

GAO

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Report to the Chairman, Subcommittee  
on Military Readiness, Committee on  
National Security, House of  
Representatives

August 1996

# DEFENSE TRANSPORTATION

## Migration Systems Selected Without Adequate Analysis



G A O  
**75** *years*  
1921 - 1996





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

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Accounting and Information  
Management Division

B-271782

August 29, 1996

The Honorable Herbert H. Bateman  
Chairman, Subcommittee on Military Readiness  
Committee on National Security  
House of Representatives

Dear Mr. Chairman:

In response to your request, we are reporting the results of our review of the Department of Defense's (DOD) selection of transportation migration systems.<sup>1</sup> Specifically, we evaluated whether Defense made proper and cost-effective transportation migration system selections. The selection of migration systems is part of Defense's Corporate Information Management (CIM) initiative—a departmentwide effort to improve operations and reduce costs by streamlining business processes, consolidating information systems, and standardizing and integrating data. For transportation, Defense plans to migrate from an inventory of about 130 systems. To date, 28 major migration systems have been selected, with additional minor selections still to be made.

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## Results in Brief

Defense has little assurance that its transportation migration system selections are cost-effective. In April 1994, Defense developed a structured approach to identify, select, and implement these systems. However, in its haste to meet a March 1997 deadline, Defense selected transportation migration systems without fully analyzing alternatives, such as acquiring new systems or contracting for services. Further, in making a quarter of its transportation migration system selections, Defense relied on incomplete and unverified cost data. Finally, Defense did not assess how making significant changes to transportation operations—through reengineering and outsourcing—will affect its migration systems. As a result, Defense is not assured that it will garner the savings expected from migration.

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## Scope and Methodology

To address our objectives, we reviewed ongoing efforts within Defense to reduce Defense Transportation System (DTS)<sup>2</sup> costs by eliminating

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<sup>1</sup>A migration system is an automated information system which replaces several systems that perform similar functions. The systems replaced are called legacy systems.

<sup>2</sup>DTS is that part of the U.S. transportation infrastructure which supports Defense common-user transportation needs. DTS consists of common-user Defense transportation assets, service, and automated information systems which are owned and operated by Defense or by commercial businesses.

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redundancy in automated information systems and in the business processes they support. We examined governing regulations and directives, evaluated plans and actions to select transportation migration systems and improve transportation processes, and interviewed key Defense officials.

We performed our audit from June 1995 through May 1996 in accordance with generally accepted government auditing standards. We worked principally at the offices of the Deputy Under Secretary of Defense for Logistics (Transportation Policy) in Washington, D.C.; the U.S. Transportation Command's (USTRANSCOM) Joint Transportation CIM Center (JTCC) at Scott Air Force Base, Illinois; and at development sites for selected migration systems. Appendix I details our scope and methodology.

Defense provided written comments on a draft of this report. These comments are reprinted in appendix II and are discussed in the agency comments and evaluation section of the report.

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## Background

Defense relies on transportation services and information systems to help ensure that cargo, supplies, and people are conveyed to designated locations as quickly as possible during peace and war. Information is needed to perform functions like deploying troops for wartime, packing and shipping cargo for transport, and drawing plans for ship loading. Because today's defense strategies use fewer forward deployed troops and equipment, the transportation function and the information systems supporting it have become increasingly important. During fiscal year 1995, the total cost of common-user Defense transportation amounted to about \$6 billion. For the same period, USTRANSCOM spent approximately \$164.5 million on information technology to support transportation services.

While transportation is crucial to achieving U.S. military objectives, Defense transportation business operations are very similar or identical, in some cases, to those of the commercial transportation industry. This commonality enables Defense to rely on the commercial transportation industry to meet about 85 percent of its peacetime and wartime transportation needs. Moreover, commercial transportation providers and port management authorities have developed or purchased their own automated information systems to perform many of the same functions as defense transportation performs, such as those for moving passengers,

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documenting and reporting on cargo, and operating sea and aerial ports. Defense itself recognizes the similarities between itself and the commercial transportation sector in its policies and procedures, which call for using commercial automated information systems when feasible.

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### Widely Recognized Defense Transportation Deficiencies Persist

Over the years, various studies, commissions, and internal DOD reports have noted that military transportation processes are fragmented, outdated, inefficient, and costly. In addition, Defense has long recognized that timely, accurate, and comprehensive information on transportation activities would greatly increase its effectiveness. For example:

- In 1992,<sup>3</sup> GAO reported serious problems with the services' deployment data bases during Operation Desert Shield/Storm. Inaccurate and incomplete database information resulted in erroneous lift requirements, inefficient use of lift, and revisions to movement routing and scheduling. Defense was forced to rely on informal, personal communication and manual methods to obtain the correct amount of lift and to determine which units were ready to move.
- According to a Defense report on Operation Desert Shield/Storm logistics, military airport facilities became so overloaded with high-priority sustainment cargo that other cargo was hastily repacked into shipping containers with partial documentation or without any documentation and reshipped by surface transport. Because little or no documentation accompanied the cargo, over half of the 40,000 containers sent to Saudi Arabia had to be reopened to determine their contents.
- In 1993,<sup>4</sup> GAO reported that Defense's ability to effectively manage its transportation operations was limited, in part, because of redundancy and the lack of standardization among its automated information systems. Specifically, we noted, and Defense agreed, that the Continental United States Freight Management System (CFM) would duplicate functions which are similar or identical to transportation systems concurrently under development by the Air Force, Marine Corps, Army, and the Defense Logistics Agency (DLA).
- In a 1994 report, Reengineering the Defense Transportation System: The "Ought To Be" Defense Transportation System for the Year 2010, Defense recognized that change to transportation business processes is key to realizing large cost savings and performance improvements. Defense

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<sup>3</sup>Desert Shield/Storm: U.S. Transportation Command's Support of Operation (GAO/NSIAD-92-54, January 9, 1992).

<sup>4</sup>Defense Transportation: Commercial Practices Offer Improvement Opportunities (GAO/NSIAD-94-26, November 26, 1993).

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further maintained that nothing less than fundamental change would be required to achieve such gains in savings and productivity.

- In 1995,<sup>5</sup> Defense reported that the lack of visibility over shipments and units entering a theater of operations has been a chronic problem experienced in every major U.S. deployment during the 20th century. The report asserted that acquisition of transportation automated information systems providing more timely, accurate, and complete information would help resolve the problem.
- In early 1996,<sup>6</sup> GAO reported that Defense common-user transportation costs were two to three times higher than comparable commercial carrier costs. Higher costs were attributed, in part, to fragmented business processes and an inefficient organizational structure.

