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FAA INFORMATION RESOURCES

Agency Needs to Correct Widespread Deficiencies

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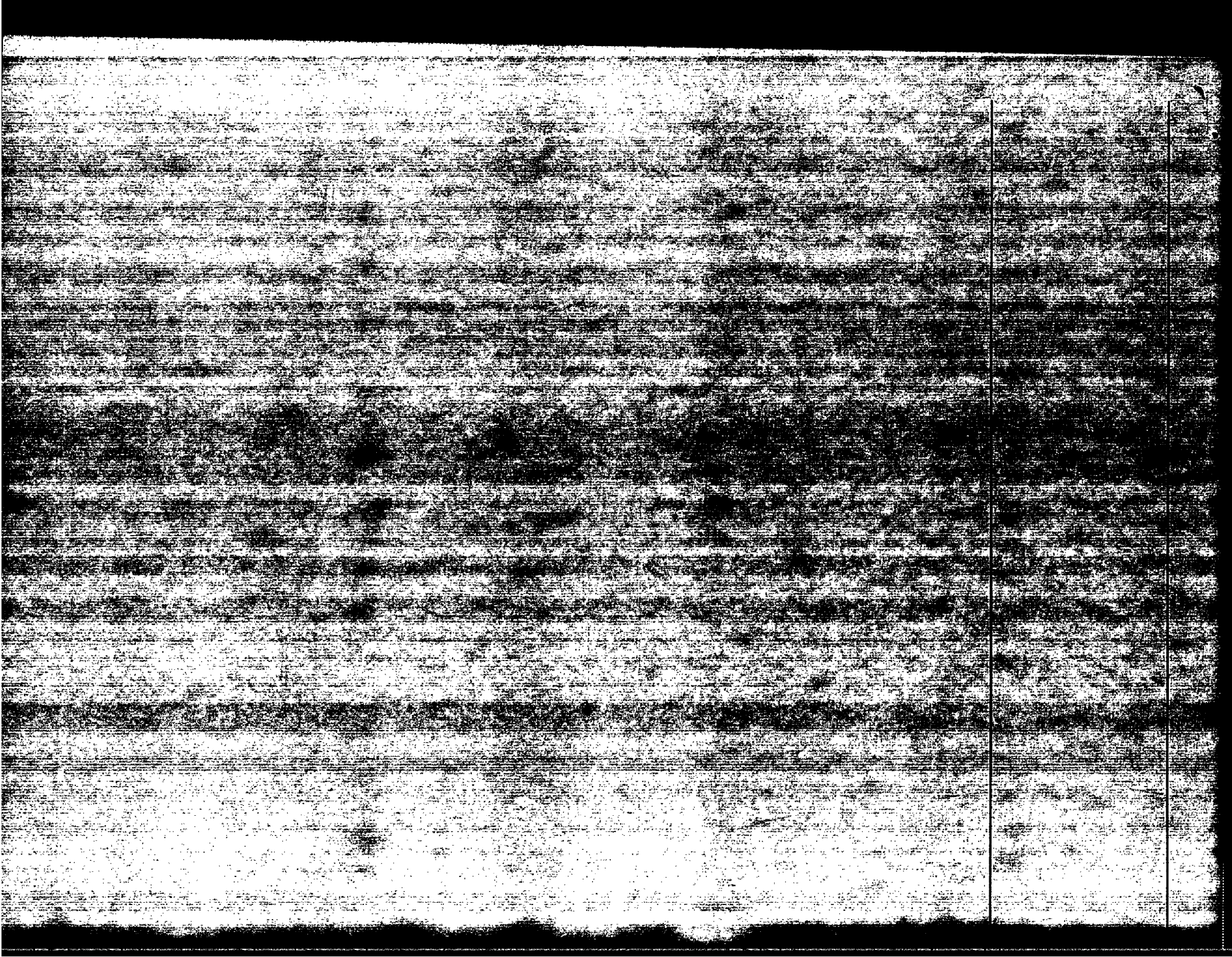
B-243851

June 18, 1991

The Honorable John Conyers, Jr.
Chairman, Committee on Government
    Operations
House of Representatives

Dear Mr. Chairman:

In response to your March 11, 1991, request, we are reporting to you on
the Federal Aviation Administration's (FAA) management of its informa-
tion resources. As you know, FAA invests billions of dollars in informa-
tion technology resources annually. Effective and efficient management
of these resources is critical to meeting the agency's missions, such as
maintaining air safety.

