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IMPLICATIONS OF ARMY XXI TOTAL ASSET VISIBILITY

BY

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IMPLICATIONS OF ARMY XXI TOTAL ASSET VISIBILITY (TAV)

by

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ABSTRACT

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Total Asset Visibility (TAV) has received a lot of attention as Army leaders focus logistics efforts to provide swift, uninterrupted support to warfighters in the 21st Century. Army organizations at all levels of war must have total asset visibility (TAV) of units, equipment, supplies, and personnel, regardless of the types of operation. Fiscal constraints have forced the Army to transition from maintaining excess supplies, just in case they will be needed, to providing just enough at the right time and at the right place. To ensure TAV, the Army must discipline automated information systems and continue to leverage automated information technology to provide timely and accurate information. The ability to link stovepipe logistics automated information systems to shared databases with common access will contribute to the success of future Army operations. This paper highlights some of the Army XXI TAV challenges and suggests how to overcome them.

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PREFACE

I would like to thank my family and Professor Thomas W. Sweeney from the U.S. Army War College for assisting me with writing this paper. My wife Bettie and my three sons (Nicholas II, David, and Austin) provided me wholehearted support through all phases of this research project. I am forever thankful for their patience and assistance while I labored in the library and in our basement with this research project. I would like to thank Professor Sweeney for his recommendations and guidance while writing this paper.

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IMPLICATIONS OF ARMY XXI TOTAL ASSET VISIBILITY (TAV)

To fuse the integration of information, logistics and transportation technologies to provide rapid response to crises, enable better tracking and shifting of supplies and forces enroute to engagements and deliver tailored packages of supplies to each level of military operations.

Gen John Shalikashvili
Chairman, Joint Chiefs of Staff
Defense News
6 May 96

Total Asset Visibility (TAV) has received a lot of attention as Army leaders focus logistics efforts to provide swift, uninterrupted support to warfighters in the 21st Century. Similar to the Year 2000 (Y2K) craze when everyone wanted to ensure that date sensitive automated systems would not be affected by the rollover into the new millenium, TAV has created quite a stir at all levels of the Army. Fiscal constraints have forced the Army to transition from maintaining excess supplies, just in case they will be needed, to providing just enough at the right time and at the right place. Like the Y2K compliance measures that were implemented, the Army must have reliable TAV systems and procedures to prevent loss of logistics support capability as it streamlines operations.

As the Army moves into the new millenium, organizations at all levels will rely on information technology and automated systems to provide TAV of units, equipment, supplies, and personnel. Information technology serves as the hub for sending data to and from automated systems. Proper applications of information technology and automated systems will result in efficient and effective means of managing assets in the logistics pipeline. The key to realizing the fullest potential of information technology will be connecting automated systems to shared databases.

The ability to connect logistics automated systems to shared databases will influence the success of future Army operations. This paper highlights some of the Army XXI TAV challenges and suggests how to deal with them. The following sections contain descriptions of some of the major TAV automated systems, some of the challenges leaders will face when implementing these systems, and recommendations for overcoming them.

TAV AUTOMATED SYSTEMS

What is TAV? What does it mean to strategic, operational, and tactical leaders? Who is responsible for reporting TAV information? How does the system work? What technological developments can be utilized to assist distribution managers? These are some of the questions that this section of the paper will answer.

TAV is the capability to provide timely and accurate information on the location, movement, status, and identity of units, personnel, equipment, and supplies.¹ TAV provides information concerning assets in the logistics pipeline. Not to be confused with its subordinate element, called intransit visibility (ITV), TAV reports the status of asset production, repair, fielding, requisition, stockage level, etc.; whereas, ITV provides the status of assets passing through nodes in the transportation system. TAV, as a whole, is the system that personnel involved with managing Army assets need to know.

