

IG-97-001

AUDIT REPORT

Early Phases Of NASA'S Integrated Financial Management Project (IFMP)

NASA Headquarters

October 21, 1996



National Aeronautics and
Space Administration

OFFICE OF INSPECTOR GENERAL

ADDITIONAL COPIES

To obtain additional copies of this audit report, contact the Assistant Inspector General for Auditing at 202-358-1232.

SUGGESTIONS FOR FUTURE AUDITS

To suggest ideas for or to request future audits, contact the Assistant Inspector General for Auditing. Ideas and requests can also be mailed to:

Assistant Inspector General for Auditing
NASA Headquarters
Code W
300 E St., SW
Washington, DC 20546

NASA HOTLINE

To report fraud, waste, abuse, or mismanagement, contact the NASA OIG Hotline by calling 1-800-424-9183; 1-800-535-8134 (TDD); or by writing the NASA Inspector General, P.O. Box 23089, L'Enfant Plaza Station, Washington, DC 20026. The identity of each writer and caller can be kept confidential upon request to the extent permitted by law.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
INTRODUCTION	5
OBJECTIVES, SCOPE, AND METHODOLOGY	7
OBSERVATIONS AND RECOMMENDATIONS	9
RISK ANALYSES SHOULD BE CONDUCTED	9
ALTERNATIVES SHOULD BE ANALYZED AND DOCUMENTED	15
MANAGEMENT PLAN NEEDS TO INCLUDE SOME KEY COST ISSUES	17
A MORE REALISTIC PROJECT SCHEDULE IS NEEDED	19
 APPENDIX 1	
FEDERAL POLICIES AND REGULATIONS REVIEWED AND APPLIED DURING THIS AUDIT	A-1-1
 APPENDIX 2	
POSSIBLE ALTERNATIVES TO CONSIDER FOR MEETING NASA'S IFMIS NEEDS	A-2-1
 APPENDIX 3	
WRITTEN RESPONSE FROM THE ASSOCIATE CHIEF FINANCIAL OFFICER, DATED MARCH 28, 1996	A-3-1
 EXHIBIT A	
GAO MODEL OF SECURITY IN THE SYSTEM LIFE CYCLE	

GLOSSARY OF ACRONYMS

ADP	Automated Data Processing
BPR	Business Process Reengineering
CFO	Chief Financial Officer
COTS	Commercial Off-The-Shelf Software
DLA	Defense Logistics Agency
EPA	Environmental Protection Agency
FIP	Federal Information Processing
FIPS PUB	Federal Information Processing Standards Publication
FIRMR	Federal Information Resources Management Regulation
FMSS	Financial Management Systems Software
GAO	General Accounting Office
GSA	General Services Administration
HQ	Headquarters
IFMIS	Integrated Financial Management Information System
IFMP	Integrated Financial Management Project
JFMIP	Joint Financial Management Improvement Program
MMAS	Mandatory Multiple Awards Schedule
NAFIS	NASA Accounting and Financial Information System
NASA	National Aeronautics and Space Administration
NFC	National Finance Center
OIG	Office of Inspector General
OMB	Office of Management and Budget
PCIE	Presidents Council on Integrity and Efficiency
TALC/LD	Time Attendance Labor Collection/Labor Distribution System

EARLY PHASES OF NASA'S INTEGRATED FINANCIAL MANAGEMENT PROJECT

NASA HEADQUARTERS, WASHINGTON, DC

EXECUTIVE SUMMARY

INTRODUCTION

In February 1995, NASA began a new approach to an integrated financial management information system through the planned purchase of Commercial-Off-The-Shelf (COTS) software. The project is referred to as the Integrated Financial Management Project (IFMP). The Office of Inspector General has been monitoring this project from the beginning stages and will continue to do so until final implementation of the system. In this capacity, we have been advising management on the design and development of the system.

OBJECTIVES

The overall audit objective was to evaluate the early planning of the IFMP. Specifically, we determined whether the IFMP team had planned for or accomplished:

- a high-level management oversight committee and a full-time Project Manager to oversee the project;
- an analysis of how the overall financial management process could be improved as part of the system design;
- a complete and effective analysis of requirements;
- a comprehensive analysis of available alternatives in meeting NASA requirements;
- establishing total project costs that were properly planned and budgeted for; and
- a realistic project schedule.

RESULTS OF AUDIT

The early phase of the IFMP was generally managed well. Specifically:

- The project is subject to high level NASA oversight, via the Integrated Financial Management Council;
- NASA appointed a full-time Project Manager and staff for planning and overseeing the project; and
- There is a major commitment to analyze how system improvements, new technology, and modifications to significant NASA work processes can improve overall financial management.

However, based upon our review to date, we believe additional steps, discussed below, should be taken to further ensure that the project is cost effective and consistent with important management objectives and legal requirements, including:

- Conducting risk analyses as part of the requirements definition;
- Performing and documenting a comprehensive analysis of alternatives for meeting Integrated Financial Management Information System (IFMIS) requirements;
- Modifying project plans to include several key cost issues and alternatives; and
- Preparing a more realistic project schedule.

Risk Analyses Should Be Conducted. NASA, as part of its requirements planning, has not yet conducted a functional risk analysis of the individual reengineered work processes and has not planned to conduct a risk analysis of the overall system. As a result, the analyses may have to be done later in the system acquisition life cycle. This may require system changes that are more costly and may adversely affect warranties and maintenance agreements.

(Page 9)

Alternatives Should Be Analyzed And Documented. NASA has not performed an analysis of alternatives to support its selection of COTS as the best method of meeting its IFMIS needs. As a result, there is no documented support to show that COTS is NASA's most advantageous alternative to meeting its IFMIS needs. (Page 15)

Management Plan Needs To Include Some Key Cost Issues. The cost of validating the applications to meet Joint Financial Management Improvement Program (JFMIP) requirements, and the costs of various system architecture options that are being considered, have not been included in the overall IFMIS planning and cost estimates. As a result, NASA's latest cost estimate to complete the IFMP does not include some key costs. (Page 17)

A More Realistic Project Schedule Is Needed. The current IFMP schedule appears overly optimistic, unnecessarily subjecting the Agency to criticism for not meeting deadlines and milestones. (Page 19)

RECOMMENDATIONS

We recommended the Project Manager:

1. Ensure that a risk analysis, from both a functional and technical standpoint, is performed as part of the requirements definition.
2. Conduct a comprehensive analysis of possible alternatives to meeting NASA's IFMIS needs and document the results of that analysis.
3. Ensure that all project plans and cost estimates are updated to include: (1) plans and associated costs of alternatives for ensuring how the package will meet JFMIP requirements, and (2) plans and associated costs for system architecture alternatives.
4. Prepare a realistic and accurate schedule by: (1) identifying possible contingencies and allowing reasonable time for them; and (2) developing a detailed schedule to support the post award phase, based upon an analysis and realistic assessment of the time needed for implementation.

