommendation the specific action taken or planned and the 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.

We appreciate the cooperation and assistance provided by your staff during the review. If you have any questions or need further assistance, please contact me at (202) 366-1992, or David Dobbs, Deputy Assistant Inspector General for Aviation, at (202) 366-0500.

Survey Methodology

We surveyed 1,056 FAA employees in the Air Traffic Automation, and Communications, Navigation, and Surveillance teams to assess how well IPDS teams are working. Our survey addressed areas such as: training, team charters, empowerment, decision-making, resolving critical issues, communications and information exchange, team composition, responsibilities, morale, administrative support, and management support. We also requested written comments to any issues related to IPDS.

We developed a draft questionnaire that was coordinated with FAA's IPDS Working Group, a full-time team dedicated to IPDS implementation and improvement. Prior to mailing the survey, we held two pre-tests with FAA IPDS team members, on June 24, 1999, and July 13, 1999. The survey was revised to reflect the results of both pre-tests and suggestions from the IPDS Working Group. The final survey questionnaire contained 63 questions.

We mailed a pre-survey notification letter on August 31, 1999, to the entire survey population. Two weeks later, on September 15, 1999, we mailed the survey. An anonymous response was used to ensure the highest possible return. The questionnaire was mailed to each employee at their home address, if available, and included a postage-paid reply envelope to return the response directly to the Office of Inspector General.

A follow-up letter was sent on September 30, 1999, to remind survey participants to complete the questionnaires. Lastly, the Associate Administrator for Research and Acquisitions sent a follow-up e-mail reminder on November 2, 1999, to all members within the Office of Research and Acquisitions. We received the last survey included in our analysis on November 26, 1999.

Overall, we received a 45 percent response rate to the survey. Of the 1,056 surveys mailed out to IPDS team members, 474 survey responses were received. Seventy-three responses were not eligible to participate in the survey because they were either private sector employees or not members of IPDS teams. We were also informed that one member of the survey population was deceased. Therefore, 400 eligible responses were received. The target population was adjusted accordingly and reduced the total population from 1,056 to 891 surveys.

Four of the 400 eligible responses were not included in our analyses because their surveys did not provide a sufficient amount of information for the survey. Therefore, our analyses were based on 396 eligible survey responses. Percentages were calculated based on the number of survey respondents who answered each question.

Survey of FAA Integrated Product Development System (IPDS) Team Members

ABOUT THIS SURVEY

The purpose of this survey is to solicit your views about your job and the operations of FAA's Integrated Product Development System (IPDS). The information provided by you and other members of IPDS teams will be used to help evaluate the effectiveness of the IPDS and identify areas where improvements could be made. This questionnaire primarily asks about your experiences as a member of an IPDS team. A few questions ask about your background and career with the FAA. We estimate that completing the survey will take about 20 minutes.

INSTRUCTIONS FOR COMPLETING THE SURVEY

Your responses to the survey will be completely anonymous. Do not put your name or other identification anywhere on this questionnaire.

This is not a test. Take your time and select the answers that best fit you. You may skip any questions you don't want to answer, but please answer questions honestly. Your personal views are important.

Indicate your answers by placing an X or a check mark in the appropriate box. You may use either pencil or pen, as long as your marks are clear. If you want to change an answer, be sure your new mark is clearly indicated.

Correct Marks   ☒   ☑

If you are asked to write an answer, please use the space provided.

If you have any questions about the survey, please contact Mr. Don Pierro, Office of Inspector General, at (202) 366-0253.

U.S. Department of Transportation
Office of Inspector General, JA-10
400 Seventh Street, S.W.
Washington, DC 20590

YOUR INTEGRATED PRODUCT DEVELOPMENT SYSTEM (IPDS) TEAM

NOTE: ALL NUMBERS ARE ROUNDED TO THE NEAREST PERCENT

1. **Which of the following best describes your status? (MARK ONLY ONE)**

   100 Employee of the Federal Aviation Administration (FAA)
     0 Employee of the U.S. Department of Transportation, but not in the FAA
     0 Member of the U.S. Coast Guard
     0 Employee of a private-sector organization (e.g., a consulting firm doing business with the federal government under a contractual arrangement) ➔ **STOP HERE. You do not   need to complete the survey. Please return this questionnaire in the enclosed postage-paid reply envelope. Thank you.**
     0 Other (please specify):_____

