

GAO

Report to the Chairman, Subcommittee
on Transportation and Related
Agencies, Committee on
Appropriations, House of
Representatives

June 1990

FAA PROCUREMENT

Competition for Major Data-Processing Project Was Unjustifiably Limited



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Information Management and
Technology Division

B-239902

June 11, 1990

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

Dear Mr. Chairman:

This report responds to your request that we review the Federal Aviation Administration's (FAA) acquisition approach for its Computer Resources Nucleus (CORN) project. The CORN project is intended to meet the agency's general-purpose data-processing needs for 10 years and provide optional processing support to other organizations within the Department of Transportation. Specifically, you asked that we determine if a key design requirement in the CORN request for proposals may have unnecessarily limited competition. Appendix I explains our objective, scope, and methodology.

Results in Brief

FAA's original objective for the CORN procurement was to achieve full and open competition and encourage innovative vendor proposals. This was to be done by communicating what FAA needed (functional requirements) while allowing vendors flexibility in determining how best to meet agency needs. Although initially recognizing that varied combinations of hardware and software could meet its needs, FAA later decided to require a single architecture solution on the basis that it would reduce operational costs and provide a technical platform for an integrated data base. A single architecture, however, will not necessarily meet these objectives. Further, in its request for proposals, FAA did not define key functional requirements for achieving its objectives, such as those pertaining to data accessibility. As a result, FAA (1) unjustifiably limited competition and restricted the range of solutions that vendors could offer and (2) dictated a system design that may not satisfy the agency's needs.

We have previously recommended that the CORN procurement not be awarded because FAA had not adequately planned and justified the acquisition.¹ In planning future procurements such as CORN, FAA should

¹FAA Procurement: Major Data Processing Contract Should Not Be Awarded (GAO/IMTEC-90-38, May 25, 1990). In addition, we issued a fact sheet on the project, Computer Procurement: FAA's \$1.5-Billion Computer Resources Nucleus Project (GAO/IMTEC-89-44FS, Mar. 31, 1989).

define the agency's needs in functional terms wherever possible and include restrictive provisions only if justified by the agency's mission needs.

Background

Under CORN, FAA intends to divest itself of its general-purpose data-processing resources, located at 12 agency facilities. In their place, FAA plans to enter into a single contract under which the contractor would provide the agency with data-processing services. The contractor would provide, maintain, and operate computer facilities, equipment, systems software, and technical support to meet FAA mission and program needs, as specified in CORN's request for proposals. The contractor would also convert current applications to the new system, but FAA would continue to develop and maintain its applications software. The contractor must also be able to provide similar data-processing services for other organizations within the Department of Transportation. The contract would cover an initial 5-year period, followed by five 1-year renewals. FAA estimates the contract value to be \$1.5 billion.

FAA issued the CORN request for proposals in February 1989. The contract was scheduled to be awarded by mid-1990. However, the House Committee on Appropriations has directed FAA and the Department of Transportation to defer awarding the CORN contract until they resolve issues raised in our earlier report on the project.

FAA's CORN Acquisition Goal Is Full and Open Competition

Federal Information Resources Management Regulation part 201-30.013-1 states that specifications shall be developed in such a way as to maximize, not limit, competition. Establishing functional requirements—that is, delineating precisely the needs that must be met, rather than how those needs will be met with a particular system design—is the preferred method for expressing users' requirements. The regulation recognizes that the use of restrictive provisions or conditions may be necessary in acquiring property or services, but only to the extent needed to satisfy the agency's needs. In other words, an agency may restrict the technical options that potential contractors can use if the agency can demonstrate that the restriction is necessary and justified.

One of the original and continuing objectives of the CORN project is to obtain full and open competition. As stated in its September 30, 1987, CORN Requirements Analysis, FAA intended to ensure, in accordance with the requirements of the Competition In Contracting Act and other relevant statutes, "that the project attracts a broad competitive range and

does not unfairly eliminate potential solutions." This position is in keeping with the January 1987 CORN project charter, where FAA stated that it "would not specify how the vendor would perform the job, only what computing and other services would be provided at what levels. The vendor would be responsible for obtaining the best hardware and software to do the job and operating facilities that made data processing most economical and responsive to users."

FAA's declared acquisition strategy was to prepare a request for proposals in functional terms that would "allow the widest possible selection of solutions, while preserving the functional requirements of the Agency."² In its April 1988 mission needs statement for CORN, FAA reaffirmed its intention to "conduct this procurement in a manner that ensures the broadest competitive range of bidders and encourages the submission of innovative configuration proposals."