The actions taken or planned by the Project Manager were responsive only to Recommendation 3. However, considering the aggressive

proposed schedule for the IFMP, and the point in that schedule in which the project currently exists, we believe that it would be more productive to close out all of the recommendations and to continue to work with the project staff to implement a successful system.

INTRODUCTION

In 1989 NASA was cited by the Office of Management and Budget (OMB) as having a material internal control weakness for not having a standardized, centralized financial accounting system. To correct that problem the Agency began work on two major system development projects: (1) The NASA Accounting and Financial Information System (NAFIS); and (2) The Time Attendance and Labor Collection/Labor Distribution System (TALC/LD). Both of these systems were designed to incorporate and link the many different systems that already existed at the NASA field centers and Headquarters (HQ) using specially designed software.

In February 1995, the NASA Chief Financial Officer (CFO) terminated all work on NAFIS and TALC/LD and redirected efforts toward a new approach for an integrated financial management information system (IFMIS) through the purchase of Commercial-Off-The-Shelf (COTS) software. This new project is referred to as the Integrated Financial Management Project (IFMP).

The scope of IFMP is currently planned to be much larger than that of NAFIS and TALC/LD and will consist of subsystems to be implemented in two phases. Phase I will include the processes of core accounting, budget formulation and execution, procurement, time attendance and labor distribution, travel, and an executive information system. Phase II, which will be started after Phase I is implemented, will include the processes of payroll, personnel, inventory, and grant management.

One of the initial steps in the IFMP was to reengineer each of these processes to streamline and improve them. Once this was complete, the plan was to identify, evaluate, and acquire software that best fits these processes.

A full-time Project Manager and staff of 12 employees have been appointed to manage the project at HQ. The reengineering tasks and software selection process are being carried out by 168 NASA employees in various teams from each center. As of August 1995, the system (with only the Phase I requirements) was scheduled to be installed and operating by October 1, 1997 at a cost of \$67 million.

The Office of Inspector General (OIG) has been monitoring this project from the beginning stages, providing independent advice and

comment to management on system development, and plans to continue to do so until final implementation of the system.

OBJECTIVES, SCOPE, AND METHODOLOGY

OBJECTIVE

The overall audit objective was to evaluate the early planning of the IFMP. Specifically, we determined whether the IFMP team had planned for or accomplished:

- a high-level management oversight committee and a full-time Project Manager to oversee the project;
- an analysis of how the overall financial management process could be improved as part of the system design;
- a complete and effective analysis of requirements;
- a comprehensive analysis of alternatives in meeting NASA's requirement;
- establishing project costs that were properly planned and budgeted for; and
- a realistic project schedule.

SCOPE AND METHODOLOGY

In order to meet the objectives, we obtained a general understanding of the IFMP by interviewing members of the IFMP team; attending project meetings and conferences; and reviewing various documentation such as briefing charts, detailed work plans and schedules, and the overall management plan.

We also obtained a general understanding of federal government policies, procedures and experiences regarding the development of major information systems. This understanding was accomplished by interviewing managers of similar projects, EDP specialists, accountants, and auditors from other federal agencies that had implemented similar systems. We also reviewed federal policies and regulations for implementing information processing systems (see Appendix 1), as well as a number of articles in various professional journals regarding federal and non-federal information systems.

Audit work on the IFMP began as a broad survey with the objective to review and evaluate the overall management of the project. Based on that survey work we identified several areas to be covered by separate audit objectives, work steps, and assignment numbers. The purpose of this report is to provide timely feedback on areas we feel

require immediate attention.

***MANAGEMENT
CONTROLS REVIEWED***

We reviewed the following applicable administrative controls to evaluate the overall management of the project:

- assignments of organizational responsibility;
- supportive management attitude;
- qualified and continuous supervision; and
- existence of written policies and procedures.

We reviewed the following general management controls to evaluate the level of risk associated with each audit objective:

- performance of risk analyses;
- documentation of cost/benefit analyses;
- documentation of project cost estimates;
- review and approval of project cost estimates; and
- review and approval of project schedules.

Strengths and weaknesses associated with those controls were identified and are addressed in the Observations and Recommendations section of this report.

AUDIT FIELD WORK

This report addresses issues and concerns resulting from audit fieldwork conducted from May 15, 1995 through August 15, 1995 at NASA HQ. The audit was performed in accordance with generally accepted government auditing standards.

OBSERVATIONS AND RECOMMENDATIONS

OVERALL EVALUATION

The early phase of the IFMP was generally managed well. Specifically:

- The project is subject to high level NASA oversight, via the Integrated Financial Management Council;
- NASA appointed a full-time Project Manager and staff for planning and managing the project; and
- There is a major commitment to analyze how system improvements, new technology, and modifications to significant NASA work processes can improve overall financial management.

However, based upon our review to date, we believe additional steps, discussed below, should be taken to further ensure that the project is cost effective and consistent with important management objectives and legal requirements, including:

- Conducting functional and overall risk analyses as part of the requirements definition;
- Performing and documenting a comprehensive analysis of alternatives for meeting IFMIS requirements;
- Modifying project plans to include several key cost issues and alternatives; and
- Preparing a more realistic project schedule.

RISK ANALYSES SHOULD BE CONDUCTED

NASA, as part of its requirements planning, has not yet conducted a functional risk analysis of the individual reengineered work processes and has not planned to conduct a risk analysis of the overall system. Although the Project Manager indicated his desire to have the risk analyses performed, he felt he did not have qualified staff available at the time to do it. By performing risk analyses early in the system life cycle, management control requirements can be identified before the system is designed and applications are acquired. Thus, the system could then be designed to fit the control requirements. Otherwise, the

Reengineered Work Process Controls

analyses will have to be done later in the system acquisition life cycle requiring costly system changes and adversely affecting warranties and maintenance agreements.

OMB Circular A-123, "Internal Control Systems", provides the general requirement for performing a functional type of risk analysis early in the program's life. Paragraph 8(c) requires that agencies make risk assessments to identify potential risks in agency operations, and that risk assessment on new or substantially revised programs should occur *as part of planning* for implementation.

As part of requirements planning for Phase I, the six work processes are planned to be greatly modified using the Business Process Reengineering (BPR) approach. That approach has been widely used in private industry to redesign work processes from "the ground up" focusing on customer service and streamlined operations.

As a result of using BPR, drastic changes to the six work processes were proposed, which would eliminate many management controls. For example, the proposed:

- Procurement process would reduce the number of approvals for all procurement actions and eliminate invoice requirements for most simplified acquisitions.
- Employee attendance tracking system would allow employees to record their own hours and would require supervisory review and approval for exceptions only.
- Travel process would eliminate much of the review and approval of travel vouchers and supporting detailed documentation that are currently required.

