Joint Total Asset Visibility Strategic Plan

January 1999

Joint Total Asset Visibility Office
Department of Defense

Executive Summary

Joint Total Asset Visibility (JTAV) is the capability that provides commanders-in-chief, the military services, and Department of Defense (DoD) components with timely and accurate information on the location; movement; status; and identity of units, personnel, equipment, and supplies. The JTAV capability is created by fusing data retrieved from DoD legacy systems. The JTAV goal is to provide a capability that, in harmony with other DoD initiatives, facilitates improvements in the performance of DoD logistics practices. This plan is a guide for understanding JTAV's evolution, capabilities, and implementation strategies. It incorporates and supports the goals and requirements of DoD plans and initiatives, including the *DoD Logistics Strategic Plan* and the focused logistics concept of the Joint Chiefs of Staff's future warfighting concept, *Joint Vision 2010*. This plan also describes the subordinate JTAV plans that support JTAV development, fielding, testing, and interoperability as well as the milestones for JTAV's modernization and sustainment into the 21st century.

In every troop deployment this century, DoD has been plagued by a major difficulty—the inability to *see* assets as they flow into a theater and are in storage. This situation has led to direct and significant degradation in operational readiness. When assets in the pipeline are not visible, they are difficult to manage. Property is lost, customers submit duplicate requisitions, superfluous materiel chokes the transportation system, and the cycle continues. Assets at the retail level that are not visible and, therefore, not available for redistribution further compound the degradation of operational readiness. JTAV will help DoD break the cycle. Materiel that is visible in the pipeline will not be lost, customers will gain a renewed faith in the logistics system and refrain from submitting redundant requisitions, and the transportation system will not be strangled by excess property. Logistics support will be more timely, efficient, and effective.

An initial JTAV capability has been fielded to the U.S. European Command where it is being used to track the flow of materiel for peacekeeping operations in Bosnia and eastern Europe. Initial JTAV capabilities have also been fielded to the U.S. Atlantic Command, U.S. Central Command, U.S. Pacific Command, and U.S. Forces Korea. Declining resources and increasing operational commitments around the world present serious challenges for DoD. The challenges facing the DoD

logistics community include maintaining and improving joint readiness, reducing costs and inventories, improving productivity, and maintaining accountability of DoD assets. The following four strategies address the challenges from a JTAV perspective:

- *Strategy I. Continue to develop and field the JTAV capability incrementally by taking advantage of emerging technologies.* Source data will be obtained through automated information systems that support functional areas and will be accessed incrementally. Fielding schedules will be phased to allow for rapid prototyping, customer feedback, and testing during each deployment.

- *Strategy II. Integrate the JTAV capability into the overall Global Combat Support System (GCSS) and other DoD data-sharing initiatives.* The JTAV capability will be a key component of the overall GCSS. JTAV will provide the capability to access distributed data across DoD, including data on nontraditional supply assets, such as program manager materiel, unit-level operations and maintenance assets, and contractor or vendor-managed materiel. JTAV development will be used to define requirements for the DoD shared data environment necessary to achieve GCSS.

- *Strategy III. Provide tailored customer support.* JTAV's incremental building block design and adherence to DoD and commercial standards allow JTAV to be tailored to meet a variety of customer needs. To support the customers, the JTAV capability can be used alone or as a data feed to customer-developed applications. Additionally, JTAV will support access to data for decision support applications.

- *Strategy IV. Institute a continual quality improvement program.* In today's dynamic environment a key to success is to modernize by implementing change effectively. The JTAV Office will institute a program that emphasizes data quality and technology insertion.

A critical component of this strategic plan is the JTAV "to be" system architecture. The "to be" system architecture is characterized by global access to shared data at the source via a standard definition of the data and a standard access mechanism. A key element in this architecture is a mediator that provides a standard data environment definition, directs queries to the proper location, and translates data.

JTAV provides accurate and timely logistics and personnel data throughout the department. It is compliant with all major DoD data-sharing initiatives, is accessible via Web-based technology, and integrates useful emerging technologies. By maintaining a quality customer support focus, JTAV provides the tools to improve decision-making and enhance functional, operational, and business processes throughout DoD.

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Chapter 1
Introduction

Joint Total Asset Visibility (JTAV) is the capability to provide users with timely and accurate information on the location; movement; status; and identity of units, personnel, equipment, and supplies. JTAV also facilitates the ability to use that information to improve the overall performance of DoD's logistics practices. The ability to identify materiel and personnel assets and know their exact locations has long been recognized as a critical DoD need. The state of the art of today's information technology supports the development of a JTAV capability that extends worldwide to all DoD logistics and personnel activities.

PURPOSE

This plan is a guide for understanding JTAV, its major parts, their relationships, and implementation strategies. It serves as a corporate blueprint and accordingly is at a high level. This strategic plan

- reviews the background of the JTAV initiative;
- provides goals, strategies, and milestones;
- describes current capabilities; and
- presents planned improvements to the current JTAV capability.

BACKGROUND

In every major deployment in the 20th century, DoD has been plagued by one constant difficulty—the inability to *see* assets throughout the logistics pipeline. This deficiency degrades the ability to provide agile, flexible logistics. To ensure combat capability, the United States has resorted to *brute force* logistics. During Operations Desert Shield and Desert Storm, the United States shipped approximately 40,000 containers to the Middle East. More than 20,000 containers had to be opened, inventoried, resealed, and reinserted into the transportation system because personnel in theater did not know the contents or final consignees. More than 8,000 containers remained to be opened when the war ended. Until DoD institutes a comprehensive JTAV capability, similar problems will continue during future conflicts.

VISION AND MISSION

The JTAV vision is to provide a joint capability that provides access to timely, accurate, and useful data and information that enables users worldwide to accomplish their mission in full support of *focused logistics*.[1]

The JTAV mission consists of four activities:

- Complete the operational and system architectures in accordance with established guidance for the logistics and personnel segments of the Global Combat Support System (GCSS) data environment.
- Design, develop, field, and manage the JTAV logistics and personnel data environment and integrate the JTAV capability into emerging GCSS requirements.
- Work with various business areas to demonstrate the value of using the JTAV and GCSS data environment to reduce cost and increase readiness.
- Develop and implement a strategy to continually modernize the JTAV and GCSS capabilities.

JTAV SCOPE

JTAV includes wholesale and retail echelons of support as well as all military services, defense agencies, commanders-in-chief (CINCs), and commercial enterprises that use and support an item during its life cycle. The initial JTAV effort is limited to DoD, and federal agencies and commercial activities that support DoD. JTAV may eventually expand to other federal agencies, non-governmental organizations (NGO), and allied military organizations. When fully implemented, JTAV will also include visibility over blood supplies, munitions, and war reserve materiel. JTAV includes the following types of data:

- Units, their personnel, and equipment
- Personnel, equipment, and supplies in the DoD logistics system not assigned to a unit
- Supplies and equipment in supply (in-storage), transportation (in-transit), and maintenance and procurement (in-process) activities.

[1] Focused logistics is an operational concept of the Chairman of the Joint Chiefs of Staff's *Joint Vision 2010* that emphasizes the fusion of logistics information and logistics technologies.

SHORT-TERM GOALS

In the short term, JTAV will adhere to the following fundamental principles:

- Make data universally available through a standard mechanism and single access point.
- Use existing capabilities as much as possible.
- Maximize the use of commercial off-the-shelf practices, capabilities, and technologies.
- Support DoD readiness and sustainability objectives for weapon systems, equipment, and personnel.
- Provide high-quality products and services through a timely, flexible, and cost-effective worldwide capability that sustains integrated, joint, and multinational military and peacetime operations.
- Work with acquisition and maintenance managers to support total life-cycle management of weapon systems and equipment during development, production, fielding, and operational use through final disposition.
- Support the flow of logistics with relevant asset data as operations progress from peacetime to contingency and wartime.
- Focus improvement initiatives on process change and incorporate best business practices regardless of the source.

LONG-TERM GOALS

The long-term JTAV goals are to provide accurate and timely information within a specified, integrated context to enable business, functional, and operational processes to achieve benefits in the following three broad areas:

- More accurate operational planning
- Improved operational flexibility and increased combat readiness
- Reduced operating costs.

The categories are not mutually exclusive. In many cases, JTAV benefits apply to all areas. The following examples represent specific benefits that JTAV enables:

- Optimization of assets at maintenance and repair activities
- Declining backlogs at ports and depots
- More responsive supply support
- Reduced inventory levels
- More accurate operational assessment.

STRATEGIES

To meet the challenges of the JTAV mission, the JTAV Office will implement the following four strategies:

- *Strategy I.* Continue to develop and field the JTAV capability incrementally by taking advantage of emerging technologies.
- *Strategy II.* Integrate the JTAV capability into the overall GCSS and other DoD data-sharing initiatives.
- *Strategy III.* Provide tailored customer support.
- *Strategy IV.* Institute a continual quality improvement program.

These strategies are fully discussed in Chapter 4.

CRITICAL SUCCESS FACTORS

Several factors are critical to the success of the JTAV effort. The following factors are outside the control of the JTAV Office and require cooperative support by the military services and defense agencies:

- *Communications*. The JTAV concept rests on assured and reliable communications. JTAV success will be constrained by the quality and capacity of communications lines.
- *Integration*. JTAV is primarily the integration of data, automated information systems (AISs), standards, and communications networks. JTAV can facilitate the integration of functional, operational, and business processes that have operated independently.
- *Security.* Maximizing JTAV capabilities requires supporting a wide range of information exchange needs. To support the needs, several security

issues need to be addressed. The exchange of unclassified information from highly classified systems to ones with lower classifications, access controls, encryption, and data aggregation are key security issues that need to be resolved.

- *Data quality*. JTAV success depends on the quality and timeliness of the data provided to users. Data availability and data accuracy are constrained by quality controls of source system data. Because data in JTAV are readily available and consequently widely used, data providers should feel a heightened sense of responsibility to provide data that are as timely and accurate as possible.

- *Business rules*. The following two types of business rules are relevant to JTAV:

  - *Visibility business rules*. Visibility rules govern what information is exchanged, how it is exchanged, and who has access to it. Although DoD policy considers data to be a corporate, shared asset and DoD 4140.1-R prescribes logistics policy, the data providers and users are responsible for implementation.[2] Accessibility to required logistics data necessitates cooperation of service and agency owners of logistics AISs. The JTAV Office serves as a facilitator.

  - *Functional business rules*. Functional rules determine how business processes are performed and how the information is used. Business processes may be improved by taking advantage of improved visibility capabilities.. Although these rules are the responsibility of the applicable functional offices, the JTAV Office can facilitate a revision of the rules.

REPORT ORGANIZATION

The remainder of this report is organized into three chapters and six appendices:

- Chapter 2, *Current Capabilities*. Strategies are often dependent upon how far a program has progressed along the implementation schedule. This chapter discusses fielding progress and how the JTAV capability is currently being used.

- Chapter 3, *JTAV Architectures*. The JTAV "to be" system architecture is the foundation on which the JTAV capability depends. Successful migration to the new architecture is a critical component of this strategic plan.

[2] U.S. Department of Defense, *DoD Materiel Management Regulation*, DoD 4140.1-R, January 1993.

This chapter describes the JTAV "to be" system architecture and contrasts it with the current architecture.

- Chapter 4, *Challenge of Integration*. In large part, the success of the JTAV strategies hinges on successful integration. This chapter presents the major components of JTAV and complementary efforts outside the JTAV scope that require integration. This chapter also includes a discussion of the recommended JTAV strategies.

The six appendices provide additional information on the JTAV strategies:

- Appendix A, *Milestones*. This appendix identifies actions needed to implement the strategies, including key activities, organizational responsibilities, and milestones.

- Appendix B, *Organization, Metrics, and Funding*. The success of any strategy is dependent on the organizational infrastructure and financial resources supporting the effort. This appendix discusses the JTAV organization, funding program, and how the JTAV initiative will be measured for success.

- Appendix C, *Requirements*. The strategies are an outgrowth of the requirements established by the customers. This appendix provides examples of JTAV requirements for all levels of support to assist readers in understanding some needs for the JTAV capability. The requirements identified are approved by the Office of the Secretary of Defense (OSD); future requirements will be identified, prioritized, and added. The primary source document for this chapter is the *Functional Requirements Document for Joint Total Asset Visibility*.[3]

- Appendix D, *Automatic Identification Technology*. The success of the JTAV capability depends on the ability of participating AISs to quickly and accurately capture and transmit data. This appendix discusses automatic identification technology, an automated method to accomplish those tasks.

- Appendix E, *JTAV in the 21st Century*. Strategies require periodic review and adjustment. This appendix looks at logistics in the 21st century and some possible impacts on the JTAV strategies.

- Appendix F, *Abbreviations*. A compendium of abbreviations is provided for the reader's convenience.

[3] JTAV Office, *Functional Requirements Document for Joint Total Asset Visibility*, July 1997.

Chapter 2
Current Capabilities

INTRODUCTION

The JTAV Office has made steady progress and achieved regular successes since it was initiated in 1995. For several years many DoD organizations had developed asset visibility capabilities, creating *islands* of visibility within the DoD logistics system. JTAV has bridged the legacy systems and is facilitating the development of new capabilities to fill voids in those systems.

HISTORY OF PROGRESS

This strategic plan continues to follow the concepts and intent of the *DoD Total Asset Visibility Plan*[1] published in 1992. The plan served as an excellent first document to lay the foundation for the current effort. It established many JTAV ideas, such as the concept of establishing visibility of in-storage, in-process, and in-transit assets, that continue today.

In March 1993, OSD formed a DoD Asset Visibility Integration Group composed of all military services, Defense Logistics Agency (DLA), Joint Logistics Systems Center, U.S. Transportation Command (USTRANSCOM), Joint Staff, and Defense Information Systems Agency (DISA). The group capitalized on related DoD component efforts, began the integration of the Logistics Information Processing System (LIPS) with the Global Transportation Network (GTN), and sponsored fast payback efforts that could be implemented by legacy systems. For example, one effort was the visibility of consumable items at Navy and Air Force retail units by DLA. This effort required agreements on visibility and business rules as well as the integration of data in legacy systems. The agreements were achieved by making the process a win–win experience for all participants. The Asset Visibility Integration Group was disbanded in October 1993.

In March 1994, the Deputy Under Secretary of Defense (Logistics), DUSD(L), sponsored a total asset visibility (TAV) conference that generated significant interest and support for TAV by the DoD components. In September 1994, the DUSD(L) established the TAV Joint Task Force (TAVJTF) with the mission to update the original TAV plan. The new plan was drafted in April 1995 and published in November 1995 as the *Defense Total Asset Visibility Implementation*

[1] U.S. Department of Defense, *DoD Total Asset Visibility Plan*, April 1992.

Plan.[2] The TAVJTF also began development of the prototype in-theater module that eventually became "JTAV–IT (in-theater)" as well as development of the Defense Transportation Reporting and Control System (DTRACS), an in-theater tracking system similar to the CONUS based Defense Transportation Tracking System (DTTS).

In April 1995, DUSD(L) selected the Army as the Executive Agent for JTAV and established the JTAV Office. The office continued the development of JTAV–IT and deployed it to U.S. European Command (USEUCOM) in March 1996 in support of Operation Joint Endeavor and other peacekeeping operations in Bosnia and central Europe. In addition to JTAV–IT, the office has sponsored initiatives to redistribute reparable assets among the military services and monitor convoys and trains supporting Operation Joint Endeavor with radio frequency identification (RFID) devices and satellite technology under DTRACS.

In June 1998 the executive agency for JTAV was transferred from the Army to DLA.

CURRENT STATUS

The current status of the JTAV initiative is best described in terms of JTAV–IT, Global JTAV, and JTAV's relationship to the GCSS. JTAV–IT is the capability being developed for a CINC, joint task force (JTF) commander, and service component to use in an overseas theater. Global JTAV consists of additional functions, including wholesale supply and depot maintenance, for which the JTAV Office is working to improve asset visibility.

