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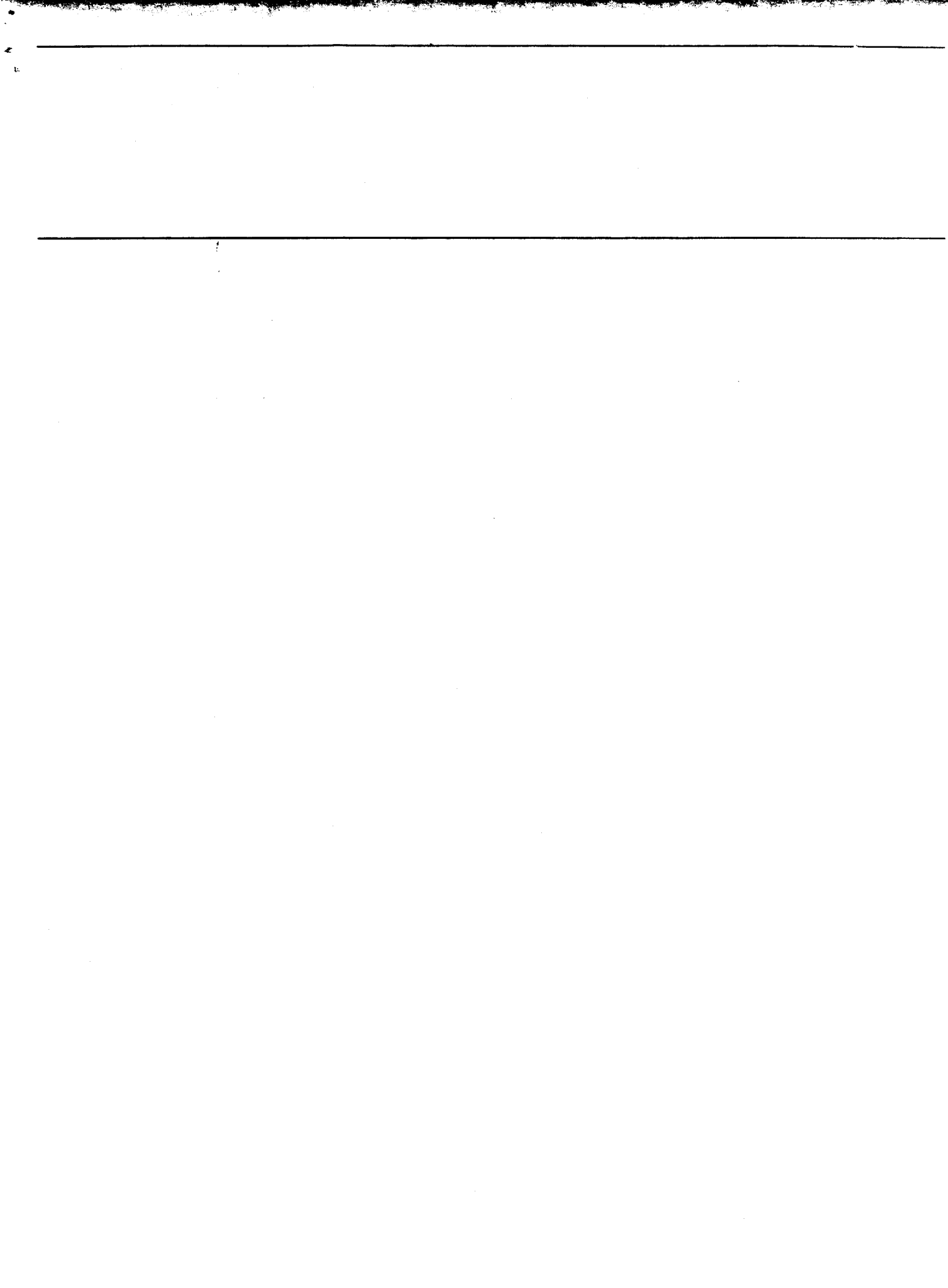
Fact Sheet for the Chairman, Subcommittee on Transportation and Related Agencies, Committee on Appropriations, House of Representatives