The elimination of key management controls, such as approval of procurement actions and travel requests, greatly increases opportunities for system abuse and emphasizes the need for a risk analysis. Within the last year alone, the OIG received many complaints of abuse in these areas. For example:

- A HQ employee prepared false travel vouchers and travel advance documents for people at other NASA centers. That person then used stolen NASA identification cards to pick up the advances at the imprest fund under a false name.

- An individual accessed and used altered NASA pay statements to falsely attest to employment with NASA.

These examples emphasize the need to assess potential risks under the proposed reengineered processes and identify the minimum controls needed prior to the evaluation and selection of system applications.

Overall System Controls

OMB Circular A-130, "Management of Federal Information Resources", provides the general requirement for performing technical types of risk analyses on the EDP system as a whole. The Circular requires that agencies define and approve security requirements and specifications prior to acquiring or starting formal development of the application. The results of the risk analyses should then be taken into account when defining and approving system security specifications and application controls.

Federal Information Processing Standards Publication 65 (FIPS PUB 65), "Guideline For Automatic Data Processing Risk Analysis", also provides guidance in doing risk analyses. It states that such analyses are critical, and to be done correctly, should be: (1) done early in the development cycle; (2) should not be hastened; and (3) should be done by a team approach. These teams should include people with backgrounds in ADP operations, systems programming, internal auditing, and security.

As of the time of our audit work, the detailed project work breakdown structure, though still in preliminary stages, did not include steps to perform a system risk analysis. The Project Manager was not sure when an overall system risk assessment would be performed due to the lack of available staff and because the system was still in its early stages. We believe that a risk analysis should be performed early in the system's development cycle to prevent unnecessary costs, fraud and abuse later.

In a 1988 study, GAO identified a number of potential problems resulting from not assessing controls and security early in a system's life cycle including increased costs and system vulnerabilities. See Exhibit A for further details of that study.

The fact that a lack of an early overall system risk analysis can lead to later vulnerabilities is supported by both a President's Council on Integrity and Efficiency (PCIE) study, and NASA OIG experiences. The PCIE study known as "The Computer Security Project", attempted to identify common vulnerabilities associated with 172 known cases of computer-related fraud and abuse. That study found that virtually all of the abuses were carried out by authorized system users that were both government and contractor employees. The OIG has completed many investigative cases and received many complaints regarding unauthorized computer system access and penetration. For example:

- One NASA employee, on several occasions, penetrated the NASA personnel/payroll system and made unauthorized changes for personal gain.
- A contractor employee gained access to a NASA employee's personal information through the computer and used that information to try to ruin the NASA employee and create a false identity as a Brigadier General in the Air Force.

These examples emphasize the need for strong system controls that start with the performance of an effective risk analysis early in the system's development life cycle.

Conclusion

The above discussion points out the need to have strong controls for both functional processes as well as for the overall system. Those controls start with an effective risk analysis. Proper steps need to be taken now, to ensure that qualified personnel are made available, and time allotted, to perform an effective risk analysis both functionally and technically. At a minimum, the following questions should be assessed prior to any major development effort:

- What are the principal risks to NASA when the system becomes operational?
- Will new control and security procedures be required?
- How dependent will NASA be on the system, what are the consequences of system failure, how can it be avoided, and what sort of backup is required?
- Will the system impact other Agency activities?

- How vulnerable will the system be to fraud, waste, and abuse?
- What organizational changes will be required because of the system?

In discussing this with the IFMP Manager, he agreed that some type of risk analysis is necessary, but only *after* the software is purchased. He explained that after the software is purchased, the IFMP team expects that further reengineering will be needed on each work process to make it "fit" the purchased software. Our opinion is that risk analyses should be done as part of the early requirements planning, so that necessary controls can be identified and considered when evaluating possible vendors. Our research showed that some Federal agencies that installed COTS software packages - including: the Library of Congress, Internal Revenue Service, Public Health Service, Department of Agriculture, Office of Personnel Management - conducted risk analyses as part of their requirements definitions. Those agencies found that the careful early planning paid off with successful systems.

However, through discussions with officials from several Inspector General offices, we found that several agencies experienced cost increases and even system failure, because of inadequate internal control planning early in the system's development life cycle. For example:

- A General Services Administration system used to manage the Public Buildings Service, that cost \$121 million, failed because the project team began developing the system before all of the requirements were identified. Security and audit needs were specifically mentioned by the auditors as requirements that should have been identified before system development.
- At the Environmental Protection Agency (EPA), an integrated financial management system was purchased without performing a risk analysis. As a result the system implementation was delayed and program offices had to use their own funds to maintain alternate systems. Also, there were not adequate controls to ensure the integrity of sensitive data that existed on the system. Finally, the EPA Inspector General was unable to give an opinion on the Agency's accounting system due to the lack of an audit trail. EPA has

spent almost \$20 million for a system that may be inaccurate and not meet user needs, and must now invest additional time and funds to modify the system.

In addition, both the Resolution Trust Corporation and the Department of Energy had to significantly revise systems due to the lack of an assessment of internal control requirements as part of their early planning. For these reasons we reemphasize that risk analyses should be performed as part of the requirements definition. This early work will help reduce system risks and eliminate unnecessary systems modifications in the long run.

RECOMMENDATION 1

The IFMP Project Manager should take immediate action to ensure that a risk analysis, from both a functional and technical standpoint, is performed as part of the requirements definition, prior to the acquisition and installation of the actual system applications.

Management Response

We agree that risk analyses should be conducted and the project has been analyzing several types of risks. The project has developed and continues to update a Risk Management Plan. As new risks are identified, they are added to the plan along with a strategy for reducing or eliminating the risks.

After the software is procured and the business processes are reengineered to match the capabilities of the software, we will order an independent audit of the processes to ensure that there are no outstanding risks.

The Core Financial software will be procured from the Federal Mandatory Supply Schedule (FMSS) and is already certified for use by the Federal government. The requirements for internal controls and security for other software modules are specified in the Request for Proposals. If we find that there are no software products available that satisfy our internal control and security requirements, we will either implement manual procedures to assure adequate protections or order modification of the software we ultimately purchase.

***Evaluation of
Management Response***

We continue to believe that the reengineered processes should be evaluated for risks prior to the acquisition of the software. Identifying risks earlier in the process will reduce the costs of implementing compensating controls or enhancing the software's capabilities. We consider this recommendation closed but will selectively evaluate the processes and their controls as we continue our work on the IFMP.

***ALTERNATIVES
SHOULD BE
ANALYZED AND
DOCUMENTED***

NASA has not performed an analysis of alternatives to support its selection of COTS as the best method of meeting its IFMIS needs. NASA management officials, responsible for overseeing the IFMP, decided on COTS as the solution for meeting IFMIS needs. Thus, other alternatives were not pursued. As a result, there was no documented support to show that COTS is NASA's most advantageous alternative to meeting its IFMIS needs.