2. **What is your current FAA routing code (e.g., ABZ, AIT, AUA)?**

   Routing Code: _____

3. **Which kind of IPDS team(s) are you currently a member of? (MARK ALL THAT APPLY)**

   63 Product Team (PT)
   74 Integrated Product Team (IPT)
    8 Integrated Management Team (IMT)
    0 I'm not a member of any IPDS teams ➔ PLEASE GO TO QUESTION 51

4. **Counting both full- and part-time memberships, how many IPDS teams are you a member of?**

   50 One ➔ GO TO QUESTION 6
   30 Two
   10 Three
    4 Four
    1 Five
    5 Six or more teams

5. **Think about all the IPDS teams you are a member of. *Now pick the team that requires the greatest amount of your work time*. What kind of team is that? (MARK ONLY ONE)**

   61 Product Team (PT)
   36 Integrated Product Team (IPT)
    4 Integrated Management Team (IMT)

THE QUESTIONS IN THIS SURVEY REFER TO THE IPDS TEAM YOU MARKED IN QUESTION 5. PLEASE KEEP THAT TEAM IN MIND AS YOU COMPLETE THE SURVEY.

6. **How would you rate the overall quality of work done in your team?**

   34 Very good
   37 Good
   22 Fair
   5 Poor
   2 Very poor

7. **How would you describe the overall morale in your team at this time?**

   5 Team morale is very high
   30 Team morale is moderately high
   32 Team morale is neither high nor low
   25 Team morale is moderately low
   9 Team morale is very low

8. **Approximately how old is your team?**

   3 Less than 6 months old
   8 6 – 12 months old
   7 12 – 18 months old
   12 18 – 24 months old
   12 24 – 30 months old
   17 30 – 36 months old
   41 More than 36 months old

9. **How long have you been working with the team?**

   7 Less than 6 months
   12 6 – 12 months
   12 12 – 18 months
   14 18 – 24 months
   13 24 – 30 months
   13 30 – 36 months
   29 More than 36 months

10. **Are you currently the team lead for your team?**

    12 Yes
    88 No

11. **How many of your team members are collocated?**

    19 All or almost all are collocated
    23 More than half are collocated
    22 About half are collocated
    26 Less than half are collocated
    11 None or almost none are collocated

12. **How would you rate the frequency with which people are moved around between teams? Is it …**

    19 Not often enough
    52 About the right frequency
    29 Too often

13. How would you judge the size of your team for the work to be accomplished? Is your team …

11 Much smaller than it should be
25 Slightly smaller than it should be
44 About the right size
13 Slightly larger than it should be
*7* Much larger than it should be

14. To what extent do the members of your team complement each other's knowledge and experience?

27 To a great extent
51 To a moderate extent
18 To a slight extent
5 Not at all

15. Overall, how would you rate the level of technical expertise among your team members?

34 Very good
41 Good
16 Fair
7 Poor
2 Very poor

16. Please indicate how much you agree or disagree with the following statements by marking one answer for each statement:
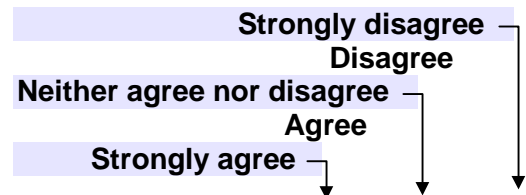
	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
a) I can't accomplish my work without input (e.g., information, materials) from other members of my team	33	31	15	15	6
b) Other members of my team need input (e.g., information, materials) from me to perform their jobs	28	48	15	7	3
c) The jobs performed by the members of my team are related to one another	27	51	13	5	4

17. During the time you've been working with the team, how many members have left the team because they were needed somewhere else to do other work?