The Congress also is concerned about continuing problems in defense transportation and has taken legislative action to reduce its costs. The House Committee on National Security, in its report on the Defense Authorization Act for Fiscal Year 1996, estimated that approximately \$100 million could be saved each year if commissaries and exchanges are allowed to contract directly, using the most cost-effective carriers to transport products overseas. Subsequently, the Congress approved a provision in the Defense Authorization Act for Fiscal Year 1996 authorizing the commissaries and military exchanges to negotiate directly with private carriers for the most cost-effective transportation of commissary and exchange supplies by sea without relying on the Military Sealift Command or the Military Traffic Management Command.

Although Defense has repeatedly attempted to correct its transportation problems over the years, many of its actions have been directed toward the acquisition of information technology to address problems rather than through a complete analysis of its business processes. Such an analysis would identify the root causes of Defense's transportation problems. Identification of the root causes helps an organization focus on appropriate means for addressing the problem and serves to direct resources where needed to achieve quality improvements in operations. These process improvements, in turn, provide the basis for the acquisition of technology to support the newly improved processes. Defense's CIM program was intended to institutionalize this type of approach to information systems management.

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<sup>5</sup>Defense Intransit Visibility Integration Plan, U.S. Transportation Command, February 1995.

<sup>6</sup>Defense Transportation: Streamlining of the U.S. Transportation Command Is Needed (GAO/NSIAD-96-60, February 26, 1996).

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## JTCC Established to Implement CIM for Transportation

In 1989, the Deputy Secretary of Defense established the CIM program to reduce the cost and improve the efficiency of operations. Defense anticipated that it would reduce costs significantly by streamlining its business practices, consolidating information systems into a core set of migration systems, and standardizing data.

To carry out the CIM initiatives for Defense transportation, the Deputy Under Secretary of Defense for Logistics chartered JTCC, in August 1993, under the command authority of USTRANSCOM. JTCC's primary objective is to improve the efficiency and effectiveness of the DTS by using business process reengineering techniques, designating and implementing migration systems selections, and leading data standardization efforts. By migrating to 28 transportation systems, Defense estimated in February 1996 that it would save \$240 million over a 6-year period, primarily through elimination of duplicate legacy systems. A description of Defense's transportation business processes and the migration systems selections that support them are provided in appendix III.

In an October 1993 CIM memorandum, after becoming dissatisfied with the pace of improvements, the Deputy Secretary of Defense directed all functional business areas to accelerate efforts to select and implement migration systems by March 1997. In response, JTCC initiated a structured approach, in April 1994, to identify, select, and implement transportation migration systems by March 1997. The approach was systematic, communicated in a written plan, and agreed to by departmentwide transportation process owners and stakeholders. Further, the approach called for consideration of alternatives, including a review of commercial products, and required that cost-benefit analyses be prepared in support of migration systems selections.

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## Little Assurance That Defense Made Proper System Selection Decisions

Defense has little assurance that its transportation system selections are cost-effective. To meet a March 1997 deadline imposed by the Deputy Secretary of Defense, JTCC hurriedly implemented its migration system selection approach without

- adequately evaluating government and/or commercial sector alternatives in selecting 17 of the 28 migration systems,

- using complete and verified cost information in choosing 7 systems<sup>7</sup> from among numerous legacy systems which could provide the same basic functionality, and
- assessing the impact that significant changes to transportation operations—made through reengineering and outsourcing—will have on its migration system selections.

In some cases, Defense selected migration systems that will lose money if implemented as migration systems.

### Defense Did Not Fully Consider Other Alternatives to Sharing In-House Systems

Governmentwide and DOD regulations require that a range of feasible alternatives be considered before significant changes to business processes or information systems are made. These regulations call for aggressive examination of alternatives to ensure that innovative and improved ways of doing business are considered. The Office of Management and Budget (OMB) Circular A-94, General Services Administration's (GSA) Federal Information Management Regulations, and DOD Instruction 7041.3 cite acquisition of new systems, sharing existing systems, contracting for services, using commercial off-the-shelf software, and maintaining the status quo as examples of alternatives that should be considered. In addition, in November 1993, the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence issued criteria requiring that migration systems selection consider a reasonable range of alternatives.

However, in selecting systems for migration, Defense did not adequately consider alternatives available in other parts of the government and/or the commercial sector. As a result, it has little assurance that the systems it chose are the most cost-effective and appropriate. The degree to which Defense considered alternatives to the systems chosen varies from system to system. However, in all cases, alternatives were not considered to the extent that Defense's own guidance calls for. Specifically:

- For all system selections, Defense did not consider developing new systems or contracting for services as required by Office of Management and Budget, General Services Administration, and Defense directives.

<sup>7</sup>These seven systems are: (1) Cargo Movement Operations System (CMOS), (2) Air Loading Module (ALM), (3) Integrated Computerized Deployment System (ICODES), (4) Consolidated Aerial Port System II (CAPS II), (5) Navy Material Transportation Office Operations and Management Information System (NAOMIS), (6) Joint Flow and Analysis System for Transportation (JFAST), and (7) Marine Corps Transportation Coordinator's Automated Information Management System and Air-Ground Task Force Deployment Support System (TC-AIMS(MC)/MDSS II).

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According to the Chair of Defense's Transportation CIM Advisory Group, the March 1997 deadline provided insufficient time to fully evaluate alternatives.

- For 17 of the 28 transportation systems selected, Defense made its decisions based on the judgment of transportation experts who determined that these 17 systems support a transportation business function so unique that nothing else could be considered as a feasible alternative. However, JTCC officials could provide no documented analysis to support this conclusion.
- Seven migration systems were selected after considering a narrow range of alternatives.
- The remaining four systems<sup>8</sup> were designated "interim" systems because Defense believes alternative solutions exist for these systems. According to JTCC officials, alternatives will be considered at a later, unspecified date.

To its credit, Defense reviewed commercial off-the-shelf transportation software products for some transportation business areas while making its migration system selections. However, this review was inadequate because it did not

- analyze the degree to which unmodified software could meet unique Defense requirements,
- identify the expected cost to make necessary software modifications,
- determine the time required to make modifications, and
- provide for a hands-on view of the software in operation.