FAA Decides to Limit Potential Computer Architecture Solutions

Although its acquisition strategy was to allow the widest possible selection of solutions, FAA decided to include a key design requirement for CORN's computer architecture. Computer architecture is the organizational structure of a computer system, including hardware and software. FAA decided that the ultimate solution to the agency's functional data-processing needs must employ a single rather than a multiple architecture. The CORN request for proposals, however, did not include a definition of either "single architecture" or "multiple architecture." Because there are no generally accepted definitions of these terms, we asked project officials to define them. They gave us the following:

- Single Architecture (synonymous with single computer architecture) - a configuration of hardware and software components wherein all major processor (CPU) [central processing unit] components run the same control program (operating system) at the same version level, and the same system software (e.g., language versions, database management systems, utility software) such that FAA application processes (programs and OCL [operational control language]) can be run on any such CPU without modification.
- Multiple Architecture (synonymous with multiple computer architecture) - a configuration wherein the major components, e.g., CPU do not meet the single architecture criteria.

²FAA's December 1987 agency procurement request to the General Services Administration states that CORN "contracting will be accomplished under procedures for full and open competition. Requirements are being specified in functional performance terms. A fully competitive procurement will be used."

FAA's current general-purpose data-processing system, which CORN is to replace, is a particular type of multiple architecture environment made up of one IBM 3084 mainframe computer and 22 Data General MV/15000 minicomputers. The computers are interconnected by the agency's Administrative Data Transmission Network. In justifying CORN, FAA has maintained that limitations in its current multiple architecture system are impeding the agency's ability to meet all its mission needs.

Evolution of the Single Architecture Requirement

At first, FAA did not mandate that the CORN configuration have a single architecture. In the two initial draft CORN specifications documents developed in 1987, FAA stated that it recognized that there are varied combinations of automatic data processing hardware and software that could provide the services needed. Accordingly, the September 1987 draft specifications, which FAA provided to vendors for comment, state:

A single type hardware and software architecture solution is not mandated. If multiple architectures are proposed as part of the solution then each must fully meet the stated criteria. Since a single architecture provides relatively greater return on investment for the Agency in the long term the evaluation of proposals will consider this as a factor.

A vendor could, therefore, propose either a single or multiple system architecture as a solution to FAA's needs throughout the life of the contract.³

In its June 1988 version of the draft solicitation document, however, FAA changed its position and included a basic system architecture requirement. FAA deleted the sentence stating that a single architecture solution was not mandated and added the requirement for a single architecture—either initially or within the first 3 years of the contract. This requirement is included in the final version of the CORN request for proposals, specified as follows:

If multiple architectures are provided then each shall fully meet the performance level requirements stated in this Section [section C]. If the Contractor provides multiple architectures initially, the transition to a single architecture shall be completed within the first three (3) years of the Contract.

³One architecture-related restriction included in the first two draft specifications documents addresses the possibility that a contractor might propose to provide a multiple architecture system initially with a plan to switch eventually to a single architecture. In this situation, FAA required that the transition be completed within the first 5 years of the contract.

According to FAA, the purpose of the requirement is to ensure that there would be no confusion in meeting CORN objectives and to ensure conformance with agency policy regarding the need for an integrated data base environment.⁴

Vendor Concerns Regarding the Single Architecture Restriction

After the CORN request for proposals was issued in February 1989, FAA received written comments from two industry vendors questioning the necessity and rationale for the single architecture requirement. The vendors claimed that a multiple architecture system could result in significant benefits and asked FAA to relax this requirement, or at least make it only a desirable option. For example, one vendor claimed a multiple architecture option could substantially reduce the cost of the conversion, allow offerors to design a technical solution that best addresses the application environment of FAA, and reduce the system life cycle cost of equipment and maintenance. In addition, the vendor claimed that a multiple architecture would drastically improve the time frame for transitioning from the current system to CORN.⁵

FAA's Rationale for Requiring a Single Architecture Solution Is Not Justified

In a July 1989 internal issue paper, FAA cited the following key reasons to support the single architecture requirement:⁶

- A single architecture will provide a technical platform for an integrated data base environment, where accurate and current information could be readily accessed by whoever needs it.
- A multiple architecture will consume 300 more employee years than a single architecture system and significantly increase costs to the government.

This rationale is inadequately supported and therefore inclusion of the requirement limiting all CORN design solutions to a single architecture is not justified.

⁴FAA also emphasized that the initial draft solicitation documents, which did not contain the requirement, were intended as requests for comment from interested parties, and should not be considered final, polished statements of requirements.