JTAV–IT

JTAV–IT provides CINCs, JTF commanders, and service components with a view of the assets in a theater. Initially, JTAV–IT included assets in the retail storage facilities of all four military services as well as war reserves in the theaters. As JTAV–IT has matured, the customer requirements have increased. Today, JTAV–IT strives to include wholesale and worldwide retail visibility. Additionally, GTN provides information on assets in-transit to a theater. Automatic identification technology (AIT) devices, through associated AISs, provide enhanced asset visibility to a theater of operation and ensure assets can be tracked from industry to foxhole. GTN and JTAV incorporate AIT capabilities into their system architectures, thus providing continental United States (CONUS) to theater asset visibility tracking information.

JTAV–IT was deployed to USEUCOM and U.S. Central Command (USCENTCOM) in 1996 and to U.S. Atlantic Command (USACOM) in 1997.

[2] U.S. Department of Defense, *Defense Total Asset Visibility Implementation Plan*, November 1995.

Although operationally oriented, the deployments to USCENTCOM and USACOM were also intended as part of a rapid prototyping strategy. The deployment to USEUCOM, on the other hand, was aimed primarily at providing operational support to Operation Joint Endeavor. In February 1998, JTAV–IT was also deployed to the U.S. Pacific Command (USPACOM).

Global JTAV

The Global JTAV mission is to ensure the required level of JTAV capability is provided to DoD's sustaining base organizations, operational units, defense agencies, and their commercial counterparts. When fully deployed, Global JTAV will track in-storage, in-process, and in-transit assets and assist in improving DoD's logistics practices. Primary Global JTAV redistribution initiatives include the interservice visibility of consumables, reparables, and maintenance activities.

The capability to provide interservice visibility of consumables has been operational since August 1994. Originally the Air Force and Navy agreed to give visibility to DLA item managers and allow them to transfer retail assets among the military services and offset procurements with retail excesses. The Army began participating in 1995. Business rules concerning stock levels and reimbursement were developed. Although participation by all military services is limited, the initiative has produced more than $30 million in lateral redistributions and more than $15 million in procurement offsets.

The capability to provide interservice visibility of reparable is being improved. Reparables are more expensive and generally considered more mission-critical than consumables. Parts repair accounts for 55 percent of logistics expenditures, which, in turn, are one-third of DoD's total budget and uses nearly half of the total manpower. Moreover, business rules for transfer and reimbursement of assets were difficult to develop. Once business rules were determined, DoD tested the concept from April–September 1997. The test bed consisted of one Navy and one Army primary inventory control activity (PICA) and one Army and one Marine Corps secondary inventory control activity (SICA). That limited test was successful in providing almost $500,000 in lateral redistributions.

Another important aspect of the Global JTAV mission is to integrate data from service legacy systems that show the capabilities of maintenance facilities and the commercial sector. The information will facilitate the repair of weapon systems and other end items in a timely, efficient, and cost-effective manner.

Relationship to GCSS

GCSS is part of the Command, Control, Communications, Computers, and Intelligence (C4I) for the Warrior (C4IFTW) concept to provide combat support information. It is a DoD initiative to provide a common data environment that allows functional combat support communities to share data and information. The

common data environment consists of standards and conventions to share data. Depending on the technologies involved, GCSS will also probably consist of data dictionaries and directories, mediator software, translation capabilities, a communications infrastructure, and hardware. Currently GCSS is focusing on the following:

- *JTAV*. One of the first applications to be made available via GCSS is asset visibility. Currently, seven CINC Integrated Priority Lists request this capability. With links to GTN that provides intransit visibility, JTAV will be able to meet warfighters' data needs.

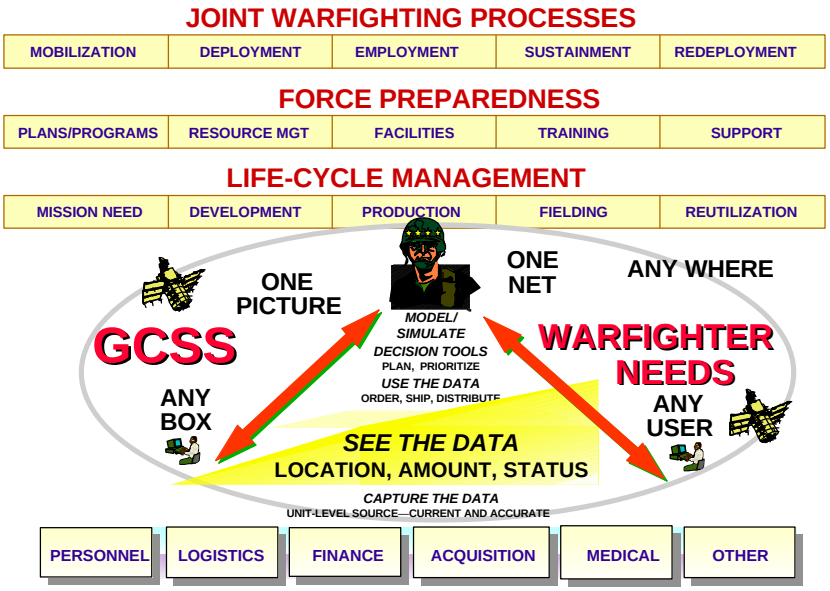
- *Joint decision support tools*. Joint decision support tools are computer tools and processes that meet CINC and user requirements to plan, execute, and monitor logistics operations and provide a common operational picture of the battlespace. The Joint Logistics Technology Office of the Defense Advanced Research Projects Agency (DARPA) is developing the tools based on CINC requirements.

- *Common Operational Picture (COP)*. The COP is a key tool for commanders in planning and conducting joint operations. The value of the COP is the display of detailed battlespace information in a graphical manner that other operational reports are unable to display. The GCSS strategy includes developing the combat support component of the COP that incorporates data from the Joint Operational Planning and Execution System (JOPES), GTN, JTAV, and other systems.[3]

GCSS uses the same tools, approach, methodology, and integration processes as the Global Command and Control System to provide C4I information. The C4IFTW concept is a commitment to meeting the warfighter's needs for information to achieve victory in any mission at any time and at any place. GCSS will achieve interoperability across combat support functions as much as JTAV will provide interoperability for logistics and personnel. The JTAV data environment forms the cornerstone of the GCSS data environment. Asset visibility is at the core of the GCSS model as depicted in Figure Chapter 2 -1.

[3] GCSS Informational Brochure at http://gcss.jsj4.com/projects/gcss/gcss-brochure.html.

Figure Chapter 2 -1. JTAV–GCSS Relationship



Functionally, the GCSS concept incorporates personnel, logistics, finance, acquisition, medical, and other support elements in a cross-functional environment. Technically, GCSS is consistent with the "any box, any user, one net, and one picture" concept. JTAV directly supports GCSS in the following three ways:

- JTAV provides the capability to *see data* in terms of identity; status; location; and movement for units, personnel and materiel. Additionally, the AIT associated with an AIS provides the automated means to *capture data* in the GCSS context.
- JTAV increases access to information for both the warfighters and corporate DoD managers.
- JTAV's operational architecture was developed using the same architectural framework as GCSS to verify functional requirements and identify information requirements.

YEAR 2000 COMPLIANCE

The JTAV Office is fully aware of the risks posed by the year 2000 (Y2K) compatibility concerns and has been proactive in ensuring minimal impact on the JTAV capability. The JTAV Office fully supported the OSD requirement to achieve Y2K validation testing of mission-critical systems by the end of 1998.

JTAV used two sets of independent auditors for overseeing the testing. The first was Lock Harbor contractors, and the second was the J4 and J6 staffs of the unified commands (e.g., USACOM, USEUCOM, USPACOM, and USCENTCOM).

The testing strategy included validation testing of the JTAV application and interface testing with CINC operational sites.

One concern raised is JTAV's ability to satisfy the validation testing requirement. The security guard hardware that supports JTAV has an e-mail function that is not Y2K-compliant. Two means can resolve the noncompliance. The first is to use the hardware platforms currently available in the JTAV inventory as a replacement; the second is to initiate a new procurement for the guard that DISA uses for its secure databases. The JTAV Program Director will make the final decision. If the decision is to adopt the strategy using the JTAV hardware platform, the security guard hardware will be replaced during the second quarter of FY99. If the decision is to acquire the DISA guard, security guard hardware will be replaced during the third quarter of FY99.

The JTAV system software is Y2K-compliant, and JTAV is capable of supporting software upgrades required at the various sites. The only outstanding action is the decision concerning the replacement of the non-compliant security guard.

SUMMARY

DoD has made steady progress toward the goal of providing accurate and timely logistics information to a wide range of users. The original TAV plan provided the foundation and underlying concepts, such as in-storage, in-transit, and in-process components that remain valid today. The *Defense Total Asset Visibility Implementation Plan* provided the direction and guidance to begin development of the prototype JTAV–IT system and its transition to operational capability.

JTAV–IT has been fielded and is working for the warfighter. JTAV–IT provides information to CINCs, JTFs, and service component commanders concerning the location, movement, status, and identity of in-storage assets in the theater. JTAV–IT also provides information on assets traveling to, through, and within a theater, if they are equipped with the appropriate AIT. Not only is JTAV–IT providing theater information to a CINC, the system is capable of accessing and providing CONUS wholesale data to a CINC for planning purposes.

Chapter 3
JTAV Architectures

INTRODUCTION

The JTAV system architecture is the foundation on which the JTAV capability depends. Successful migration to the JTAV "to be" architecture is a critical component of this strategic plan. The functionally oriented architectural basis for the initial JTAV implementation was superseded by the operationally oriented architectural framework issued as the *Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Integrated Support Activity's Architectural Framework*.[1] However, the JTAV functional architecture provided a basis for developing the JTAV operational architecture.

In 1997 the JTAV Office developed the JTAV operational and system architectures to support the joint warfighting process. (The life-cycle support and force preparedness architectures will be developed later.) The C4ISR document provides the following definitions for operational and system architectures:

- *Operational architecture.* Descriptions of the tasks, operational elements, and information flows to accomplish or support a warfighting function.

- *System architecture*. Descriptions, including graphics, of systems and interconnections that support warfighting functions.

The definitions clarify the distinctions between the two types of architectures. An operational architecture develops functional requirements, and a system architecture describes the physical capabilities that meet operational needs. A subtle but important point should be made concerning the JTAV operational architecture. As discussed in Appendix C, JTAV is a capability that facilitates improved performance for many functional or business processes, but owns no processes. Consequently, it is not feasible for the JTAV Office to develop a "to be" operational process; this task would be the responsibility of the organization or function responsible for the process. However, mapping JTAV capabilities to processes that the JTAV capability supports is a logical responsibility of the JTAV Office. A system architecture can be developed to support the processes.

[1] *C4ISR Integrated Support Activity Architectural Framework*, Version 1.0, 7 June 1996.

The JTAV architectures are documented in *Volume I, JTAV Operational Architecture,* and *Volume II, JTAV System Architecture*.[2] Both volumes will be modified to incorporate additional core processes and emerging technologies.

OPERATIONAL ARCHITECTURE

The JTAV Office developed an operational architecture to determine joint warfighting asset visibility requirements and capabilities, verify functional requirements, and identify automated systems that provide asset visibility. This architecture is compatible with the GCSS operational architecture and includes operational tasks identified by the Universal Joint Task List (UJTL).

The operational architecture consists of a narrative, process flow maps, information exchange requirements (IERs) matrices, and lists of source and receiver nodes. The process maps document the tasks that require asset visibility information to support joint warfighting. The maps also identify the high-level organizations involved in the joint warfighting process and describe the relationships among those organizations as well as a general information flow. The high-level joint warfighting tasks were derived from joint doctrine and the UJTL. These tasks were examined to identify subtasks and information flows supporting each phase. Each subactivity was directly linked to a JTAV requirement.

In developing the operational architecture, a standard process (Figure Chapter 3 - 1) was used to analyze all phases of the warfighting process.[3] Taking deployment as an example, step 1 consisted of identifying the core tasks that make up deployment. In step 2 each core task was then divided into its component activities. The activities were further decomposed in step 3 into subactivities. At this level it is possible to begin determining the JTAV information requirements necessary to accomplish each subactivity. These JTAV information requirements were documented in an IER matrix for each subactivity in step 4.

The operational architecture products were used to develop the JTAV system architecture. The IER matrix is the most critical product of the operational architecture because it expresses the relationships among the tasks, operational elements, and information flow. The IER format of the C4ISR document was tailored to link the information exchange requirements directly to the JTAV definition.[4] This approach allowed IERs to be grouped in a logical array to include all requirements and eliminate duplication.

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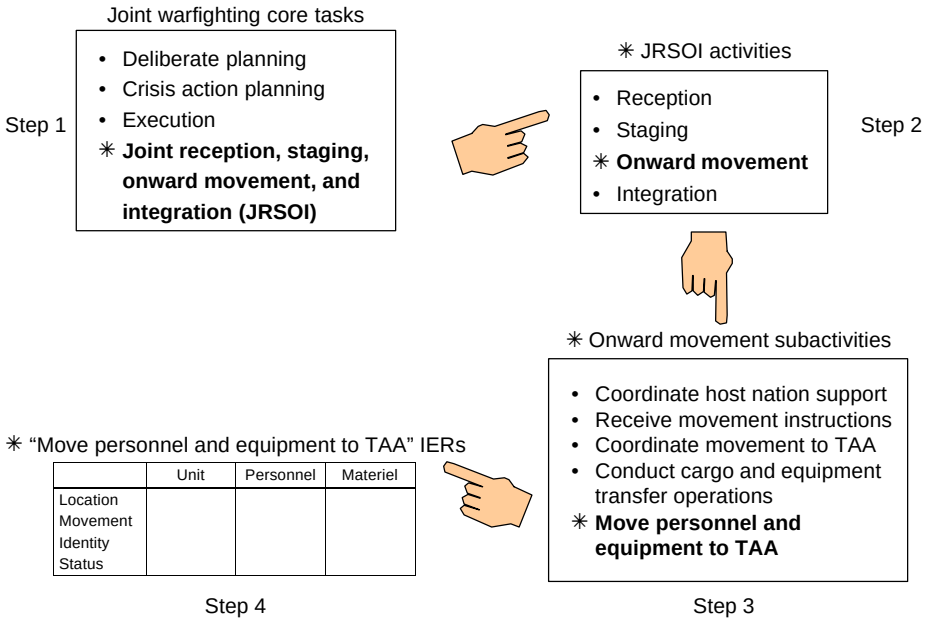
[2] *Volume I, JTAV Operational Architecture*, June 1997, and *Volume II, JTAV System Architecture*, August 1997.

[3] The operational architecture does not include the core processes of life-cycle management and force preparedness.

[4] Chapter 1 provides the JTAV definition.

Figure Chapter 3 -1. Deployment Operational Architecture Process



Note: TAA = theater assembly area.

JTAV data-access priorities are determined by this process. The data elements are used to develop the data-sharing request that the JTAV Office provides to the organization responsible for the data. Priorities for data access are determined based on the need identified in the operational architecture and IERs.

SYSTEM ARCHITECTURE

A system architecture is a description, including graphics, of systems and interconnections that support functions. In addition to a general description, it consists of system overlay diagrams and node descriptions. The initial JTAV system configuration is known as the "as is" system and depends on a database of JTAV information. The "to be" system architecture is based on providing access to data "in place" at the source as much as possible. The beta test of the architecture started in December 1998. The first operational release is scheduled for 1 April 1999.