While the study determined that about 700 commercially available software packages provided some degree of transportation functionality, 24 were selected for a final detailed review. Out of the 24 finalists, JTCC concluded that (1) none would fully support Defense's transportation requirements without modified software and (2) required modifications could not be made before March 1997 at an acceptable cost. Although Defense asserts that required modifications would be costly, it could not provide documented analysis to support this conclusion. Further, Defense plans to make \$13 million worth of software modifications to just five of its in-house selections.

Also, despite Defense's conclusion regarding the inability of commercially available software to fully support transportation requirements, a

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<sup>8</sup>The four interim systems are: (1) Passenger Reservation and Manifest System (PRAMS), (2) Department of Army Movement Management System - Redesign (DAMMS-R), (3) Groups Operational Passenger System (GOPAX), and (4) Mobilization Movement Control (MOBCON).

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government contractor is making extensive use of one of the rejected products in its development of the Global Transportation Network.

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### Cost-Effectiveness of Selected Migration Systems Is Questionable

To meet the March 1997 deadline mandated in the Deputy Secretary's October 1993 memorandum, Defense selected transportation migration systems based on incomplete, unverified cost data without comparing all the benefits of each system. Consequently, there is little assurance that these selected systems will help contain the cost of performing Defense's transportation mission to any great extent or bring about the benefits envisioned by the migration strategy.

Defense regulations stress the importance of considering system costs and benefits to ensure that correct, well-informed decisions are made about information systems. DOD Directive 8120.1 and DOD Instruction 7041.3 require preparation of a functional economic analysis to document all costs (both direct and indirect), all quantifiable benefits, and all significant nonquantifiable benefits. Also, the Assistant Deputy Under Secretary of Defense for Transportation Policy identifies conducting objective analyses that show favorable investment returns as the best way to ensure funding for migration systems. To be useful in making fully informed business decisions, such cost information should be complete and verified.

Instead of preparing the required functional economic analyses and documenting investment returns, Defense selected its transportation migration systems based primarily on a system's ability to meet current functional requirements. After the selections were made, JTCC continued to analyze savings projections associated with migration systems. This later analysis culminated in a January 1996 study discussed at the end of this section.

### JTCC's Migration Systems Selection Analysis

Had Defense followed its own regulations and calculated investment returns, it would have found—based on data available when the migration systems were selected—that two of the selected systems would lose money if implemented as migration systems. The Air Loading Module (ALM) would lose \$0.67 out of every dollar invested and the Cargo Movement Operations Systems (CMOS) would lose \$0.04 out of every dollar invested.

JTCC's analyses also did not include all costs associated with its evaluation of in-house systems. At least \$18 million in costs were excluded: \$16 million for JTCC's analysis of candidate migration systems and

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\$2 million for maintaining migration system hardware.<sup>9</sup> The magnitude of other exclusions remains unknown. For example, JTCC estimates that, collectively, training on migration systems will be required at nearly 300 sites. However, its analyses did not include estimates of the number of persons to be trained at each site or the cost of productivity losses associated with that training. JTCC also estimates that hardware and off-the-shelf software totaling \$10 million will be purchased between fiscal year 1996 and fiscal year 1999. However, JTCC's estimates do not include the cost of labor necessary to purchase these items.

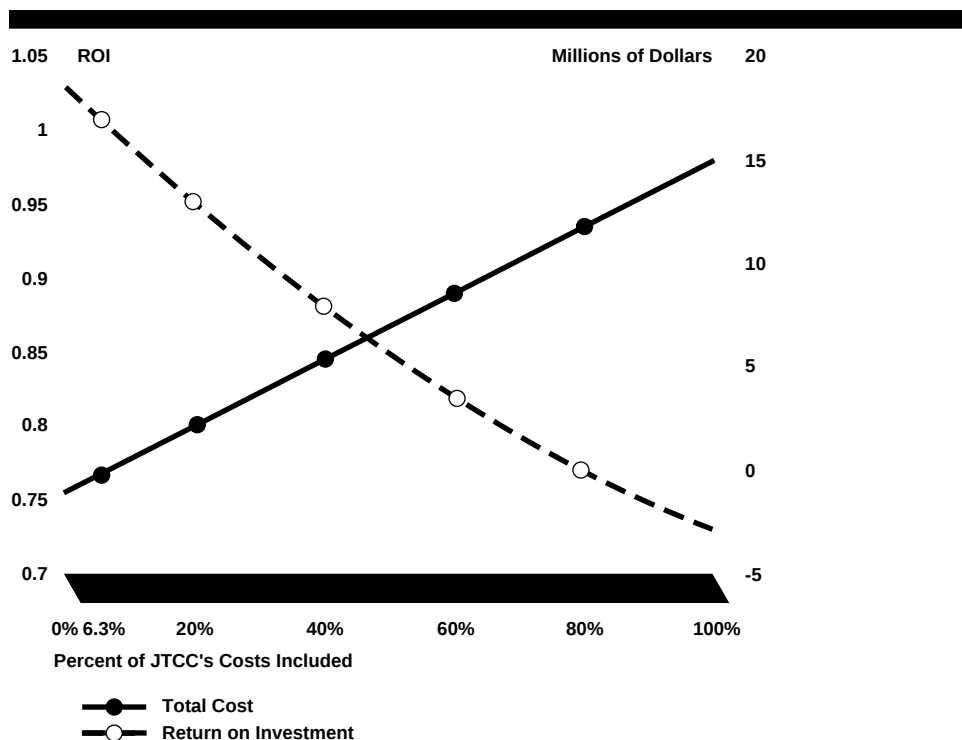
If JTCC had included these costs in its systems selection analyses, it would have found that the overall return on investment would have decreased. For example, as stated above, \$16 million in costs related to JTCC's own work on migration systems was excluded from analysis. JTCC was unable to attribute a specific percentage of these costs to its work on selecting the seven systems for which in-house alternatives competed against one another. However, if just 6.3 percent of this \$16 million were factored into the analysis, Defense would barely break even on its investment in those systems. Moreover, as figure 1 shows, Defense would actually lose money on its investment if more than 6.3 percent were included.<sup>10</sup>

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<sup>9</sup>All costs representing the understated investment have been discounted according to Department of Defense Instruction (DODI) 7041.3.