⁵Project officials currently estimate that it will take 3 years to convert current applications to CORN.

⁶In its delegation of procurement authority for CORN, the General Services Administration urged FAA to thoroughly document the project's procurement files with supporting justification for actions that may tend to restrict competition. FAA officials state that the July 1989 issue paper represents the agency's rationale for the single architecture requirement. Key points in the paper were provided to vendors in a July 1989 "Questions and Answers" document.

Specifying an Architecture Does Not Assure an Integrated Data Base Environment

According to FAA, the single architecture requirement is directly supported by policies found in the agency's Information Resources Management Plan, which requires that information systems incorporate the following concepts in their design:

- data elements are entered once and thereafter used and reused by anyone who needs them;
- information derived from multiple sources can be interrogated and accessed as a whole; and
- high flexibility is provided to accommodate changes through the elimination of interdependencies among user language, data-processing processes, and data base organization.

However, these concepts are not included as functional requirements in the request for proposals. Moreover, agency officials do not recognize that specifying an architecture will not ensure that these goals can be achieved or necessarily provide a technical platform for easily attaining an integrated data base. There may be cases where a single architecture would not meet these goals whereas a multiple architecture could. For example, a distributed system could be proposed wherein several of the same processors with the same operating and system software are connected via a local area network. In this system, some FAA applications would be resident on one machine, others would be resident on a second machine, and so on, with the same data base management system resident on each machine. Such a system would satisfy FAA's requirement for a single architecture. However, if data are stored in this system on separate machines as separate data bases and not as a single, distributed data base, it would not be possible to interrogate and access all the data in the system as a whole. Also, depending on the locations of the different applications, the data, and the applications' data needs, it may be necessary to enter data several times, not just once, for each application to have access to the data it needs.

Conversely, an open distributed system of different processors connected via a local area network, which meets the definition of a multiple architecture, could achieve the plan's goals. In this system, if a common user interface and an open distributed data base management system are employed, then it may be possible to interrogate and access all data in the system as a whole and to enter the data only once. Although we are not suggesting that one architecture is preferable to another, FAA's rationale that only a single architecture can meet its information management goals is not supported.

Increased Costs to FAA Not Supported

According to FAA, another reason for requiring a single architecture is that the costs to the government will be significantly higher in a multiple architecture environment due to additional programming costs and programmer/analyst training, decreased productivity, and higher operational costs resulting from less efficient processing. As discussed below, these programming, productivity, and operational cost estimates are flawed.

- Programming Costs: FAA states that the additional time for FAA programmer/analysts to maintain a common user interface in a multiple architecture environment "is estimated at 15%, which translates into the equivalent of over 300 additional staff years" or an estimated cost of \$137,280,000 over 10 years. No rationale or data have been provided for the derivation of this estimate and the use of 15 percent. Furthermore, FAA programmers would not necessarily be responsible for maintaining a common user interface. The interface could be considered part of the contractor's equipment and facilities, and as such would be the contractor's responsibility to maintain, not FAA's. Also, FAA programmers and analysts would not necessarily need to learn more than one environment. A vendor with a multiple system architecture could propose a single, integrated development environment for the programmer/analysts, which would permit them to target software for any machine in the architecture. In this case, the programmer/analysts would only have to learn one environment for development.
- Productivity Costs: FAA states that if a multiple architecture is provided with no common user interface, "each user would waste 15 minutes per day moving between different architectures while completing daily automation tasks without a common interface." FAA equates this with logging on and off the different architectures and estimates that it will result in a loss of productivity of \$87 million. This argument is not valid since it is not applicable solely to a multiple architecture. A distributed system could be proposed that meets the definition of a single architecture but which requires users to log on and off different processors in the system to reach the processor where the application is resident and to meet security procedures. Therefore, the additional cost of \$87 million for a multiple architecture is not supported.
- Operational Costs: FAA maintains that it is likely that superimposing a common user interface on a multiple architecture environment will require more computer resources over the life of the contract than performing the same functions in a single architecture environment. Therefore, FAA concludes that a multiple architecture system would increase FAA's 10-year computer operations costs. FAA, however, offers no support for this assumption.

