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Report to the Chairman, Subcommittee on Defense, Committee on Appropriations, House of Representatives

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ADP MANAGEMENT

Status of the Army's Logistics and Technical Information Initiatives

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Information Management and
Technology Division

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October 31, 1988

The Honorable Bill Chappell, Jr.
Chairman, Subcommittee on Defense
Committee on Appropriations
House of Representatives

Dear Mr. Chairman:

On October 20, 1987, you requested that we review the Army's major automation efforts in the logistics and technical information area to provide information that would assist your preparation for the fiscal year 1989 budget cycle. As agreed with your office, our objectives were to address the following questions:

- Has the Army identified the necessary interoperability and systems integration requirements for its many logistics and technical information automation initiatives?
- How effective has the oversight been from the Office of the Secretary of Defense (OSD), particularly the Office of the Assistant Secretary of Defense for Production and Logistics?
- Has the Army followed Department of Defense (DOD) and General Services Administration (GSA) regulations concerning acquisition of major automated information systems?
- Have the expected costs of these efforts been accurately reflected in the reviews within DOD and in its 5-year acquisition plans?
- How will the Army measure the benefits or mission improvements resulting from these automation efforts?

On June 2, 1988, we briefed your office on the status of our work. You requested that we provide a report summarizing the key facts and observations presented at the briefing. This report contains these facts and observations, as well as information obtained subsequent to the briefing.

The Army's basic logistics mission is to support worldwide operations with whatever materials or equipment are needed at the appropriate time and place, in the condition and quantity required, and at a minimum expenditure of resources. To improve logistics mission support, the Army has initiated numerous efforts to either modernize existing automated logistics systems or develop new systems.

Eight of these initiatives are major acquisitions as defined using either DOD's major automated information systems criteria,[1] or the Office of Management and Budget's (OMB) major Defense acquisition criteria.[2] These eight initiatives had aggregate development costs of nearly $600 million and life-cycle costs of over $1.3 billion. Appendix I, table I.1, lists the eight initiatives.

The Army Has Not Completed Implementing Its System Integration and Interoperability Strategy

Our review indicated that in March 1986, the Army issued Army Regulation 25-1, Army Information Management Program, that established a strategy to identify systems integration and interoperability requirements for all information systems. Such a strategy is an important first step. Once fully implemented, a strategy of this nature should enable the Army to define the necessary integration and interoperability requirements for their numerous automated logistics and technical information system initiatives. Further, GSA has issued government-wide information systems planning guidance[3] recommending a similar approach. Each Army command and activity is required to implement the strategy by the end of fiscal year 1989 and prior to funding any new information systems initiative.

Currently, key Army logistics organizations are in the process of implementing this strategy. For example, the Army's Deputy Chief of Staff for Logistics, headquarters functional manager for logistics, and the Army Materiel Command, principal logistics command, plan to complete implementation of the strategy in the second quarter of fiscal year 1989 or later. Until these logistics organizations fully implement the required strategy, the Army will lack assurance that the systems integration and interoperability requirements for its numerous logistics and technical information initiatives have been fully identified. Accordingly, current automated logistics and technical information systems initiatives presented in the Army's fiscal year 1989 budget request may not contain the necessary system integration and interoperability requirements.

[1]Defense Directive 7920.1 requires that automated systems meeting the following criteria shall be classified as a major automated system: (1) anticipated costs exceed $100 million during the time span from mission analysis/project initiation through deployment, (2) estimated development costs exceed $25 million in any single year, or (3) it is of special interest to the Secretary of Defense.

[2]Office of Management and Budget Circular A-11, Data on Acquisition, Operation, and Use of Information Technology Systems, defines automated systems that have a 5-year planned cost of more than $5 million as major Defense acquisitions.

[3]Information Systems Planning Handbook, Federal Information Resources Management Planning Support Center, U.S. General Services Administration, Office of Software Development and Information Technology, January 1988.

Appendix II contains detailed information concerning the Army's strategy for identifying integration and interoperability requirements.

For the eight Army initiatives we reviewed, we observed no major problems relating to the remaining four objectives. We have provided detailed information in appendix II concerning OSD's oversight, Army compliance with acquisition regulations, reporting of expected costs, and measurement of project benefits. In appendix III we have provided an overview of the Defense life-cycle management phases for major automated information systems acquisition.