In your request, you expressed concern about FAA's overall management
of its information resources, given the many problems it has had
acquiring and managing individual computer and communications sys-
tems. (See app. I for the request letter.) Our objectives were to review
FAA's management of information resources and assess whether FAA is
implementing needed agencywide corrections. Details of our objectives,
scope, and methodology are discussed in appendix II.

Results in Brief

Wide-ranging and fundamental information resources management (IRM)
problems with many information systems and across several major pro-
grams have impeded FAA's ability to achieve its missions. Again and
again, the same problems plague these systems—inadequate definition
of requirements and consideration of alternatives, failure to sufficiently
test systems, ineffective management of computer capacity, and unreli-
able data. As a result, systems are delivered late, they run millions of
dollars over budget, and they do not meet their objectives.

An effective IRM program could have helped FAA minimize many of these
problems. However, FAA's IRM program has had limited top management
involvement, does not have a complete strategic plan, and does not
ensure that sound practices are implemented.

To its credit, FAA has begun to recognize many of its IRM problems.
Through the efforts of an external consultant and an internal task force,

these issues have been brought to the attention of the FAA Administrator. Now, the Administrator must act to address longstanding IRM deficiencies.

Background

FAA uses computer and telecommunication technologies in virtually all aspects of its work. These technologies help FAA ensure safe air travel, set regulatory standards, maintain security, and promote air commerce. FAA estimates that it spends about $3 billion annually in information technology to support these missions. Further, it currently has over 200 computer and communications systems.

Computer systems are the backbone of the air traffic control system that handles over 200,000 daily flights in the United States. For example, controllers keep track of aircraft using information processed by computers and displayed on video screens at their workstations. FAA's current air traffic control modernization program, estimated to cost about $31 billion between 1982 and 2000, relies heavily on information technology. Many modernization projects call for faster, more powerful computers, improved workstations, and increased automation of air traffic control.

In addition to air traffic control, FAA uses computers to store, organize, and report aviation safety data. Computers also help track and analyze significant aircraft malfunctions, rules violations, accidents and incidents, pilot medical examinations, and security violations. In addition, computers are used to monitor airline safety inspections and register aircraft and pilots.

FAA Has Problems Acquiring and Managing Computer Systems

The magnitude and complexity of FAA's information resources require effective and efficient management. Further, the Brooks Act, the Paperwork Reduction Act, the Federal Information Resources Management Regulation, and Office of Management and Budget Circular A-130 are intended to ensure that agencies effectively and efficiently acquire and manage computers, software, and related information resources. However, FAA has not always followed many of these requirements which contributes to problems (1) developing and acquiring new computer and communications systems, and (2) operating and maintaining existing systems.

Development and Acquisition of FAA Systems Repeatedly Plagued by Problems

Federal regulations and guidance aim to ensure that government funds are wisely invested in the development and acquisition of new or additional information technology. They require that acquisitions (1) be based on mission needs and analysis of requirements, (2) consider a full range of alternative solutions, and (3) incorporate sufficient testing before producing costly, complex systems. FAA has often not followed these policies. We have reported numerous times on FAA's failure to (1) adequately define requirements, (2) consider a full range of available alternatives, and (3) thoroughly test systems before production. For instance:

- The Advanced Automation System, FAA's $5-billion effort to replace aging air traffic control computer systems, encountered a 13-month delay less than a year after the contractor began work on the project, in part because FAA had not defined all requirements.[1] On the $400-million FAA interim support plan, a key project to sustain air traffic control equipment and increase computer capacity, FAA inadequately defined requirements. This seriously delayed urgently needed improvements.[2] On the $1.5-billion Computer Resources Nucleus (CORN) project, FAA's single architecture design requirement unjustifiably limited competition and dictated a system design that may not have satisfied the agency's needs.[3] Because the project had also not been properly planned and contained major unresolved problems, we recommended that the contract for this project not be awarded.[4]
- On the Advanced Automation System, FAA did not fully analyze or properly compare a full range of alternatives to its preferred system to consolidate air traffic control facilities. Our analysis showed that another alternative could have cut project costs by over $500 million.[5] Similarly, on FAA's Airmen and Aircraft Registry modernization project, FAA staff analyzed a narrow set of alternatives that was predisposed toward a

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[1] Air Traffic Control: Continuing Delays Anticipated for the Advanced Automation System (GAO/IMTEC-90-63, July 18, 1990).