Total asset visibility (TAV) will provide support personnel at all levels with a near real-time picture of asset availability throughout the supply system. TAV consists of two subordinate elements: asset visibility and in-transit visibility. Asset visibility will focus on resources in inventory, or static in the CSS system. In-transit visibility will focus on resources in motion through the CSS pipeline. Ultimately, distribution managers must have visibility of Army assets as well as all common-user items for which the Army has executive Agency responsibilities to provide in order to match theater requirements to capabilities.²

Technology has provided several useful enablers to help provide TAV. Instead of manually collecting and reporting asset status, automated tools such as scanners, radio frequency tags, bar codes, and optical memory cards feed information into automated systems. For example, instead of physically inventorying shipping containers, scanners read information from radio frequency tags affixed to the shipment and download information into computers at depots and warehouses. Authorized users obtain information from the computer databases to help make logistics decisions.

On-going computer upgrades and new equipment fielding will eventually enable all TAV computers to share databases with common users. This will eliminate the requirement to query several stovepipe logistics systems that were designed to capture information that pertained to specific functions, which may be only a small piece of the TAV process. The way ahead is to link all logistics information systems to secure web-based networks that allow easy access by authorized users to view, update, or download TAV information.

Both Joint and Army TAV automated systems help provide focused logistics. The procedures for obtaining information from these web-based systems are similar. The key aspect of these systems is the ability to fuse several databases together, meaning that system protocols must be compatible and the automated information network must be capable of sending and receiving near-real time information. There are numerous automated information systems that provide TAV information to shared databases. A brief description follows for the ones listed below:

- Global Combat Support System (GCSS)
- Inventory Control Point (ICP) Automated Information Systems (AIS)
- Army Total Asset Visibility (ATAV)/Global Combat Support System – Army (GCSS-A)
- Global Transportation Network (GTN)
- Defense Standard System (DSS)
- Transportation Coordinator's Automated Information for Movements System II (TC-AIMS II)
- Movement Tracking System (MTS)

GCSS

The Global Combat Support System (GCSS) is a web-based hub for linking joint total asset visibility (JTAV) information for all DOD organizations and activities. DOD automated logistics systems will provide TAV updates to this web-based information center. Authorized users at all levels will log on to GCSS web page to view and download information. The Joint Staff J4 explains that "... The GCSS vision encompasses six essential attributes: 1) any box, 2) any user, 3) one net, 4) one picture, 5) common services, and 6) robust communications infrastructure."³ Figure 1 shows the GCSS strategy for fusing JTAV information from the weapon system life cycle process through the sustainment and warfighting processes and how information will be shared with DOD organizations and activities.