March 1989

COMPUTER PROCUREMENT

FAA's $1.5-Billion Computer Resources Nucleus Project

GAO

United States
General Accounting Office
Washington, D.C. 20548

Information Management and
Technology Division

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The Honorable William Lehman
Chairman, Subcommittee on Transportation
    and Related Agencies
Committee on Appropriations
House of Representatives

Dear Mr. Chairman:

On January 24, 1989, your office requested that we provide the preliminary results of our ongoing audit of the Federal Aviation Administration's (FAA) Computer Resources Nucleus (CORN) project to facilitate your upcoming hearing on FAA appropriations. You were particularly interested in the project's objectives, cost estimates, and implementation approach. This report contains information in appendix I that we have gathered on CORN since beginning our audit in mid-January 1989, based on agency documents and interviews with agency officials. We have not reviewed the underlying support for this information, but will do so as part of our continuing work on CORN. A detailed explanation of our objectives, scope, and methodology is found in appendix II.

Background

FAA currently has in-house data-processing resources called the "Common System," located at 12 agency facilities, that support mission and program information management needs in areas such as aviation safety, airspace information (excluding air-traffic control systems), and financial, materiel, and human resources. FAA maintains that computer capacity at Common System facilities is saturated and that it is no longer possible or desirable to upgrade the system to meet agency needs over the next 10 years.

Instead of procuring additional computer hardware, FAA intends to divest itself of its current Common System facilities. Under the CORN approach, the agency's Common System data-processing needs for the next 10 years are to be met through a single fee-for-service contract, from computer facilities provided and operated by a contractor. In addition, the contract is to include options for accommodating data-processing needs of other elements of the Department of Transportation, such as the Coast Guard, the Federal Highway Administration, and the Federal Railroad Administration.

FAA issued the project's request for proposals on February 27, 1989, and anticipates that the contract will be awarded in late September 1989.

Key Information Regarding the CORN Project

The information provided in appendix I, drawn directly from agency documents and from our interviews with agency officials, indicates that:

- Estimates for the project's total 10-year cost rose tenfold between 1986 and 1987, from $148 million to $1.5 billion. This was partly due to the scope of the project being enlarged to include optional data processing for other FAA systems and elements of the Department of Transportation, estimated to cost $619 million. FAA considers the estimate for implementing these options to be "very soft" because detailed requirements analyses and feasibility studies have not been done on them.
- The General Services Administration's Federal Systems Integration and Management/Center (FEDSIM), which reviewed the CORN project's draft specifications, maintains that the CORN request for proposals should include benchmark testing to determine whether the vendors' claims regarding system performance and cost are accurate and realistic. FEDSIM stated that an error in validating the vendors' proposals could have "staggering cost consequences over the ten year contract life." FAA, however, maintains that its planned alternative method of evaluating the vendors' proposals is sound.
- FAA currently processes about 200 different administrative and mission-oriented applications on its in-house International Business Machines and Data General equipment. The CORN contractor will be responsible for making any conversions needed to run these applications on the new system. Although FAA estimates that the whole conversion process will take about 30 months, a conversion plan will not be developed until after the award of the contract, since the contractor is responsible for developing it. Until all conversions are complete, the agency plans to operate its Common System in parallel with CORN at an estimated cost of approximately $46 million per year.
- CORN is planned to be one part of an FAA management information system that includes electronic workstations (microcomputers) and telecommunications projects. FAA is concerned that the work load involved in managing and integrating the entire system will exceed its staff resources. Therefore, in fiscal year 1990, it plans to engage an additional contractor to assist FAA in this work. The initial estimated cost of this additional contract is $35.5 million.

We discussed this report with agency officials and incorporated their comments where appropriate. As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the issuance of this letter. We will then send copies to the Secretary of Transportation; the Administrator, FAA; the Administrator of General Services, and other interested parties; and will make copies available to others upon request.

This information was compiled under the direction of Samuel W. Bowlin, Director, Defense and Aeronautics Mission Systems. Major contributors are listed in appendix III.