<sup>10</sup>JTCC reviewed GAO's analysis of competing system costs and savings, concluding that the GAO analysis is mathematically sound but does not address cost savings and avoidances documented in the January 1996 A Business Case Study for Transportation Systems Migration.

**Figure 1: Migration System Cost When JTCC's Migration Related Costs Are Included**



Still, even if recommending migration systems were accomplished for free—the estimated reduced cost associated with the selected alternatives (\$1.02 million) would be suspect since JTCC did not verify the system costs used in selecting the migration systems. Unlike the information obtained on each system's functional and technical capabilities—which JTCC meticulously verified—system cost information was taken at face value. JTCC officials concede that the costs used for its analyses were very rough and resulted in inaccurate, low estimates of migration system costs.

Further, since JTCC's migration systems selection methodology emphasized the importance of meeting current functional requirements, JTCC's analyses of in-house systems excluded the required quantification and comparison of new benefits. Although JTCC officials stated that the benefits of migration systems go beyond meeting current functional requirements, benefits such as operating more easily in remote locations and improving military readiness were not addressed in the migration system decision documents and remain unquantified. These decision documents instead

## JTCC's Business Case Justification

focus on quantifying each system's current functional and technical merits to the exclusion of new benefits a system may offer.

Although the transportation migration systems were selected and approved prior to April 1995, Defense continued to prepare justification for its migration systems selections—culminating in a January 1996 study entitled A Business Case Study for Transportation Systems Migration. This case study documents additional projected cost savings and avoidances that were not considered during the migration systems selection process. However, these estimates of cost savings and avoidances are not reliable for a number of reasons.

In its business case study, JTCC estimates that the transportation migration strategy will produce cost avoidances and savings of \$4 billion. However, the validity of this figure is questionable. First, JTCC relied on cost estimates from 13 different sources using a variety of forecasting horizons (from 4 to 17 years) without consistently accounting for the timing of estimated costs and benefits. OMB Circular A-94 and DOD Instruction 7041.3 identify the timing of costs and benefits as an important consideration in deciding whether a government program can be justified on economic principles. These regulations further require that estimated gains and losses occurring in different time periods be converted to a standard unit of measurement that accounts for the time-value of money.

Second, JTCC did not report estimated savings and avoidances in a constant base-year's dollars. By mixing base-years, JTCC has failed to show the expected benefits and costs associated with the transportation migration systems in terms of meaningful, actual purchasing power.

Third, Defense would be expected to realize \$3.75 billion (93 percent) of the reported \$4 billion in savings and avoidances whether or not the migration strategy was implemented. For example, JTCC estimates that Defense will avoid and/or save \$92 million by implementing and operating the TC-AIMS II migration system over a 13-year period. However, the Air Force's CMOS system, which is now a component of the TC-AIMS II migration system, predates the migration effort and was expected to save \$57 million—without being implemented in any service but the Air Force.

The remaining savings and avoidances that can be attributed directly to migration are comprised of estimates that rely on questionable assumptions. For example, JTCC assumed that each legacy system, if not terminated, would attempt to acquire all the functionality that a fielded

migration system would have. Based on this assumption, JTCC calculated that Defense will avoid \$101 million in costs for the legacy systems that competed as in-house alternatives. For example, JTCC estimated that by migrating to the TC-AIMS II system, Defense will avoid spending \$17.4 million between fiscal year 1998 and fiscal year 2001 to upgrade the unit movement function of the CMOS system. CMOS program officials maintain that this estimate is grossly high—more than double the Air Force approved budget for the entire CMOS program during the same period. Similarly, JTCC estimated that Defense will avoid spending \$18 million over the same period to upgrade the Transportation Coordinator - Automated Command and Control Information System (TC-ACCIS) unit movement functionality. This estimate increases by nearly 28 percent prior estimates for the entire TC-ACCIS program that already include system enhancements.

Another \$96 million in migration-related cost avoidances are associated with Defense's data standardization, functional process improvement, electronic data interchange, and Defense Logistics Management System (DLMS) efforts. This estimate may overstate software maintenance costs by as much as \$61.7 million, since it does not consider maintenance costs that legacy systems already planned to incur over the next 5 years. JTCC officials stated that preparing a cost analysis that takes into account what each program already planned to spend for software maintenance would require a level of visibility into each system that JTCC does not have.

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## System Selections Did Not Consider Potential Impact of Changes to Transportation Operations

In May 1995, Defense launched an effort to reengineer the Department's transportation processes, focusing first on transportation acquisition and financial payment/billing processes. According to the Assistant Deputy Under Secretary of Defense for Transportation Policy, this effort will examine transportation issues from a top-down perspective and will change Defense policies to affect the way work is done in the transportation acquisition and finance areas. Defense expects the reengineering of its remaining transportation processes to be completed within the next 6 years.

In making its migration system selections, however, Defense did not assess the impact that these changes and other potential significant changes to transportation operations—such as outsourcing—would have on its system selections. Consequently, Defense may end up investing in systems that do not provide positive investment returns before such changes to transportation operations are made.

For example, Defense plans to spend \$63 million from fiscal year 1996 through fiscal year 2001 to implement a migration system that will automate and standardize the moving, storing, and managing of personal property for Defense personnel. At the same time, the Department is considering the outsourcing of major components of the personal property function. If outsourced, contractors will perform the management, administrative, and operational duties that Defense now performs for personal property movement and storage. As a result, further spending on the migration system may be questionable since the system may no longer be needed.

Also, in following its migration strategy, Defense believes that the implementation of migration systems will resolve some of its process problems that may be more appropriately addressed through reengineering. For example, to alleviate water port loading dock congestion during full-scale deployment, Defense has selected a migration system to more quickly develop plans for loading ships. This system, the Integrated Computerized Deployment System (ICODES), is capable of dramatically reducing the time required to plan the load. However, without performing a thorough analysis of the nature of dock congestion, Defense cannot expect its load planning migration system to alleviate the congestion. In fact, according to an ICODES program official, port congestion is not caused by lengthy planning times. Rather, unit commanders load more equipment than necessary since they do not believe that all of it will arrive at the right location when needed. According to the official, this problem was so severe during Operation Desert Storm that unit commanders were typically bringing division-size loads to port.

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## Conclusions

Defense's initial approach to selecting and implementing transportation migration systems was systematic, communicated in a written plan, and agreed to by departmentwide transportation process owners and stakeholders. It was geared to ensuring that the Department chose systems that would meet its needs in the most cost-effective fashion. However, faced with the March 1997 deadline, Defense deviated from this approach and selected systems that may not provide much new savings or, in some cases, will actually lose money.