Public Law 89-306, the Brooks Act, is the basic legislation for the acquisition of Federal Information Processing (FIP) resources. The Brooks Act gave the General Services Administration (GSA) authority to make the rules governing the acquisition of FIP resources. That authority is codified through the Federal Information Resources Management Regulation (FIRMR). The FIRMR (Chapter 201 of the Code of Federal Regulations) applies to the acquisition, use, and management of FIP resources by Federal agencies. FIRMR 201-20.202 provides the requirement for performing an analysis of alternatives:

Using the results of the Requirements Analysis as the basis, agencies shall conduct an *analysis of alternatives*, commensurate with the size and complexity of the requirement, to identify the most advantageous alternative to the Government.

Also, FIRMR 201-20 stipulates some of the alternatives to consider:

. . . agencies shall (1) conduct market research to determine the availability of technology; (2) use GSA's mandatory-for-use programs; (3) use GSA's mandatory-for-consideration programs; (4) consider using FIP resources available for reuse within the agency and from other agencies; (5) consider using existing FIP resources on a shared basis; and (6) consider acquiring FIP resources by contracting.

Finally FIRMR 201-20.203-2 requires a cost analysis of the alternatives:

In the analysis of alternatives, agencies shall calculate the total estimated cost for each feasible alternative.

.. When evaluating alternatives, it is important for the Government to consider its investment in FIP resources that may have to be converted, replaced, or disposed of as a result of the alternative selected.

NASA has not, and does not plan to perform an analysis of alternatives, as required in the FIRMR, to support its decision to use COTS as the means to acquire a new IFMIS. The IFMP Project Manager stated that nothing has been done yet, and nothing is planned. Furthermore, there is no indication in the detailed work breakdown structure of an analysis of alternatives.

NASA management has already determined COTS as the solution for meeting its IFMIS needs. The reasoning is based on prior experience with similar endeavors at the State of Maryland, and results from other Government agencies.

There is no evidence to support whether or not COTS is the most advantageous alternative to meeting NASA's IFMIS needs. Many other federal agencies we contacted expressed great satisfaction with COTS software as a way of meeting their IFMIS needs. However, in addition to COTS, there are other possible alternatives for meeting NASA's IFMIS needs, and other costs and procurement methods that should be considered before selecting the method. Details on each of these alternatives and the possible procurement methods are shown in Appendix 2.

By not performing an analysis of alternatives, NASA will not be assured of acquiring an IFMIS that is the most advantageous alternative to NASA, and will not have documented evidence to support its choice should it be questioned, for example, by GAO, OMB, Congress, etc. A recent GAO audit of the Defense Logistic Agency (DLA) disclosed that DLA did not justify its need to acquire a computer estimated to cost \$7.8 million. Half of the work load requirements used to justify the purchase were not supported. Finally NASA, by performing an analysis of alternatives, will be in compliance with the Brooks Act.

RECOMMENDATION 2

The IFMP Project Manager, once the system requirements have been defined, should conduct a full analysis of possible alternatives to meeting its IFMIS needs, and document the results. The analysis should evaluate both the cost/benefits for each feasible solution and the costs of converting any FIP resources that may have to be

converted, replaced, or disposed of as a result of the alternative selected.

Management Response

The Integrated Financial Management Project was established after NASA's senior management studied several alternatives for acquiring a fully integrated set of financial management software tools that were JFMIP-compliant and would support full cost accounting and budgeting. OMB Circular A-127 requires the use of COTS software and the FMSS. Since OMB is requiring NASA to use FMSS for Core Financial software, other alternatives are closed to us for that module. For the remaining financial management software modules, our analysis indicates that the cost of buying COTS is 20-25 percent of the cost of developing our own software.

***Evaluation of
Management Response***

Circular A-127 requires the use of COTS software as one of several alternatives to be considered by agencies when implementing financial management systems. During our audit, we saw no documented evidence to support management's analyses of any alternative solutions. Nevertheless, at this point in the project, it would be counterproductive to require management to go back and analyze alternatives and we, therefore, consider this recommendation to be closed.

***MANAGEMENT PLAN
NEEDS TO INCLUDE
SOME KEY COST
ISSUES***

NASA's estimated cost to complete the IFMP, per IFMP team internal planning documents, as of July 5 1995, was \$66.9 million. The cost breakdown consisted of hardware/software, contractor support, technical support, and logistics. Within each of those categories are numerous line items of individual costs. The cost of validating the applications to meet JFMIP requirements, and the costs of various system architecture options that are being considered, have not been included in the overall IFMIS planning and cost estimates. This occurred because management has still not addressed how many aspects of the system and its architecture will be implemented and, therefore, those issues are not yet included in the overall IFMP Project Plan, which is still subject to final review and concurrence. As a result, NASA's latest estimate of cost to complete the IFMP is not totally supported and does not include the costs of some key issues.

GAO Policies and Procedures Manual for Guidance of Federal Agencies, Appendix III, Chapter 4 discusses the importance of an overall plan and a structured approach for developing a new information system and estimating its costs. The manual states that the overall management plan should guide the project, *its budget*,

staffing, and scheduling.

NASA Handbook 7120.5, "Management of Major System Programs and Projects", provides policies and processes for the production of cost estimates in support of NASA programs. The Handbook states that cost estimates shall be comprehensive in character, identifying all elements of additional cost that would be entailed by a decision to proceed with development, production, and operation of a system.

While the project has developed a good overall management plan, the current plan does not address two key issues that we feel are critical. They are as follows:

1. The cost of benchmarking the system to meet JFMIP requirements was not addressed. OMB Circular A-127 requires agencies that bypass the GSA Multiple Mandatory Awards Schedule (MMAS) must ensure that the software purchased or developed is benchmarked as meeting JFMIP requirements, by an independent team approved by OMB. NASA had not decided how that procedure would be accomplished and, therefore, the cost associated with that process was not included in the estimate. A major process such as this may be very costly, especially if performed by an independent team. The IFMP Manager has said that for all of the packages that NASA is interested in, the cost of JFMIP compliance will be borne by the vendor. While this may be the case, there is no guarantee of JFMIP compliance. Therefore, the IFMP team should consider including a contingency in its current budget for meeting JFMIP requirements.
2. Various project architecture alternatives and the associated costs were not addressed. The total cost estimate is based on an assumption that NASA will use as much of the existing system architecture as possible. However, the use of the existing NASA system architecture is only one of many options being considered by NASA, and the final decision on the system environment has still not been made. Thus, the costs for technical support are estimates based on experience from the NAFIS project, and are not supported. NASA project officials say that these costs can only be estimated because they still do not know what technical aspects of the system will be used.

The current estimate can be made more accurate by updating project plans to include and assess the two areas discussed above. By doing this, NASA will ensure that its cost estimate is as accurate as possible and will not fall materially short of final actual costs. This may prevent later criticisms, of cost overruns, by outside sources such as Congress, OMB, and GAO.