JTAV "As Is" Architecture

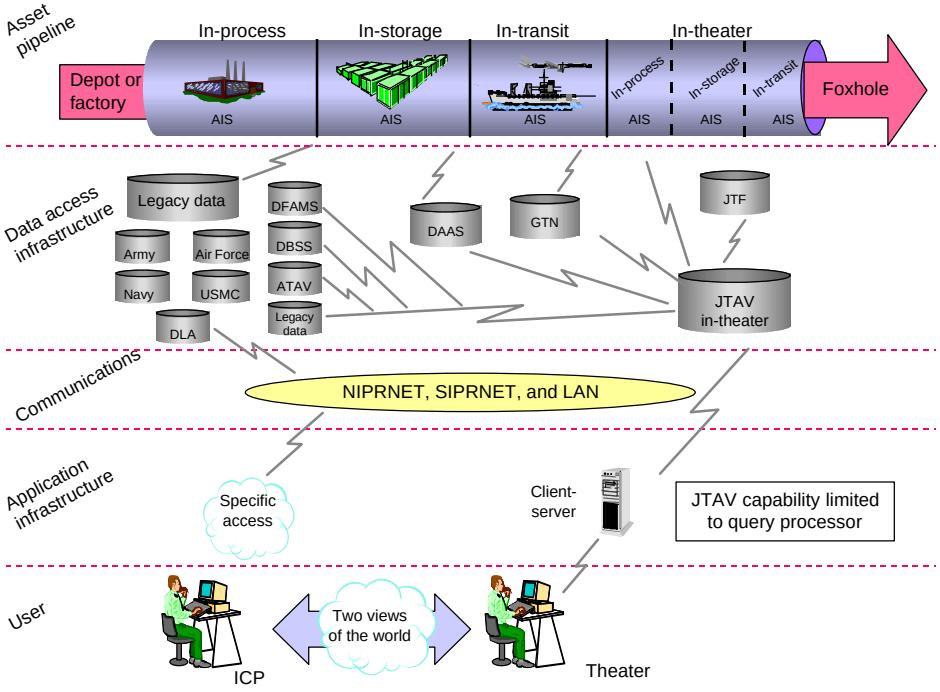
The JTAV "as is" architecture has the following significant architectural characteristics:

- Application software resides on a workstation, making configuration management and support difficult while allowing only one type of workstation to be used (single user and single box).

- The architecture does not take full advantage of Web technology.
- Information is fused when a database is loaded. As a result, ad hoc queries cannot be adequately accommodated.[5]

Figure Chapter 3 -2 depicts the JTAV "as is" system architecture. It consists of two differing world views by users. One is the theater, or operational, view—the view by a CINC or JTF—and the other is from an inventory control point (ICP), or sustainment base, perspective. JTAV supports both views by providing one account to access information previously contained in numerous data systems. Theater users access asset visibility information from the JTAV database.

Figure Chapter 3 -2. JTAV "As Is" System Architecture



Note: ATAV = Army total asset visibility; DAAS = Defense Automatic Addressing System; DBSS = Defense Blood Standard System; DFAMS = Defense Fuels Automated Management System; LAN = local area network; NIPRNET = Nonsecure Internet Protocol Router Network; SIPRNET = Secure Internet Protocol Router Network; USMC = U.S. Marine Corps.

[5] Information is fused when it is brought together from separate sources and presented in a single picture.

JTAV "To Be" Architecture

The JTAV "to be" architecture has the following significant architectural characteristics:

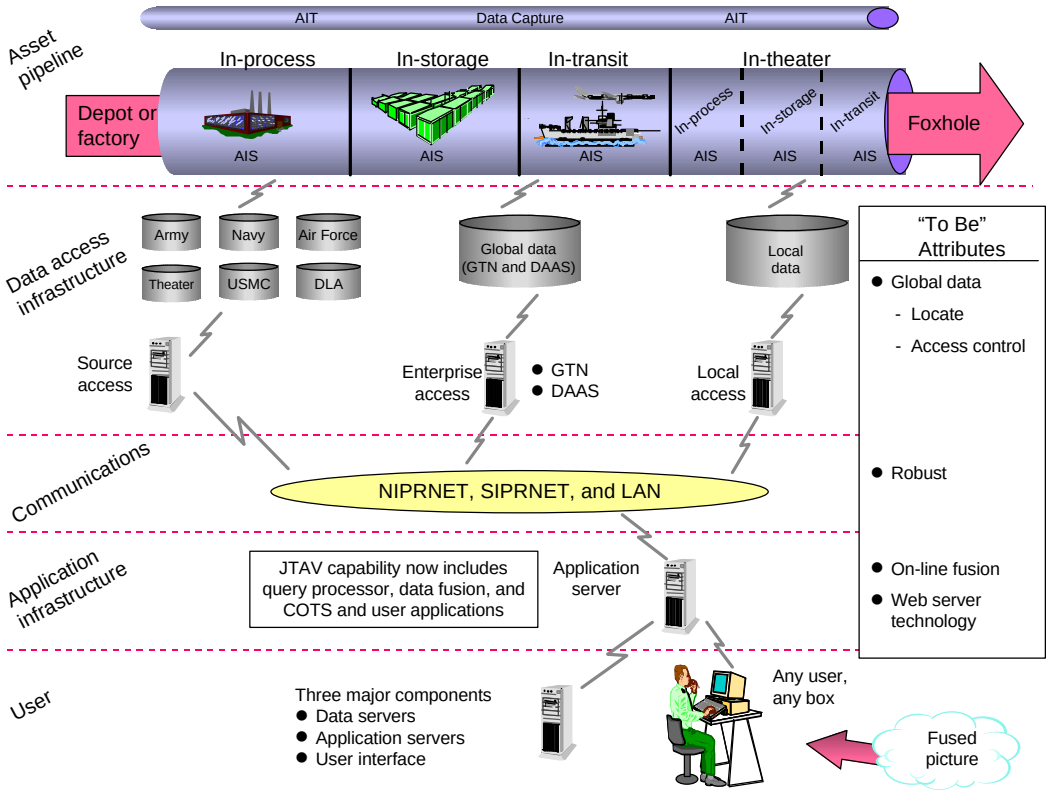
- Access to the JTAV capability is provided by a Web browser that allows a user to communicate with the JTAV application.
- Queries and responses are processed through a mediator that is configured with a dictionary that identifies the data available in the JTAV data environment and a directory that defines the location of the available data sources and their associated data elements.
- The mediator, using data translation information provided in the directory, fuses the responses into a single response for the user and passes it to the JTAV application.
- The JTAV application prepares the appropriate screen and passes the response through the Web server to the user's Web browser that displays the response.

Implementing the JTAV "to be" system architecture requires the following five conditions or qualifications:

- *Accurate operational architecture products.* Operational architecture products, particularly the IER matrices, need to be timely and accurate.
- *Fulfillment of development assumptions* Several assumptions were made to develop the JTAV "to be" system architecture. Two major assumptions are that communications capacity and response times are not constrained and that technology supporting access control and other security functions will be available.
- *Compatibility with GCSS design.* The architecture should be designed to allow JTAV extension to GCSS, support data access from commercial off-the-shelf (COTS) and user applications, comply with the Defense Information Infrastructure (DII) and Common Operating Environment (COE) framework, and serve as a baseline for COP support.
- *Migration of JTAV system architecture.* The architecture should support a migration path from the existing JTAV system architecture.
- *Responsibility for data quality.* The data provider is responsible for ensuring that data are accurate and timely.

Figure Chapter 3 -3 depicts the JTAV "to be" system architecture. It does not depend on building new databases, but relies on accessing data in place at the source as much as possible.

Figure Chapter 3 -3. JTAV "To Be" System Architecture



GENERAL OPERATING CONCEPT

The operational and system architectures are designed to support the joint warfighting process. Consequently, any general operating concept derived from those architectures maintains that perspective. The basic JTAV operating concept is simple. The JTAV capability needs to gain access to the data, fuse the data, and present the fused data to a user in a timely manner and useful format.

Data Access

The JTAV capability accesses data through data servers, the primary mechanisms that collect data and provide information. JTAV uses data resident in several databases and logistics information systems developed primarily to support functional processes. Each server accesses and aggregates data according to user needs.

The JTAV operating concept depends on three types of servers: local, global, and enterprise.

- Local servers provide access to *local* data.[6] For an overseas user, the local server allows access to theater data (e.g., data concerning assets under control of a CINC, JTF, or service component commander). Likewise, for a CONUS user, a local server allows access to CONUS data.

- Global servers provide access to data outside the theater or geographical area of a user. For example, an overseas user can use a global server to access wholesale assets. Likewise, a CONUS user can use a global server to access stocks in an overseas theater.

- Enterprise servers do not depend on a user's location and contain national-level joint information. GTN and LIPS are examples of enterprise servers. GTN collects, fuses, and integrates information concerning the Defense Transportation System.

Mediator

The mediator is the key for providing a reach-back capability directly to an authoritative data source. This concept replaces the current store-forward concept of JTAV-IT. The principal functions of the mediator are to

- respond to a data query request from an application or system,

- translate the queries into calls to the authoritative database,

- use a data dictionary and directory to determine the authoritative source, and

- fuse the database responses and return the fused response to the requestor.

The mediator should fit within the strategic vision; in other words, it should provide solutions that add value. An example is the time-critical nature of some data; (e.g., air mission data in GTN). In this case, data more than a few minutes old may be out-of-date and have no further value. A mediated solution provides near real-time updated data to ensure the most accurate and timely data possible.

Data Fusion

The JTAV capability retrieves data elements from many sources and consolidates the elements in the mediator. JTAV's capability to consolidate, or fuse, data is dependent on two primary functions—communications and data population. Un-

[6] Local data resides in a geographical area or theater.

classified communications is accomplished using the NIPRNET and classified communications is accomplished using the SIPRNET.

In the JTAV "as is" architecture, data are obtained through a data *pull* or *push* process that, in most instances, uses a file transfer protocol. In the JTAV "to be" architecture, data will be obtained using the following five-step process:

- The data dictionary defines all potential data in the environment.
- The directory identifies where the data reside and explains how to translate the data into the view defined by the dictionary.
- The dictionary and directory are installed in the mediator.
- The terminology in the dictionary is used to request data from the environment.
- The mediator uses the directory to submit requests to the data source and present the data to the user.

In addition to accessing data from numerous sources and making the data available on a single platform, the JTAV capability provides the consolidation of data into useful information. This consolidation is accomplished through the query process capability and reference tables in the server. Based on the data elements requested in the query, intelligent middleware accesses the correct database and retrieves, stores, and consolidates the data with other data to respond to a query. The reference tables are indispensable as they relate the data elements to specific queries and allow the fusion of data.

SECURITY

The JTAV Security Management Program encompasses all aspects of providing confidentiality, integrity, and availability for JTAV data accessed via JTAV applications. It supports the DoD information assurance efforts, particularly the DoD Information Technology Systems Certification and Accreditation Process in accordance with MIL-STD-5200.4D.

The objective of the JTAV Security Management Program is to provide security techniques and procedures to protect classified and unclassified information that is at least sensitive. The JTAV Security Management Program includes security for all current and future versions of JTAV, including JTAV-IT, "to be," ammunition, medical, and personnel applications. It includes technical and administrative interfaces with approval authorities, common security requirements, and security requirements of other joint AIS programs. The program encompasses all phases of development and operational deployment.

Most JTAV applications fall into the secret and below interoperability (SABI) category. The SABI process evaluates systems consisting of classified and unclassified data. The SABI process has separate approval requirements. The JTAV Office is following SABI procedures and has received fielding approval for USEUCOM, USPACOM, and USACOM.

The JTAV Office has conducted two formal risk assessments; both were on the "as is" configuration. The results of the tests provide a complete list of potential risks for the configuration. Architectural modifications have been introduced and risks have been mitigated. The first major change was the introduction of a guard to move data from unclassified to classified servers. The second change was the deletion of the graphical user interface (GUI) and the introduction of a Web-based interface using Netscape software. The development contractor will conduct a formal risk assessment for the JTAV "to be" architecture.

JTAV security procedures have been established in the following documents:

- JTAV risk management program
- JTAV concept of operations
- System administrators' manuals
- Users manuals.

SUMMARY

Operational and system architectures are the foundation for a concept of operations and should be reviewed periodically for currency and relevancy. The JTAV operational architecture provides common terms of reference, establishes common definitions, and documents asset visibility information requirements to support joint warfighting. The information requirements are documented in IER matrices that express the relationships among tasks, operational elements, and information flow.

The JTAV "to be" system architecture identifies and describes the infrastructure and components, as determined by the information exchange requirements, to support the joint warfighting process effectively. The keynote of the JTAV "to be" system architecture is access to data in place at the source and provide near real-time data access to users.

Chapter 4
Challenge of Integration

INTRODUCTION

In large part, the success of the JTAV strategies hinges on successful integration. This chapter presents major JTAV components and complementary efforts that require integration. The environment in which JTAV capabilities will be used is affected by local, national, and international events. For ease of reference, these events can be characterized as internal and external integration challenges. The internal integration challenges include the JTAV system components (for example, Army TAV, Navy TAV, GTN, and Defense Automatic Addressing System). The internal components are both the sources and receivers of data and serve as the building blocks for developing JTAV capabilities. The external integration challenges include events, plans, and strategies outside the JTAV scope and different in mission and purpose, which influence the success or direction of JTAV's implementation. Examples include the *Defense Planning Guidance* (DPG), *Quadrennial Defense Review* (QDR), and *Joint Vision 2010.*

JTAV's desired objective is the same as *Joint Vision 2010*—supporting the warfighter from a source of supply to a point of need, whether the location is a foxhole, cockpit, deck plate, or base, while maximizing the benefits of information superiority and technological innovation—also called *full spectrum supportability*. This chapter describes the supporting component efforts and the national context in which those efforts reside. This chapter also draws from related strategic plans, projects, studies, and initiatives.

EXTERNAL INTEGRATION

For many people, the term *integration* has connotations of bringing computer databases together. That view is not valid in relation to JTAV. With some exceptions (e.g., GTN and the Joint Medical Asset Repository), JTAV aims to access data in place at the source and integrate data elements from one system with data elements from other systems. On the other hand, when discussing the external elements that affect JTAV implementation, the term *integration* has a broader meaning. It means the integration of concepts, ideas, and basic principles. JTAV is working in concert with, and not against, the basic premises of other DoD initiatives.

National Objectives and Strategy

The 1990s have seen dramatic changes in U.S. national and military strategy. The reunification of Germany, end of the Warsaw Pact, and demise of the Soviet Union changed the threat facing the United States. The changing threat precipitated a shift in the focus of military strategy from a global war to diverse major regional conflicts. The new focus requires a leaner, more flexible, and more agile logistics force. Coincident to that change in threat is a realization that the world is becoming more economically interdependent. Coupled with logistics outsourcing and a decreased national industrial base on which a majority of logistics support depends, the potential exists for diminishing domestic sources of supply and a transfer to offshore sources.

National and DoD Plans and Guidance

The *National Performance Review* (NPR) is the U.S. government initiative to reform the way the federal government operates. The NPR submitted its original report, *Creating Government That Works Better and Costs Less* in September 1993.[1] Its primary principles are to put customers first, cut red tape, empower employees, and get back to basics. JTAV is a perfect example of a program designed with NPR objectives. JTAV puts customers first by providing answers to questions about assets in the logistics pipeline, and JTAV empowers employees by providing the necessary information to push decision-making down to the individual best suited to make the decision.

The DPG is published yearly and provides the annual guidance by the Secretary of Defense to DoD. The DPG lists seven strategic goals. JTAV directly applies to the following three goals:

- *Provide flexible, ready military forces and capabilities*. JTAV is a tool to increase flexibility and agility by providing accurate and timely information to improve the speed and accuracy of decisions.

- *Ensure the readiness, training, equipment, and sustainability of U.S. Armed Forces are sufficient to conduct all assigned missions successfully*. JTAV will improve readiness and sustainability by providing data to developers of tools to improve the timeliness and accuracy of logistics support.

- *Ensure exemplary management performance throughout all DoD mission areas while reducing costs.* JTAV will improve efficiency of inventory control point, depot maintenance, and retail operations by facilitating more informed and timely decisions.

[1] National Partnership for Reinventing Government, *Creating Government That Works Better and Costs Less*, September 1993, available at *http://www.npr.gov*.

The QDR was required by the Military Force Structure Review Act, which was included as part of the National Defense Authorization Act of FY97. The QDR reviewed all aspects of U.S. defense strategy and programs, including force structure, infrastructure, readiness, intelligence, modernization, and personnel. The review was a comprehensive assessment of the nation's defense requirements, based on emerging threats to U.S. security during the next two decades. JTAV was specifically mentioned in the QDR report as a key strategy enabler.