Sincerely yours,

Ralph V. Carlone
Assistant Comptroller General

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Abbreviations

COBS	computer operations basic statistic
CORN	Computer Resources Nucleus
FAA	Federal Aviation Administration
FEDSIM	Federal Systems Integration and Management Center
GAO	General Accounting Office
IMTEC	Information Management and Technology Division

Information on FAA's Computer Resources Nucleus Project

On February 27, 1989, FAA issued a request for proposals for its largest and most complex general purpose data-processing acquisition to date: the Computer Resources Nucleus (CORN) project. This $1.5 billion project is intended to meet the agency's general purpose data-processing needs for up to 10 years in the following mission and program areas:

- airport and aviation activity;
- air traffic control and airspace (excluding real-time air-traffic control systems);
- aviation safety;
- national airspace system facilities;
- financial, materiel, and human resources; and
- management support.

Currently, these areas are supported by FAA's "Common System" data-processing resources, dispersed among 12 agency facilities (1 located at headquarters, 9 at regional offices, and 2 at FAA centers).[1] Under the CORN approach, the agency plans to divest itself of its Common System resources and in their place procure a single systems-integration contract. The CORN contractor is to be responsible for providing, maintaining, and operating the computer facilities, equipment, software, and technical support to meet mission and program needs, as specified by FAA. In addition, the CORN contract is to include options for supporting data-processing needs of other FAA systems and elements of the Department of Transportation, such as the Coast Guard, the Federal Highway Administration, and the Federal Railroad Administration.

CORN is intended to cover an initial 5-year implementation period, followed by five 1-year renewals. The agency anticipates that the contract will be awarded in late September 1989.

Shortcomings Identified by FAA in Its Current Data-Processing System

FAA officials state that the agency is relying increasingly on data-processing systems to accomplish its mission, particularly in growing areas such as air safety and the enforcement of regulations. They maintain, however, that the agency's required service levels are not being met and that data-processing levels have been continually degrading. Specifically, they claim that the agency is faced with the following problems:

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[1]The Common System environment is currently made up of one International Business Machines 3084 computer and 22 Data General MV/15000 computers.

• The Common System computer capacity is saturated and needs to be increased by 150 percent just to meet current data-processing demand levels.
• The agency's data-processing demand levels are growing at a rate of 30 percent per year. (Over 10 years, this amounts to the demand growing by over 1380 percent.)
• Current funding levels allow only a 15 percent per year growth in the Common System's capacity.

According to FAA, in the past, the agency attempted to meet its need for increased data-processing capacity by upgrading the separate facilities of the Common System. Agency officials claim that now it is no longer possible or desirable to continue such upgrades to meet future needs. Among the reasons they cite are the following:

• The agency's 30 percent per year growth in data-processing demand "far exceeds" any feasible timetable for expanding the Common System because the agency's procurement cycle is a complex, lengthy process that cannot keep pace with the increased demand.
• The agency's traditional piecemeal approach to procurement has led to a Common System that is a "hodge-podge" of widely varying equipment that cannot readily communicate with each other or foster uniformity and integration of data.
• The geographical distribution of the Common System among 12 facilities is inefficient, wastes critical staff and funding resources, and is uneconomical to enhance.
• The agency's current staff level is insufficient to handle the procurement and operation of an expanded Common System, and budget constraints may prevent the agency in coming years from hiring additional technical staff.

FAA has concluded that in order to meet its future needs, it must realign its Common System data-processing environment. Specifically, the agency maintains that it must free itself from the administrative and technical burdens involved in acquiring, managing, and operating its own computer facilities. This has led to the CORN approach, which is oriented to procuring data-processing services rather than data-processing equipment.

How FAA Hopes CORN Will Meet Its Needs

FAA officials view the CORN project approach as a comprehensive solution to the problems that they believe the agency faces in providing its staff with adequate data-processing support. Under CORN, FAA is to define and aggregate its current and future general purpose data-processing needs for the next 10 years. The contractor—not FAA—is to determine which computer system is most appropriate and cost-effective for meeting these specified needs. The contractor is to operate, maintain, and manage the system in at least two contractor-provided facilities, dedicated exclusively to the project, which communicate with each other and with FAA centers, regions, and offices, and other Department of Transportation locations.

The contractor is also to convert the current Common System applications software and data to the new system, provide technical staffing, implement enhancements and upgrades, provide training and technical support to agency users of the system, and select and manage subcontractors. The contractor is supposed to configure the system so that it can be easily expanded to meet the agency's projected 10-year growth in its data-processing work load and to support, on an optional basis, the data-processing needs of other elements of the Department of Transportation.