22 None ➔ GO TO QUESTION 19
8 One
15 Two
16 Three
9 Four
4 Five
26 Six or more

18. What kind of impact did their leaving have on the team's overall performance?

- *4* Very positive impact
- *4* Moderately positive impact
- *39* Little or no impact
- *45* Moderately negative impact
- *8* Very negative impact

19. When new members join your team, how well qualified are they in terms of their technical skills?

- *0* Does not apply – There haven't been any new members since I've been on the team ➜ GO TO QUESTION 21

- *4* Extremely well qualified
- *26* Very well qualified
- *52* Moderately well qualified
- *14* Poorly qualified
- *3* Not at all qualified
- *0* Don't know

20. When new members join your team, how well prepared are they in terms of their ability to work in teams?

- *2* Extremely well prepared
- *22* Very well prepared
- *58* Moderately well prepared
- *15* Poorly prepared
- *3* Not at all prepared

21. Approximately how many full-time and part-time members are on your team?

Full-time Team Members: _____   Part-time Team Members: _____

22. Is your team lead also your formal supervisor?

- *27* Yes
- *73* No

23. Not counting your formal supervisor, how many people in the horizontal IPDS system are you required to report to?

- *47* None
- *24* One
- *14* Two
- *7* Three
- *9* Four or more

HOW YOUR TEAM WORKS AS A GROUP

24. **How would you describe the effectiveness of your team's plan or charter in helping the team to accomplish its work? (MARK ONLY ONE)**

    0   Does not apply– There is no team plan or charter in place ➔ GO TO QUESTION 27

    10 The plan/charter is very effective – it <u>helps</u> the team's performance
    25 The plan/charter is somewhat effective
    49 The plan/charter has little or no effect on the team's performance
    13 The plan/charter is somewhat ineffective
    4   The plan/charter is very ineffective – it <u>hurts</u> the team's performance

25. **Were you directly involved in developing your team's plan or charter?**

    57 Yes
    43 No

26. **Is your team's plan or charter currently up to date?**

    55 Yes
    45 No
    0   Don't know

27. **Are all of the functional areas and organizations that impact your team's major decisions represented on the team?**

    65 Yes
    35 No
    0   Don't know

28. **To what extent are the roles and responsibilities of the various members of your team clearly defined?**

    20 To a great extent
    52 To a moderate extent
    21 To a slight extent
    7   Not at all

29. **When decisions need to be made about who will do what tasks within the team, how are those decisions usually handled?**

    27 Usually the team decides
    50 Sometimes the team decides, sometimes management decides
    24 Usually management decides

30. **To what extent are the members of your team, rather than your managers, responsible for determining the procedures and schedules for the work to be done?**

    33 To a great extent
    36 To a moderate extent
    24 To a slight extent
    8   Not at all

31. Please indicate how much you agree or disagree with the following statements by marking one answer for each item:
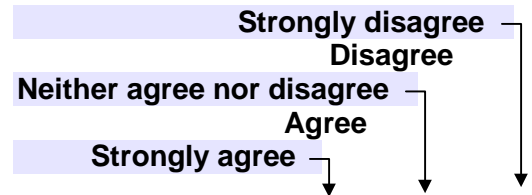
		Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
a)	Members of my team get along well with each other	18	50	21	9	3
b)	Most of the people on my team seem to see things the same way	4	30	35	23	9
c)	There is little or no friction among the members of my team	4	27	31	30	9
d)	Members of my team generally give each other suggestions and feedback (e.g., suggesting a better method of completing a task)	9	54	19	14	4
e)	Members of my team are generally very receptive to suggestions and feedback from others (e.g., thanking someone for catching a mistake)	8	41	28	17	7
f)	The workload is distributed fairly among the members of my team	2	23	28	34	12
g)	People on my team do their fair share of the work	5	33	30	24	8
h)	People on my team cooperate to get the work done	7	50	26	13	3
i)	People on my team offer to help each other with their work	5	37	33	20	5
j)	Members of my team can change the way they do things when necessary	8	45	28	14	5
k)	Members of my team can fill in for one another when needed	4	41	27	24	5
l)	My team is very flexible when there are changes in members	5	39	41	13	3
m)	Disputes are resolved within my team rather than elevated through the hierarchy	8	38	28	16	9
n)	My team's decisions are frequently overturned	7	16	34	33	9
o)	The leadership of my team is effective	10	37	26	14	13

32. To what extent are there conflicts between your team and other IPDS teams?

- *22* There are no conflicts with other teams
- *43* There are slight conflicts
- *27* There are moderate conflicts
- *8* There are substantial conflicts

33. How many members of your team have been empowered by their managers to represent their organizations and make decisions?