RECOMMENDATION 3

The IFMP Project Manager should ensure that all project plans and cost estimates are updated to include: 1) plans and associated costs for all alternatives for ensuring how the package will meet JFMIP requirements, and 2) plans and associated costs for all system architecture alternatives.

Management Response

We did not consider the two cost issues to be key to this project. Since NASA will procure the Core Financial software from the FMSS, there is no need for NASA to estimate the cost for benchmarking the software to meet JFMIP compliance. We will not be incurring these costs. Also, the RFP will ask offerors to propose a system architecture; therefore, it is not necessary for the project to conduct its own study of architecture alternatives and costs. Senior management is aware of the many unknowns and uncertainties surrounding this project. As we learn more, we will refine our estimate and adjust our plans accordingly.

***Evaluation of
Management Response***

Management's actions are responsive to the intent of the recommendation.

***A MORE REALISTIC
PROJECT SCHEDULE
IS NEEDED***

The current IFMP schedule appears overly optimistic for two reasons. First, minimal time has been allocated in the overall project for contract protests and other contingencies. Second, the time allowed for project implementation (after award) is driven only by an October 1, 1997 cut-off date imposed by senior NASA management officials. The result is what we consider to be an unrealistic schedule, which may not be met and could subject the Agency to criticism for not meeting deadlines and milestones.

A major system such as IFMP should have a realistic schedule that is well thought out and allows for contingencies. Contractor protests and hardware/software failures are two common contingencies that could lead to delays and should be planned for. Also, the current Government environment of downsizing, budget cutting, and

Congressional interest increases the potential for unforeseen delays.

The IFMP schedule consists of two parts. The first starts with planning of the IFMP through contract award (as of the time of our audit, it was not decided if the system would be acquired through one contract covering all six processes, or through individual contracts). The second starts with initial system implementation, and ends with full operation. Contract award is scheduled for June 1, 1996 with Phase I operations to begin October 1, 1997.

The first part of the IFMP schedule (through contract award) is supported by a very detailed work breakdown structure. It contains detailed information on such tasks as project management, requirements definition and acquisition strategy. However, the detailed schedule allows minimal time for contingencies such as vendor questions and bid protests - common occurrences in a major award such as this. For example, a recent Internal Revenue Service project for the acquisition of a tax modernization system, experienced a 16-month delay in contract award due to protests, responses to vendor questions, and time needed to obtain proof that items contained in vendor proposals were commercially available.

The second part of the IFMP schedule (post award through Phase I operation) is not supported by a detailed schedule because it is driven by a completion date of October 1, 1997 imposed by senior NASA management officials. This imposed completion date allows only 16 months to review, revise, and approve the implementation plan; install and test the software for each application and interface; work out all bugs in the system; code and test any necessary modifications or interfaces; operate the new system; and validate it as necessary to reach operating requirements. Through discussions with other federal agencies who installed COTS systems, we found an average implementation period of about 18 months for mainframe-based systems that were much smaller than the system planned by NASA. Thus, a 16-month implementation period for a system the magnitude of IFMP appears ambitious. Furthermore, NASA plans to start the system to coincide with a new fiscal year; therefore, any delay past October 1, 1997 may delay the project for up to another year.

The IFMP manager agreed that the overall schedule is extremely optimistic but explained that the tight schedule was necessary to help meet the October, 1997 deadline. While the need to meet the October, 1997 deadline is desirable, it is also desirable, for planning purposes,

POSSIBLE ALTERNATIVES TO CONSIDER FOR MEETING NASA'S IFMIS NEEDS

COTS. Commercial-Off-The-Shelf (COTS) is currently the alternative that is being pursued by NASA. NASA management's justification for COTS was based on, among other things, experience with a similar project at the State of Maryland. Many other federal agencies interviewed were pleased with the operational capabilities of their COTS systems in place. However, COTS is not always successful. According to an article written by the then President of the Association of Government Accountants, some federal agencies have spent tens of millions of dollars in procuring, modifying and implementing off-the-shelf software and the results have been mixed at best. A GAO audit found that the Department of State spent four years trying to modify its COTS-based system to meet its needs. After four years the system was still not capable of reporting on all types of appropriations.

NAFIS. Prior to this current IFMP, NASA spent over 7 years and over \$50 million to attempt to develop NAFIS. NAFIS, which was only weeks away from formal testing before it was cancelled, consisted of some of the same modules (travel, funds control, general ledger, receivables, etc) that are in the current planned IFMP. A possible alternative to NASA would be to determine if there are any useable parts of NAFIS that could be applied to the IFMP, that may result in cost savings.

Other NASA Systems. NASA currently has many different systems in operation at each of its field centers. Although a single integrated accounting system is the goal of NASA, each field center has its own accounting system. A possible alternative could be modifying one or more of those systems and adopting them NASA-wide, as opposed to buying a COTS-based system(s).

Cross-Servicing. Federal law requires that cross-servicing be used whenever feasible and cost-effective, as a solution to meet IFMIS needs. Cross-servicing is the process of one federal agency providing services to another agency on a reimbursable basis. The U.S. Department of Agriculture's National Finance Center (NFC) is the largest cross-servicing provider in the government. Many large and small agencies are customers of the NFC. Federal agencies who contract with NFC have saved and continue to save millions of dollars each year in development and operational costs. GAO reported that the Department of Treasury may save up to \$52 million over the next 10 years by using NFC's payroll/personnel system. Also, agencies who enter into cross-servicing arrangements with others quickly upgrade their services by using proven cost effective systems. The Departments of Treasury and Interior have also provided cross-servicing to other agencies.

A possible alternative could be to look into available cross-servicing options for any parts of either phase of the IFMP.

Other Agency Systems/Assistance. Federal law encourages federal agencies to use or adopt software from other agencies, or to undertake joint development efforts whenever possible. Our interviews identified some agencies that have developed, or are in the process of acquiring and modifying their own financial management systems to include many of the same modules (e.g., travel, general ledger, receivables, payable, and procurement) as the IFMP.

The Library of Congress (LOC), in developing its financial management system through COTS software, conducted a survey of available reports, documentation, table structures, and interface software to reduce costs and meet tight schedules. LOC used the Patent and Trademark office's payroll interface software, the Security and Exchange Commission's reimbursable travel interface software, the U.S. Court's payment procedures, and the GAO's table structures all as starting points in developing its own interfaces and tables.

Thus another possible alternative for NASA may be to evaluate the feasibility of working with other agencies to developing common systems or to use already established methods and software in NASA's own work.

