

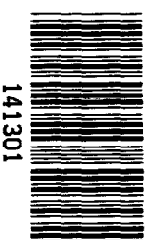
GAO

Report to the Chairman, Committee on
Government Operations, House of
Representatives

May 1990

ADMINISTRATIVE SYSTEMS

NASA Should Reassess Its AIM Program and Rescind Its IBM- Compatible Policy



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**Information Management and
Technology Division**

B-238776

May 1, 1990

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

Dear Mr. Chairman:

In a February 1, 1989, letter, you asked that we review automated data processing (ADP) procurement practices at the National Aeronautics and Space Administration (NASA). As agreed in subsequent discussions with your office, this report addresses NASA's justification for (1) implementing the \$165.5 million Automated Information Management (AIM) program, and (2) its May 29, 1984, policy requiring that equipment compatible with International Business Machines, Inc. (IBM) equipment be used for all of its administrative ADP systems. Details on our objectives, scope, and methodology are included in appendix I.

Results in Brief

Through the AIM program, NASA is standardizing 17 of its administrative ADP systems including payroll, personnel, and accounting systems. NASA has taken a decentralized approach to operating these systems, relying on headquarters and each of its nine centers to individually process automated administrative data. In our view, NASA's approach allowed the agency's culture—autonomy and decentralization—to override such factors as cost, efficiency, and effectiveness. In effect, the agency relied on consensus among the centers rather than on analytical data to determine that AIM systems would be decentralized. As a result, NASA does not know whether its decision to operate AIM systems at each decentralized location is the most cost efficient and effective.

NASA has spent around \$32 million on AIM through fiscal year 1989, and has completed and implemented standard software for seven of the AIM systems. Standard software can be operated at different locations without significant modification, providing flexibility in determining where AIM systems should be implemented. Thus, at this point, less than half way through the AIM program, NASA has an opportunity to reassess its decentralized approach to operating AIM systems. Therefore, we are recommending that NASA (1) determine the most cost-effective number of locations for operating its AIM systems and (2) adopt the best approach given the results of the analysis.

We also believe that NASA's 1984 policy requiring IBM-compatible hardware for all of its administrative ADP systems (including AIM systems) is not justified. In our view, this agencywide policy that promotes restrictions on competition may be prejudicial to the procurement process and thus should be rescinded.

Background

NASA is headquartered in Washington, D.C., and has nine centers nationwide. Individual centers are responsible for such projects as the space shuttle, earth-orbital spacecraft, and aerospace vehicles. While NASA's headquarters is responsible for overseeing the centers, by tradition and culture NASA's centers manage and control their own activities, including administration.

The AIM program was initiated in 1984 to improve the management of NASA through the development and implementation of standard software for administrative ADP systems throughout the agency. The AIM program evolved from the recommendations of a 1982 internal study conducted at the request of the then Acting Associate Administrator for Management.¹ The study examined NASA's administrative computing capability and recommended improvements with significant operational and cost advantages. Concerns had been raised that the autonomy granted NASA's nine centers had resulted in the evolution, over a 20-year period, of unique and possibly inefficient administrative ADP systems. For example, payroll/personnel operations at NASA's nine centers were being supported by 14 nonstandard, decentralized systems that varied greatly in their age, capabilities, and maintainability.

The study recommended that NASA develop a core of uniform software for administrative systems to be operated at all centers, while accommodating unique requirements by site specific modifications at each center. In addition, the study recommended that IBM-compatible hardware be used to run all of NASA's administrative systems, to ensure that the standard software would operate at all locations.

Under the AIM program NASA's headquarters and its centers will use the same, centrally developed software to manage property, human resources, facilities, procurements, information resources, and financial information. By developing and using standard software, which can be

¹Report of the Subcommittee on Administrative Automatic Data Processing, Intercenter Committee for ADP (June 18, 1982).

readily implemented at different locations, NASA has flexibility in determining where AIM systems should be operated. When completed, the AIM program will consist of 17 standard software applications that will be separately operated by NASA locations that have a need for the particular application. For example, NASA plans to operate software for its new accounting and financial information system at headquarters and at eight of its nine centers. NASA plans to operate AIM software on existing hardware located at headquarters and the centers. (See app. II for detailed information on AIM system processing locations.)

NASA has completed and implemented standard software for seven AIM systems.² The agency estimates that it will cost around \$165.5 million through fiscal year 1994 to develop and implement software for all of the AIM program's 17 applications.