The Chairman of the Joint Chiefs of Staff developed *Joint Vision 2010,* a template for how America's Armed Forces will fight in joint military operations. *Joint Vision 2010* embraces the following four new operational concepts: dominant maneuver, precision engagement, full-dimension protection, and *focused logistics*. *Joint Vision 2010* describes focused logistics as the fusion of logistics information and transportation technologies. The vision focuses on rapid crisis response; deployment and sustainment, tracking and shifting units and materiel, and delivery of tailored logistics packages directly to the warfighter. Logisticians need to demonstrate the ability to tailor forces and resources as the nature of the threat changes from a large-scale major theater war to smaller contingencies. JTAV will be a critical enabler to accomplishing that goal.

DoD Logistics Strategic Plan

The *DoD Logistics Strategic Plan* is designed to focus attention and resources for improving logistics support to customers. Increased attention and resources will improve readiness and sustainability significantly. Additionally, the plan identifies targets of opportunity to reduce the life-cycle cost of logistics. This focus is consistent with the following long-term, overarching JTAV goals:

- Improving operational flexibility
- Reducing operating costs.

JTAV objectives are fully integrated with the *DoD Logistics Strategic Plan*. JTAV has been identified as a key objective to satisfy the DoD plan's first strategic goal—to provide timely and responsive support to warfighters and other customers.[2]

Operational Systems

The JTAV capability will be able to provide data of interest to operations personnel as well as logisticians. For the JTAV capability to be fully exploited, the data need to be integrated into operational systems, such as the Global Status of Resources and Training System (GSORTS) and JOPES. JTAV will provide the most

[2] U.S. Department of Defense, Deputy Under Secretary of Defense (Logistics), *DoD Logistics Strategic Plan,* 1998 edition, p. 20.

accurate information available on logistics assets and personnel available in the units—the same information that serves as the backbone of GSORTS reporting. Additionally, JTAV will provide the most accurate information available concerning logistics assets and personnel that have deployed—information necessary to be incorporated into JOPES. The GCSS COP will be a primary logistics interface with operational systems. JTAV support to COP is key to the full integration of logistics information into the operational picture.

INTERNAL INTEGRATION

Asset visibility requirements are affected by the way each DoD component performs its mission. For example, the Air Force usually deploys to a location that supports aircraft and subsequently remains contained to that area supporting flight operations. Navy units usually deploy on a ship, and operations remain associated with the ship. The Army, on the other hand, deploys to a location and disperses to engage in combat. As a result, the ability to provide asset visibility is more difficult. The Marine Corps has similar visibility difficulties as the Army. Consequently, each DoD component is developing an internal JTAV capability to meet its needs in relation to its assigned mission. However, the JTAV needs of the JTF commander include rapid access by a single joint user to the component initiatives. Therefore, the military services should develop their initiatives in concert with the overall JTAV concept and ensure that the data provided are as timely and accurate as possible.

Army Total Asset Visibility

The Army has been a leader in identifying visibility deficiencies and developing capabilities. ATAV is an automated capability to provide total visibility of Army assets and aid strategic decision-making by providing a single authoritative source of asset information. ATAV assimilates data from as many as 42 data sources to provide users with a correct and complete response. ATAV provides the following information:

- *Asset quantity and condition*. On-hand quantity, due-in quantity, due-out quantity, and condition.
- *Force structure* (down to company level).
- *Authorizations*. Authorized quantities for major items and retail requirement objectives for repair parts.

- *Item information*. On-line information from the Army Master Data File and Federal Logistics Information System.

- *In-transit visibility (ITV) information*. Assets by document number, stock number, voyage and flight number, transportation control number, and radio frequency tag.

Navy Total Asset Visibility

In 1992, the Navy expanded DoD's capabilities for wholesale and retail asset visibility with its Virtual Master Stock Item Record (VMSIR) program. VMSIR linked Navy wholesale, retail, and residual assets into one virtual database that enables item managers to use and redistribute assets efficiently. The Navy also worked with DLA to provide DLA access to Navy materiel. Today the Navy has achieved numerous TAV capabilities as outlined in the *Navy TAV Strategic Plan*, [3] and is developing many new initiatives that will achieve Navy, NPR and *DoD Logistics Strategic Plan* goals for TAV. The following areas are targeted for TAV:

- Afloat asset visibility for operational shipboard assets

- Sponsor-owned materiel and government-owned materiel controlled by hardware system commands and program managers

- Navy ICP and Defense Reutilization and Marketing Service (DRMS) link that permits reviews of disposal assets by an integrated materiel manager to offset procurements automatically

- Assets under repair for piece parts at both organic and commercial repair activities

- Web-based tools that educate users and expand user access to emerging DoD TAV initiatives.

Additional Navy TAV programs and initiatives are in the *Navy TAV Strategic Plan*.

Air Force Total Asset Visibility

The Air Force has been a leader in efforts to provide visibility of consumables to DLA item managers for the purpose of cross-leveling between military services. In addition, the Air Force performed two studies to establish an Air Force JTAV

[3] The *Navy TAV Strategic Plan* is available at *http://www.ntav.navy.mil.*

strategy. The first study culminated with the publication of *Total Asset Visibility—Improving Logistics Capabilities*.[4] It documents the evolution of TAV capabilities by DoD and identifies requirements for the Air Force. A follow-on study, *Total Asset Visibility—Roadmap to the Future*, specifies an execution strategy to invest in three areas—policy, education and training, and systems development and integration—to achieve an Air Force TAV capability.[5] For those areas, the Air Force has identified the following 12 initiatives (listed in priority):

- Establish a cross-functional JTAV management structure in the Air Force
- Train Air Force logisticians at technical schools on procedures related to JTAV
- Educate Air Force logisticians on how to apply JTAV and benefits it provides
- Develop an Air Force policy and procedural framework to support JTAV
- Develop Air Force procedures to distribute assets in theaters of operation efficiently and effectively
- Improve the visibility of the logistics pipeline
- Improve asset visibility between the base transportation community and base supply
- Improve the Air Force's Standard Base Supply System interface with DLA's Standard Automated Materiel Management System
- Improve the visibility of assets in storage at base level
- Implement a suite of AIT devices with the other military services to improve asset visibility
- Provide an integrated source of asset visibility data generated by base maintenance activities
- Improve the visibility of assets being repaired at depots.

Marine Corps Total Asset Visibility

The Marine Corps has embraced TAV concepts by including TAV requirements in the FY98 Installations and Logistics Campaign Plan and making TAV a

[4] U.S. Air Force, *Total Asset Visibility—Improving Logistics Capabilities*, HQ USAF/LGXX, October 1995.

[5] U.S. Air Force, *Total Asset Visibility—Roadmap to the Future*, HQ USAF/LGXX, December 1995.

required operational capability in the Marine Corps Master Plan. The Marine Corps has invested much time and many resources in developing wholesale and retail TAV programs as well as solidifying their integration with JTAV. The following initiatives encapsulate Marine Corps efforts:

- Testing and development of interservice visibility and redistribution of reparables and consumables
- TAV requirements incorporated in the Asset Tracking Logistics and Supply System, the future Marine Corps materiel management system
- Web application prototype of internal Marine Corps visibility from wholesale to consumers
- Asset visibility capability for retail use, secondary item sourcing, and redistribution
- Logistics Bases Inventory Visibility, a Web application that gives asset visibility and the ability to make redistribution decisions to wholesale activities
- An extensive education process to solidify field "buy-in" and set the foundation for TAV expansion.

Defense Logistics Agency

DLA was a leader in developing the first retail-to-retail redistribution effort facilitated by JTAV. DLA developed the Personal Computer Logistics Information Network (PC LINK), a Windows-based software package designed and developed by the Defense Automatic Addressing System Center (DAASC) and the Defense Logistics Services Center. PC LINK provides access to many logistics databases, both inside and apart from DLA, from one entry point using one user identification and password. For example, PC LINK can access the following DLA systems:

- Interrogation Requirements Information System for items available from all defense reutilization and marketing offices
- DAASC Inquiry System for communication routing identifiers, DoD activity address codes, and military assistance program address codes
- LIPS for requisition status by document number of items ordered by all military services
- Standard Automated Materiel Management System for wholesale item inventory and supply management information at DLA supply centers.

In addition, PC LINK can also access the following systems and records external to DLA:

- ATAV for the visibility of stock levels in Army commands
- VMSIR for the visibility of stocks at Navy stock points
- Worldwide Port System for the visibility of military cargo through common-use ocean ports
- General Services Administration Multi-Use File for Interagency News for the visibility of requisitions in the past 12 months.

U.S. Transportation Command

OSD assigned USTRANSCOM the responsibility to develop and implement an ITV capability. GTN is the primary tool for providing that visibility; however GTN is more than ITV. GTN is primarily the command and control system for USTRANSCOM. As a result, ITV and JTAV have no effect on the bulk of the GTN mission. Conversely, JTAV includes a broader focus than ITV (i.e., in-storage, in-process, and in-theater). As a result, JTAV and GTN have complementary capabilities. One of GTN's principles is to operate ITV source systems in a shared data environment to support real-time access to information. GTN achieved this objective in its initial operating capability in March 1997 when it became available to customers of the Defense Transportation System.

The second principle is to provide accurate, automated source data and rapid transmission to users. Several efforts, such as the Defense Transportation Electronic Data Interchange Program and Web access to GTN, address those challenges. When fully operational, GTN will access data from a variety of systems that support the Defense Transportation System. These systems include DTRACS, Transportation Coordinator's Automated Information for Movement System II, Worldwide Port System, and Global Air Transportation Execution System. The *Defense Intransit Visibility Integration Plan (Revised 1997)* provides more information on ITV.[6]

Medical Logistics Total Asset Visibility

The medical logistics community has been a leader in efforts to provide visibility of medical logistics assets in field and fixed facilities and in the commercial sector. Medical Logistics Total Asset Visibility is the ability to provide timely and accurate information on the location, status, and identity of medical equipment and supplies, including blood. This capability also includes commercial asset visibil-

[6] U.S. Transportation Command, *Defense Intransit Visibility Integration Plan (Revised 1997)*, May 1997.

ity—the capability to provide timely and accurate information on the location, movement, status, and identity of government-furnished materiel and equipment and noncontractual (commercially owned) materiel and equipment. The Joint Medical Asset Repository, the medical logistics shared data server, is the authoritative source for medical logistics data.

BUILDING THE INTEGRATED ENVIRONMENT

Building the integrated data environment for JTAV requires strategies that address the primary areas that influence the JTAV mission. Areas requiring focused effort are system development, information environment, customer support, and technology. The following focus areas and companion strategies are relevant.

Focus Areas

To enhance the JTAV capability that has been developed, the following areas need to be addressed:

- *JTAV development and fielding*. The primary thrust behind the underlying JTAV concept is to integrate and make data available to all parties who require them. The JTAV initiative is one of the largest integration efforts undertaken by DoD and will take a coordinated approach to accomplish. The JTAV system architecture takes advantage of the latest technology and architectural concepts.

- *Large number of information-sharing initiatives*. In the last several years, a large number of information and data-sharing projects have been initiated by DoD. Some initiatives set data-sharing standards as their primary goal, and some strictly promote the sharing of information. JTAV needs to leverage data standardization programs and data-sharing initiatives to expedite a complete, timely asset visibility capability.

- *Increased customer expectations for custom support*. Closely paralleling the private sector, DoD customers are beginning to expect suppliers to tailor their product to meet special needs. In many cases, customers also need assistance in determining the best way to use the data provided by the JTAV capability.

- *A dynamic, rapidly changing environment.* Today's environment is characterized by rapid change and the rate of change is accelerating. The JTAV initiative needs to identify opportunities for change early and provide the procedures to implement changes rapidly and effectively. JTAV facilitates the integration of functional, operational, and business processes that operate independently.

Strategies

To meet the challenges offered by the four focus areas in accomplishing the JTAV mission, the JTAV Office will implement the following four companion strategies:

- *Strategy I. Continue to develop and field the JTAV capability incrementally by taking advantage of emerging technologies.* Source data will be obtained through AISs that support functional areas and will be accessed incrementally. Fielding schedules to the CINCs will be phased to allow for rapid prototyping, customer feedback, and testing during each deployment. The architectural configuration has been revised to exploit Web technology and support direct, on-demand access to data at the source.

- *Strategy II. Integrate the JTAV capability into the overall GCSS and other DoD data-sharing initiatives.* The JTAV capability will be a key component of the overall GCSS. JTAV will provide the capability to access distributed data across DoD, including data on nontraditional supply assets, such as program manager materiel, unit-level operations and maintenance assets, and contractor or vendor-managed materiel. JTAV development will be used to define requirements for the DoD shared data environment necessary to achieve GCSS.

- *Strategy III. Provide tailored customer support.* JTAV's incremental building block design and adherence to DoD and commercial standards allow JTAV to be tailored to meet a variety of customer needs. To support the customers, the JTAV capability can be used alone or as a data feed to customer-developed applications. Each user community can tailor applications to improve their processes. Additionally, JTAV will support access to data for decision support applications, such as the Advanced Logistics Program, Advanced Concept Technology Demonstration, and COP.

- *Strategy IV. Institute a continual quality improvement program.* In today's dynamic environment, a key to success is to modernize by implementing change effectively. The JTAV Office will institute a shared data quality improvement program that emphasizes data quality and technology insertion that is consistent with DoD guidance.

Appendix A lists the key activities, organizational responsibilities, and milestones necessary to implement the strategies. The milestones are not intended to provide all the information necessary for implementation. Implementation plans will be required as well as numerous meetings and conferences. The milestones serve as a strategic guide for developing the detailed plans.

Appendix A consists of two tables. The first table lists the actions required by the JTAV Office. This table is organized to coincide with the major phases of the

JTAV "to be" system architecture as described in the JTAV *"To Be" System Architecture Implementation Plan*. The strategies are cross-referenced to each milestone. The second table consists of actions required by organizations external to the JTAV Office to implement the strategies. These milestones are at a high level. Each organization tasked with a milestone responsibility should carefully review the underlying requirements and establish a plan of action.

SUMMARY

Despite significant changes in national and military objectives, JTAV continues to be developed with national, DoD, logistics, and information management plans and strategies. JTAV shares common principles and objectives with the DPG, QDR, and *Joint Vision 2010*. JTAV capabilities are part of the vision in the *DoD Logistics Strategic Plan* and a key objective of that plan's goal to reduce logistics response time.

Four areas that require special attention to ensure JTAV success are system development efforts, the information environment, customer expectations, and technology change. The following four strategies address those areas:

- Continue to develop and field the JTAV capability incrementally by taking advantage of emerging technologies
- Integrate the JTAV capability into the overall GCSS and other DoD data-sharing initiatives
- Provide tailored customer support
- Institute a continual quality improvement program.

Appendix A
Milestones

The strategic milestones associated with JTAV have been grouped into two tables. Table Appendix A -1 consists of JTAV Office milestones grouped according to major tasks associated with the implementation of the "to be" system architecture. Table Appendix A -2 consists of actions for organizations external to the JTAV Office. These milestones are explained at the end of Table Appendix A -2. The strategy related to each task is identified in both tables.