GSA Schedule vs Non GSA Schedule. FIRM 201-39 and OMB Circular A-127 requires agencies to use the GSA Financial Management Systems Software (FMSS) Mandatory Multiple Awards Schedule (MMAS) for the acquisition of COTS software for primary accounting systems. As of the time of the audit, NASA was planning to obtain a waiver from GSA to bypass the MMAS to acquire software. Bypassing MMAS would cause additional cost to be incurred due to: (1) time and effort necessary for the full procurement process; (2) acquisition of more expensive, technologically advanced software; (3) effort needed to ensure that the packages meet JFMIP standards; and (4) time and effort needed to prepare a waiver and justification to GSA.

The Project Manager felt that the more advanced technology not available from the MMAS would, in the long run, provide savings and other benefits that would offset the higher initial costs. Some of the federal agencies interviewed that had used the MMAS were satisfied with the results despite being technologically inferior to other products. Their reasoning was that the level of technology acquired was sufficient, considering the simplicity of the systems upgraded (e.g., general ledger, accounts payable, accounts receivable). Thus, NASA needs to assess the necessity of acquiring the more advanced technology and analyze the expected cost savings of that technology and compare it with the higher initial cost of acquiring software not on the MMAS.

National Aeronautics and
Space Administration
Headquarters
Washington, DC 20546-0001

RECEIVED

APR 1 1996



Reply to Attn of: **B**

MAR 28 1996

TO: W/Acting Deputy Assistant Inspector General for Auditing

FROM: B/Associate Chief Financial Officer, Integrated Financial Management Project

SUBJECT: Response to Draft Audit Report
Early Phases of NASA's Integrated Financial Management Project
Assignment Number A-HQ-95-005

Several members of the Integrated Financial Management Project (IFMP) staff as well as the Chief Financial Officer's (CFO) staff have reviewed the subject document. Following is our response to the recommendations.

1. Risk Analysis Should Be Conducted. We agree that risk analysis should be conducted, and the project has been analyzing several types of risks. As part of the planning phase, the project identified several management, technical, and cost risks. Part of our strategy for addressing technical risks was to conduct a market survey to learn about available products and technology. We also developed a strategy for acquiring COTS products that shifts most of the cost risks to the contractor. Other risks will be mitigated, if not eliminated, during system implementation planning. The project has developed and continues to update a Risk Management Plan. As new risks are identified, they are added to the plan along with a strategy for reducing or eliminating the risks.

During the business process reengineering work, most process teams addressed the issue of internal controls and made an effort to design adequate controls into the processes. After the software is procured and the processes are once again reengineered to match the capabilities of the software, we will order an independent audit of the processes and software to ensure that there are no outstanding risks in this area. To conduct such an audit now would not be a wise use of resources as the software capabilities will determine to a great extent what the detailed work for each process will be.

Much of the discussion on this subject as well as the references to OMB Circular A-130 deal with system design and development. It is important to keep in mind that IFMP is not a system development effort. We are procuring commercial off-the-shelf software (COTS). The Core Financial software will be procured from the Federal Mandatory Supply Schedule (FMSS) and is already certified for use by the Federal government. The requirements for internal controls and security for the other software modules are specified in the Request for Proposals (RFP). The software will be evaluated for compliance with these requirements. If we find that there are no

COTS software products available that satisfy our internal controls and security requirements, we will either implement manual procedures to assure adequate protections or order modification of the software we ultimately purchase.

2. Analyze Alternatives to COTS. The Integrated Financial Management Project was established after NASA's senior management had studied several alternatives for acquiring a fully integrated suite of financial management software tools that were JFMIP-compliant and would support full cost accounting and budgeting: 1) Reinitiate NAFIS with new goals aimed at meeting JFMIP requirements and standardizing business practices throughout the agency; 2) Buy COTS software that is already JFMIP-compliant; 3) Enter into cross-servicing agreements with other federal agencies; 4) Custom develop software for all financial management processes.

OMB policy (A-127) requires use of COTS software and the FMSS. Since OMB is requiring NASA to use the FMSS for Core Financial software, other alternatives are closed to us for that module. For the remaining financial management software modules, our analysis indicates that the cost of buying COTS is 20-25% of the cost of developing our own software. Additional cost savings are realized in the maintenance phase of the life cycle. Typically, 80% of development costs are spent in the maintenance phase. With COTS, the vendors assume the majority of these costs. The other alternatives mentioned above were not feasible.

3. Include Key Cost Issues in Management Plan. At the time the audit was conducted, the project was just beginning to prepare the in-house cost estimate for the procurement of software and associated services. We have completed the estimate for the procurement and have refined cost estimates for other aspects of the project, e.g., completion of business process reengineering. However, we did not consider the 2 issues mentioned in the audit report to be key to this project. Since NASA will procure the Core Financial software from the FMSS, there is no need for NASA to estimate the cost of benchmarking software to meet JFMIP-compliance. We will not be incurring these costs. Also, the RFP will ask offerors to propose a system architecture; therefore, it is not necessary for the project to conduct its own study of architecture alternatives and costs. Our current estimate is based on many assumptions that may or may not prove to be true. Senior management in Code B and the Headquarters Operations Office are aware of the many unknowns and uncertainties surrounding this project and are assisting us in planning for contingencies. As we learn more, we will refine our estimate and adjust our plans accordingly.

This section of the report also cites various references that pertain to the development of a new information system. Again, this is not a system development effort.

4. Produce a More Realistic Project Schedule. The project schedule has been given a great deal of thought by both the project staff and Code B senior management. We agree that the current schedule is optimistic. From our customers' perspective, however, it is not optimistic enough; our customers are pressing us to implement the system by October 1, 1996. The project has set October 1, 1997, as the earliest date we can meet that requirement.

While the schedule allows for a few minor contingencies, it is not padded to the extent that the accomplishment of most milestones could be considered early completions. The project team

Appendix I
Model of Security in the System Life Cycle
Development Process

Section C: Potential Effects of Not Performing Security Activities During System Development

Figure I.6: Potential Effects of Not Performing Security Activities During System Development: Initiation Phase

SECURITY

Operating Environment

- Management control process to ensure security controls are incorporated into new applications and significant modifications (OMB A-130)

Agency program in place:

- Security responsibilities in ADP position descriptions (FIPS 87)
- Personnel screening (OMB A-130, FPM 732, 736)
- Security awareness training program (OMB A-130)
- Configuration management/change control plans (OMB A-130)

1. Define basic security needs
 - Identify sensitive information and applications (OMB A-130, NSDD 145, FIPS 64, 73)
 - Identify system concepts (preliminary architecture)(FIPS 64)
 - Identify basic security objectives (FIPS 73)
 - Identify privacy and security controls work load (FIRMR)

Security Project
Request Document
(FIRMR, FIPS 64)

2. Identify security alternatives
 - Identify threats, vulnerabilities, and risks (FIPS 31, 41, 65, 73, FIRMR)
 - Assess technical, operational, and economic feasibility of system security alternatives (FIPS 64, 73)
 - Estimate the security-related cost/benefits of system alternatives (FIPS 64, 73)