Scope and Methodology

In the course of our review, we interviewed OSD and Army officials concerning logistics support, review and management of logistics and technical information systems acquisitions, and Army budget submissions. We also discussed the review and management of automated information system procurements with Army officials. We reviewed GSA, OSD, and Army guidance, directives, and regulations concerning system integration and interoperability, and major automated information system acquisitions. We analyzed program, planning, approval, project status, and funding documents relevant to the Army's major automated information systems. Our work was conducted from November 1987 through July 1988. Appendix I contains a detailed description of our review scope and methodology.

Our work was performed in accordance with generally accepted government auditing standards. We discussed key facts with OSD and Army officials and have included their comments where appropriate.

We are providing copies of this report to the Secretary of Defense and the Secretary of the Army. We will also make copies available to other interested parties upon request. If you have any questions regarding this report, please contact William Franklin, Associate Director, at 275-3188.

Sincerely yours,

Ralph V. Carlone
Director

Contents

Abbreviations

ADP	automated data processing
AMC	Army Materiel Command
DCSLOG	Deputy Chief of Staff for Logistics
DOD	Department of Defense
FIRMR	Federal Information Resources Management Regulations
GAO	General Accounting Office
GSA	General Services Administration
IMTEC	Information Management and Technology Division
MAISRC	Major Automated Information Systems Review Council
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense

Scope and Methodology

We interviewed officials from the offices of the Assistant Secretaries of Defense for Production and Logistics and the Comptroller at the Pentagon, Washington, D.C., concerning logistics support, major automated logistics and technical information system acquisitions, and project oversight. We also held discussions with Army officials from the Office of the Deputy Chief of Staff for Logistics and the Directorate of Information Systems for Command, Control, Communications, and Computers at the Pentagon; the Army Materiel Command and the Information Systems Selection and Acquisition Agency in Alexandria, Virginia; and the Information Systems Engineering Command and the Army Acquisition Executive's Project Executive Officer for Standard Army Military Management Information Systems at Fort Belvoir, Virginia.

To identify and confirm features of a prudent comprehensive integration strategy, we reviewed regulations, directives, and guidance concerning the development of system integration strategies issued by OSD, the Department of the Army, and GSA. We also reviewed industry reports and articles on systems integration and interoperability, and assessed key Army logistics activities' implementation of the Army Information Management Program, which mandates a strategy to identify systems integration and interoperability requirements.

Our review focused on the major Army logistics and technical information initiatives. We selected the eight initiatives listed in the Army's Logistics Automation Master Plan that met DOD or OMB criteria for classification as a major automated information system initiative. Table I.1 shows the eight Army logistics and technical information initiatives that are subject to either or both of these criteria.

Table I.1: Army's Major Logistics and Technical Information Initiatives

	Acquisition criteria	
Initiatives	**DOD**	**OMB**
Computer-aided Acquisition and Logistics Support	X	X
Commodity Command Standard System		X
Dept. of the Army Movements Management System Redesign	X	
Integrated Procurement System	X	X
Logistics Application of Automated Marking and Reading Symbols		X
Standard Depot System Modernization	X	X
Test and Evaluation Analysis Management Uniformity Plan		X
Unit Level Logistics System	X	

For our work concerning Defense oversight and Army life-cycle management, we focused on the five Army initiatives that met the Defense definition of major automated information systems as contained in Defense Directive 7920.1. The directive states that automated information systems meeting the following criteria shall be classified as major: (1) anticipated costs exceed $100 million during the time span from mission analysis/project initiation through deployment, (2) estimated costs exceed $25 million in any single year, or (3) it is designated as being of special interest to the Secretary of Defense.

For our work concerning the Army's compliance with General Services Administration acquisition regulations, we focused on the six Army initiatives that met the OMB criteria for major acquisitions. All six had procurement obligations presented in the Army's combined Fiscal Years 1988 and 1989 Information Technology Systems President's Budget. Office of Management and Budget Circular A-11, Data On Acquisition, Operation, and Use of Information Technology Systems, requires agencies, as part of their budget submissions, to prepare special exhibit 43A of their information technology activities and resource requirements when those requirements will be more than $100,000 in the past, current, or budget year covered by the budget. Major automated information system acquisitions, for this exhibit, are defined in the circular as acquisitions having a 5-year estimated cost exceeding $5 million.[1]

Our review identified applicable GSA regulations and Defense directives and instructions issued to help ensure that major automated information systems are designed, acquired, evaluated, and operated in an effective manner and at the lowest cost. We compared available systems' life-cycle management and procurement documentation of the Army's initiatives with these requirements to measure the degree to which the Army has been in compliance. OSD oversight provided for these initiatives was also reviewed to determine whether any noncompliance with DOD life-cycle management principles has been or was likely to be identified.