[2] Air Traffic Control: The Interim Support Plan Does Not Meet FAA's Needs (GAO/RCED-90-213, Sept. 11, 1990).

[3] FAA Procurement: Competition for Major Data-Processing Project Was Unjustifiably Limited (GAO/IMTEC-90-71, June 11, 1990).

[4] FAA Procurement: Major Data-Processing Contract Should Not Be Awarded (GAO/IMTEC-90-38, May 25, 1990).

[5] Air Traffic Control: FAA Should Define the Optimal Advanced Automation System Alternative (GAO/IMTEC-89-5, Nov. 30, 1988).

specific type of optical disk technology that may not meet the agency's needs.[6]

- FAA has often moved major computer and communications projects into production to meet predetermined schedules before adequately testing the systems.[7] This contributed to project delays from 1 to 8 years.[8] For example, safety enhancements at FAA facilities were delayed 3 years because FAA awarded a production contract before a system was adequately tested and ready to be produced. The contractor subsequently had to modify the system design, leading to delays in production.[9] In another instance, on a major surveillance and communications acquisition known as Mode S, FAA did not adequately develop or test the system before awarding the production contract. This led to serious technical problems. Specifically, 5 years after awarding a $221-million production contract to buy 137 systems, FAA had spent about $145 million without receiving the first system.[10]

Because of FAA's repeated acquisition problems, we recently recommended that the Secretary of Transportation report FAA's major system procurement process as a material internal control weakness.[11] The Secretary reported this weakness in the most recent Department of Transportation Federal Managers' Financial Integrity Act report and stated his intent to develop a plan to address this deficiency. FAA has begun taking action in this area. For example, FAA made its operational test and evaluation group organizationally independent of developers and users. We previously recommended that FAA take this action.[12]

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[6] FAA Registry Systems: Key Steps Need to Be Performed Before Modernization Proceeds (GAO/IMTEC-91-29, Apr. 9, 1991).

[7] Air Traffic Control: Continued Improvements Needed in FAA's Management of the NAS Plan (GAO/RCED-89-7, Nov. 10, 1988).

[8] Air Traffic Control: FAA Needs to Implement an Effective Testing Program (GAO/IMTEC-89-62, Sept. 22, 1989).

[9] Air Traffic Control: Smaller Terminal Systems' Capacity Requirements Need to Be Defined (GAO/IMTEC-90-50, June 25, 1990).

[10] Air Traffic Control: Ineffective Management Plagues $1.7-Billion Radar Program (GAO/IMTEC-90-37, May 31, 1990).

[11] GAO/IMTEC-90-37, May 31, 1990.

[12] GAO/IMTEC-89-62, Sept. 22, 1989.

Ineffective Management of Existing Systems

FAA has also had problems managing existing systems. Especially noteworthy are the agency's ineffective management of computer capacity and safety systems' data reliability.

- FAA's ineffective management of computer capacity has been the subject of several of our reports.[13] Although practiced in the private sector and required by Federal Information Resources Management Regulation Part 201-30, FAA has not adequately managed its computer resources. For example, computer capacity shortfalls at large, busy terminal radar approach control facilities impaired controllers' ability to safely direct aircraft. At many of these facilities, aircraft position and identification information disappeared from controllers' displays, data flickered on the displays, and computer responses were delayed.[14]
- Data in safety and inspection systems are often inaccurate, delayed, and incomplete. For example, a vital inspection information system providing safety information to the Congress had inaccurate data on the number of FAA inspections of pilots and aircraft.[15] In another instance, a data base designed to identify trends in serious aircraft malfunctions had inconsistent, incomplete, and outdated data.[16]

FAA's Ineffective IRM Program Has Allowed Problems to Occur

FAA's problems in acquiring and managing information resources have impeded its mission, and created cost overruns and schedule delays. An effective IRM program could minimize these problems. However, FAA's ineffective IRM program suffers from a lack of top management involvement, an incomplete strategic plan, and inadequate application of accepted IRM practices.