Table Appendix A -1. JTAV Office Milestones

Task number	Strategy	Action task	Lead office	Date
1.1	I, II	Perform system engineering	JTAV Office	
1.1.1	I, II	Resolve security issues (high to low)	JTAV Office	Jun 99
1.1.2	I, II	Resolve security issues (access control)	JTAV Office	Sep 99
1.1.3	I, II	Ensure communications capacity and infra-structure is adequate	JTAV Office	Notes 1,2
1.2	I, II	Design and develop "to be" system architecture	JTAV Office	
1.2.1	I, II	First release	JTAV Office	Apr 99
1.2.2	I, II	Second release	JTAV Office	Sep 99
1.2.3	I, II	Third release	JTAV Office	Mar 00
1.3	I, II	Integrate data sources	JTAV Office	
1.3.1	I, II	Secondary items	JTAV Office	
1.3.1.1	I, II	Wholesale	JTAV Office	
1.3.1.1.1	I, II	First increment	JTAV Office	Apr 99
1.3.1.1.2	I, II	Second increment	JTAV Office	Sep 99
1.3.1.1.3	I, II	Third increment	JTAV Office	Mar 00
1.3.1.2	I, II	Retail	JTAV Office	
1.3.1.2.1	I, II	First increment	JTAV Office	Apr 99
1.3.1.2.2	I, II	Second increment	JTAV Office	Sep 99
1.3.1.2.3	I, II	Third increment	JTAV Office	Mar 00
1.3.2	I, II	Ammunition	JTAV Office	
1.3.2.1	I, II	First increment	JTAV Office	Apr 99
1.3.2.2	I, II	Second increment	JTAV Office	Sep 99
1.3.3	I, II	Medical	JTAV Office	
1.3.3.1	I, II	First increment	JTAV Office	Apr 99
1.3.3.2	I, II	Second increment	JTAV Office	Sep 99

Table A-1. JTAV Office Milestones (Continued)

Task number	Strategy	Action task	Lead office	Date
1.3.4	I, II	Fuel	JTAV Office	
1.3.4.1	I, II	First increment	JTAV Office	Jun 99
1.3.4.2	I, II	Second increment	JTAV Office	Dec 99
1.3.5	I, II	Personnel	JTAV Office	
1.3.5.1	I, II	First increment	JTAV Office	Jun 99
1.3.5.2	I, II	Second increment	JTAV Office	Mar 00
1.3.6	I, II	Units	JTAV Office	
1.3.6.1	I, II	First increment	JTAV Office	Jun 99
1.3.6.2	I, II	Second increment	JTAV Office	Jun 00
1.3.7	I, II	Weapon systems	JTAV Office	
1.3.7.1	I, II	First increment	JTAV Office	Jun 99
1.3.7.2	I, II	Second increment	JTAV Office	Sep 00
1.3.8	I, II	Weapon systems life cycle	JTAV Office	
1.3.8.1	I, II	First increment	JTAV Office	Sep 99
1.3.8.2	I, II	Second increment	JTAV Office	Dec 00
1.4	I, II	Develop dictionary and directory	JTAV Office	
1.4.1	I, II	First release	JTAV Office	Apr 99
1.4.2	I, II	Second release	JTAV Office	Aug 99
1.4.3	I, II	Third release	JTAV Office	Feb 00
1.5	I, II	Migrate to in-theater sites	JTAV Office	
1.5.1	I, II	USEUCOM	JTAV Office	Sep 99
1.5.2	I, II	USACOM	JTAV Office	Nov 99
1.5.3	I, II	USPACOM	JTAV Office	Jan 00
1.5.4	I, II	USCENTCOM	JTAV Office	Feb 00
1.5.5	I, II	USSOCOM	JTAV Office	Apr 00
1.5.6	I, II	USSOUTHCOM	JTAV Office	Jun 00
1.5.7	I, II	USSTRATCOM	JTAV Office	Aug 00
1.6	I, II	Field to CONUS sites	JTAV Office	
1.6.1	II, III, IV	Common Operational Picture	JTAV Office	Apr 99
1.6.2	II, III, IV	Advanced Concept Technology Demonstration	JTAV Office	Jun 99
1.6.3	II, III, IV	Business Process Reengineering	JTAV Office	Jun 99
1.7	IV	Migrate to CONUS operational support	JTAV Office	
1.7.1	IV	Maintain repository	JTAV Office	Apr 99
1.7.2	IV	Establish operational support capability	JTAV Office	Aug 99

Note 1: This milestone will be repeated for each instance of migrating to in-theater sites as described in milestone 1.5.

Note 2: This milestone will be implemented by a memorandum of agreement between the JTAV Office and the services. It will be repeated for each instance of fielding to CONUS users as described in milestone 1.6.

General Note: USSOCOM = U.S. Special Operations Command; USSOUTHCOM = U.S. Southern Command; USSTRATCOM = U.S. Strategic Command.

Table Appendix A -2. Milestones External to the JTAV Office

Task number	Strategy	Action task	Lead office	Date
2.1	I, II	Provide secure data exchange capability across security boundaries	DISA	
2.1.1	I, II	Type certification	DISA and JCS J-6	Dec 99
2.1.2	I, II	SABI tested and approved	DISA	Dec 99
2.2	I, II	Provide access controls	DISA	
2.2.1	I, II	Secure socket layer certificates for browsers	DISA	Jun 99
2.2.2	I, II	Provide password encryption	DISA	
2.2.2.1	I, II	Application to mediator	DISA	Sep 99
2.2.2.2	I, II	Data sources	DISA	Sep 99
2.3	I, II, III, IV	Ensure adequate communications capacity and infrastructure	DISA	Site by site
2.4	I, II, III, IV	Develop funding strategies		
2.4.1	I, II, III, IV	Data source integration	DUSD(L)	Jun 99
2.4.2	I, II, III, IV	Operation at data source	DUSD(L)	Jun 99
2.4.3	I, II, III, IV	Query load and processing	DUSD(L)	Jun 99
2.4.4	I, II, III, IV	Operational support capability	DUSD(L)	Jun 99
2.4.5	I, II, III, IV	Operation of JTAV data environment	DUSD(L)	Jun 99
2.5	I, II, III, IV	Access data sources		
2.5.1	I, II	Negotiate memorandum of agreement	Services and agencies	TBA
2.5.2	I, II	Prepare shared data requests	Services and agencies	Note 3
2.5.3	I, II	Prepare shared data specifications	Services and agencies	Note 3
2.5.4	I, II	Implement data interface	Services and agencies	Note 3
2.6	I, II	Field the capability		
2.6.1	I, II	Theater		
2.6.1.1	I, II	Ensure adequate infrastructure	CINC	Note 1
2.6.1.1.1	I, II	Acquire necessary hardware	CINC	Note 1
2.6.1.1.2	I, II	Acquire necessary software	CINC	Note 1
2.6.1.1.3	I, II	Ensure adequate communications	CINC and DISA	Note 1
2.6.1.2	I, II	Develop policy and procedures	CINC	Note 1
2.6.1.3	I, II	Provide adequate security	CINC and DISA	Note 1
2.6.2	I, II	CONUS		
2.6.2.1	I, II	Ensure adequate infrastructure	Services and agencies	Note 2
2.6.2.1.1	I, II	Acquire necessary hardware	Services and agencies	Note 2
2.6.2.1.2	I, II	Acquire necessary software	Services and agencies	Note 2

Table A-2. Milestones External to the JTAV Office (Continued)

Task number	Strategy	Action task	Lead office	Date
2.6.2.1.3	I, II	Ensure adequate communications	Services and agencies	Note 2
2.6.2.2	I, II	Develop policy and procedures	Services and agencies	Note 2
2.6.2.3	I, II	Provide adequate security	Services and agencies	Note 2
2.7	II, III, IV	Identify requirements	JCS J-4	
2.8	II, III, IV	Develop user tools		
2.8.1	II, III, IV	Common Operational Picture	DISA	Jun 99
2.8.2	II, III, IV	Joint Logistics—Advanced Concept Technology Demonstration	DARPA	Jun 99
2.8.3	II, III, IV	Business Process Reengineering	Services and agencies	Sep 99

Note 1: This milestone will be repeated for each instance of migrating to in-theater sites as described in milestone 1.5.

Note 2: This milestone will be implemented by a memorandum of agreement between the JTAV Office and the services. It will be repeated for each instance of fielding to CONUS users as described in milestone 1.6.

Note 3: This milestone will be repeated for each instance of obtaining data access described in milestone 1.3.

General Note: TBA = to be announced.

EXTERNAL ORGANIZATION TASKS

The tasks and milestones in Table Appendix A -2 are those associated with organizations external to the JTAV Office. For JTAV to be successful, hard work and cooperation of many organizations are required. Each organization identified in Table Appendix A -2 should closely review the responsibilities to determine if they can be accomplished in the required time.

Task 2.1 Provide Secure Data Exchange Capability Across Security Boundaries

The JTAV system architecture needs to support user access to asset status data for both classified and unclassified data sources. Users obtaining access to JTAV capabilities through an infrastructure supporting only unclassified operations shall only be allowed access to unclassified data sources. Users accessing JTAV through an infrastructure supporting a secret environment shall be provided access to both unclassified data sources and data sources classified up to secret. The general approach is for a user to obtain data access via the JTAV application configured within the enclave that the user wishes to access. For example, in those cases where a user is attached to a secret enclave and wishes secret information, the JTAV application in the secret enclave submits the queries to the mediator. In cases where a user is attached to a secret enclave and wants to obtain unclassified data, a query would be sent from the JTAV application in the secret enclave to the

JTAV application in the unclassified enclave that submits the query to the mediator.

Task 2.2 Provide Access Controls

The two primary access control functions that need to be supported across the JTAV system architecture are user identification and authentication and data access control. Only authorized users will be permitted to access data through the JTAV data environment. The proposed approach to providing these controls is to assign user identifications and authenticate the identity with a password. This approach will require JTAV components transmitting user identification and password information over unprotected communication circuits to use secure sockets to encrypt the user identification and password data. Both the JTAV application and the mediator will

- maintain an access control list to identify and authenticate users,
- maintain logs of user requests to access data sources and events related to the access provided, [1]
- be capable of locking user accounts in the case of security events or alarms, and
- record unauthorized attempts to enter the JTAV application.

Task 2.3 Ensure Adequate Communications Capacity and Infrastructure

DISA is responsible for providing communication services between user facilities to support the JTAV capability. DISA will determine if an adequate supply of both classified and unclassified lines exists and if the lines can transfer the expected loads generated by the requests for exchange of JTAV data, both in peacetime and wartime.

Task 2.4 Develop Funding Strategies

With input and assistance from the JTAV Office, the DUSD(L), as the functional proponent for JTAV, is responsible for identifying and providing required funding. The DUSD(L) also needs to develop funding strategies and policies to support integration of data sources into the JTAV data environment, the method of payment for query processing at megacenters, the long-term operational support capability, and the operation of the overall JTAV data environment. Finally, the DUSD(L) will establish priorities for providing the JTAV capability to additional user communities. Several funding issues remain to be resolved. The DUSD(L) will base

[1] The logs will relate the events to the user who initiates the request.

funding decisions on requirements and priorities after full consultation with CINCs, services, agencies, and other users.

Task 2.5 Access Data Sources

The "to be" JTAV capability is based on data sharing. Shared data are created and maintained only in a single, authoritative database, and the data are accessible to users from different applications by direct query into the authoritative database. The JTAV data-sharing process consists of the following four steps:

- *Memorandum of agreement*. The memorandum of agreement identifies the specific responsibilities of the component and the JTAV Office in the data-sharing process. It also identifies the component action officer.
- *Data-sharing request.* The data-sharing request identifies the information exchange requirements and the specific data elements requested.
- *Data-sharing specification.* The data-sharing specification describes the required infrastructure components. It identifies any required translation as well as data quality guarantees from the data provider and data security constraints on JTAV.
- *Data-sharing implementation.* Implementation includes the data access mechanism and as-built documentation. The JTAV dictionary and directory will be updated and become a configuration item.

Task 2.6 Field the Capability

The external organizations' requirements for fielding the JTAV capability are the same for a theater and CONUS. The difference is the responsible organization. In a theater the CINC is responsible. In CONUS, responsibility belongs to the services and agencies. The primary responsibility is to ensure an adequate infrastructure to support the JTAV requirements. The infrastructure includes facilities, hardware, software, local communications capability, and security. Additionally, users need to develop policies and procedures to provide guidance as to who can access certain data and how the data will be used.

Task 2.7 Identify Requirements

The functional proponent should identify and consolidate requirements from field units and advocate those requirements to the JTAV Office for inclusion in future releases. In the interest of developing one team, the functional proponent should also advocate JTAV to the field. The requirements should be stated in terms of required data elements, known sources, and use for the data.

Task 2.8 Develop User Tools

The JTAV Office is not equipped, staffed, or chartered to develop tools to use the JTAV data. That requirement rests solely with the users of the data and their agents. The JTAV Office will facilitate and advocate the development and use of those tools, and will provide data to support them. Each developer of a tool who plans to use JTAV data should determine data elements, how the data will be used, and the data source (if not currently available from JTAV).

Appendix B
Organization, Metrics, and Funding

INTRODUCTION

Performance measurement, funding levels, and the organization supporting the JTAV initiative are aspects of program management that particularly affect strategic plans. The organizational elements involved in a project and their relationships affect the strategies through roles and responsibilities. Financial resources serve as restraints that impact not only the implementation of a strategy, but also the selection of strategies. Finally, to determine if the strategies are successful, a means of measuring progress is needed.

ORGANIZATION

The method in which an effort is organized is critical to its success or failure. JTAV is organized to provide centralized direction and support while allowing field units as much discretion in execution as possible.

JTAV Council

An effective JTAV program requires continued oversight and management to maintain constancy of purpose and achieve a fully integrated effort. The DUSD(L), through the JTAV executive agent, continues as the focal point for all JTAV activities and issues that require policy and guidance. The JTAV council provides a forum for senior defense leaders to discuss JTAV issues and approve recommendations that affect the DoD logistics community. The council provides broad program guidance, oversees programs as they are executed, allocates resources, and reviews JTAV implementation progress. Chaired by the DUSD(L), the council consists of the Deputy Chief of Staff (DCS) for Logistics (or equivalent) of each military service; Director, DLA; Director, DISA; Director for Personnel and Manpower (J-1) and Director for Logistics (J-4), The Joint Staff; and Deputy CINC, USTRANSCOM. The council should meet at least every 6 months.

Executive Agent and JTAV Office

The scope of the JTAV effort requires daily oversight. The JTAV Office was established to provide that oversight for the JTAV Executive Agent (EA).[1] The

[1] The Department of the Army DCS for Logistics was the JTAV EA until 1 June 1998 when EA responsibility transferred to the Defense Logistics Agency.

EA is also responsible for providing guidance and administrative support to the JTAV Office. The JTAV Office has the following recurring responsibilities:

- Monitor execution of this plan to include periodic reviews of progress
- Advise the JTAV Council on the status of the plan's implementation
- Program and budget for JTAV activities
- Identify and recommend JTAV priorities and provide major milestones for approval by the JTAV Council
- Facilitate the development, implementation, and integration of JTAV initiatives by DoD components, other federal agencies, commercial carriers, and vendors
- Promote integration of existing AISs and identify improvements in standard systems to share and exchange information
- Refine functional requirements and monitor the ability of logistics AISs to satisfy them.

The JTAV Office may solicit technical and functional assistance on a priority basis from DoD components. Every DoD component should designate a point of contact for coordinating JTAV activities and providing feedback to the JTAV Office. In addition, the Director, JTAV Office, has the authority to obtain technical and functional analysis from federally funded research and development centers as well as private-sector organizations. Additionally, the JTAV Office may form ad hoc working groups involving DoD component representatives.

In-Process Reviews

The JTAV Office will conduct in-process reviews (IPRs) regularly. The reviews will be held quarterly or more frequently as determined by the JTAV Director. IPRs will include all members of the JTAV Office as well as all contractors supporting the JTAV effort. The JTAV Director may require separate IPRs with some contractors, but these IPRs will not replace the large IPRs. The IPRs will include the following topics:

- *High-level review of the project*. The review will include strategic changes, changes to future deliverables, or long-range issues that impact the program. The purpose is to establish the context for the future detailed briefings.
- *Deliverables due since the previous IPR*. Each contractor will provide a brief summary of the deliverable, problems encountered, and lessons learned.

- *Deliverables due in 3 months*. Each contractor will provide a briefing on deliverable contents, progress to date, problems encountered, and projected completion date.
- *Deliverables due later than 3 months*. Each contractor will provide a briefing on progress and projected completion date.

JTAV Customers

Every organization and individual that participates in the JTAV initiative is considered a JTAV customer. Generally JTAV customers can be divided into data users and data providers. A customer can be both a data user and provider, depending on the function the customer is performing. In the JTAV concept, data users and providers have certain responsibilities. Data users are responsible for reviewing requirements, providing feedback, and budgeting for valid JTAV expenses. Data providers are responsible for ensuring the data are as accurate and current as possible and providing feedback.