We reviewed documentation of the Army's logistics and technical information system projects designated as major acquisitions by Defense to identify stated benefits and to document established measurement criteria and evaluation plans. Our review included comparing estimated project costs reported in the Army's budget submissions with those in the

[1]The Defense Budget Guidance Manual, DOD 7110-M, expands on OMB Circular A-11 by requiring exhibits for planned acquisitions that exceed $2 million in the budget year or $8 million cumulative cost over 5 years.

DOD 5-year acquisition plans for the Army's major logistics and technical information systems projects.

As agreed with your staff, we limited our work to gathering and reviewing information concerning the various aspects of the Army's automated logistics and technical information initiatives.

At the close of our review in July 1988, we discussed key facts with OSD and Army officials and have incorporated their comments where appropriate. Our review was conducted from November 1987 through July 1988, in accordance with generally accepted government auditing standards.

Army Efforts to Identify Systems Integration and Interoperability Requirements

Our review of the Army's efforts to identify the integration and interoperability requirements for its automated logistics and technical information initiatives showed that in March 1986 it issued Army Regulation 25-1, the Army Information Management Program. This regulation mandates a strategy for the Army commands and activities to identify their systems integration and interoperability requirements prior to funding any new information systems initiatives. Army activities have until the end of the fourth quarter of fiscal year 1989 to complete these requirements. The Army's development of such a strategy is an important first step towards ensuring the required level of systems integration and interoperability in the Army logistics community.

At the conclusion of our review in July 1988, Army logistics organizations had not completed their implementation of the mandated strategy. However, Army logistics activities had submitted fiscal year 1989 funding requests for several logistics and technical information automation initiatives that would ultimately have to be consistent with their implementation of the mandated strategy. Until the Army activities complete their implementation of the strategy, they lack assurance that the necessary systems integration and interoperability requirements among their numerous automated logistics and technical information system initiatives have been identified.

Army definitions of systems integration and interoperability emphasize the relationships among information systems and their respective components necessary to meet the Army's missions. For example, the Army's working definition for systems integration is:

"To make whole or complete by adding or fitting together into an agreed upon framework (architecture) the information requirements, data, applications, hardware, and systems software required to support the Army in peace, transition, and conflict."

Similarly, the Army's definition of systems interoperability describes the extent to which systems can work together by employing standards in the interfaces between them. Thus, identifying systems integration and interoperability requirements involves defining the relationships among information systems and their interface standards, within the context of an overall framework or architecture.

In the past the Army did not have an overall strategy to guide the design and development of automated logistics support systems. Consequently, as Army logistics systems were designed and developed to support various aspects of Army mission operations, no criteria (standards or procedures) were in place that would assure that systems would work together and effectively exchange data and information. Accordingly, Army decision makers have experienced difficulty in acquiring timely, accurate, and complete information on key aspects of Army mission operations. This information often had to be obtained through ad-hoc system modifications, procedures, and practices.

To ensure that Army decision makers would have complete, accurate, and timely information regarding mission operations and to avoid the additional expenditures associated with post-development modifications, the Army, as mentioned, issued Army Regulation 25-1 in March 1986. Army automated information system acquisitions were intended to be consistent with the mandatory strategy for obtaining funding approval. Specifically, Army Regulation 25-1 and the accompanying information management planning guidance,[1] requires Army organizations to

- develop an information model that describes the organization's total information needs in terms of the relationships among classes of information, functional processes, and activities needed to successfully support its mission;
- develop an information architecture that further refines the information model by documenting detailed data relationships, relationships among applications (systems), and defining an optimum technical framework to meet these information needs;
- determine whether existing systems or those under development meet the information needs, including integration and interoperability requirements, defined in the information architecture; and
- develop a plan to logically acquire information resources to satisfy unmet information needs identified when comparing the information needs defined in the organization's architecture with its existing and planned information systems.

The regulation requires Army activities to ensure that their defined information architectures contain (1) the results of a comprehensive

[1]The information management planning guidance (Annex C), as authorized in Army Regulation 25-1, provides the Army's annual information management planning goals and objectives for its commands and activities, with respect to the development of information architecture.

information requirements analysis and (2) a plan that logically describes the movement from the existing to the future information system environment. Further, Army headquarters managers for functional areas such as logistics are to develop Army-wide information architectures. The Army's efforts in this area have favorably influenced GSA to issue government-wide guidance, Information Systems Planning Handbook, recommending an approach to planning for information systems development very similar to the Army's. Annex C of the Army's information management planning guidance, dated January 28, 1988, requires commands to have completed their architectures by the end of fiscal year 1989.