The contractor is to provide this data-processing on a fee-for-service basis. The fee is to be fixed and the service is to be provided on an indefinite-delivery, indefinite-quantity basis. FAA officials maintain that this approach would allow the agency to order and utilize data processing as needed over the next 10 years, in much the same manner as a basic utility, such as electrical service.

Based on a requirements analysis and feasibility study for meeting its future needs, FAA claims that the CORN approach is the most cost-effective way to strengthen data-processing standardization, promote data integration and integrity, and reduce the complexity and improve the reliability of the agency's general purpose information management system.

Estimated Project Cost Has Increased

In the fall of 1986, when CORN was authorized, FAA estimated the project's total 10-year cost at $148.5 million—about one-tenth of the current estimate of $1.5 billion. Although the scope of the project has enlarged since that time to include optional data-processing services, the original description of the CORN approach was similar to the current one. The project was to involve a single systems-integration contract under

which a contractor would provide, operate, and manage computer resources to support the agency's general purpose data-processing needs. The $148.5-million cost estimate was just under the $150 million level, at or above which the project would have been designated a major systems acquisition by the Department of Transportation, making it subject to a more complex review process than smaller acquisitions. CORN was eventually designated a major systems acquisition in 1987 and reviewed as such.

During 1987 the project's total cost estimate was revised upward several times from the initial 1986 estimate of $148.5 million. In a March 1987 issue paper, FAA estimated that using the CORN approach to meet FAA's needs over 10 years would result in a contract value of $400-500 million. The CORN's preliminary project management plan, also dated March 1987, stated that the project would involve the procurement of a single systems-integration contract valued at approximately $750 million to meet FAA's needs over 10 years. During 1987, CORN's scope was enlarged to include options for processing data of other elements of the Department of Transportation. In October 1987, FAA estimated the project to involve total FAA and Department of Transportation expenditures up to an estimated maximum of $800 million over the 10-year life of the contract.

By December 1987, following the completion of a feasibility study and cost/benefit analysis, CORN's total 10-year cost for FAA requirements and Department of Transportation options was estimated to be $1.485 billion. FAA's January 1989 estimate was $10 million higher: $1.495 billion. In January 1989, the Deputy Secretary of the Department of Transportation placed the project's approved funding level at an even higher figure: $1.532 billion.

The two cost components of the project—mandatory FAA requirements and optional service for other elements of the Department of Transportation—are described below.

Mandatory Requirements and Estimated Cost

Mandatory (or "guaranteed") requirements refer to the FAA applications—approximately 200—currently being processed on the Common System. These include areas such as personnel and facilities management, payroll, accounting, information and statistics on air traffic and airports, and aviation safety. All of the Common System data-processing requirements are to be transferred to the CORN system. Agency officials estimate the project's total 10-year cost for the mandatory requirements

alone to be $875.8 million. The requirements are mandatory in the sense that, according to the officials, all of them need to be transferred to CORN before the agency could begin to divest itself of its current Common System facilities, which currently cost about $46 million a year to operate.

The cost estimate for the mandatory requirements component is based primarily on a 1987 market survey of vendor companies. FAA asked five vendors to provide hardware, software, and maintenance costs for several different computer system configurations. The vendors were also asked to determine costs for annual capacity upgrades, and to itemize prices for facility installation, management, and technical support. Using data provided by the three vendors who responded, FAA estimated the cost of processing its mandatory requirements work load.

Optional Levels of Service and Estimated Cost

Optional levels of service are included in the request for proposals to allow additional applications to be processed on the CORN system. These include FAA data-processing requirements that are not part of the Common System, as well as data-processing applications identified by other elements of the Department of Transportation, such as the Coast Guard, the Federal Highway Administration, and the Federal Railroad Administration. Currently, these applications are processed on dedicated hardware, time-sharing systems, or outside the FAA.

FAA estimates the cost of the optional levels of service to be $619 million. Agency officials, however, said that this estimate is "very soft" because it is based on several assumptions about the capacity and configuration of systems used to process these applications and because no detailed requirements, feasibility, or cost/benefit studies were done for the optional levels of service. The officials said that separate cost/benefit studies would be completed on each optional application before being transferred to the CORN system.