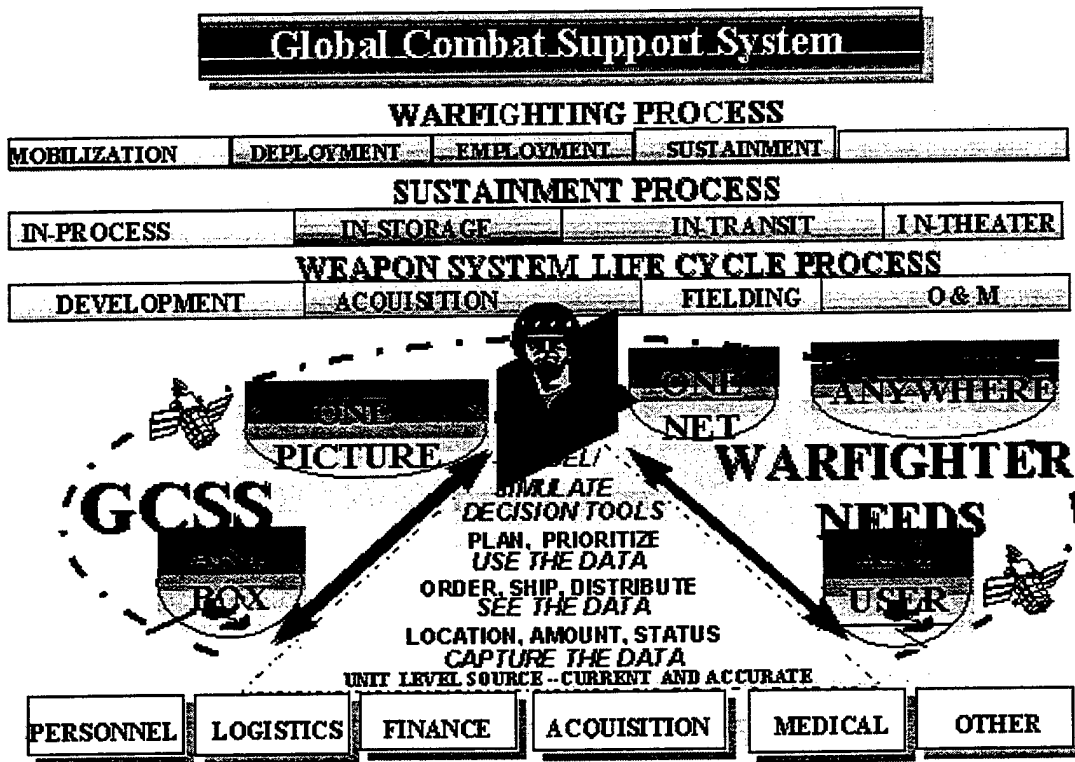


FIGURE 1. GLOBAL COMBAT SUPPORT SYSTEM⁴

... GCSS is a strategy, not a single system, that provides information interoperability across combat support functions and between combat support and command and control functions (Global Command and Control System) in support of the Joint Warfighter. It builds on existing technology, products, procedures and integration strategies. The primary goal of GCSS is to provide a fused, real-time, multidimensional view of the battlespace through an ability to coordinate across organizations, sites, and systems. It focuses on using existing applications and is geared to support seamless transition between peacetime and contingency operations. GCSS, therefore, is a critical component in supporting Command, Control, Communications, Computing and Intelligence for the Warrior (C4I²W).⁵

Automated logistics systems send information to the GCSS web page. The significant thing to note is that GCSS will provide visibility of assets in all major DOD automated logistics systems. GCSS will perform duties like a conductor who orchestrates the activities of subordinate automated systems with the goal of attaining a shared database for DOD users. If a commodity manager needs to know where to locate assets to support a contingency, GCSS will provide useful information concerning the status of that asset DOD wide.

ICP AIS

Inventory Control Point (ICP) commodity managers utilize Automated Information Systems (AIS) to manage depot stockage levels. When these automated systems are linked to shared databases, the probability of procuring unneeded supplies will be minimized. For example, upon receipt of requests for assets that are on-hand, commodity managers will not procure additional items to fill the request if they know that enough is on-hand. It will simply be a matter of directing on-hand assets to locations where they are needed. Without visibility of information provided by shared database, the risk of procuring assets to satisfy requirements that can be met with on-hand inventory is high. The ICP AIS provide the following types of information:

- "On-hand wholesale and retail assets by location and condition code;
- Wholesale assets due-in from procurement and projected delivery dates;
- Items in intermediate- and depot-level repair, with projected repair completion dates; and
- Requisitioning objectives and retention limits for every reporting supply activity."⁶

ICP AIS also include automated systems for managing specialized commodities. The major ICP AIS that provide the status of specialized commodities include the Ammunition Management Standard System (AMSS), Defense Integrated Subsistence Management System (DISMS), Fuels Automated System (FAS), and Defense Medical Logistics Standard Support (DMLSS) System. The information that ICP AIS share with TAV databases help provide responsive logistics support.

ATAV/GCSS-A

The Army Total Asset Visibility (ATAV) automated system is an Office of the Deputy Chief of Staff for Logistics (ODCSLOG) initiative to link Army automated logistics systems to a shared database at the strategic and operational levels. The Army Materiel Command's Logistics Support Activity (LOGSA) is the proponent for ATAV. "ATAV functionality is currently being integrated into the Logistics Integrated Database at LOGSA. LIBD will encompass all the LOGSA databases. Those databases currently get feeds from many sources, some of which will be replaced by GCSS-A in the future."⁷ Until GCSS-A has been become fully operational, the ATAV program will continue to be the focal point for integrating Army logistics information.