Lack of Top FAA Management Involvement

The Paperwork Reduction Act requires federal executive departments and independent agencies to designate a senior management official for IRM. This official is to report to the agency head and carry out the agency's IRM responsibilities. Although component agencies, such as FAA,

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[13] Air Traffic Control: Computer Capacity Shortfalls May Impair Flight Safety (GAO/IMTEC-89-63, July 6, 1989); GAO/IMTEC-90-38, May 25, 1990; GAO/IMTEC-90-50, June 25, 1990; and Air Traffic Control: Inadequate Planning Increases Risk of Computer Failures in Los Angeles (GAO/IMTEC-90-49, July 16, 1990).

[14] GAO/IMTEC-89-63, July 6, 1989.

[15] Aviation Safety: FAA's Safety Inspection Management System Lacks Adequate Oversight (GAO/RCED-90-36, Nov. 13, 1989).

[16] Aviation Safety: Changes Needed in FAA's Service Difficulty Reporting Program (GAO/RCED-91-24, Mar. 21, 1991).

are not required by law to appoint a senior official, some agencies do so in order to ensure top management accountability and support. Our 1989 symposium on information technology also pointed out the need for agencies to elevate the authority of the senior IRM position to ensure that information resources responsibilities are fulfilled.[17]

The FAA Administrator has designated his Associate Administrator for Administration as the agency's senior official for IRM. According to the agency directive on FAA's IRM program, the Associate Administrator for Administration is expected to execute all IRM-related management, policy, and oversight responsibilities on behalf of the Administrator. However, FAA program organizations retain major responsibility for key information resources activities such as operational telecommunications and the information resources supporting the operational air traffic control system.

The Associate Administrator for Administration has not spent most of his time on information resources because he has many other non-IRM responsibilities. He is also responsible for FAA's budgeting, contracting, and accounting. The Associate Administrator estimated that before 1990 he devoted only about 15 percent of his time to information resources management. In 1990, he stated, he spent more of his time on information resources-related matters—about 50 percent—due to his concerns about the CORN project.

Further, FAA's attempts to involve top managers in IRM policy and decisionmaking by establishing committees has not succeeded. In 1985, to further ensure top management involvement, FAA initiated a steering committee of top agency executives, known as the IRM Executive Committee. The committee was composed of associate administrators and regional and center directors and was charged with making key decisions on administrative IRM programs. This committee met three times between 1985 and 1987. The committee was then discontinued because it did not analyze or develop overall IRM issues, according to the FAA IRM division director. Instead, FAA decided to incorporate IRM issues under another committee that deals with a broad range of agencywide issues, including information resources. However, according to the Office of Management Systems director, this committee has seldom discussed IRM issues.

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[17]Meeting the Government's Technology Challenge: Results of A GAO Symposium (GAO/IMTEC-90-23, February 1990).

FAA's Strategic IRM Plan Is Incomplete

FAA's strategic IRM plan has inappropriately excluded most of the agency's needs for information resources. The Paperwork Reduction Act as amended requires agencies, such as the Department of Transportation, to develop and annually revise a 5-year strategic plan for meeting the agency's information technology needs. Such plans are critical to focusing an agency's use of information resources toward achieving its mission.

To respond to this requirement, the Department of Transportation compiles and summarizes the strategic plans of its component agencies. However, FAA's most recent strategic IRM plan excluded all information resources needs supporting operational air traffic control systems, even though most of FAA's information technology supports these systems. This exclusion of information resources amounts to billions of dollars annually. Because of this omission, the Department of Transportation is not in compliance with the act. This constitutes a material internal control weakness under the Federal Managers' Financial Integrity Act.[18]

Senior FAA systems development officials believe they have accounted for all information resources supporting operational air traffic control in a separate plan, known as the capital investment plan. However, this plan, in a section entitled "linkage to other plans," does not mention the IRM plan and does not present the mission-based information needs of the agency. Rather, this plan focuses on providing a compilation of air traffic control projects. As a result, FAA may not be adequately planning for its strategic information needs. At the conclusion of our review, FAA IRM officials stated they would begin to incorporate the information resources supporting air traffic control into the strategic IRM planning process.