We believe Defense's management approach to implementing its transportation system migration strategy was shortsighted. By not considering alternatives, not relying on complete cost estimates, and by

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not assessing the potential impact of outsourcing and reengineering on its migration systems, Defense essentially gambled that systems migration would achieve anticipated savings and resolve problems with transportation business processes. As a result, these selections may turn out to be poor investments and preclude the use of better commercial alternatives.

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## Recommendations

We recommend that the Secretary of Defense direct the Deputy Under Secretary of Defense for Logistics to complete the following actions.

- To ensure that positive investment returns are achieved before reengineered or outsourced processes are implemented, immediately establish current cost, benefit, investment return, and schedule baselines for the seven migration systems<sup>11</sup> that were selected from among in-house legacy systems.
- For these systems, terminate the migration of transportation systems for which migration is shown to be a poor investment.

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## Agency Comments and Our Evaluation

The Department of Defense provided written comments on a draft of this report. The Deputy Under Secretary of Defense for Logistics partially concurred with the report's recommendations and stated that Defense would terminate systems that are shown to be poor investments. Defense's response to this report is summarized below, along with our evaluation, and is presented in appendix II.

In its response, Defense stated that its selection of migration systems was driven by the Deputy Secretary of Defense's October 1993 memorandum which directed expedited selection and implementation of migration systems. Further, Defense stated that in accordance with DOD 8020.1, it selected transportation migration systems based primarily on their ability to improve support to the warfighter and enhance readiness. Defense added that cost effectiveness and economic factors were also considered when selecting migration systems.

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<sup>11</sup>These seven systems are: (1) Cargo Movement Operations System (CMOS), (2) Air Loading Module (ALM), (3) Integrated Computerized Deployment System (ICODES), (4) Consolidated Aerial Port System II (CAPS II), (5) Navy Material Transportation Office Operations and Management Information System (NAOMIS), (6) Joint Flow and Analysis System for Transportation (JFAST), and (7) Marine Corps Transportation Coordinator's Automated Information Management System and Air-Ground Task Force Deployment Support System (TC-AIMS(MC)/MDSS II).

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We recognize that the October 1993 memorandum was the primary basis for migration system selections. However, we believe that Defense erred in implementing the memorandum, because it did not follow its own regulations on systems development life cycle management. These regulations are designed to ensure that all essential ingredients to making sound business decisions are incorporated into all major technology investment decisions. In particular, DOD 8120.1-M directs that migration system selections be based on functional economic analyses (FEA) and that migration systems follow DOD life cycle management policies and procedures, to include making maximum use of commercial off-the-shelf (COTS) products. However, despite these requirements, Defense had just one up-to-date FEA available at the time it made its transportation migration selection decisions. Further, the analyses that Defense conducted in lieu of preparing the required FEAs did not (1) adequately consider alternatives (such as the use of COTS products), (2) rely on complete, verified cost and benefit data, and (3) consider the potential impact of change to transportation operations that reengineering would have on its system selections.

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We are sending copies of this report to the Ranking Minority Member of the Subcommittee on Military Readiness, House Committee on National Security; the Chairmen and Ranking Minority Members of the Senate and House Committees on Appropriations, the Senate Committee on Armed Services, the Senate Committee on Governmental Affairs, and the House Committee on Government Reform and Oversight; the Secretaries of Defense, the Army, the Navy, and the Air Force; the Director of the Office of Management and Budget; the Commander-in-Chief, U.S. Transportation Command; and other interested parties. Copies will be made available to others on request.

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If you have any questions about this report, please call me at (202)512-6240 or Franklin W. Deffer, Assistant Director, at (202)512-6226. Major contributors to this report are listed in appendix V.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'J. Brock, Jr.', with a stylized, flowing script.

Jack L. Brock, Jr.  
Director, Defense Information  
and Financial Management Systems

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**Abbreviations**

|        |                                    |
|--------|------------------------------------|
| ADANS  | Airlift Deployment Analysis System |
| AF/LGT | Air Force Transportation           |
| ALM    | Air Loading Module                 |
| AMC    | Air Mobility Command               |
| AMP    | Analysis of Mobility Platform      |

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|--------------|------------------------------------------------------------------------------|
| AMS          | Asset Management System                                                      |
| CanTRACS     | Canadian Transportation Automated Control System                             |
| CAPS II      | Consolidated Aerial Port System II                                           |
| CFM          | CONUS Freight Management System                                              |
| CFM(HOST)    | CONUS Freight Management (freight and cargo transportation services support) |
| CFM(FM)      | CONUS Freight Management (field module)                                      |
| CIM          | Corporate Information Management                                             |
| CINC         | Commander-in-Chief                                                           |
| C2IPS        | Command and Control Information Processing System                            |
| CMOS         | Cargo Movement Operations System                                             |
| CONUS        | Continental United States                                                    |
| COTS         | commercial off-the-shelf                                                     |
| DAMMS-R      | Department of the Army Movement Management System-Redesign                   |
| DLA          | Defense Logistics Agency                                                     |
| DLMS         | Defense Logistics Management System                                          |
| DOD          | Department of Defense                                                        |
| DTS          | Defense Transportation System                                                |
| DTTS         | Defense Transportation Tracking System                                       |
| ELIST        | Enhanced Logistics Intra-Theater Support Tool                                |
| FEA          | functional economic analysis                                                 |
| GDSS         | Global Decision Support System                                               |
| GOPAX        | Groups Operational Passenger System                                          |
| GSA          | General Service Administration                                               |
| GTN          | Global Transportation Network                                                |
| IBS          | Integrated Booking System                                                    |
| ICODES       | Integrated Computerized Deployment System                                    |
| IC3          | Integrated Command, Control, and Communications                              |
| IDP          | Integration Decision Papers                                                  |
| ITO          | Installation Transportation Office                                           |
| ITV-MOD      | In-Transit Visibility Modernization                                          |
| ITV-MOD HOST | ITV-MOD Headquarters On-Line System for Transportation                       |
| JALIS        | Joint Air Logistics Information System                                       |
| JFAST        | Joint Flow and Analysis System for Transportation                            |
| JTCC         | Joint Transportation CIM Center                                              |