The Global Combat Support System (GCSS-A) is scheduled to begin fielding in July 2000.⁸ GCSS-A will integrate logistics information at the operational and tactical levels (figure 2). It will also feed information into the strategic level GCSS web-based hub and interface with command and control systems in the theater. GCSS-A will be a secure web-based automated system that shares information from common databases with authorized users. This system will allow materiel managers, maintenance personnel, and others with a need to know to access the status of assets in warehouses, supply points, maintenance activities, and other logistics activities. Some of the legacy systems will be replaced, and some will be retained, as GCSS-A modules become operational. This will improve the manner in which logistics information is shared in the theater.

GCSS-Army is a multifunctional CSS information system that integrates and enhances current logistics Standard Army Management Information System (STAMIS) functionality. GCSS-Army consists of six functional modules as described below:

- **Maintenance Module.** This module replaces Standard Army Maintenance System (SAMS-1), Unit Level Logistics System-Ground (ULLS-G), and ULLS-Aviation. The UMO/mode operator will use this module to obtain operational status of movement assets, and driver qualification information.
- **Supply Property Module.** This module replaces Standard Property Book System-Redesign (SPBS-R), and ULLS-S4. The UMO will use this module to obtain unit equipment information. The Movement Control Battalion (MCB) will use this module to receive requests for transportation, and shipment tracing, and respond to the request.
- **Management Module.** This module replaces the Integrated Logistics Analysis Program (ILAP), and SAMS-2.
- **Supply Support Activity Module.** This module replaces Standard Army Retail Supply System-1 (SARSS-1), and incorporates Radio Frequency-Identification (RF-ID) Technology and Class I automation. The MCB will use this module to provide advance shipment arrival notice to supply support activities.
- **Ammunition Module.** This module subsumes Standard Army Ammunition System-MOD (SAAS-MOD).
- **Integrated Material Management (IMM) Module.** This module replaces SARSS-2A, SARSS-2AC/B, and Standard Army Ammunition System-Materiel Management Center/Defense Accounting Office (SAAS-MMC/DAO).⁹