Alternatives for AIM Program Implementation Not Adequately Assessed

NASA decided that standard software for each of the AIM systems will be separately operated by NASA headquarters and by each center that has a need for the particular application. The agency took this approach, according to the Assistant Associate Administrator for Information Resources Management, because it was compatible with the agency's decentralized culture. This official also stated that NASA did not consider a centralized approach—using one site to operate all AIM systems—because such an approach would not be accepted by NASA's autonomous centers.

NASA headquarters and program office officials could not provide adequate documentation justifying the decision to decentralize the operation of AIM systems. While required by the Federal Information Resources Management Regulation (FIRMR), no comparative cost analyses for 13 of the 17 systems were conducted to determine the most cost effective number of sites needed to operate AIM systems, and inadequate studies were conducted for the remaining four systems.³ The Assistant Associate Administrator for Information Resources told us the 1982 study supported operating AIM systems on a decentralized basis. However, this study is inadequate because it does not provide any cost data to support its conclusion that the systems should be decentralized.

²The systems are Acquisition Management, Document Generation, Facilities Management, NASA ADP Budget, NASA Equipment Management, NASA Metrology Information, and Procurement Regulation.

³FIRMR, Part 201-30.009.

NASA analyzed alternatives for only 4 of the 17 AIM systems, comparing a decentralized approach with a centralized, one-site approach and determined that the software for these systems should be operated on a decentralized basis.⁴ However, in our view, these four studies are inadequate because they do not consider an adequate range of plausible site alternatives, such as implementing the systems on a regional basis using two or three sites. In addition, two of the four studies are deficient because they do not include a comparative cost analysis of alternative approaches. As a result, NASA does not know whether its decision to operate AIM systems at each decentralized location is the most cost efficient and effective.

The Assistant Associate Administrator for Information Resources stated that the FIRMR requirement to analyze alternative approaches did not apply because the AIM program involved software development of administrative applications, whereas the FIRMR requirement related to the purchase of commercially available, off-the-shelf hardware. We disagree. This section of the FIRMR contains requirements for federal agencies related to the management, acquisition, and use of ADP resources. Because the AIM program concerns the acquisition, management, and use of these resources, which include the software and hardware necessary to operate the systems, the FIRMR requirement for conducting comparative cost analyses applies.

In addition, good business practices dictate that an agency consider alternative approaches for implementing new or redesigned systems, to ensure that the most cost effective approach is chosen. Industry officials have stated that large administrative systems, such as payroll and personnel systems, are normally located at one processing site because it is usually more efficient and less costly. Operating costs, for example, are usually less when using a central processing site compared to using multiple sites, because personnel are only needed to operate and maintain one set of hardware and software. Although centralized operations can increase telecommunications expenses, these costs can sometimes be offset by significant reductions in operations and maintenance costs.

Other federal agencies have determined that it is cost effective to consolidate administrative system processing at a few sites or one central site. For example, we reported in June 1989 that the Navy decided that

⁴The four systems are the NASA Occupational Health Management Information System, NASA Payroll/Personnel System, Standard Agency-wide Accounting System, and Institutional Environmental Management System.

it would be more cost effective to implement its new civilian payroll system at 3 sites, rather than the 10 sites originally planned. The Navy estimated it can save \$800,000 a year in reduced operating expenses by changing to three sites.⁵ Also, the Department of Agriculture has estimated that by centralizing its administrative payments from 215 agency offices located throughout the United States, to its National Finance Center in New Orleans, Louisiana, it saves almost 400 staff years, or about \$19 million annually.

NASA's Policy Requiring IBM Compatibility Is Not Justified

In a May 29, 1984, policy memorandum the NASA Administrator established the requirement that IBM-compatible hardware was to be used for all administrative systems.⁶ The memorandum stated that the implementation of IBM-compatible hardware would allow NASA to "develop and install agency administrative systems that will over time provide cost savings and better management of our resources." NASA's policy resulted from its 1982 study that recommended that the agency's administrative systems be developed to run on IBM-compatible computers. The study specifically noted that for IBM-compatible hardware vendors, a significant competitive market exists both for mainframe computers and for peripheral devices, such as disk and tape drives. However, for most non-IBM-compatible computer systems, according to the study, competition for future system augmentations would be limited to a small number of third party vendors. In addition, the study stated that IBM-compatible hardware for administrative systems was already in place at six of NASA's nine centers, thus facilitating conversion to IBM-compatible systems.