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|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| MOBCON             | Mobilization Movement Control                                                                                                                   |
| NAOMIS             | Navy Material Transportation Office<br>Operations and Management System                                                                         |
| OMB                | Office of Management and Budget                                                                                                                 |
| PRAMS              | Passenger Reservation and Manifest System                                                                                                       |
| TC-AIMS            | Transportation Coordinator's Automated<br>Information Management System                                                                         |
| TC-AIMS II         | Transportation Coordinator's Automated<br>Information Management System II                                                                      |
| TC-AIMS(MC)/MDSSII | Marine Corps Transportation Coordinator's<br>Automated Information Management Systems<br>and Air-Ground Task Force Deployment<br>Support System |
| TC-ACCIS           | Transportation Coordinator Automated<br>Command and Control Information System                                                                  |
| TMO                | Traffic Management Office                                                                                                                       |
| TOPS               | Transportation Operational Personal Property<br>System                                                                                          |
| TRAC2ES            | TRANSCOM Regulating and Command and<br>Control Evacuation System                                                                                |
| USTRANSCOM         | U.S. Transportation Command                                                                                                                     |
| WPS                | Worldwide Port System                                                                                                                           |

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# Scope and Methodology

In addressing our objectives, we reviewed ongoing efforts within Defense to contain DTS costs by eliminating redundancy in automated information systems and in the business processes they support. We examined a number of governing criteria including GSA's information resources management regulations; OMB policies and procedures for managing federal information resources; and Defense directives and instructions pertaining to acquisition of automated systems, defense information management, and life cycle management of automated information systems. We evaluated plans and actions to select migration systems and improve key transportation processes including USTRANSCOM's Defense Transportation System 2010 Action Plan and 2015 Strategic Plan; the DOD Transportation Process Improvement, Systems Migration, and Data Standardization Plan; and 21 Integration Decision Papers justifying migration selection decisions. We analyzed Defense's cost containment strategy including comparing investment costs among competing systems and identifying costs associated with systems not selected for retention. In performing our investment analysis, we used cost data published in the Integration Decision Papers, which the JTCC had not validated but considered the best data available.

We worked primarily with officials at USTRANSCOM's JTCC, Scott Air Force Base, Illinois, to determine the regulating criteria, methodology, and status of Defense's cost containment and streamlining efforts. We also interviewed the Deputy Director for Command, Control, Communications, and Computers at the Military Sealift Command, Washington Navy Yard, Washington, D.C.; the Program Manager for the Global Transportation Network; the Assistant for Travel and Transportation Management to the Assistant Deputy Under Secretary for Transportation Policy-Logistics; staff at Air Force Transportation (AF/LGT), Deputy Chief of Staff (Logistics); and the former Transportation Management Division Chief, Directorate of Transportation Energy and Troop Support, Office of the Deputy Chief of Staff for Logistics, Department of the Army. To see migration projects firsthand, we interviewed representative officials and received demonstrations of CMOS at Gunter Air Force Base, Montgomery, Alabama; Navy Material Transportation Office Operations and Management Information System under development at Norfolk Naval Base, Norfolk, Virginia; Consolidated Aerial Port System II and Passenger Reservation and Manifest System systems at Charleston Air Force Base in Charleston, South Carolina; and Worldwide Port System in operation at the Military Traffic Management Command's Major Port Command in Charleston, South Carolina. To better understand overall transportation issues, we interviewed the Chairman, Information Technology Committee, American

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Association of Port Authorities; and the manager of the Systems and Programming Information Services, South Carolina State Ports Authority. We interviewed the Vice President for Technology at Boeing Information Services regarding private industry system migration efforts. We also provided status briefings to the Assistant Deputy Under Secretary of Logistics (Transportation Policy) at the Pentagon in Arlington, Virginia.

Our audit was performed from June 1995 through May 1996 in accordance with generally accepted government auditing standards.

# Comments From the Department of Defense

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



ACQUISITION AND  
TECHNOLOGY

## OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON  
WASHINGTON DC 20301-3000



07 AUG 1996

(L/TP)

Mr. Gene L. Dodaro  
Assistant Comptroller General for Accounting  
and Information Management  
U. S. General Accounting Office  
Washington, DC 20548

Dear Mr. Dodaro:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report dated June 27, 1996, "DEFENSE TRANSPORTATION: Migration Systems Selected Without Adequate Analysis," (GAO Code 511320/OSD Case 1178). The Department partially concurs with the report.

The detailed DoD comments addressing the report findings and recommendations are provided in the enclosure. The DoD appreciates the opportunity to comment on the GAO draft report.

Sincerely,

John F. Phillips  
Deputy Under Secretary  
of Defense (Logistics)

Enclosure



GENERAL ACCOUNTING OFFICE (GAO) DRAFT REPORT - DATED JUNE 27, 1996  
(GAO CODE 511320) AIMD-96-81

“DEFENSE TRANSPORTATION: MIGRATION SYSTEMS SELECTED WITHOUT  
ADEQUATE ANALYSIS”

\* \* \* \* \*

RECOMMENDATIONS

**RECOMMENDATION 1:** GAO recommended the Secretary of Defense direct the Deputy Under Secretary of Defense for Logistics to ensure that positive investment returns are achieved before reengineering or outsourced processes are implemented, immediately establish current cost, benefit, investment return, and schedule baselines for the seven migration systems that were selected from among in-house legacy systems.

**DoD RESPONSE:** Partially concur. The strategy for selecting and implementing transportation migration systems was based on the October 1993 Deputy Secretary of Defense guidance which directed the expedited selection and implementation of migration systems and noted that completion of functional process improvement projects was not a prerequisite to the implementation of migration systems. DoD developed a best-value strategy for selection of transportation migration systems that would provide for the right functional and technical decisions and still consider cost relationships. This best-value approach was preferred to meet the primary objective of supporting the warfighter. In conjunction with the functional and technical analyses, economic factors for each system were collected and evaluated. This selection process allowed the DoD to rapidly reduce the number of systems currently maintained to support similar functions. With a reduced number of migration systems, the Department is better postured to improve readiness, decrease system maintenance and enhancement costs, and increase support to the warfighter through functional process improvement and data standardization. Cost and schedule baselines have been established for all 23 migration systems. Functional economic analyses have been completed or are in progress, where applicable.

It should be noted that the Joint Transportation Corporate Information Management (CIM) Center (JTCC) assessed 120 DoD transportation systems and recommended 65 systems for elimination; 23 systems were approved as migration systems. Fourteen systems were not transportation systems and decisions are pending on the remaining 18 systems. It is not clear as to which seven of the 23 selected migration systems the recommendation addresses.