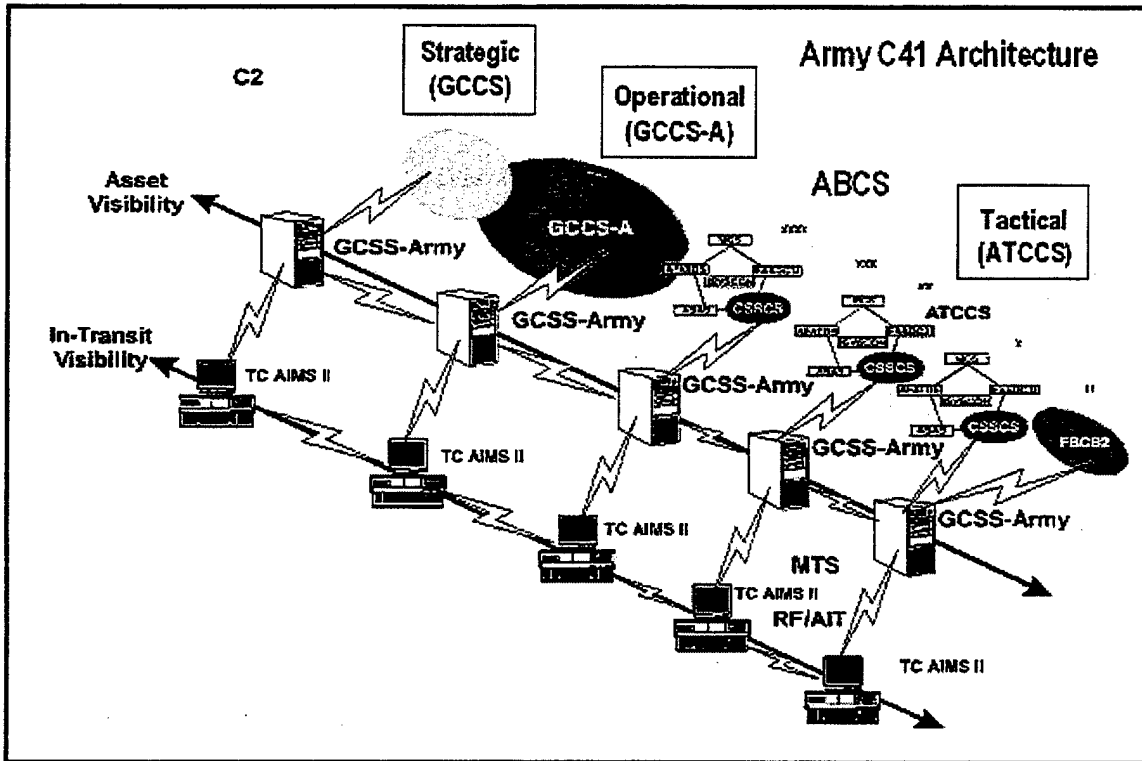


FIGURE 2. EMERGING CSS AUTOMATION¹⁰

GTN

The next automated system that provides TAV information is the Global Transportation Network (GTN). GTN provides intransit visibility of items in the Defense Transportation System (DTS). It is a secure web-based system that provides the status of units, personnel, equipment and supplies passing through transportation nodes, and it interfaces with commercial carrier automated intransit visibility systems via electronic data interchanges (EDI). "At its heart, GTN is a big, friendly, easy-to-access database. The idea is to gather together in one integrated repository all of the useful data that's currently stored in dozens of different DOD (and commercial) transportation systems..."¹¹

The information that GTN provides helps organizations at all levels during all phases of operations. GTN provides force tracking information for the deployment, sustainment, and redeployment phases of operations. It helps control the flow of forces and sustainment supplies into and out of the theater. Movement Centers from the strategic level down to the tactical level rely on GTN information to manage the flow into and out the theater. It is an important management tool that provides useful asset tracking information.

DSS

The Defense Standard System (DSS) is another automated tool that provides TAV information. DSS provides visibility over the flow of assets into and out of the distribution depots and feeds distribution depot ITV information into GTN.

Distribution Standard System (DSS) is the DOD standard automated information system that manages the flow and storage of stock at DLA distribution depots. With the consolidation of Service- operated distribution depots under DLA, a common operating system was needed to standardize the multiple legacy Service and DLA systems ... DSS provides enhanced tools for improving asset accuracy and control, improves the operating efficiency of depots, and supports TAV by enabling use of AIT devices to continuously update the JTAV database.¹²

TC-AIMS II

The Transportation Coordinator's Automated Information for Movement System II (TC-AIMS II) is another TAV automated system. TC-AIMS II is a joint system that will provide transportation and movement information to all services. It is presently under development. Fielding to Army units is scheduled to begin in FY 2000. "TC-AIMS II will replace current transportation management systems (TC-ACCIS and DAMMS) in TDA and TOE organizations respectively at many locations throughout the Army."¹³ TC-AIMS II will help movement coordinators plan and execute movements during all phases of military operations.

....TC-AIMS II is the enabler for force projection supporting the new Force XXI and Battlefield Distribution doctrine. It will be linked to Automatic Identification Technology (AIT) devices at many of the critical transportation nodes in the deployment and sustainment infrastructure. It provides standardization in reporting events as they occur for In-Transit Visibility (ITV), and the information needs of the Global Transportation Network (GTN), and Service-unique Total Asset Visibility (TAV) database systems.¹⁴

MTS

The last automated system that this paper will present is the Movement Tracking System (MTS). Organizations with MTS will have the capability to redirect movements without requiring vehicle operators to return to home station for additional instruction. MTS provides near-real time visibility of asset moving through the logistics pipeline in the theater of operations.