Sound IRM Practices Are Not Applied

FAA's problems acquiring and managing information resources also reflect the lack of adherence to sound IRM principles and practices. As previously discussed, FAA managers have often not adequately defined requirements, considered alternatives, tested before production, managed computer capacity, or ensured data reliability.

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[18]The Office of Management and Budget has defined a material weakness as a specific instance of noncompliance with the Financial Integrity Act of sufficient importance to be reported to the President and the Congress.

In particular, managers have not always recognized the importance of following sound IRM practices and may not always have adequate knowledge, skills, and training to know how to apply them. A recent internal FAA report on IRM recognized this.[19] According to the report,

The IRM educational process has been ineffective in educating FAA's leaders and workforce on the effective application of IRM principles, practices, and technologies. . . . Program managers are unfamiliar with required IRM procedures and approvals, causing delays in the initiation, development, and implementation of critical information systems.

FAA's planned modernization of its Airmen and Aircraft Registry Systems is a case in point. Program officials chose a system solution without following accepted IRM principles.[20] Specifically, user needs and functional requirements were not adequately defined, alternatives were not properly assessed, and costs and benefits were not adequately determined. As a result, FAA had to start over on the project and begin to define the underlying needs and requirements that the project was attempting to address.

FAA Has Recognized Its Problems

FAA recognizes the depth and severity of its IRM problems. Recent efforts by an external consultant and an internal FAA task force confirm many of these shortcomings.

In response to our earlier reports on FAA's CORN project, the FAA Administrator appointed an outside consultant to independently review the project and help determine whether or not—and under what conditions—CORN should proceed. In addition to their work on CORN, the consultant and his team of top information technology experts concluded that serious deficiencies existed in FAA's information resources management, organization, and leadership. The review recommended that the Administrator appoint a chief information officer who would directly report to the Administrator and have "global responsibility for leading and advising the Administrator and other FAA management concerning all information systems and utilization issues."

In response to this independent review, FAA established an IRM Quality Task Force to make recommendations to the Administrator on how to improve the IRM program. The resulting task force report identified five

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[19]A Report from the Information Resources Management (IRM) Quality Task Force (Oct. 22, 1990).

[20]GAO/IMTEC-91-29, Apr. 9, 1991.

- Direct the agency's senior IRM official, with the advice of the senior-level executive IRM steering committee, to
(1) develop and complete a strategic IRM plan for FAA within the next 12 months that considers the information technology needs of the entire agency,
(2) raise the level of knowledge and awareness of IRM in the organization by providing information resources management training to program staff, and
(3) implement the requirements of applicable laws, regulations, and guidance in acquiring and managing information resources.

We also recommend that the Secretary of Transportation report the lack of a complete strategic IRM plan as a material weakness under the Federal Managers' Financial Integrity Act. This weakness should remain outstanding until FAA's segment of the Department's strategic plan is modified to cover all of the agency's information resources.

As requested by your office, we did not obtain official agency comments on a draft of this report. However, the views of agency officials were sought during our work and incorporated where appropriate. Unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days after the date of this letter. We will then send copies to interested congressional committees; the Secretary, Department of Transportation; the Administrator, FAA; the Director, Office of Management and Budget; and other interested parties. Copies will also be made available to others upon request.

This report was prepared under the direction of JayEtta Z. Hecker, Director, Resources, Community, and Economic Development Information Systems, who can be reached at (202) 275-9675. Other major contributors are listed in appendix III.

Sincerely yours,

Ralph V. Carlone
Assistant Comptroller General

major problem areas with FAA's management of information resources:
(1) top management was not involved, which allowed subordinate orga-
nizations to make decisions with agencywide ramifications; (2) a corpo-
rate process to align information resources with mission priorities was
lacking; (3) information was not treated as an asset; (4) IRM practices
were ineffectively applied, which limited potential safety and other mis-
sion gains; and (5) inadequate knowledge of IRM principles, practices,
and technologies impeded the way the agency does business.