Our review of Army logistics organizations' implementation of the Army Information Management Program indicated that they have completed the required information models. However, key organizations have not fully developed the required information architectures. For example, the Deputy Chief of Staff for Logistics (DCSLOG), the functional manager for all Army logistics activities, has completed the required information model and architecture for just the Office of the DCSLOG and two of its support activities. It has not completed the required information architecture needed for identifying Army-wide logistics system integration and interoperability requirements among the Army's numerous logistics initiatives. According to the DCSLOG Director for Information Management, his staff is currently working with staff from the Office of the Assistant Secretary of Defense for Production and Logistics to develop this Army-wide logistics architecture. Officials from the Office of the Assistant Secretary of Defense for Production and Logistics estimated that the project will be completed in January 1989.

We also found that the Army Materiel Command (AMC), the Army's principal logistics command, had also developed its required information model, but not the architecture. The director of the AMC Standard Systems Office, responsible for architecture development, indicated that AMC had contracted for the development of the required information architecture. The contractor's work was estimated to be completed sometime during calendar year 1989.

OSD Oversight of Army's Initiatives

Our review of oversight for the Army's automation initiatives shows that OSD provided initial oversight reviews for two of the five Army logistics and technical information initiatives that were included in our review. One initiative was scheduled for review in late 1988. The

remaining two initiatives subject to the review criteria for major systems were not scheduled to receive oversight because OSD delegated review authority for them to the Army.

The Major Automated Information Systems Review Council (MAISRC) process, as prescribed in DOD Instruction 7920.2, Major Automated Information Systems Approval Process, is the principal mechanism through which Defense provides oversight for the acquisition of major general-purpose automated information systems, including those for logistics and technical information. The Council serves as Defense's senior management oversight and decision-making body. It approves, redirects, or recommends cancellation of the system projects on the basis of reviews prior to each of five broad phases covering the system's life cycle. Appendix III contains an overview of these life-cycle phases.

MAISRC reviews only those automated information system acquisitions defined as major under DOD Directive 7920.1, Life Cycle Management of Automated Information Systems. Of the eight automated information systems included in our review, the following five met this criteria:

- Computer-aided Acquisition and Logistics Support,
- Department of the Army Movements Management System Redesign,
- Integrated Procurement System,
- Standard Depot System Modernization, and
- Unit Level Logistics System.

We found that as of July 1988, two of the five initiatives had received an initial MAISRC review. MAISRC reviewed the Computer-aided Acquisition and Logistics Support project in May 1988 and granted approval contingent on the Army providing more precise descriptions of how the project will meet its needs and appointing a project manager. For the Integrated Procurement System project, MAISRC provided, on June 10, 1988, a combined review of its first two life-cycle phases. It granted approval for these phases and directed the Army to complete specific actions prior to the next review. The third project, the Unit Level Logistics System, was scheduled for an oversight review in late 1988. In May 1987, because the Secretary of Defense expressed special interest, Defense designated the project, currently in its fourth life-cycle phase, as a major automated information system acquisition. During the project's first three life-cycle phases, it was not designated as such, and thus was not subject to MAISRC review until after May 1987.

The remaining two acquisitions, the Department of the Army Movement Management System Redesign and the Standard Depot System Modernization, were not scheduled to receive MAISRC review because OSD delegated all review authority for these initiatives to the Army. OSD may delegate review authority to the agency if (1) planning continues to be comprehensive and sound, (2) action has been taken to ensure that the most effective system alternative has been selected, (3) the system development is within schedule and cost, and (4) program management and acquisition strategy remain sound and stable. Our review did not identify any basis on which to question these delegations.

Army Compliance With Acquisition Policies and Regulations

Our review of the Army's eight major logistics and technical information initiatives indicated that the Army has followed or was in the process of preparing required documentation to comply with DOD and GSA major systems acquisition policies and regulations. The Army must follow DOD major systems acquisition policies for five of its eight initiatives and GSA regulations for the six that met OMB criteria for major acquisitions. Both DOD policies and GSA regulations apply to three of the eight initiatives.

Compliance With Defense Policies

OSD has issued policies to ensure that major automated information systems are effectively and efficiently managed. Defense Directive 7920.1, Life Cycle Management of Automated Information Systems, and the accompanying Department of Defense Instruction 7920.2, Major Automated Information Systems Approval Process, directs the use of a life-cycle management approach that incorporates phased system design and development and establishes documentation requirements by phase for the life of an automated information system. Appendix III contains a more detailed description of the documentation and action requirements for each life-cycle phase.