Initial Risk Analysis
(FIPS 31, 41, 65, 73,
and FIRMR)

Security Aspects in
Feasibility Analysis
(FIPS 64)

EFFECTS

Examples of Potential Effects of Not Performing Security Activities

- Not effectively incorporating needed security controls in later development phases
- Favoring development of unnecessarily vulnerable system that is difficult to secure
- Favoring development of system that is not cost beneficial when security costs and potential losses are considered
- Favoring development of system that is not technically, operationally, functionally, or politically feasible due to security risks not considered
- Inadequate planning for and provision of resources and funds for effective security in development and in operations resulting in vulnerable systems produced
- Selection of physical location, processing environment, and/or system architecture that creates vulnerabilities to threats above acceptable levels of risk
- Intuitive selection of security controls leaving systems excessively vulnerable to threats, risks, and/or creating excess security costs (see "Select security controls" in definition phase)
- Mission impediment potential
- Disclosure of sensitive information
- Financial, human, and other losses
- Violation of privacy

Appendix I
Model of Security in the System Life Cycle
Development Process

3. Identify basic security framework in the selected system alternative
- Provide essential information on security issues and risks (PCM/PCIE)

Security Areas in
Cost/Benefit Analysis
(FIPS 64, 73)

Security Areas in
System Decision Paper
(PCM/PCIE)

Initiation
Phase
Completed

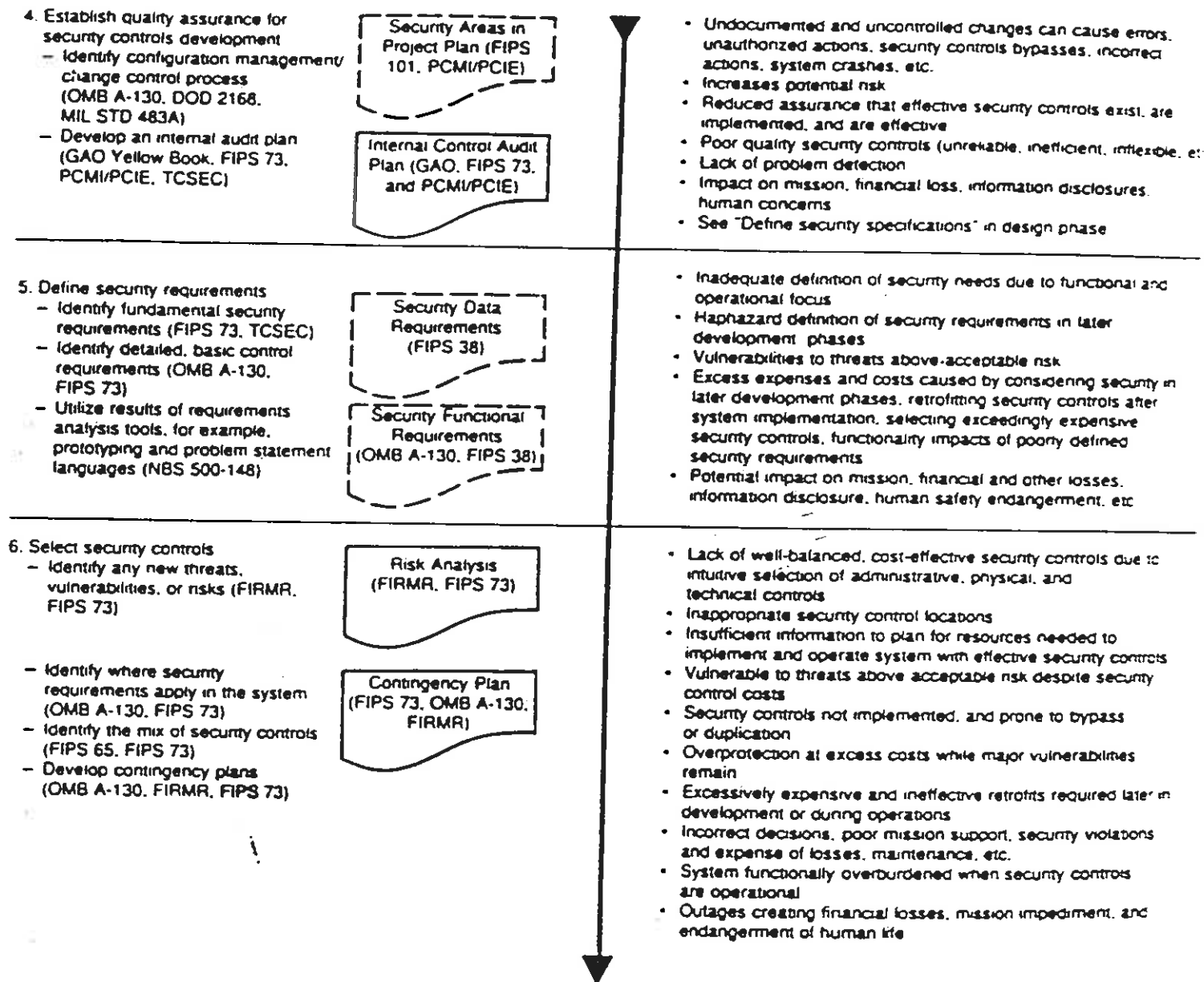


- * Not assessed at the nine agencies reviewed.
- * Acronyms and abbreviations are spelled out in table of contents.