**RECOMMENDATION 2:** GAO recommended that the Secretary of Defense direct the Deputy Under Secretary of Defense for Logistics to terminate the migration of transportation systems for which migration is shown to be a poor investment.

Enclosure

See comment 1.

**DOD RESPONSE:** Partially concur. Consistent with DoD 8020.1 guidance, the principal factor for selecting the migration systems was the functional capabilities provided to the transportation community which will enhance readiness and improve support to the warfighter. Cost effectiveness and other economic factors for each system were also considered when selecting migration systems. The functional analysis was performed by personnel familiar with the transportation systems operations in both peace and wartime conditions. Automated information systems technical personnel evaluated each system for its potential for future technical improvement. While Net Present Value and Return on Investment were not formally documented, key economic indicators were considered during the selection of the 23 migration systems.

Migration system decisions were, and will continue to be, based on a sound best-value strategy, which includes functional and technical assessments as well as cost considerations. The Deputy Under Secretary of Defense for Logistics will continue oversight of the migration systems to ensure best value to the warfighter is preserved. Should the DoD identify a transportation migration system which is determined to be a poor investment in terms of the best-value selection criteria, the Department will terminate the migration.

Enclosure

**GENERAL COMMENTS**

See comment 2.

1. The reference to 28 transportation migration systems is incorrect; 23 migration systems were selected. The systems listed in Appendices III and IV included the Cargo Movement Operational System (CMOS) and Consolidated Aerial Port Subsystem II (CAPS II) legacy systems and did not recognize the three Global Transportation Network (GTN) applications (Analysis of Mobility Platform (AMP), Joint Flow and Analysis System for Transportation (JFAST), and TRANSCOM Regulating and Command and Control Evacuation System (TRAC2ES)) as components of GTN. Further, three systems (not four) were identified as "interim migration" systems for further evaluation to determine if other Government or commercial systems could be used.

See comment 3.  
Now on p. 8.

2. Pg 14 - CMOS provides cost and operational benefits, and a positive return on investment. A February 1995 Air Force paper showed a favorable benefit to cost ratio of 1.76. CMOS showed a positive Net Present Value of \$98.4M in constant FY 1994 dollars.

Enclosure

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The following are GAO's comments on the Department of Defense's letter dated August 7, 1996.

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## GAO Comments

1. We have clarified our recommendation to specify the systems requiring cost, benefit, investment return, and schedule baselines.
2. According to Defense, the total number of migration systems is 23, while the report states the number as 28. The 28 figure cited in our report is based upon the signed July 1995 memorandum from the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence which identifies 26 of the 28 migration systems listed in appendixes III and IV. The additional systems not listed in the memo, the Analysis of Mobility Platform (AMP) and Joint Flow and Analysis System for Transportation (JFAST) are identified in JTCC's Integration Decision Papers (IDP) as the two systems supporting the future operations component of the Global Transportation Network (GTN). The IDP for the transportation planning and execution functional area specifically recommends that Defense select AMP and JFAST as the migration system for the future operations subfunctional area. Further, while Defense does not identify in its response which one of the four interim migration selections is incorrect, our report identifies the four systems as interim migration selections based upon information in the January 1996 A Business Case Study for Transportation Systems Migration.
3. According to a February 1995 Air Force paper, CMOS provides cost and operational benefits and a positive return on investment. However, these benefits and returns are relevant to the CMOS system only when it is deployed within the Air Force—but not to any other military service as a migration system. The figures cited in the February 1995 paper are based on a CMOS Functional Economic Analysis that is nearly 4 years old and that predated the migration effort. And although the February 1995 paper included some cost avoidances that were not considered in the CMOS FEA, it did not include an analysis of costs and benefits associated with migrating CMOS to the other military services. We modified our report to reflect that implementing CMOS as a migration system is a losing proposition.

# Transportation Business Functions and Supporting Migration Systems

| Transportation Business Process                                                                                                                                                                                                                                                                  | Supporting Migration Systems                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unit Movement - creation and maintenance of a unit deployment database, movement of units to marshaling and staging areas, identification of deployment and redeployment needs                                                                                                                   | — Transportation Coordinator's Automated Information Management System II (TC-AIMS II)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Installation Transportation Office/Traffic Management Office (ITO/TMO) - receive movement requirements; plan, monitor, and conclude movements; screen potential carriers; order conveyances; reserve space on scheduled carriers; and produce documentation for billing and statistical purposes | — Cargo Movement Operations System (CMOS)<br>— CONUS Freight Management (CFM)<br>— Canadian Transportation Automated Control System (CanTRACS)<br>— Passenger Reservation and Manifest System (PRAMS)<br>— Groups Operational Passenger System (GOPAX)<br>— Transportation Operational Personal Property System (TOPS)                                                                                                                                                                                                                                                                                                                                                   |
| Load Planning - planning to fit cargo, vehicles, and equipment onto specific aircraft, ships, and rail cars                                                                                                                                                                                      | — Air Loading Module (ALM)<br>— Integrated Computerized Deployment System (ICODES)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Port Management - planning for arriving passengers and cargo; preparing shipments for transport; supervising terminal operations                                                                                                                                                                 | — In-transit Visibility-Modernization (ITV-MOD) Consolidated Aerial Port System II (CAPS II)<br>— Worldwide Port System (WPS)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Mode Clearance - actions taken to hand off cargo, passengers, and equipment from one transportation mode to another                                                                                                                                                                              | — Navy Material Transportation Office Operations and Management Information System (NAOMIS)<br>— Integrated Booking System (IBS)<br>— Mobilization Movement Control (MOBCON)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Theater Transportation Operations - includes all business processes described above with the primary difference being a more extensive use of service and host country organizations                                                                                                             | — Command and Control Information Processing System (C2IPS)<br>— Department of the Army Movement Management System-Redesign (DAMMS-R)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| High-Level Transportation Planning and Execution - actions performed at the Commander-in-Chief (CINC) and CINC Component levels to plan and perform deployment, operational level movement, sustainment, and redeployment                                                                        | — Airlift Deployment Analysis System (ADANS)<br>— Global Decision Support System (GDSS)<br>— ITV-MOD Headquarters On-Line System for Transportation (ITV-MOD HOST)<br>— Global Transportation Network (GTN)<br>— Analysis of Mobility Platform (AMP)<br>— Joint Flow and Analysis System for Transportation (JFAST)<br>— TRANSCOM Regulating and Command and Control Evacuation System (TRAC2ES)<br>— Enhanced Logistics Intra-Theater Support Tool (ELIST)<br>— Asset Management System (AMS)<br>— Integrated Command, Control, and Communications (IC3) Project<br>— Joint Air Logistics Information System (JALIS)<br>— Defense Transportation Tracking System (DTTS) |

Note: Two migration systems support more than one transportation function: TC-AIMS II supports the unit move and ITO/TMO functions and C2IPS supports the theater operations and theater planning and execution functions.