On the basis of its findings, the Task Force also recommended several
improvements in FAA, including the establishment of a chief information
officer who would report directly to the Administrator and be the
agency's senior management official for all IRM-related matters. The
Task Force briefed the FAA Administrator on its findings and recommen-
dations in February 1991. As of May 1991, the Administrator is consid-
ering the Task Force's recommendations.

Conclusions

FAA has not effectively managed its tremendous investment in informa-
tion resources. The agency has encountered serious and fundamental
information resources problems, making it much more difficult for it to
do its job. These problems have also led to significant cost overruns and
schedule delays on major automation projects.

FAA's IRM program has not addressed information resources areas that
could have minimized these problems. Specifically, the program has suf-
fered from a lack of top management involvement, an incomplete stra-
tegic planning process, and a failure to follow generally accepted IRM
practices. This has helped create automated systems that are expensive
and ineffective.

FAA's recent recognition and confirmation of these serious problems is to
be commended. Swift, effective action to fix these problems is needed
now.

Recommendations

We recommend that the FAA Administrator take the following actions to
improve IRM:

• Appoint a top executive as the agency's senior IRM official who will
spend time solely on information resources activities, and implement a
senior-level executive IRM steering committee to guide the agency's
efforts.

ONE HUNDRED SECOND CONGRESS

Congress of the United States
House of Representatives
COMMITTEE ON GOVERNMENT OPERATIONS
2157 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515

March 11, 1991

Honorable Charles A. Bowsher
Comptroller General
General Accounting Office
441 G Street, N.W.
Washington, D.C.   20548

Dear Mr. Bowsher:

The Committee is pleased with the assistance GAO has
provided in helping oversee the Federal Aviation Administration's
(FAA) acquisition of data processing services under the proposed
Computer Resources Nucleus (CORN) project. FAA's significant
changes to the CORN procurement should help correct the many
deficiencies that were evident and ensure that this will be a
cost-effective and competitive procurement.

The many shortcomings experienced with CORN, in addition to
the other widely known problems FAA has had in acquiring and
managing computers and communications for air traffic control,
raise serious questions about FAA's management of information
resources. We understand that FAA is beginning to recognize
these problems and is considering managerial and organizational
changes to prevent them from recurring. To help ensure that FAA
does not lose momentum in making necessary changes, we are
requesting that you review the current state of FAA's management
of information resources and assess whether FAA is acting to
implement needed agency-wide corrective measures.

We ask that you provide a report on this critical area by
May 1991. Questions concerning this request should be directed
to Chuck Wheeler of the Committee staff at (202)225-5051.

Sincerely,

JOHN CONYERS, JR.
Chairman

Objectives, Scope, and Methodology

In response to the request of the Chairman, House Committee on Government Operations, we reviewed FAA's management of information resources. Our objectives were to review FAA's management of information resources and assess whether FAA is acting to implement needed agencywide corrective measures.

To do this, we reviewed recently issued reports on FAA computer and communications systems and identified common problems that FAA was experiencing in managing information resources. We also analyzed FAA's policies, procedures, and other documentation on the agency's IRM program and documents on the IRM activities of FAA program and regional offices. In addition, we reviewed federal requirements and guidelines and compared these criteria with FAA's program. We discussed the IRM program with FAA officials from the Office of Management Systems and IRM managers representing FAA regional offices and program organizations. We also discussed FAA's IRM program with officials at the Department of Transportation and General Services Administration.

We reviewed recent studies by an independent consultant and by an internal FAA task group on FAA's IRM program. We discussed these studies and FAA's planned actions to respond to the two reviews with FAA officials.

We performed our work at the Department of Transportation and FAA headquarters in Washington, D.C.; the FAA Aeronautical Center in Oklahoma City, Oklahoma; the FAA Technical Center in Pomona, New Jersey; the FAA Western Pacific Region in Hawthorne, California; and the Transportation Systems Center in Cambridge, Massachusetts.

Our review was performed between July 1990 and May 1991, in accordance with generally accepted government auditing standards. While we did not seek official agency comments on a draft of this report, we discussed the contents of this report with Department of Transportation and FAA officials, and have incorporated their views where appropriate.

Major Contributors to This Report

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