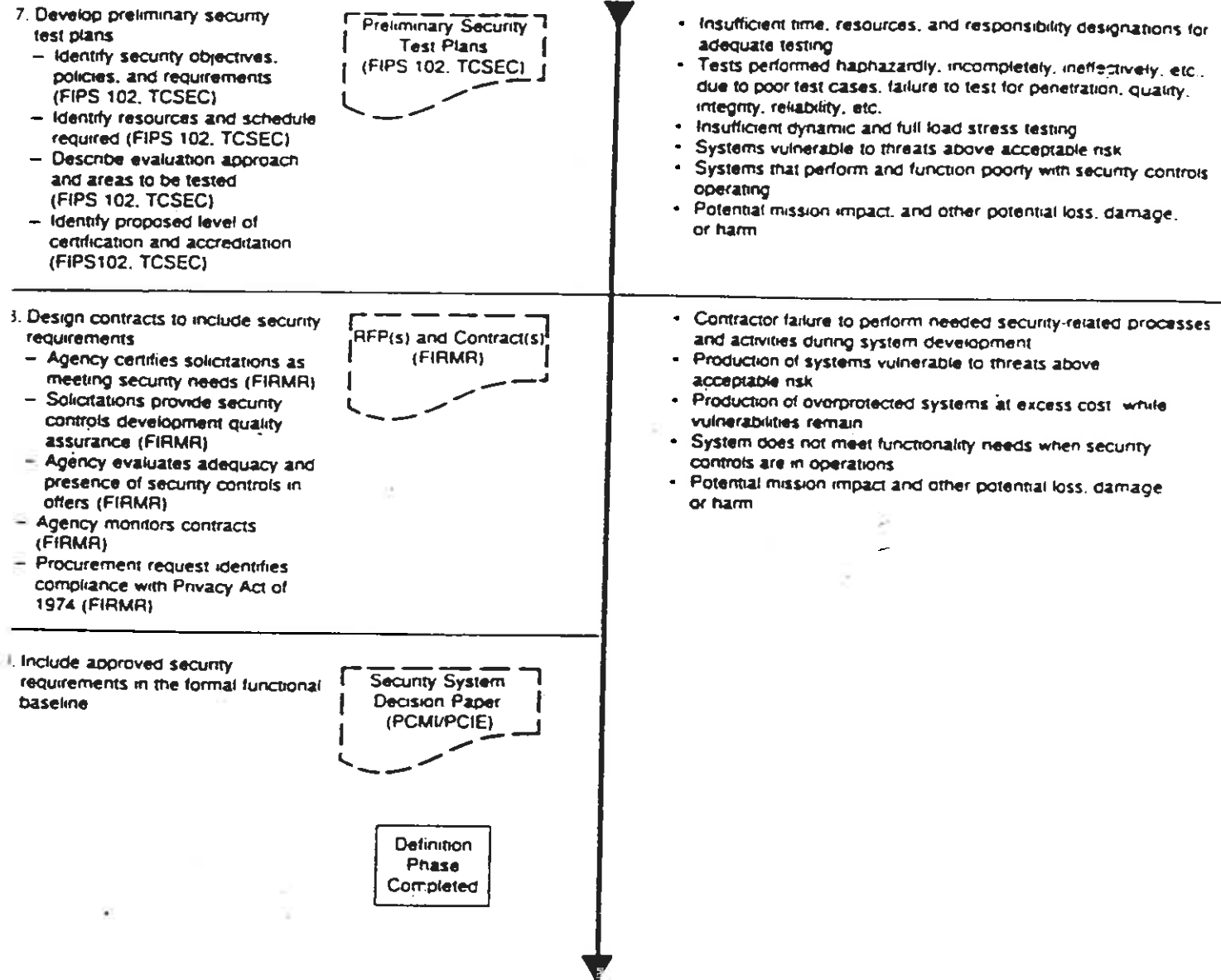
Note: Shared information sources are indicated by a dotted line around the document at the security level, whereas "stand alone" security documents are indicated by a solid line.

Appendix I
Model of Security in the System Life Cycle
Development Process

Figure L7: Potential Effects of Not Performing Security Activities During System Development: Definition Phase

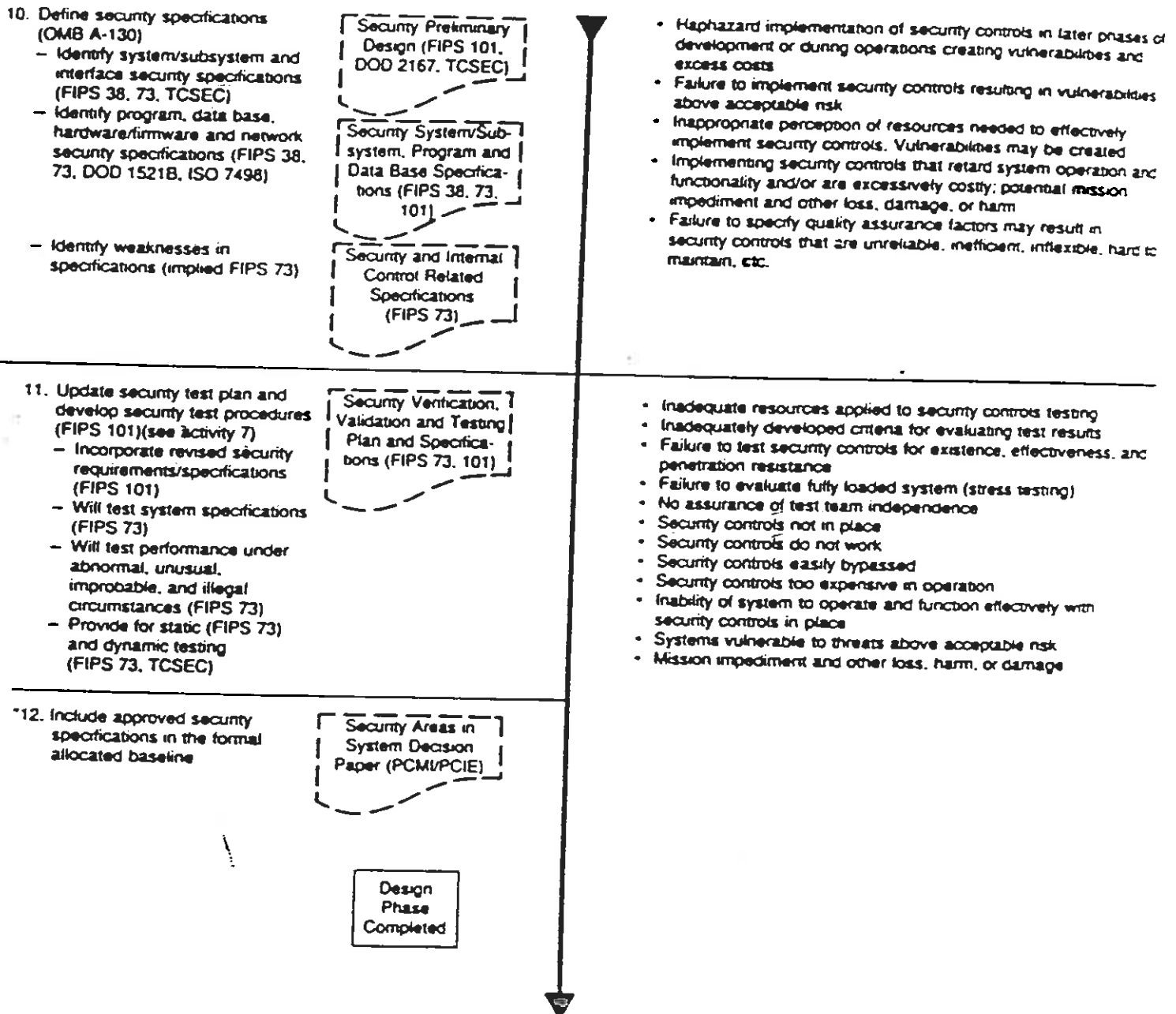


Appendix I
Model of Security in the System Life Cycle
Development Process



Appendix I
Model of Security in the System Life Cycle
Development Process

Figure I.8: Potential Effects of Not Performing Security Activities During System Development: Design Phase



Appendix I
Model of Security in the System Life Cycle
Development Process

Figure I.9: Potential Effects of Not Performing Security Activities During System Development: Construction Phase