CORN Funding Requirements for Fiscal Years 1989-1992

FAA's CORN funding requirements for the initial 4 fiscal years of the project (as of December 1988) are shown in table 1. We have not reviewed the support for these figures, which were provided to us in February 1989 by project officials.

Table 1: FAA Estimates on the CORN Project's Initial Funding Requirements (Fiscal Years 1989-1992)

Dollars in millions

	Fiscal Years				
	1989	**1990**	**1991**	**1992**	**Total**
Facilities and Equipment					
Conversion	15.0	13.4	46.1	0.0	**74.5**
Operations	0.0	10.8	25.7	0.0	**36.5**
10 percent growth	0.0	0.0	1.1	0.0	**1.1**
Subtotal	**15.0**	**24.2**	**72.9**	**0.0**	**112.1**
Operations	0.0	0.0	0.0	42.6	**42.6**
Subtotal	**0.0**	**0.0**	**0.0**	**42.6**	**42.6**
Total	**15.0**	**24.2**	**72.9**	**42.6**	**154.7**

Source: FAA CORN Project Office

Cost Validation

In May 1988, FAA's Associate Administrator for Administration called for an independent review of the CORN project draft specifications. The General Services Administration's Federal Systems Integration and Management Center (FEDSIM) was chosen to conduct the review.[2] In September 1988, FEDSIM provided the Department of Transportation with a written review of the project's draft request for proposals.

FEDSIM's review expressed concern about the use of a unit of measure in the request for proposals called a "computer operations basic statistic" (COBS). COBS is to be a measure of the level of data-processing resources provided by the contractor. The request for proposals calls for each vendor to develop an algorithm that establishes the components of a COBS unit. The components are to include price elements such as hardware and software, disk and tape storage, and facility operations.

FEDSIM stressed that it is crucial for FAA to accurately validate its work load in terms of the COBS units proposed by each vendor. This is important because COBS units serve as the basis for billing the government each month for the level of data-processing resources provided by the contractor. According to FEDSIM, a validation error could have "staggering cost consequences over the ten year contract life."

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[2]FEDSIM was established in 1972 to assist federal agencies in the acquisition, management, and use of information systems and technology. It provides agencies with a wide range of technical and contractual assistance on a cost-reimbursable basis.

FEDSIM stated that the only reliable method for performing this validation is through government-furnished benchmark testing.[3] Although the need for benchmark testing is mentioned in the 1987 CORN feasibility study, FAA decided not to include it in the CORN request for proposals. According to FEDSIM, the lack of benchmark testing leaves the agency without an objective method for validating the accuracy of the COBS portion of the vendors' proposals. As a consequence, the agency would not be able to determine if a vendor's price for services is accurate or realistic, or to identify the "best deal" among the several vendor systems being offered.

FAA officials said that requiring vendors to perform a benchmark test would limit the number of vendors that would want to compete for the contract because of the costly nature of doing such testing for a project as large as CORN. They maintain that a full benchmark test would be equivalent to requiring the vendors to construct all of the facilities and convert all of the programs needed for the project. The officials maintain that the accuracy of the benchmark test would also be questionable because of the difficulty of providing a truly representative work load for the test.

Instead of a benchmark test, FAA plans to have the vendors conduct an operational capability demonstration.[4] This demonstration would require the vendors to convert subsets of two large FAA applications. The vendors would then operate the applications on a segment of the equipment that they propose to use to meet the agency's requirements. The data obtained from the demonstrations would be analyzed by FAA and compared with the vendor selection criteria presented in the request for proposals. Agency officials believe that a close examination of the demonstration results, along with a comparative analysis of cost data provided by the vendors and the technical factors behind each vendor's cost proposal, will enable them to identify the vendor with the most advantageous price/technical proposal. FEDSIM, however, believes that an operational capability demonstration does not appear to meet the Federal

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[3] A benchmark is a set of computer programs and associated data tailored to represent a particular work load and used to evaluate system performance or cost. A benchmark test is a user-witnessed demonstration on a vendor's proposed computer system done to validate system performance or cost. Benchmark tests are needed to assess how a vendor's system will process the work load (e.g., processing speed, resource consumption) and to compare the performances of several systems.