The Chief of the Regulations Branch, Procurement Policy Division, told us that the May 1984 policy was devised as a solution to NASA's internal problems concerning the organizational independence that the centers exercised over their administrative functions. This official said that when the memorandum was issued, the Johnson Space Center did not have IBM-compatible administrative systems, and was resisting attempts by NASA headquarters to implement a standard IBM-compatible hardware requirement. However, when the matter was elevated to the NASA Administrator who mandated IBM-compatibility for all administrative systems, Johnson agreed to change its systems. The Director, Information Resources Management Policy Division, also told us that the centers

⁵ADP Procurement: Navy Improperly Restricted Competition for Its Civilian Pay System (GAO/IMTEC-89-61, June 21, 1989).

⁶The policy also applied to the 17 AIM systems.

would not have proceeded to standardize administrative ADP systems without an official policy statement from the NASA Administrator.

In our view, NASA's reasons for establishing its IBM-compatible hardware policy—the 1982 study and the professed need to exert discipline over the centers—are not adequate. Specifically, NASA did not justify the policy by analyzing the costs and benefits of different approaches to standardizing systems; therefore, NASA does not know whether its choice of IBM-compatible hardware for the agency's administrative systems is either cost effective or technically sound. Further, while the policy may be useful to NASA in managing its autonomous centers, such management concerns should not override the need to analyze cost data and alternative approaches to determine the agency's hardware requirements.

In addition, while NASA may have a need for some IBM-compatible systems, it does not have to establish a formal agency policy to fulfill this need. Even with this policy, NASA must justify IBM-compatible requirements for individual ADP hardware procurements in accordance with the FIRM and the Federal Acquisition Regulation. For example, since the policy was issued, NASA's headquarters has awarded two contracts for IBM-compatible hardware to run its administrative systems—a \$2.8 million contract to PacifiCorp Capital, Inc. and a \$429,000 contract to IBM. For each of these procurements, NASA properly justified the IBM-compatible requirement on the basis of mission need, a requirements analysis, and a software conversion study.

Because all of NASA's centers now have IBM-compatible hardware for administrative computing, the continuing need for the policy, justified or not, is questionable. In our view, the negative aspects of a policy that excludes non-IBM-compatible equipment vendors probably outweigh the benefits of such a policy. This policy gives the appearance that NASA is predisposed to favor certain vendors, even before the justification for an IBM-compatible acquisition has been developed.

Conclusions

NASA management has correctly recognized that standardizing hardware and software can improve the efficiency and effectiveness of its administrative ADP systems. Toward that end, under the AIM program, it plans to develop and implement uniform software for 17 standard administrative systems. Further, with its 1984 policy, NASA established IBM-compatible hardware as the agencywide standard for all administrative computing systems. However, in neither of these cases did NASA adequately justify its approach to standardization.

In our view, NASA's management approach to operating the standard systems being developed under AIM has not been adequately justified. By allowing its culture to dictate key AIM program requirements—decentralized processing and IBM-compatible architecture—NASA may not be proceeding in a cost effective manner. An agency's culture should not be the overriding factor in deciding where its administrative systems should be operated or what hardware architecture should be used. Instead, such factors as cost, efficiency, and effectiveness should be considered in making these decisions.

We also believe that NASA's policy requiring IBM-compatible hardware for all administrative computing systems is not justified. NASA has a responsibility not only to comply with federal regulations mandating full and open competition, but to ensure that it is perceived by the vendor community as conducting its procurements fairly, openly, and without prejudice. Even the slightest hint of favoritism evident in NASA's IBM-compatible policy can damage the integrity of the procurement process and should be avoided.

Recommendations

To ensure that NASA's AIM systems are implemented in the most cost effective manner for meeting its needs, we recommend that the NASA Administrator direct that NASA:

- Determine the most cost effective approach, including the number of locations and the hardware architecture for operating AIM systems by conducting a comparative cost analysis of the various alternatives; and,
- Implement the best approach, given the results of the analysis, which may result in using either an IBM-compatible or a non-IBM-compatible architecture to process AIM at a centralized location, continue AIM on a decentralized basis at each center, or a combination of these approaches.

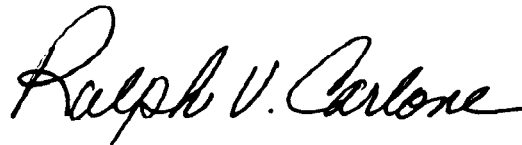
In addition, we recommend that the NASA Administrator rescind the May 29, 1984, policy requiring IBM-compatible hardware for all agency administrative systems.