- *19* All or almost all
- *26* More than half
- *18* About half
- *24* Less than half
- *13* None or almost none

34. To what extent have <u>you</u> been empowered by <u>your</u> manager?

- **47**   To a great extent
- **28**   To a moderate extent
- **16**   To a slight extent
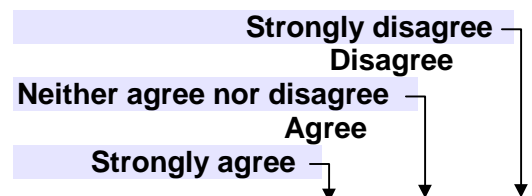- **8**   Not at all   ➔   GO TO QUESTION 36

35. How clear to you are the conditions under which you may exercise your power?

- **43**   Very clear
- **36**   Somewhat clear
- **12**   Somewhat unclear
- **9**   Very unclear

36. About how often do you have to deal with conflicts between your team and your reporting chain?

- **50**   Rarely
- **36**   Occasionally
- **14**   Frequently

37. Please indicate how much you agree or disagree with the following statements by marking one answer for each item:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
a) Empowerment of teams is supported by the Office Directors	9	26	29	20	15
b) Empowerment of teams is supported by the Division Managers	9	32	27	18	14
c) Managers have fully empowered their employees	5	22	24	29	21

38. Within your team, how often are work-related decisions made by team consensus compared with referring them upward to a higher-level team or manager? (MARK ONLY ONE)

- **31**   Decisions are usually made by team consensus
- **54**   Some decisions are made by consensus and some are referred upward
- **15**   Decisions are usually made by referring them upward

39. In general, about how often do you think decisions are made at the lowest appropriate level?

- **8**   Always or almost always
- **31**   Most of the time
- **20**   About half the time
- **28**   Sometimes
- **13**   Rarely or never

40. Who usually decides what contracting approach (e.g., sole source, firm fixed price, option years, etc.) will be used for an acquisition?

26 The sponsoring organization
24 The team lead
28 The team members
22 Other (please specify): _____

41. Who usually has the greatest impact on the final decision about what should be included in …

	Investment Analysis Staff	Line of Business (sponsor)	Team Lead	Team Member(s)
a) …the mission analysis	11	57	16	16
b) …the investment analysis	52	21	16	11
c) …the solution implementation	3	22	30	45
d) …the procurement document	5	21	31	43

42. Overall, how satisfied are you with …

	Very satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Very dissatisfied
a) …the amount of information you get from other members of your team?	8	45	22	19	6
b) …the quality of the information you get from other members of your team?	8	42	26	18	6
c) …the timeliness of the information you get from other members of your team?	5	38	25	23	10
d) …the ease of communicating with the other members of your team?	10	43	24	18	5
e) …the extent to which members of your team share their knowledge with one another?	8	40	26	20	7
f) …the information (e.g., lessons learned) you receive about what's going on in other teams?	2	18	33	25	22
g) …your involvement in decisions that affect your work?	7	38	24	19	12
h) …your physical working conditions?	14	44	23	11	9

TRAINING ISSUES

43. Have you received any team-related training as a member of an IPDS team?

67 Yes
33 No ➔ GO TO QUESTION 47

44. In general, how well could you apply the training you received to your day-to-day job activities? That is, to what extent could you <u>use</u> what you learned in training when you were back on the job?

11 To a great extent
40 To a moderate extent
37 To a slight extent
12 Not at all

45. When you were back on the job after training, to what extent were you <u>encouraged</u> (e.g., by your supervisor) to apply your training?