[4] An operational capability demonstration is used to verify the capability of a proposed computer system to satisfy functional requirements. Unlike benchmark testing, an operational capability demonstration does not verify the ability of a data-processing system or its components to handle specified work loads.

Information Resources Management Regulation 201-24.213(c) on performance validation.

Planned Transition to the CORN System

The CORN contractor, with assistance from FAA staff, is to be responsible for making any conversions necessary to process current Common System applications on the contractor-provided system. The request for proposals calls for four application systems to be converted from the Common System within 9 months of contract award: the Airport Safety Improvement Program, the Personal Property In-Use Management System, the System for Acquisition Management, and the Consolidated Uniform Payroll System. Conversion of a fifth system, the Consolidated Personnel Management Information System, is due to be completed 12 months after contract award. Conversion of the remaining "mandatory" application systems—about 200—will depend on the contractor's overall conversion approach. FAA currently expects this to take 30 months. Altogether, the applications to be converted involve an estimated 32,000 computer programs, of which about 19,000 are currently processed in an International Business Machines environment and 13,000 in a Data General environment.

The conversion plan, which establishes procedures and schedules for various conversion activities, will not be developed until after the contract is awarded, since the contractor is responsible for developing the plan. Lengthening the projected conversion period could affect the total cost of the project because FAA intends to operate its Common System in parallel with CORN during the conversion period. In addition, the agency does not plan to begin divesting itself of any Common System facilities until all of the mandatory applications are successfully converted. FAA estimates that the cost of running the current Common System is about $46 million per year (excluding agency staff costs), increasing at a rate of 19 percent per year.

Technical and staffing factors have the potential to lengthen the conversion period. According to FAA, the documentation for the applications "varies widely." Agency officials maintain that the essential elements to support the conversion, such as the current computer source programs, are available and complete for all applications. Programmer and user manuals, however, are only 60 percent current and complete. According to FAA, these manuals simply assist analysts in determining the overall direction and approach for the conversion. The conversion effort also will require FAA staff resources. According to the draft implementation plan, responsible agency units are to provide staff support for each

application system to be converted. FAA estimates that this support will amount to a total of 85 employee-years.

FAA Oversight of Contractor Performance

FAA maintains that CORN's "single contract" approach will reduce the administrative costs and difficulties associated with maintaining multiple data-processing contracts. Agency officials are, nevertheless, concerned that they will not have sufficient staffing to oversee the agency's information management system, which is to include three major components: (1) the CORN system, (2) the Office Automation, Technology and Services project for standardizing the agency's electronic workstation (microcomputer) environment, and (3) the Administrative Data Transmission Network system, which is to link CORN to the microcomputers. FAA plans to contract for each of these components separately. In fiscal year 1990, the agency plans to engage a fourth contractor to provide the agency with assistance in integrating the whole system and assessing and resolving conflicts that might occur among the system's three components. The initial estimated cost of this fourth contract is $35.5 million. Agency officials said that the actual cost would depend on the extent to which the contractor's services are used.

Objectives, Scope, and Methodology

On January 24, 1989, we were requested by the Chairman, Subcommittee on Transportation and Related Agencies, House Committee on Appropriations, to provide information on FAA's CORN project. The objective of this report is to provide information on cost and other key areas.

The information in this report was obtained as part of our ongoing audit of the CORN program, also being done at the request of the Chairman. Since beginning our audit work in mid-January 1989, we have gathered information on the project's development, goals and objectives, estimated cost, implementation approach, and management. We have examined key project documents—such as the requirements analysis, feasibility study, mission need statement, project charter, project specifications, and draft implementation plans—which define FAA's information management goals, evaluate alternatives for meeting those goals, and describe the CORN project approach. We have met with FAA and Department of Transportation officials responsible for managing the project to discuss their efforts, and have also met with information management specialists at FEDSIM who reviewed the project's draft specifications. We have not reviewed the underlying support for this information, but will do so as part of our ongoing work.

We discussed this report with agency officials and incorporated their comments where appropriate. Our work was performed in accordance with generally accepted government auditing standards.

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