Other Organizations

Some organizations outside the JTAV Office who are neither data users nor data providers are critical to JTAV's success. These organizations usually provide a service that enables the JTAV capability to perform its mission successfully.

DEFENSE INFORMATION SYSTEMS AGENCY

DISA's role is critical to JTAV success. The JTAV concept is predicated on the ability to share data over long distances. As the DoD agency responsible for long-haul communications DISA has the primary responsibility for ensuring that data lines are sufficiently robust to handle the volume of data generated by JTAV. Additionally, DISA is also responsible for resolving security issues revolving around the transfer of data. These security issues include access control and protection through the COE, and the movement of unclassified data from a classified to unclassified environment.

AUTOMATIC INFORMATION TECHNOLOGY PROGRAM OFFICE

The first step in an asset visibility effort is to collect the data that need to be seen. Normally, the data are entered manually into a database. This method is not only very time consuming but is also susceptible to mistakes in data entry. AIT enables data collection and facilitates data aggregation, and transmission to AISs. The AIT Program Office provides the critical first step in achieving asset visibility, the automated capture of the data.

METRICS

Metrics are a standard of measurement. Metrics help organizations develop mission goals and objectives, quantify problems, evaluate alternatives, allocate resources, track progress, and learn from experience. Congress requires government executives to provide specific mission and program results. Program authorizations, resource decisions, and oversight requirements are increasingly determined by how well agencies meet expectations and improve performance.

The *DoD Strategic Logistics Plan* identifies capabilities to be measured and metrics for the implementation of JTAV.[2] The metrics, although adequate to measure JTAV implementation, do not address JTAV performance. Most information technology efforts are designed to support a business process (e.g., requisitioning, requirements determination, warehousing). JTAV, on the other hand, does not own a business processes, but is a tool to be used by many communities to improve their processes. Consequently, JTAV depends on the functional and business communities to use JTAV to improve their processes. As a result, only in very few cases is JTAV directly responsible for a measurable benefit. On the other hand, JTAV can cause a functional or business change that results in a measurable benefit. Reviewers of JTAV performance and performance measurement need to recognize that fact. As a result, JTAV has the following two types of performance measures:

- *Measures of how well JTAV provides access to data*. The measures consist of timeliness and accuracy of data as well as data elements provided. Because these measures are the essence of what JTAV is designed to do, they are referred to as core JTAV performance measures.

- *Measures of how well JTAV is used to improve processes to increase readiness and sustainment to the warfighters while reducing costs and the logistics footprint*. One of JTAV's primary purposes is to facilitate the "capability to act upon that information to improve the overall performance of DoD's logistics practices."[3] Consequently, many of these measures are the same as those in the *DoD Logistics Strategic Plan*. As these metrics often rely on other offices and systems, they are referred to as extended JTAV performance measures.

The core performance measures will rely on automated means to collect and measure data. The data should be primarily quantitative to measure technical performance. The extended performance measures may rely on automated means

[2] U.S. Department of Defense, Deputy Under Secretary of Defense (Logistics), *DoD Logistics Strategic Plan*, 1998 edition.

[3] U.S. Department of Defense, Deputy Under Secretary of Defense (Logistics), *Defense Total Asset Visibility Implementation Plan*, November 1995, p. iii.

of data collection but will be more dependent on cooperative reporting and may be more qualitative in terms of data collection.

Although performance measures may be useful in evaluating performance, they may not be valid for a cost-benefit analysis for two reasons. First, linking the measures directly to tangible JTAV-related benefits is difficult and inexact. Second, JTAV capabilities alone provide marginal benefit; the visibility needs to be used in a functional or operational process to provide cost savings and operational benefits.

The JTAV Office will develop a performance management plan that addresses both types of JTAV performance measures. The plan will use as a framework the performance measurement model of the General Accounting Office (GAO). The GAO states that "there is not one 'best' approach to information technology performance management. How [information technology] performance management is designed, implemented, and sustained … depends upon a multitude of contextual factors."[4] Accordingly, the GAO model will be modified to suit JTAV needs and requirements. The model uses the following phased approach:

- *Use an information technology results chain*. Build and enforce a disciplined flow from goals and objectives to measures of individual accountability. Define goals, objectives, and measures; use a diversity of measure types; and develop an assessment as to how information technology outcomes affect operational customer and enterprise requirements. Match customer goals to unit objectives to strategic direction.

- *Follow a balanced scorecard approach.* Use an information technology goal, objective, and measurement approach that translates organizational strategy into a view of operational and strategic measures. Four generic goal areas include meeting the strategic needs of the enterprise, meeting the needs of operational customers, addressing internal information technology performance, and addressing information technology innovation and learning.

- *Target measures, results, and accountability at appropriate levels of the decision-making process.* Match measures and performance results to decision-making tiers. The tiers include executives, senior to mid-level managers, and low-level managers.

- *Build a data collection and analysis capability*. Emphasize benchmarking, baselining, and the collection and analysis of performance information to minimize the administrative burden on users. Periodically review performance measures for appropriateness.

[4] U.S. General Accounting Office, *Measuring Performance and Demonstrating Results of Information Technology Investments*, September 1997, p. 9.

- *Improve performance of information technology business processes*. Map information technology business processes to enterprise and operational customer goals to determine the processes that require improvement.

Performance is defined by requirements, and requirements are determined by users and linked to their business areas. The plan will also take into consideration other data-sharing initiatives, such as GCSS and the COP. Accordingly, the JTAV performance measurement plan will be evolutionary in nature and will be developed and coordinated with CINCs, services, agencies, and other users.

PROGRAM FUNDING

The DoD components, JTAV executive agent, and JTAV Office have program funding responsibilities. The DoD components have the responsibility to fund their visibility systems. Funding of legacy system modernization is also the responsibility of the components. They are responsible for design, development, deployment, and sustainment costs of applications, infrastructure, and data conversions of these systems.

The JTAV EA has the funding responsibility for developing corporate JTAV systems. The EA has programming and budgeting responsibilities and conducts reviews to identify collaborative efforts and common resource opportunities. The EA prepares inputs to the program objective memorandum (POM) and budget for approved joint visibility systems. DoD components will be responsible for the infrastructure costs at their activities. The JTAV Office is developing funding support through the POM process. Several funding issues remain to be resolved. These issues will be resolved after consultation with appropriate CINCs, services, agencies, and other users.

The JTAV Office provides on-site contractors to perform system administration, database administration, and help desk functions. The JTAV Office and the contractor support team are responsible for all JTAV system maintenance during the initial JTAV fielding. Costs associated with operational fielding of JTAV beyond an initial fielding to a CINC is the responsibility of the CINC. Contractor personnel can assist in operational fieldings on a cost-reimbursement basis. The “to be” architecture should reduce the requirement for on-site contractor personnel. The JTAV Office will resolve that issue only after full consultation with the CINCs, services, agencies, and other users.

SUMMARY

The DUSD(L) is the focal point for all JTAV activities and issues that require policy and guidance and chairs the JTAV Council consisting of the major JTAV stakeholders. The council, chaired by the DUSD(L), consists of the DCS for Logistics (or equivalent) of each military service; Director, DLA; Director, DISA;

Director for Personnel and Manpower (J-1) and Director for Logistics (J-4), The Joint Staff; and Deputy CINC, USTRANSCOM. The council provides a forum for senior defense leaders to provide broad JTAV program guidance. The JTAV Office provides daily oversight for the JTAV executive agent.

Appendix C
Requirements

SPECTRUM OF JTAV

JTAV has been described as a system, a capability, and an activity. It is sometimes even discussed in terms of how the information is used (such as for redistribution and procurement offsets). Any of these descriptions of JTAV may be valid; however, each also obscures the basic JTAV concept. The JTAV concept is to obtain access to data, convert the data into useful information, present the information to the customer, and, where applicable, provide a customer with the ability to act on the information. Although those steps may appear to be an oversimplification, they serve as a useful point to examine JTAV functional requirements.

In order to accomplish its mission, each DoD component performs functional, operational, or business processes. Consequently, information systems and associated databases have been developed to support those processes. JTAV is not a process; rather it is a data sharing capability that supports many processes. Consequently, JTAV needs to be associated with one or more of those specific processes for its definition to gain clarity and be useful for implementation. JTAV requirements are dependent on organizations that use the capability to support one or more processes. As JTAV is primarily defined by the requirements, and the requirements are somewhat different for each supported process, the picture of JTAV from each organization performing those processes is also different. As a result, JTAV has been an elusive concept and continues to represent different concepts to many people.

ASSET CATEGORIES

One of the enduring JTAV concepts is the classification of assets into the categories of in-storage, in-process, and in-transit. In addition to being a classification of assets, the three categories describe locations where assets can be found in the logistics pipeline. All materiel assets are in one of the three categories, and all relevant JTAV data concerning those assets can be found in the databases supporting those categories.

In-Storage

In-storage assets include assets stored at retail supply, wholesale storage (both ashore and afloat), and disposal activities. They also include inventories held by maintenance activities to support repair and vendor-managed inventories as part of

vendor-DoD partnerships. This category encompasses all classes of supply. Integrated materiel managers (IMMs) own wholesale assets, such as depot stocks, or have access to them (e.g., Defense Reutilization and Marketing Service [DRMS]). Retail assets are assets maintained below the wholesale echelon. The following levels are the lowest retail supply levels where visibility of Class IX (repair and spare parts) assets is maintained:

- Army—authorized stockage lists
- Navy—shore activities and the portion of shipboard assets managed by the Navy Working Capital Fund
- Air Force—base supply
- Marine Corps—installation supply and Marine Expeditionary Force support activities.

Vendor managed inventory is a vital component of medical asset visibility and will be available in the medical data environment.

In-Process

They are not generally regarded as assets on-the-shelf since they have not been shipped, but because of potential near term delivery are of interest to war planners and warfighters. While the majority of assets in maintenance are not in condition for issue, adjustments may be made to process them ahead of schedule. These adjustments may be critical to maintaining operational readiness and having visibility at this level is an important part of the JTAV in-process effort.

- *Procurement.* Procurement assets include items a vendor has not yet delivered, some items owned by DoD and stored by a commercial vendor, and assets that DoD furnishes to vendors to produce other assets in support of DoD's requirements. For items being procured, visibility begins when a purchase request is prepared and ends when a DoD component's representative inspects and issues a receipt for the ordered asset.
- *Maintenance*. Assets in repair can serve as a source of supply. DoD's need for repair visibility ranges from specific data (such as estimated completion dates and condition changes by stock number and serial number) to broad aggregated data that support program, budget, and readiness assessments.

Critical to this aspect of JTAV is access to service and maintenance AISs and the establishment of key relationships with the IMM and the weapon system program manager.

In-Transit

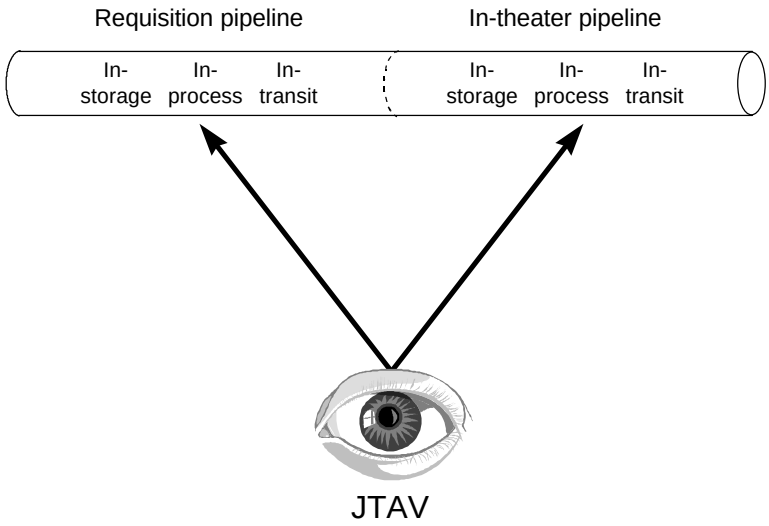
The third category, ITV, focuses on the movement of assets from origin to destination. DoD needs to be able to identify the contents of a shipment and monitor its movement throughout the logistics pipeline. DoD also needs the ability to track item, unit, and personnel movements as well as be able to reconstitute and divert shipments. GTN, developed by USTRANSCOM, the functional proponent of ITV, is the key to the in-transit portion of JTAV. GTN receives movement data from many source systems. *The Defense Intransit Visibility Integration Plan (Revised 1997)* provides a detailed discussion of ITV; GTN; and associated requirements, timelines, and milestones.[1]

REQUISITION AND IN-THEATER STATUS

Although requisition and in-theater status are sometimes equated with the three asset categories, this view is not correct. Requisition and in-theater status are ways of viewing data obtained from one or more of the asset categories. For example, all requisitions and all assets in a theater are in one of the three categories (Figure Appendix C -1)—making the asset categories sources of property *and* information. The transportation and maintenance processes are users of information as well as providers of materiel. Consequently, an *in-transit* asset is an item we want information about, whereas the *transportation process* needs information to function efficiently. The result is that the time-tested concepts of in-storage, in-transit, and in-process are primarily useful in terms of identifying databases and accessing data. Requisition tracking and in-theater visibility, among other user needs, are more useful when seen as ways of providing information to users. The JTAV concept views the asset pipeline as a continuum; assets move from outside to inside a theater, from one location within a theater to another, or from inside a theater to outside the theater in the same pipeline. Clearly one of the more important JTAV customers is the CINC. As depicted in Figure Appendix C -1, each of the standard asset categories is included in the CINC's theater.

[1] U.S. Transportation Command, *Defense Intransit Visibility Integration Plan (Revised 1997)*, May 1997.

Figure Appendix C -1. Requisition Tracking and In-Theater Visibility



PERSONNEL VISIBILITY

The current JTAV architecture provides automated logistics and personnel asset visibility for a JTF commander or a CINC of a unified command. The JTAV capability consists of the hardware, software, interfaces, policies, and procedures to provide commanders with total asset visibility. This visibility includes in-theater and global-level logistics and personnel data provided to the Joint Staff, OSD, and military service headquarters as well as theater JTAV users. The JTAV logistics and personnel data environment provides users with the capability to quickly locate logistics and personnel resources anywhere in the world. The ability of a CINC or JTF commander to trace the status of all personnel assigned or attached to the JTF is an integral part of JTAV. Personnel readiness is a critical element in assessing force readiness. Consequently, the ability to assess personnel strengths and establish personnel accountability throughout the military services has been a long-term goal of The Joint Staff. *Joint Personnel Asset Visibility* (JPAV) is the capability to identify, locate, and track U.S. forces (both units and individuals) as they enter into, move within, and redeploy for a JTF's area of responsibility.[2] U.S. forces include active and Reserve military components, DoD civilians, contractors, and non-DoD government personnel. JPAV information requirements can also extend to foreign military personnel assigned to support U.S. missions when required by CINCs and JTF commanders. The following primary goals have been established for JPAV:

- Facilitate time-phased analysis of personnel requirements, personnel availability, and levels of demographic data, including occupational skill and language skills

[2] JPAV is also the name of the system being developed to provide JPAV capabilities.

- Provide tools to quickly locate personnel with specified skills for potential reallocation in a JTF
- Convert DoD, Joint Staff, military service, and other unique codes into clear text
- Generate the Joint Personnel Status Report (a JTF J-1 report)
- Archive files to the Defense Manpower Data Center.

The JPAV system supports—but does not replace—existing personnel systems of the military services. JPAV uses existing personnel databases and data elements of the military services. JTAV fuses demographic, in-transit, and in-theater data to present a joint service, composite view of persons and skills in a theater of operations. JPAV is compatible with existing military service applications and complies with the GCCS's common operating environment and integration standards.

The personnel module uses both client-server and Web-based architecture to permit full integration as a module on the JTAV desktop. When deployed, the personnel module (i.e., JPAV) database is collocated on the JTAV communications servers that ensure access control to the personnel database in keeping with provisions of the Privacy Act. The JTAV platform includes query-processing capabilities, database management, and communications services in a DII and COE-compliant environment.