8   To a great extent
28 To a moderate extent
31 To a slight extent
34 Not at all

46. How would you rate the following training courses?

	Very good	Good	Fair	Poor	Very poor
a) Working Together Effectively (WTE) workshop	12	35	32	11	10
b) Collaborative Team Processes (CTP) workshop	13	35	33	11	9
c) Combined (five-day) WTE and CTP training	17	32	29	15	8
d) Training in teamwork skills other than the WTE and CTP	9	42	31	11	6
e) Leadership Enhancement Session (LES) workshop	11	40	40	8	3
f) Team leadership training other than LES	16	48	30	6	0
g) Fundamentals of Acquisition Management System (FAMS)	36	33	23	6	2
h) Training in quality and customer service	12	39	39	4	8

47. Below is a list of training topics. Which topics do you think <u>you</u> need additional training in, to perform your job more effectively? (MARK ALL THAT APPLY)

45	Technical subjects in your field or profession
29	PC software applications
28	Contracting regulations
26	Contract management
17	Working as a team member
27	Team communications
30	Business management
27	Dealing with unexpected events
21	Team coordination
15	Serving as a Contracting Officer's Representative (COR)
23	Collaborative decision-making and problem-solving (e.g., Delphi method, brainstorming)
34	Conflict resolution
37	Lifecycle acquisition management
17	Leading small groups within the team
32	Effective meeting techniques
11	Other (please specify):

48. Which topics do you think the <u>members of your team</u> need training in, for the team to perform more effectively? (MARK ALL THAT APPLY

42	Technical subjects in their fields or professions
17	PC software applications
27	Contracting regulations
28	Contract management
42	Working as a team member
51	Team communications
25	Business management
41	Dealing with unexpected events
49	Team coordination
16	Serving as a Contracting Officer's Representative (COR)
32	Collaborative decision-making and problem-solving (e.g., Delphi method, brainstorming)
43	Conflict resolution
41	Lifecycle acquisition management
20	Leading small groups within the team
39	Effective meeting techniques
6	Other (please specify):

SUPPORT FOR IPDS TEAMS

49. **Regardless of what is said officially, how much commitment to the team concept and the IPDS teams do you think there is at the following management levels?**

		Great commitment	Moderate commitment	Slight commitment	No commitment
a)	FAA Administrator	17	32	33	18
b)	Associate Administrators	12	31	35	21
c)	Office Directors	12	33	36	19
d)	Division Managers	15	39	27	19
e)	Integrated Product Leadership Team (IPLT)	22	42	24	12
f)	Integrated Product Team (IPT) Leads	34	40	15	11

50. **How would you rate the following?**

		Very good	Good	Fair	Poor	Very poor
a)	Administrative support provided to your team	11	38	30	13	8
b)	Clerical support provided to your team	12	35	27	16	10
c)	Materials and supplies provided to your team	8	38	32	15	7
d)	Quality of computer hardware available to your team	18	43	25	10	4
e)	Suitability of computer software for the work your team does	15	45	27	10	3
f)	Technical support for computer systems	14	39	30	12	5
g)	Written procedures or guidelines for your job	4	20	28	28	20
h)	Written procedures or guidelines for your team's work	3	22	31	25	19
i)	The information your team gets for up-front planning	4	17	36	23	20

EFFECTIVENESS OF THE INTEGRATED PRODUCT DEVELOPMENT SYSTEM (IPDS)

51. What kind of impact do you think the Integrated Product Development System (IPDS) has had on the following, compared to pre-IPDS?

Very negative impact
Moderately negative impact
Little or no impact
Moderately positive impact
Very positive impact

	Very positive impact	Moderately positive impact	Little or no impact	Moderately negative impact	Very negative impact
a) Acquisition decision making	9	32	44	8	7
b) Quality of products	5	32	44	12	7
c) Cost effectiveness of products	4	26	46	14	10
d) Timeliness of product delivery	7	27	44	11	12
e) Technical documentation	4	20	55	11	10
f) Relationships with contractors	7	26	51	9	7
g) Customer satisfaction	5	30	44	12	9

52. Please indicate how much you agree or disagree with the following statements by marking one answer for each item:

Strongly disagree
Disagree
Neither agree nor disagree
Agree
Strongly agree

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
a) Management is open and responsive to change	3	23	26	29	19
b) Needed information flows freely up and down in the organization	3	19	20	35	22
c) Needed information flows freely across the organization	4	22	27	29	18
d) There has been a real effort to streamline rules and procedures	5	27	28	21	20

53. Overall, how well do you think the team concept is working?

- *8* Very well
- *50* Moderately well
- *42* Not very well

ABOUT YOU AND YOUR BACKGROUND

54. **As of your last anniversary date with the FAA, how many years had you been employed by the FAA?**

    Years with FAA: _____

55. **What is your job series (e.g., 343, 801, 1102)? Write in your series number below, but <u>not</u> your grade.**

    Job Series: _____

56. **About how many years have you been employed in that series at your current grade or an equivalent level?**

    Years in current series at current grade level: _____

57. **Are you working under a paybanding system?**

    54   Yes
    46   No

58. **How do you feel your pay compares with that of people in similar jobs at FAA? Is it…**

    0   much higher?
    6   somewhat higher?
    61   about the same?
    21   somewhat lower?
    11   much lower?