Our review of the five Army initiatives subject to DOD major automated information system acquisition policies found that

- one initiative—Computer-aided Acquisition and Logistics Support—was in full compliance,
- another initiative—Integrated Procurement System—had recently received a MAISRC review and was directed to make changes to be in compliance, and
- for the three remaining initiatives—Department of the Army Movement Management System Redesign, Standard Depot System Modernization,

and Unit Level Logistics System—the Army was preparing documentation to bring them into compliance.

The Computer-aided Acquisition and Logistics Support project began its second life-cycle phase in May 1988. At this development stage, it is required to have a mission element needs statement. Our examination of project documentation identified that the Army had developed this statement.

The Integrated Procurement System project received a combined review covering its first two life-cycle phases on June 10, 1988. Defense acquisition policies require a mission element need statement for approval of the first life-cycle phase. We found that the Army had prepared a mission element need statement. For approval of the second phase, a project management charter, plan of action, system alternatives, economic analysis, acquisition strategy, and general functional requirements are all required. These life-cycle management documents were to be reviewed as part of the June 1988 MAISRC. Although the MAISRC granted approval of the project's second phase, it directed the Army to complete life-cycle documentation needed to bring the Integrated Procurement System into full compliance with DOD acquisition policies.

The remaining three projects—Department of the Army Movement Management System Redesign, Standard Depot System Modernization, and Unit Level Logistics System—were ongoing when they exceeded the dollar thresholds or became of special interest to the Secretary of Defense and were designated by Defense as major information system acquisitions. Our review of these projects indicated that the Army was preparing life-cycle management documentation required to bring them into compliance with DOD policies. For example, the Standard Depot System Modification was designated a major system acquisition subject to DOD's life-cycle management regulations in late 1987. As of June 1988, the Army had justified the mission requirements, defined the system's requirements, established central approval and coordination controls, and was in the process of validating the project's economic analysis.

Compliance With GSA Regulations

The Federal Information Resources Management Regulations (FIRMR) are the primary GSA regulations governing federal agencies' acquisition of automated data processing resources. Among other provisions, they require agencies to obtain prior GSA approval when their procurements (1) are not from established GSA requirements or schedule contracts, and (2) have a purchase price that exceed established dollar thresholds.

These thresholds vary according to the type and method of planned procurement. For example, a delegation of procurement authority is required when an agency plans to competitively acquire hardware valued at more than $2.5 million or software costing more than $1 million. For non-competitive procurements, these thresholds are $250,000 for hardware and $100,000 for software.

Of the six major initiatives that we identified as subject to GSA acquisition regulations, we found that four were required to obtain a GSA delegation of procurement authority: the Computer-aided Acquisition and Logistics Support, Commodity Command Standard System, Logistics Applications of Automated Marking and Reading Symbols, and Standard Depot System Modernization initiatives. Our review of the procurement contracts and requests for proposals for these initiatives found that the Army had obtained the required prior GSA approvals. Neither of the remaining two initiatives, the Test and Evaluation Analysis Management Uniformity Plan or Integrated Procurement System, had ongoing or planned procurements that met the thresholds requiring a GSA delegation of procurement authority.

Project Cost Reporting

Expected costs for seven of the Army's eight major logistics and technical information initiatives reported in the Army's fiscal year 1988 information system technology budget matched those reported in Defense's June 1987, 5-year plans. The Standard Depot System Modernization initiative was not reported in either document because the Army had erroneously incorporated the modernization costs with the operation and maintenance costs of the operational Standard Depot System. Additionally, we cannot comment on the overall accuracy of the expected costs reported in the budget exhibits or the Defense 5-year plans because only the Integrated Procurement System initiative had a current validated economic analysis at the conclusion of our review in July 1988.[2]

As mentioned, OMB Circular A-11, Data on Acquisition, Operation, and Use of Information Technology Systems, requires agencies to prepare a special exhibit (43B) of their Major Information Technology Acquisition Plans. This exhibit presents expected costs for each activity that has planned acquisition of services and equipment exceeding $2 million in

[2]DOD Directive 7920.1, Life Cycle Management of Automated Information Systems, requires an economic analysis for major acquisitions to be completed prior to system's third life-cycle phase. The analysis is to show all costs required to achieve the stated system objectives.

the budget year or planned costs of more that $8 million over a 5-year period.