JPAV was prototyped to USEUCOM to support Operation Joint Endeavor. The deployment was very successful in highlighting several personnelissues, including integration of unique CINC personnel data sources, the complexity of CINC and JTF situation reporting, and the lack of data standardization among the military services. Each issue has been included in the rapid prototyping approach. Future JPAV deployments will be directed by The Joint Staff in conjunction with CINC J-1 staffs and the JTAV Office. JPAV deployment requires JTAV infrastructure, on-site support staffs, and CINC security accreditation.

The personnel module is a function module of JTAV; therefore, costs associated with operational fielding of the module are equivalent to the costs associated with fielding other JTAV capabilities. Operational fieldings can be supported by contractors on a cost-reimbursement basis. Software license costs are fully covered for the period of contractor support. All licenses are titled to the U.S. government and are transferable to a CINC when system support migrates.

JTAV REQUIREMENTS BY USER

JTAV requirements documents have historically included the three asset categories (in-storage, in-transit and in-process) as well as other categories—in-theater, requisition tracking, and special commodities (such as ammunition and medical sup-

plies). That format has obscured the nature of the requirements because it mixes sources of data, users, commodities, and logistics processes. That format can also confuse requirements to provide data with requirements to use data. This appendix focuses strictly on the requirements of users of data from the perspective of the asset pipeline.

JTAV supports many processes and the definition gains added meaning each time JTAV is associated with a new process. As a result, JTAV functional requirements are actually the requirements of those functional processes for JTAV data. Consequently, several studies have recorded JTAV functional requirements, which are based on requirements generated by customers. The best compilation of JTAV functional requirements can be found in the *Functional Requirements Document for Joint Total Asset Visibility*.[3] This appendix provides a sample of user requirements to provide a functional perspective.

End Users

An end user is an organization (or person) that is the ultimate consignee or uses the item. End users should have visibility of in-transit shipments (both inbound and outbound), including individual items, delivery quantities, and expected delivery dates. ITV and transportation systems that collect movement data do not automatically notify customers about assets inbound to their location and the expected delivery times. End users also need the ability to inquire as to movement status using standard data terminology, such as a requisition number, purchase order number, unit identification, transportation account codes, transportation control number, container number, conveyance number, and unit line number. Finally, end users need visibility of wholesale assets to execute operational planning responsibilities.

Retail Supply Activities

Retail supply activities are normally the organizations that requisition and store items at unit or base level. Retail supply activities should have the capability to obtain item and shipment information for all outbound and inbound shipments, including outstanding requisitions. Retail inventory managers also need visibility of all DoD-owned assets, including wholesale, retail, and "nontraditional" supply inventories, as well as assets due in from procurement and repair. Additionally, consumer-level retail activities in the same supply chain require visibility of assets at intermediate-level retail supply activities.

[3] JTAV Office, *Functional Requirements Document for Joint Total Asset Visibility*, July 1997.

CINCs

The CINCs' primary requirement for JTAV is a force-tracking tool. The CINCs' staffs need to be able to find, see, and move assets and relate them to unit combat readiness. The staff also needs to be able to relate personnel identification numbers and characteristics (including skills, gender, home of origin, race, and religion) to personnel in-theater. A CINC's logistics staff requires the ability to identify available transportation to move noncombatants to staging facilities and from staging facilities to ports of debarkation. CINC staffs also need access to unit readiness postures, including training status, equipment readiness status, and available load dates for deployment. Finally, CINC medical managers need to have rapid access to current patient status, location, and movement.

Joint Task Force

A JTF is a military organization composed of more than one military service that is established on a temporary basis under the control of the Chairman of the Joint Chiefs of Staff. The JTF commander is frequently the theater commander. JTF staffs require visibility of the readiness status and actual movement of all forces (active and reserve) deploying to the theater. JTF planning staffs require visibility of outstanding requisitions to assess contingency operations and prepare operational plans. JTF staffs should also have aggregate visibility of assets at depot- and intermediate-level maintenance facilities to assess readiness, identify and manage critical items, identify logistics bottlenecks, establish priorities, and determine asset and lift requirements. JTF medical managers need to have rapid access to current information about patient status, location, and movement.

Intermediate and Depot Maintenance

Intermediate-level and depot-level maintenance share many materiel and logistics support characteristics. Both require visibility into materiel availability to support repair and overhaul production schedules. Both require detailed information pertaining to requisition status and shipping information. Both activities maintain in-storage and in-process asset classes.

Command and Management Levels

The information needs of OSD, Joint Chiefs of Staff, and military service headquarters are generally similar. In most cases, any difference merely exists in the level of aggregation.

- *Office of the Secretary of Defense.* OSD logistics staff elements require access to logistics responsiveness between nodes to monitor and study potential improvements in logistics response time. OSD also needs visibility

over broad categories of in-repair assets to monitor logistics system performance; support major industrial mobilization decisions; and evaluate policy, budget, and procurement alternatives.

- *Joint Staff.* The Joint Staff requires visibility of assets due in from procurement and maintenance to assess contingency plans and prepare special operations plans. Joint Staff medical managers need rapid access to current information about patient status, location, and movement. The Joint Staff also needs visibility of the readiness status and actual movement of all deploying forces (active and Reserve).

- *Military service and major command headquarters*. Headquarters and major commands include any organizational level above a unit or base that encompasses more than one unit. Headquarters require visibility of outstanding requisitions for units under their command to monitor the status of critical orders. Logistics and personnel staffs should have visibility of the readiness status and actual movement for unit equipment, accompanying supplies, and personnel moving to, from, and within a theater and be able to associate actual movement data with specific line items in a deployment plan. Major commands need visibility of assets at depot- and intermediate-level maintenance organizations when developing plans, assessing the ability to execute plans, managing critical items, and making financial decisions.

Inventory Control Points and Integrated Materiel Managers

To fill customer requisitions, determine procurement quantities, replenish asset levels, and make repair and disposal decisions, IMMs need visibility of all wholesale assets they directly manage. IMMs that are PICAs require visibility of all SICA assets and requirements. IMMs that are SICAs require visibility of all PICA assets and requirements. IMMs need the ability to obtain item and shipment information for all inbound and outbound shipments they initiate. They also require visibility of DRMS assets under repair at intermediate- and depot-level repair facilities as well as excess inventories held by those facilities. Additionally, they need visibility of government-furnished materiel, contractor logistics support, program manager materiel, unit-level assets, and retail assets and requirements.

Weapon System Managers

Weapon system managers require visibility of new weapon systems en route to field units, in-transit information of parts shipments, and notification of discrepancies that have been incurred while in-transit. They also need aggregate and detailed visibility of depot- and intermediate-level maintenance assets to assist in planning, deploying, and managing of their weapon system. Finally, weapon system managers require the visibility of DoD assets and requirements to assess logistics support capabilities and monitor an item’s use.

SUMMARY

Historically, each DoD component developed and maintained information systems to meet its functional requirements. Consequently, information systems and their associated databases have evolved to support functional processes. Although satisfying the needs of the DoD component, this evolutionary process has drawbacks for the joint community, particularly in terms of interoperability and information sharing.

One of the enduring JTAV concepts involves the asset categories of in-storage, in-process, and in-transit. The three categories are not only a means to classify assets, but also describe locations where assets can be found in the logistics pipeline. All materiel assets are in one of those three categories and all relevant JTAV data concerning those assets can be found in the databases supporting those categories. As a result, the three asset categories can also be seen as categories of data sources. The basic JTAV concept requirements are to obtain data, convert the data into useful information, and present the information to a customer.

Appendix D
Automatic Identification Technology

INTRODUCTION

The past decade has seen a proliferation of technologies that have allowed DoD to become more efficient and effective. In Somalia, Haiti, and now in Bosnia we use technology to support forces and accomplish the mission. The JTAV system architecture is designed to be flexible and incorporate changes to technologies as well as new technologies as they emerge. The incorporation of new technologies will require the elimination of old technologies. The old technologies will be discarded as they become obsolete.

AIT AND ASSET VISIBILITY

In no area is JTAV as dependent on other programs and initiatives than the first step of collecting data. The best way to ensure the integrity of data collection is by exploiting technology. One of the prime methods for using technology to collect data is automatic identification technology (AIT). AIT enables and facilitates data collection, aggregation, and transmission to AISs. AIT's strength is its ability to capture information rapidly and connect to AISs with little human intervention. AIT improves data quality and timeliness by performing data transfers automatically, thus eliminating time-consuming manual processes and associated mistakes.

The relationship between AIT and asset visibility is often misunderstood. AIT collects data, but by itself is limited in the role it plays in asset visibility. AISs are the foundation of providing DoD's asset visibility capability. After the data are collected, they need to be stored, transmitted, received, and displayed to provide visibility. Consequently the relationship between AIT and AISs is symbiotic. AIT collects and provides data to the AISs, and the AISs provide a context, format, and vehicle for the transfer and display of the data. This relationship requires that the AIT transfer data directly to the appropriate AIS to the maximum extent possible. User data, collected by AIT, will be integrated with DoD systems, technologies, software, and encoding formats as well as with international commercial applications and users.

AIT minimizes the human intervention to collect and transfer data to AISs, and radio frequency (RF) tags practically eliminate human involvement in the data collection effort. Minimizing human intervention is the key to AIT's primary advantages—speed and accuracy—over manual entry. Only seconds are needed to

read a bar code, optical memory card (OMC), or RF tag. Even two or three attempts to read a bar code are faster than manual entry. Additionally, AIT is extremely accurate. AIT automatically collects data so no human errors occur in entry. When using AIT, data collection accuracy approaches 100 percent.

AIT is sometimes viewed as a "toolbox" with many tools. Each AIT device should be selected for the appropriate task based on user requirements for accurate and timely data, process improvement, and enhanced warfighting capabilities. No single AIT device satisfies the myriad DoD requirements. For this reason, DoD needs to consider a mix of AIT capabilities. Although this mix should be based on the application, location is also a factor. DoD needs to coordinate AIT initiatives to prevent a situation where four applications use four separate AIT capabilities at one location when one application can satisfy the requirements.

AIT capabilities are necessary at any place in the logistics pipeline that requires information on assets. The locations are commonly called nodes. Consequently, a node that processes personnel or ships, stores, receives, transports, or repairs materiel, needs an AIT capability. By establishing a network of AIT-capable nodes that transmit data directly to AISs accessible by the JTAV application, DoD can determine where items are in the pipeline. The Joint Staff is leading an effort to develop a worldwide joint AIT architecture to determine nodes that have adequate AIT capabilities. The result will be important for determining where AIT is needed, setting priorities for implementation, and programming funds.

AIT includes a family of technologies that can be used to identify, capture, store, and transmit asset information. AIT devices offer a wide range of data storage capacities ranging from a few characters to thousands of bytes. The information on each device can range, for example, from a single part number to a self-contained database. The devices are interrogated using a variety of means, including contact, laser, or RF, with the information obtained from those interrogations provided electronically to AISs that support DoD's logistics operations.

TYPES OF AIT DEVICES

Examples in the AIT family of technologies include bar codes, magnetic stripes, integrated circuit cards, OMCs, and RF identification (RFID) tags. AIT also includes the hardware and software required to read the information on storage devices and integrate that information with other logistics data. Finally, AIT also includes the use of satellites to track and redirect shipments.

Bar Codes

A bar code is an array of black and white spaces that represent a group of alpha-numeric characters according to a particular symbology. Bar codes include the following two types—linear and two-dimensional (2D):

- *Linear bar codes,* normally limited to about 20 characters, are used to represent a data element that serves as a point of reference in a central database.
- *2D bar codes* have a larger data capacity than linear bar codes (up to 1,850 characters in a single symbol). DoD plans to phase in 2D bar codes as the replacement for linear bar codes.

Optical Memory Cards

OMCs use the optical technology popularized by audio compact disks and are similar in size to a credit card. Information can be written to the card in increments rather than at one time. Consequently, an OMC can have data written to it in a sequential order on many occasions until all available memory has been used. OMCs are particularly useful if an audit trail is necessary or if a large amount of data needs to be stored.

Radio Frequency Identification

RFID technology can be used for various applications. Consisting of transponders and interrogators, RFID is based upon radio wave propagation. Consequently, it has the ability to read tags that are not visible to the naked eye. Transponders are usually small tags that contain data. Interrogators are also referred to as readers and have the ability to write to a tag as well as read it. RFID enables the automated acquisition and entry of identification and other data directly into a computer without human intervention. RFID tags include the following two types—active and passive:

- *Active RFID tags* have their own power source that they use to communicate with an interrogator.
- *Passive RFID tags* use energy from an interrogator. As a result, their capabilities are limited.

Satellite-Tracking Systems

A satellite-tracking system provides the ability to track the exact location of a transceiver because the latitude and longitude are transmitted periodically via a satellite to a ground station. The most active current user of this technology is the commercial motor carrier industry. However, this capability can be easily adapted

to rail, bus, barge, or any other mode of surface transportation, either military or commercial.

AIT CONCEPT OF OPERATIONS

When a DoD logistics asset arrives or departs a commercial or military activity, the AISs at those activities need to capture the departure or arrival information. The information should be provided to logistics decision-makers and customers throughout DoD. As established by the *Logistics Automatic Information Technology Concept of Operations* (CONOPS), the time criteria for users to receive that information are

- 1 hour for all shipments of unit and nonunit equipment,
- 1 hour for all air shipments,
- 4 hours for all ocean surface shipments, and
- 2 hours for all intratheater shipments.[1]

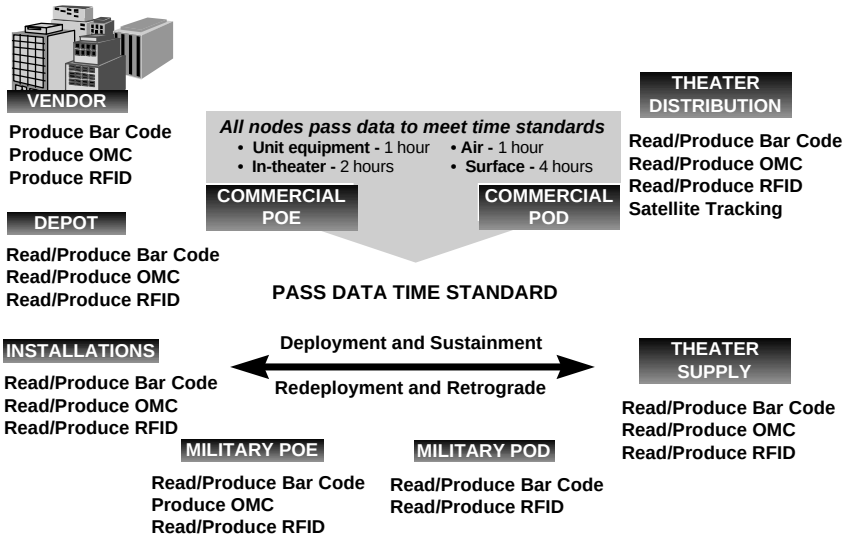
If an existing AIS cannot meet the criteria, it should be upgraded while the immediate customer need can possibly be satisfied by AIT. Because of the wide diversity of DoD's operating environments, the AIT CONOPS calls for a suite of AIT devices that includes linear bar codes, 2D bar codes, OMCs, RFID tags, and satellite-tracking systems.

Figure Appendix D -1 portrays an overview of the AIT CONOPS. The data timeliness criteria indicate the time frames for providing data to a customer after an asset is received or shipped through each link in the chain. For example, as a pallet for an air shipment leaves a depot's shipping dock, the customer needs to know that information in not more than 1 hour. When the shipment arrives at a port's receiving dock, the same time criterion applies—status should be updated in not more than 1 hour. The time criteria continue throughout the pipeline until the shipment is received by the user.

DoD should take the necessary steps to ensure an uninterrupted operational JTAV capability with no degradation in data quality despite local infrastructure deficiencies. Likely trouble spots around the world will not have an infrastructure that permits immediate use of AISs. In that case, AIT can provide an effective means of maintaining a viable JTAV capability. For example, RFID technology is being used in Operation Joint Endeavor to provide timely and accurate shipment data not available in AISs. DoD needs to maintain an adequate level of RFID in peacetime to provide a viable capability during contingencies and develop process improvements.