We conducted our review from June 1989 through February 1990 at NASA headquarters in Washington, D.C., and at the Johnson Space Center in Houston, Texas. Our review was conducted in accordance with generally accepted government auditing standards. We discussed our review

with NASA officials and have incorporated their views where appropriate. In accordance with your wishes, we did not obtain official agency comments on a draft of this report.

As arranged with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days after the date of this letter. At that time, we will send copies to the Chairman of the Senate Committee on Governmental Affairs; the Administrator, NASA; other interested parties; and will make copies available to others upon request. This report was prepared under the direction of Jack L. Brock, Jr., Director, Government Information and Financial Management, who can be reached at (202) 275-3195. Other major contributors are listed in appendix III.

Sincerely yours,

A handwritten signature in cursive script that reads "Ralph V. Carlone".

Ralph V. Carlone
Assistant Comptroller General

Objectives, Scope, and Methodology

In February 1989, we were requested by the Chairman, House Committee on Government Operations, to review NASA's ADP procurement practices. In response to this request and in subsequent discussions with the Chairman's office, we agreed to review the justification for (1) NASA's implementation of its AIM program, and (2) its May 29, 1984, policy requiring the use of IBM-compatible hardware for all its administrative computing systems.

To determine whether NASA had a proper basis for implementing the AIM program, we

- reviewed the 1982 NASA study that recommended that the agency's administrative ADP systems be standardized;
- interviewed the AIM program director, the Assistant Associate Administrator for Information Resources Management, and other NASA headquarters and AIM program office officials concerning the agency's plans to implement the systems; and,
- analyzed the studies of alternatives NASA performed for AIM system implementation, and assessed whether these studies met the requirements of the FIRMR.

To determine whether NASA is justified in implementing a policy requiring the use of IBM-compatible hardware for its administrative computing systems, we

- reviewed the 1982 NASA study that provided the basis for the policy;
- interviewed NASA headquarters officials concerning the justification for the policy and the actions taken to implement it at the agency's centers; and
- reviewed the requirements for full and open competition in the FIRMR, the Federal Acquisition Regulation, and the Competition in Contracting Act.

Our review was conducted from June 1989 through February 1990 at NASA headquarters in Washington, D.C., and at the Johnson Space Center in Houston, Texas. We discussed our review with NASA officials and have incorporated their views where appropriate. Our review was conducted in accordance with generally accepted government auditing standards.

Automated Information Management Program

System	AIM Processing Sites									
	Ames Research Center	Goddard Space Flight Center	Jet Propulsion Laboratory	Johnson Space Center	Kennedy Space Center	Langley Research Center	Lewis Research Center	Marshall Space Flight Center	Stennis Space Center	NASA Headquarters
Acquisition Management ^a	x	x		x	x	x	x	x	x	x
Aerospace Research Information Network	x	x	x	x	x	x	x	x	x	x
Consolidated Agency Personnel/ Payroll	x	x		x	x	x	x	x	x	x
Document Generation ^a	x	x		x	x	x	x	x	x	x
Facilities Management ^a	x	x	x	x	x	x	x	x	x	x
NASA Accounting & Financial Information	x	x		x	x	x	x	x	x	x
NASA ADP Budget ^a										x
NASA ADP Equipment Inventory	x	x	x	x	x	x	x	x	x	x
NASA Equipment Management ^a	x	x		x	x	x	x	x	x	x
NASA Institutional Environmental Management	x	x	x	x	x	x	x	x	x	x
NASA Metrology Information ^a	x	x		x		x	x	x		
NASA Occupational Health Management Information	x	x		x	x	x	x	x	x	x
NASA Personnel Payroll	x	x		x	x	x	x	x		x
NASA Property Disposal Management	x	x		x	x	x	x	x	x	

(continued)

**Appendix II
Automated Information
Management Program**

System	Ames Research Center	Goddard Space Flight Center	Jet Johnson Propulsion Laboratory	Space Center	Kennedy Space Center	Langley Research Center	Lewis Research Center	Marshall Space Flight Center	Stennis Space Center	NASA Headquarters
NASA Supply Management	x					x	x	x	x	
NASA Training & Development	x	x		x	x	x	x	x	x	x
Procurement Regulation ^a	x	x		x	x	x	x	x	x	x

Legend: x = actual/planned installation
^a= completed system

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