Data-Processing Requirements Need to Be Clearly Defined

Restricting the design solution to any particular architecture is not an adequate substitute for carefully delineating the agency's functional requirements wherever possible and specifying them in the request for proposals. As previously noted, establishing functional requirements is the preferred method for expressing users' requirements. Further, defining functional requirements in the request for proposals enables vendors to determine how to respond with proposed solutions that would meet the requirements. However, FAA did not fully define its functional requirements. For example, FAA did not translate the Information Resources Management Plan goals into its request for proposals as functional requirements. Examples of areas where FAA may need to define specific requirements are:

- single entry of data;
- the interrogation, accessing, and interchanging of data resident anywhere in the system; and
- the porting (moving) of applications, and system and support software (e.g., operating system and data base management systems) among the different data-processing equipment in the system.

FAA officials stated that it was unnecessary to include these requirements in the request for proposals. They argued that FAA's intent has been identified in its overall program objectives and that if a vendor's proposal did not satisfactorily accomplish these objectives, FAA could remedy this during subsequent negotiations. However, the request for proposals, not the agency's intent, is the official document that vendors use to determine whether and how to respond.

Conclusions

FAA's intended acquisition approach is to define the agency's data-processing needs in functional terms in order to promote full and open competition. However, instead of defining key functional requirements in the CORN request for proposals, FAA has substituted a single architecture design solution which it maintains will enable the agency to meet mission needs. In requiring a single architecture, FAA unjustifiably limited competition and restricted the range of solutions that vendors could offer. Moreover, FAA dictated a system design that may not satisfy the agency's needs. As a result, potential cost-effective solutions may have been unnecessarily eliminated and systems proposed by vendors may not satisfy the agency's needs.

Recommendation to the Secretary of Transportation

In our May 1990 report on CORN, we recommended that the contract not be awarded because FAA had not adequately planned and justified the procurement. We pointed out that the agency should adequately define its data-processing needs before proceeding with an approach such as CORN. In defining the best way to meet these needs, we recommend that the Secretary of Transportation direct the Administrator, FAA, to first fully specify the agency's functional requirements wherever possible. Examples of functional requirements that may need to be specified include single entry of data; interrogation, accessing, and interchanging of data; and porting of software among different equipment. In doing this, if FAA determines that the procurement should have restrictive provisions, then it should justify their inclusion. FAA should then allow the vendors to propose systems that they believe will best meet the agency's requirements. FAA should plan to adequately test and evaluate vendors' proposals to determine how well they meet the stated requirements, at a reasonable cost and acceptable risk to the government.

We obtained the views of Department of Transportation and FAA officials on the key facts, conclusions, and recommendation contained in this report. These officials disagreed with our conclusions and recommendation. They maintained that the single architecture requirement is necessary to achieve FAA's information management goals. A senior department official for information resource management stated that the single architecture requirement was a judgment based on how the agency should do its business and did not require detailed written justification. FAA officials also questioned the need to put the type of functional requirements identified in this report into the CORN request for proposals. FAA maintained that the vendors were aware of FAA's intent and that if a vendor's solution did not adequately provide needed capabilities, any such problems could be addressed during negotiations or the contract could simply not be awarded.

Regarding the view that the decision was based on the agency's judgment and did not require documentation, the General Services Administration urged FAA to thoroughly document the project's procurement files with supporting justifications for actions that may tend to restrict competition. While FAA documented its decision for a single architecture to some extent, we have demonstrated that FAA's rationale was faulty. In response to our requests for further justification of its decision, FAA did not expand on its rationale. Regarding functional requirements, we believe that a system architecture requirement is an inadequate substitute for detailed specifications of the agency's functional requirements.

Such specifications should precede any decision to require a particular type of system architecture.

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 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; the Administrator of General Services; and other interested parties.

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

Sincerely yours,



Ralph V. Carlone
Assistant Comptroller General

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Objective, Scope, and Methodology

The Chairman, House Committee on Appropriations, Subcommittee on Transportation and Related Agencies, asked that we review FAA's \$1.5-billion CORN procurement. Our specific objective was to determine if a key design requirement in the CORN request for proposals may have unnecessarily limited competition

Accordingly, we reviewed the provisions of the Competition in Contracting Act, the Federal Acquisition Regulation, and the Federal Information Resources Management Regulation regarding competition. We interviewed FAA and Department of Transportation officials to determine their rationale for having a restrictive system architecture requirement. We also examined all relevant project documents, including the requirements analysis, project charter, mission need statement, agency procurement request, the delegation of procurement authority, draft solicitation documents, the request for proposals and subsequent amendments, vendors' comments on the request for proposals and FAA's responses, and an internal FAA paper discussing the rationale for requiring a single architecture system.

Our review was conducted at FAA headquarters in Washington, D.C., from April through June 1990. We performed our work in accordance with generally accepted government auditing standards.

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