59. **Besides your first- and second-level supervisors (i.e., the official rater and the reviewing official), how many people had input into your last performance rating?**

    68   None
    17   One
    8   Two
    7   Three or more
    0   Don't know

60. **What is the <u>highest</u> grade or academic degree that you have completed? (MARK ONLY ONE)**

    0   Less than 12 years of school (no diploma)
    0   GED or other high school equivalency certificate
    2   High school diploma
    1   Vocational training after high school
    12   Some college credit, but no college degree
    5   2-year college degree (e.g., AA, AS)
    24   4-year college degree (e.g., BA, BS)
    21   Some graduate school credit, but no graduate degree
    32   Master's or equivalent degree (e.g., MA, MS)
    3   Doctoral or professional school degree (e.g., PhD, MD, JD, DVM)

61. **To what extent does your current job make use of your education and experience?**

    32 To a great extent
    41 To a moderate extent
    22 To a slight extent
    6   Not at all

62. **Overall, how satisfied are you with your job at FAA?**

    20 Very satisfied
    45 Satisfied
    16 Neither satisfied nor dissatisfied
    15 Dissatisfied
    5   Very dissatisfied

63. **Thank you for your cooperation. If you have any comments or concerns that you were not able to express in answering the survey, please write them in the space below. If your comment concerns a particular question on the survey, be sure to indicate the question number.**

Exhibit C

Cost and Schedule Delays of Programs Used to Assess AMS

Program	Planned Program Costs [1] (in millions)	Cost Growth (in millions)	Percent Cost Growth	Planned Months to Commission System [2]	Months of Schedule Delay	Percent Schedule Delay
Wide Area Augmentation System	$1006.6	$632.6 [3]	63 %	48	14	29 %
Standard Terminal Automation Replacement System	940.2	462.4	49 %	28	49	175 %
Operational and Supportability Implementation System	174.7	74.8	43 %	12	48	400 %
Local Area Augmentation System	586.5	134.8	23 %	N/A [4]	N/A	N/A
Air Traffic Control Beacon Interrogator	282.8	0	0 %	20	27	135 %
Host and Oceanic Computer System Replacement Program	442.5 [6]	0	0 %	8	1	13 %
Integrated Terminal Weather System	276.1 [7]	0	0 %	57	0	0 %
Acquire	5.6	0	0 %	16	0	0 %
National Airspace System Implementation Support Contract	495.1	0	0 %	N/A [4]	N/A	N/A
Integrated Computer Environment – Mainframe and Networking	N/A	N/A	N/A	7	0	0 %
National Airspace System Infrastructure Management System	100.8	(40.5) [5]	(40 %)	24	18	75 %
Total	$4,310.9	$1,264.1	29 %	24 [8]	17 [8]	71 %

[1] Planned program costs include funding from the Facility and Equipment and Research, Engineering, and Development accounts.

[2] The planned months to commission a system was measured from the time of contract award to initial commissioning of the system. Commissioning of a system is done after all testing, deployment and system familiarization activities are completed. Our data are based on the acquisition program baseline in effect at the time FAA began tracking cost and schedule performance under AMS.

[3] We did not include $1.339 billion of funding that was transferred from the Operations account to the Facility and Equipment account.

[4] FAA did not measure the schedule baseline for commissioning this program in its analysis.

[5] This program was rebaselined and the scope of work was reduced for Phase 1. The program was experiencing more than a 50 percent cost growth before FAA rebaselined the program.

[6] This includes $18.4 million for travel and overtime.

[7] This includes $103.1 million for a pre-planned product improvement.

[8] This reflects the average months planned to commission the first system and the average months of delay to commission the first system.

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