Our review of the 43B exhibit for the Army logistics and technical information initiatives found that it presented estimated costs on seven of the eight initiatives defined as major acquisitions by either Defense or OMB. See table I.1 for identification of these eight initiatives. We compared the expected costs presented for these seven initiatives with expected costs presented in the Defense section of the June 1987 Five Year Plan for Meeting Automatic Data Processing and Telecommunications Needs of the Federal Government, Volume II, Major Information Technology Systems Acquisition Plans of Federal Agencies for Years 1987 through 1992. We found that expected costs reported in these documents were consistent for each initiative.

The expected costs for the Standard Depot System Modernization were not separately presented in either the budget exhibits or Defense's 5-year acquisition plans. The Army had erroneously included its cost estimates with the operation and maintenance costs of the operational Standard Depot System. This problem, identified in a prior GAO report,[3] has been corrected. The Army established a budget reporting indicator specifically for the project to require it to be reported separately in the next budget submission. The project was separately reported in the Army's fiscal year 1989 updated budget submission.

Army Measurement of Stated Benefits

We did not determine how the Army plans to specifically measure the stated benefits for each of its major logistics and technical information acquisitions because project management documents that are to specify measurement criteria have not yet been prepared. However, the Army has established a formal process through which planned quantified dollar benefits for automated information system acquisitions are verified and automatically removed from the appropriate budget once the system is fully operational. The Army has not established a process to measure nonmonetary benefits.

DOD Directive 7920.1, Life Cycle Management of Automated Information Systems, requires that system objectives be expressed in terms of performance measures and supported by economic analysis prepared in

[3]ADP Modernization: Army Plans to Improve Budget Disclosure for Its Standard Depot System (GAO/IMTEC-88-30, May 25, 1988).

accordance with DOD Instruction 7041.3, Economic Analysis and Program Evaluation for Resource Management. This instruction requires agencies to complete economic analyses by systematically identifying system benefits and costs associated with alternative approaches for satisfying project objectives. However, a completed economic analysis is not required until the system acquisition ends its third life-cycle phase. Appendix III contains the Defense acquisition management phases.

As discussed previously, our review identified that only five of the Army's eight major logistics and technical information initiatives were subject to DOD major system acquisition regulations. Of these five initiatives, none had received the MAISRC approval necessary for it to begin its fourth life-cycle phase. As a result, none of the initiatives are required to have a complete economic analysis.

In lieu of specific documentation, we asked Army officials responsible for management and oversight of these initiatives how system benefits were to be measured. According to these officials, all dollar quantified benefits would be measured under the Army's budget process. This process is to integrate information systems requirements, costing, programming, budgeting, and execution. As part of the process, (1) project benefits are to be quantified whenever possible to the same level of detail as project costs, and (2) dollar-quantified benefits are to be identified in the appropriation and fiscal year of the expected savings. Once a system is fully operational, these realized dollar benefits, upon verification, are to be automatically removed from the appropriate budget. Army officials stated that, since estimated dollar savings are automatically removed from activity budgets, individual project managers are allowed the discretion to implement their own procedures for measuring non-monetary benefits.

Defense Acquisition Management Phases

This appendix provides an overview of the Defense life-cycle management phases. It shows the documents and actions required and the milestone review approval points for each phase.

Phase				
Mission analysis/project initiation	**Concept development**	**Definition/design**	**System development**	**Deployment/operation**
Purpose				
Identify mission element need (set of requirements)	Synthesize and evaluate (solicit) alternative ways to meet need	Define functional needs (system and subsystem specifications) and design an operational system	Develop, integrate, test, and evaluate the system	Install the system(s), continue approved operations, budget adequately, control changes, and maintain the system for its remaining life
Validate need Recommend exploration of ways to meet need	Recommend one or more concepts for further study			
Documentation and action				
Mission element need statement	Project management charter	Functional description	Users' manual	Periodic reviews
	Plan of actions and milestones	Data requirements	Computer operations manual	
	System alternatives	System/subsystem specifications	Program maintenance manual	
	Economic analysis	Program specifications	Prototype testing	
	Acquisition strategy	Data base specifications	System integration testing	
	General functional requirements	Test and evaluation plan		
	Validation of user needs			
Mission element need statement	System Decision Paper I	System Decision Paper II	System Decision Paper III	System Decision Paper IV
Review points				
Milestone 0 review and approval ends phase one	Milestone I review and approval ends phase two	Milestone II review and approval ends phase three	Milestone III review and approval ends phase four	Milestone IV review and approval ends phase five

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