[1] Deputy Under Secretary of Defense (Logistics), AIT Task Force, *Logistics Automatic Identification Technology Concept of Operations*, November 1997.

Figure Appendix D -1. DoD's Concept of Operations for AIT



Note: POD = port of debarkation; POE = port of embarkation.

AIT STANDARDS

JTAV capabilities are affected by efforts to reconcile and coordinate DoD and national AIT standards. In most cases, DoD standards are not integrated with commercial, national, and international standards. The most basic need is for a DoD standard data format, including data elements, the manner to array them, and the type and capability of the media. Because DoD and the commercial sector are increasingly interdependent, standards need to be compatible. The following standards have been established or are needed:

- *Linear bar code standard.* DoD has had a linear bar code standard—Code 39—since November 1982. However, linear bar codes have not been enforced throughout the logistics chain, and the bar codes produced are not always readable. The AIT CONOPS requires all DoD logistics nodes to be able to read linear bar codes by November 1998. In addition, future contracts, as necessary, will require vendors to bar code items.

- *2D bar code standard.* Although DoD established Portable Data File 417 as the 2D bar code standard for logistics in July 1995, a plan for implementation has yet to be developed. In accordance with the AIT CONOPS, DoD will use 2D bar codes at all DoD logistics nodes by May 1999 and achieve a fully implemented capability within 5 years. AIT equipment contracts, as required, will include provisions for the purchase of 2D bar codes. Future contracts will require vendors to bar code items.

- *OMC standard.* In November 1996, DoD adopted an industry standard for OMCs. This standard, in turn, was based on an international standard recognized by the American National Standards Institute (ANSI), International Organization for Standardization, and International Electrotechnical Commission. OMCs will be implemented on a case-by-case basis as supported by a business case analysis.

- *RFID standard.* No accepted military or commercial standard exists for RFID. Establishing RFID standards will be a difficult task; however, without this first step, the goal of achieving DoD-wide integration will be much more difficult to achieve.

SUMMARY

AIT can improve support to a CINC's warfighting capability and DoD's logistics business processes by facilitating the collection of initial source data and its subsequent transmittal. Because no single technology can satisfy DoD's logistics requirements, DoD needs to embrace a family of technological devices and integrate those devices into its logistics functions. The AIT CONOPS establishes time criteria for users to receive information whenever a logistics asset arrives or departs a shipping activity. AIT can assist DoD activities in meeting those criteria.

In addition, AIT improves DoD's logistics business processes and enhances the ability to satisfy all reporting criteria. It can improve data collection and data sharing by improving the speed of the process and eliminating errors. For JTAV capabilities to realize their full potential, AIT needs to be implemented in a timely manner.

Appendix E
JTAV in the 21st Century

NEW LOGISTICS DYNAMIC

After four decades of relative stability, U.S. national and military strategy has changed dramatically in the post-Cold War 1990s. Similarly, the concept of logistics is experiencing an era of renewed interest. Logistics has undergone many changes since the term was first used by Baron Jomini in 1838 in *The Art of War*. Jomini referred to logistics as "comprising the means and arrangements which work out the plans of strategy and tactics. Strategy decides where to act: logistics brings the troops to this point."[1] Logistics has generally been regarded as a necessary evil—often seen as the *tail* of a warfighting machine and constantly in a battle with the teeth for resources. This image has caused the art of logistics to be somewhat neglected by all but those who must make it work.

In the last few years, logistics has undergone a revolution, resulting from the realization that logistics is necessary, but not necessarily an evil. Logistics impacts on the consumer can be directly applied to productivity, efficiency, effectiveness, and customer satisfaction. In short, logistics can provide a *strategic* advantage—a situation with serious implications for sharing data and information technology.

BUSINESS PROCESS REENGINEERING

To maintain viability, all institutions need to continually improve. One of the more popular improvement strategies is business process reengineering, a systematic method for redesigning the processes of a business unit.

Time and Location

The concepts of *time utility* and *location utility* are being integrated with *cost*. Traditionally, *time* and *location* have been cornerstones of the logistics process. Time is viewed in terms of minutes, hours, or days; and location in terms of distance from one location to another. Logistics decisions have generally been made in regard to them as separate, but equal, concepts with a direct linear relation. For example, as distance increases, so has time. These two concepts are now seen as not separate but two aspects of the same issue—cost—and the relationships are not always direct or linear. For example, with the advent of premium transportation services, sending a package to Dubai takes no more time than sending it to

[1] Clark, Arthur L, *Warrior's Wisdom*, Perigee Books, New York, 1977, p. 90.

Dubuque. In this case, as distance increases, time remains constant, but cost increases. In addition, if the package is sent to Dubai by ship, the delivery time increases, but the cost decreases—an indirect relationship. As a result, rather than the logistics pipeline being viewed as a constraint that limits operational capability, it can be seen as an opportunity to increase combat power by making effective tradeoffs among the three elements.

Impact on JTAV—To make effective tradeoff decisions, managers and leaders need accurate and timely information. The need not only necessitates more integrated information systems and more sophisticated decision support tools, but also requires a broad spectrum of users and support tools share that information. JTAV capabilities need to be robust, flexible, accurate, and timely.

Custom Service

Customer satisfaction has been a standard tenet of business practice for many years. Until recently, customer satisfaction has been expressed in terms of actions to satisfy customers *within certain boundaries*. Customer satisfaction is beginning to mean actions *outside the boundaries* to keep customers happy. For example, in the past, if customers were unhappy with the service they received, a business unit would explain the limitations it had, might offer a discount price temporarily, and (if very customer-oriented) might waive a rule on a one-time basis. Now business units are customizing their services and products to meet consumer needs. This trend should continue to grow, and the need to customize service for individual customers should continue to receive additional emphasis.[2]

Impact on JTAV—Customized logistics requires customized information systems to support the processes. As a result, custom information support systems and interfaces may be needed to provide interoperability and the full sharing of information.

Outsourcing and Third-Party Logistics

Many organizations realize that not only is logistics very important, but logistics functions are very difficult to perform and not everyone has the right skills. As a result, the business world has seen the emergence of outsourcing and third-party logistics (3PL) firms. DoD has embarked on a selective program to outsource noncore logistics functions, but has little control and visibility over 3PL shipments. Generally, 3PL providers do not use Defense Transportation System procedures, systems, and standards. This situation makes achieving an ITV capability for 3PL-managed shipments particularly challenging. Although USTRANSCOM is developing GTN to become the single defense database for ITV information,

[2] Interestingly, the root of *customer* is *custom*.

3PL providers are not contractually obligated to provide asset visibility information to GTN, and they do not use standard military information.

Impact on JTAV—DoD needs to develop and implement a program for obtaining ITV of 3PL-managed shipments.

Strategic Alliances

Many firms are building alliances with trading partners rather than merely selling goods and services. Suppliers realize that if they provide a value-added service and help their customers become more profitable, market share increases. Likewise, many retail units (for example, the Wal-Mart distribution system) view their suppliers as more than a source of goods. Wal-Mart has no wholesale warehouses, but receives deliveries directly from vendors. In effect, a supplier serves as a Wal-Mart warehouse and provides a distribution function. This example illustrates the idea of replacing costly inventory with less expensive information. Within the DoD context, however, many instances may occur when replacing inventory with information may not be operationally beneficial. These decisions need to be made on a case-by-case basis.

Impact on JTAV—The trend of creating alliances with suppliers should continue to increase and create additional data integration challenges. As DoD becomes more dependent on just-in-time delivery concepts, information should increasingly replace the need for inventory, and JTAV or similar capabilities can provide data access.

LOGISTICS INFORMATION HUB

Some supply and transportation transactions of the military services do not pass through a DoD communications link (for example, DAAS and GTN) for several reasons. First, 3PL providers do not use DoD standards or systems. Consequently, asset visibility is not available when these firms provide support. Also, although other means of electronic commerce (such as dedicated communications services, value-added networks, and data fax) adequately exchange information to accomplish business processes, they do not permit sharing data without a direct and specific system interface. Additionally, many business transactions can be conducted on the World Wide Web. While making life much more convenient, those transactions are not processed through any central activity that allows them to be tracked and traced. We should continue to fix problems with innovative solutions, but we also need to ensure that JTAV compatibility is addressed if information is relevant to JTAV capabilities.

Impact on JTAV—If all logistics transactions with JTAV significant data are not routed through a control/communications link, significant discrepancies occur in

the ability to track assets from a central location. A method needs to be developed to ensure that all JTAV significant transactions are tracked and archived.

BUSINESS GLOBALIZATION

The increasing *globalization* of businesses has a direct effect on Defense activities and the implementation of JTAV capabilities. In many instances, international procurement is a matter of economic necessity because the goods are cheaper or, in some cases, only available overseas. However, this trend adversely affects U.S. mobilization capabilities. If goods are not made in the United States, the infrastructure to produce the goods may atrophy and the industrial base will not be able to support mobilization requirements or to provide routine spares and replacement parts. This trend may continue and require a greater and more complex information integration effort.

Impact on JTAV—The in-process (procurement) portion of JTAV should be developed to accommodate a wide variety of possible source systems. As more American firms that support DoD build relationships with foreign companies, more information systems and business processes will need to be accommodated in the JTAV environment.

COALITION FORCES

U.S. military planning involves multilateral actions. Our mutual interdependence requires that we know the needs of our allies. The Gulf War, which was fought with coalition forces that benefited from international agreements, may be useful for showing how coalition partners may participate in future military engagements. While having political and military advantages, the strategy of international cooperation also presents many logistics challenges, particularly to creating JTAV capabilities. This setting introduces more nonstandard document, shipment, and transportation identifiers; potentially incompatible communications links; and unfamiliar business processes.

In addition, a reliance on allied or coalition forces also brings an attendant reliance on foreign vendors and host nation support. The United States is a member of many multinational defense and security alliances. As a result, U.S. forces may deploy to several locations with each host nation possessing different capabilities of resources and infrastructure. Accordingly, the logistics and operational support deployed U.S. forces receive may vary by host nation.

Impact on JTAV—If the United States plans to take full advantage of agreements with coalition forces, information concerning logistics support should be exchanged with friendly foreign forces. This concept requires JTAV-related systems to be able to transmit and receive data from foreign systems.

SUPPLY CHAIN MANAGEMENT

Supply chain is a term increasingly used by the private and government sectors to describe all processes involved in producing, storing, and delivering a product. The activities include identifying sources for raw materials and parts; developing, manufacturing, and assembling final products; storing materiel; tracking inventory; and delivering products to customers. A supply chain comprises not only all of an organization's logistics processes, but its business processes as well. The idea of a chain connotes interdependency among suppliers, manufacturers, distributors, transporters, and customers. The concept of supply chain management is closely related to DoD's concept of functional integration. Functional integration examines processes as they involve more than one functional area. The objective is to develop a means of monitoring and managing a process from end to end regardless of the functions that provide support to the process. Managing processes from end to end is beneficial to a customer as well as a provider. Customers receive better and faster service, and the provider reduces its costs.

Impact on JTAV—The trend of using process management techniques should continue to grow. Information on the status of individual logistics functions facilitates effective management of the entire supply chain. Several tools are available. They include the Internet, satellite tracking, point-of-sale systems, RF tagging, and electronic ordering. To support process management techniques, JTAV should be developed to take advantage of available and emerging technology.

VALUE-ADDED VISIBILITY

Having visibility of every item in the DoD logistics pipeline is not cost-effective or necessary. Some areas with visibility *blind spots* may be acceptable. These areas include an item that is inexpensive or easily procured, or the time period is so brief that tracking the product is not cost-effective. An example would be subsistence items procured directly from a vendor that delivers them in less than 48 hours. These items, if delayed, can normally be obtained from another source. Another example is administrative and office items. Again, the general noncriticality of these items, their general availability, and short time that visibility is lost suggest that gaining visibility is not cost-effective, especially since the ability to use information to influence a transaction is negligible.

Impact on JTAV—This issue has serious implications for JTAV implementation. First, resources should not be spent to provide visibility that is not cost-effective. Second, the issue also depends on how JTAV implementation is regarded as successful. The JTAV scope needs to be refined to identify items and processes where JTAV capabilities are not relevant. The JTAV Office needs to coordinate with users to determine which items provide minimal value added.

SUMMARY

DoD and the private sector continue to reengineer business processes. Such concepts as the integration of time and location with cost, customized service for individual customers, outsourcing, third-party logistics, and strategic alliances require JTAV capabilities to be flexible and robust. The increasing globalization of business directly affects defense activities and the implementation of TAV. The use of coalition forces that may be the model for future military engagements creates logistics challenges that include nonstandard formats, potentially incompatible communications links, and unfamiliar business processes. In addition, a reliance on allied forces also brings an attendant reliance on foreign vendors and host nation support. Visibility requirements need to be refined continually to satisfy customer requirements.

Appendix F
Abbreviations

2-D	two-dimensional
3PL	third-party logistics
AIS	automated information system
AIT	automatic identification technology
ANSI	American National Standards Institute
API	application programming interface
ATAV	Army total asset visibility
C4I	Command, Control, Communications, Computers, and Intelligence
C4IFTW	Command, Control, Communications, Computers, and Intelligence for the Warrior
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance
CINC	commander-in-chief
COE	Common Operating Environment
CONOPS	concept of operations
CONUS	continental United States
COP	Common Operational Picture
COTS	commercial off-the-shelf
DAAS	Defense Automatic Addressing System
DAASC	Defense Automatic Addressing System Center
DARPA	Defense Advanced Research and Projects Agency

DBSS	Defense Blood Standard System
DCS	Deputy Chief of Staff
DFAMS	Defense Fuels Automated Management System
DII	Defense Information Infrastructure
DISA	Defense Information Systems Agency
DLA	Defense Logistics Agency
DLMS	Defense Logistics Management System
DoD	Department of Defense
DPG	Defense Planning Guidance
DRMS	Defense Reutilization and Marketing Service
DTRACS	Defense Transportation Reporting and Control System
DTTS	Defense Transportation Tracking System
DUSD(L)	Deputy Under Secretary of Defense (Logistics)
EA	Executive Agent
EC	electronic commerce
EDI	electronic data interchange
GAO	General Accounting Office
GCSS	Global Combat Support System
GSORTS	Global Status of Resources and Training System
GTN	Global Transportation Network
GUI	graphical user interface
ICP	inventory control point
ID	identification
IER	information exchange requirement

IMM	integrated materiel manager
IPR	in-process review
IT	in-theater
ITV	in-transit visibility
J-1	Director for Personnel and Manpower
J-4	Director for Logistics
JCS	Joint Chiefs of Staff
JOPES	Joint Operational Planning and Execution System
JPAV	joint personnel asset visibility
JRSOI	joint reception, staging, onward movement, and integration
JTAV	Joint Total Asset Visibility
JTF	joint task force
LAN	local area network
LINK	Logistics Information Network
LIPS	Logistics Information Processing System
MLSS	Military Logistics Standard System
NIPRNET	Nonsecure Internet Protocol Router Network
NPR	National Performance Review
OMC	optical memory card
OSD	Office of the Secretary of Defense
PC	personal computer
PICA	primary inventory control activity
POD	port of debarkation
POE	port of embarkation

POM	program objective memorandum
QDR	Quadrennial Defense Review
RF	radio frequency
RFID	radio frequency identification
SABI	secret and below interoperability
SICA	secondary inventory control activity
SIPRNET	Secure Internet Protocol Router Network
TAA	theater assembly area
TAV	total asset visibility
TAVJTF	Total Asset Visibility Joint Task Force
TBA	to be announced
UJTL	Universal Joint Task List
USACOM	United States Atlantic Command
USCENTCOM	United States Central Command
USEUCOM	United States European Command
USMC	United States Marine Corps
USPACOM	United States Pacific Command
USSOCOM	United States Special Operations Command
USSOUTHCOM	United States Southern Command
USSTRATCOM	United States Strategic Command
USTRANSCOM	United States Transportation Command
VMSIR	Virtual Master Stock Item Record