# Description of Transportation Migration Systems

|                                                                        |                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Airlift Deployment Analysis System (ADANS)                             | Plans and schedules transportation airlift missions for commercial aircraft and for the C-17, C-5, and C-141. The system also plans and schedules aerial refueling for the KC-10 and KC-135.                                                                                                                              |
| Air Loading Module (ALM)                                               | Performs military and civilian aircraft load planning.                                                                                                                                                                                                                                                                    |
| Analysis of Mobility Platform (AMP)                                    | Performs rapid time-phased force deployment data modeling for all transportation modes and deployment phases.                                                                                                                                                                                                             |
| Asset Management System (AMS)                                          | Manages movement tracking, repair, modification, compliance with industry and regulatory requirements, receipt and disposal of equipment, and auditing of revenues and expenses for the Defense Freight Railway Interchange Fleet and the Army's railroad container fleet.                                                |
| Canadian Transportation Automated Control System (CanTRACS)            | Routes and ranks cargo shipments originating in Canada and maintains all Canadian commercial transportation tenders and contracts.                                                                                                                                                                                        |
| Command and Control Information Processing System (C2IPS)              | Accepts aircraft mission schedule information from GDSS and then distributes the schedule data to wing activities involved in aircraft launch, loading, and recovery.                                                                                                                                                     |
| CONUS Freight Management (CFM)                                         | CFM(HOST) supports procurement of commercial freight and cargo transportation services. CFM(FM) is a field module which allows transportation officers to obtain routing and rating information via the Defense Information System Network or a commercial telephone line. CFM(HOST) and CFM(FM) together constitute CFM. |
| Cargo Movement Operations System (CMOS)                                | Supports the collection, processing, and transmission of information concerning the movement of cargo entering aerial ports located outside the continental United States. CMOS supports both peacetime and contingency operations.                                                                                       |
| Department of the Army Movement Management System - Redesign (DAMMS-R) | Supports the management of joint-use theater land transportation.                                                                                                                                                                                                                                                         |

|                                                               |                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Defense Transportation Tracking System (DTTS)                 | Provides near real-time satellite tracking of any sensitive cargo transported by commercial carriers and of classified arms, ammunition, and explosives.                                                                                                                                             |
| Enhanced Logistics Intra-Theater Support Tool (ELIST)         | Compares the planned theater arrival schedule against a theater's transportation assets, cargo handling equipment, facilities, and routes in order to produce a detailed plan of the daily flow of theater transportation including delays and constrictions.                                        |
| Global Decision Support System (GDSS)                         | Worldwide command control system for strategic airlift and air refueling.                                                                                                                                                                                                                            |
| Groups Operational Passenger System (GOPAX)                   | Performs functions associated with arranging commercial transportation for groups of 21 or more passengers by air or surface transport.                                                                                                                                                              |
| Global Transportation Network (GTN)                           | Transportation command and control system providing intransit visibility of units, passengers, and cargo during both peace and war. It also tracks patient movement and performs planning activities. GTN is the transportation command and control module of the Global Command and Control System. |
| Integrated Booking System (IBS)                               | Standardizes booking procedures for unit and nonunit ocean-eligible cargo.                                                                                                                                                                                                                           |
| Integrated Command, Control, and Communications Project (IC3) | This project consolidates four sealift transportation planning and execution systems onto one hardware platform.                                                                                                                                                                                     |
| Integrated Computerized Deployment System (ICODES)            | Facilitates ship loading by integrating digitized ship drawings and cargo data from multiple information sources.                                                                                                                                                                                    |

|                                                                                                                                                              |                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| In-Transit Visibility Modernization Consolidated Aerial Port System (ITV-MOD (CAPS II))                                                                      | Performs command and control operations, passenger operations, and cargo movement operations at Air Mobility Command (AMC) aerial ports.                                                                          |
| In-Transit Visibility Modernization Headquarters On-Line System for Transportation (ITV-MOD (HOST))                                                          | Provides for a centrally located record of on-hand cargo and cargo movements to AMC aerial ports and operating sites around the world. Maintains airlift cargo data, manifest data, and air shipment information. |
| Joint Air Logistics Information System (JALIS)                                                                                                               | Schedules all the Services' fixed-wing and rotary-wing support airlift for nontactical passengers and cargo.                                                                                                      |
| Joint Flow and Analysis System for Transportation (JFAST)                                                                                                    | Provides strategic transportation feasibility estimates.                                                                                                                                                          |
| Marine Corps Transportation Coordinator's Automated Information Management System and Air-Ground Task Force Deployment Support System (TC-AIMS (MC)/MDSS II) | Plans and supports unit deployments. Also builds and maintains a database of force and equipment data on support assets and requirements.                                                                         |
| Mobilization Movement Control (MOBCON)                                                                                                                       | Plans the routes and obtains permission to use state highways for truck convoys.                                                                                                                                  |
| Navy Material Transportation Office Operations and Management System (NAOMIS)                                                                                | Provides shipment information on clearing or challenging air-eligible cargo, supports asset visibility, and performs cargo manifesting and transportation billing processes.                                      |

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**Appendix IV**  
**Description of Transportation Migration**  
**Systems**

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|                                                                         |                                                                                                                              |
|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Passenger Reservation and Manifest System (PRAMS)                       | Performs passenger reservation services for AMC, including flight and reservation processing and passenger processing.       |
| Transportation Operational Personal Property System (TOPS)              | Manages DOD personal property movement and storage information.                                                              |
| TRANSCOM Regulating and Command and Control Evacuation System (TRAC2ES) | Provides in-transit visibility of patients, monitors patient medical equipment pools, and plans transportation for patients. |
| Worldwide Port System (WPS)                                             | Performs water port terminal management functions.                                                                           |

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