MTS is designed to provide mode operators with a system that can be used ... to link them with their drivers. The purpose is to provide ... intransit visibility of movements with positions reports on assets and means of long-range, assured communications that enable the redirection of assets due to Mission Enemy Terrain Troops-Time (METT-T) in support of a Force XXI campaign. MTS will allow for intransit visibility of units, personnel, and cargo. Transportation elements will use MTS to monitor and control intransit status throughout the theater transportation system...¹⁵

The key thing to remember about the TAV automated systems is that all of them must be linked to shared databases. GCSS, GCSS-A, GTN, DSS, TC-AIMS II, and MTS are the main automated systems that will provide TAV information. Leaders will utilize information from these systems to help make logistics decisions. The next section of this paper examines some of the challenges that Army leaders will face while implementing these systems.

CHALLENGES

TAV automated systems help provide focused logistics, but there are several challenges that Army leaders must understand and overcome. These challenges include materiel, training, leader development, organization, and doctrine changes. Integrated TAV automation and communication systems with common operating systems must be fielded. Personnel must be trained how to obtain accurate information rapidly. Leader development must focus on obtaining useful data and knowing what decisions to make, coupled with measuring the effectiveness and efficiency of TAV automated systems. Some organizations must be reorganized to support the battlefield distribution concept. Doctrine must be updated. These are some of the TAV challenges that Army organizations must deal with. Overcoming these challenges is the test to determine if logisticians will be able to provide swift, uninterrupted support during Army XXI operations.

MATERIEL

CSS organizations must replace and/or upgrade automated equipment over time, but the overriding materiel issue is access to communications. TAV automated systems must be able to transmit near-real time data to common databases. To do this, they must be supported with uninterrupted communication that enables them to operate in an "interactive, semi-interactive, and/or remote mode."¹⁶ The primary reasons for this are the magnitude of stand-alone systems still in use and the fact that operational conditions will vary.

Communication networks must be robust enough to handle intranet and internet requirements. Supply Clerks, Movement Specialists, and other personnel must be able to connect their computers to shared logistics databases. The challenge is how to ensure TAV automated system connectivity with shared databases when either the tactical communication network cannot support connectivity, or when organizations have to wait for the tactical communication network to become operational. Signal units may not arrive early enough in the theater of operations to provide required communication support to manage the flow of assets into the theater effectively and efficiently during contingency operations. How will CSS organizations in the theater, especially early arrival units, obtain visibility over the asset flow?

The answer for this question is to have redundant communication capability, just in case the tactical communication infrastructure cannot support TAV automated requirements. CSS units should not assume that data reception and transmission capabilities will be in theater when they deploy. Early entry organizations such as Port Battalions, Arrival/Departure Airfield Control Groups, Movement Control Teams, Supply Companies, etc., must have deployable/fly-away integrated communications and TAV

automated systems. There are several of them on the commercial market that can be adapted for military use. The Army needs to procure them and field them Army wide. Examples of these commercial communication networks include wireless internet connection devices such as hand-held personal computers, digital cell telephones capable of connecting to computers to send and receive data, and the International Maritime Satellite System (INMARSAT).

When Supply Sergeants, Movement Specialists, commodity managers, and staff personnel deploy to a field environment, they will not have fast speed ISDN telephone lines that they had in garrison. They will have to connect computers to a tactical communication networks and will experience all the challenges that come with them, i.e. transmission interruptions, limited number of lines, start-up delays, etc. The Integrated Combat Service Support Standard Information Management System (ICS3) mission need statement emphasizes the importance of having communication support for TAV automated systems:

ICS3 automation and supporting communications need to be welded together into a seamless, responsive, sufficient, and efficient system. To support this, system interfaces need to provide for a seamless flow of information between all CSS functional elements and users at all echelons automation and communications are inextricably related... CSS systems require communications connectivity, capacity, and interoperability.¹⁷

The equipment part of the materiel challenge includes replacing and upgrading TAV automated systems to keep pace with technology developments. Under existing new equipment fielding procedures, technological developments have caused some new equipment to become obsolete by the time they reach organizations. The equipment fielding process for some equipment takes as long as 10 years. The importance of overcoming this challenge is further amplified in the ICS3 mission need statement:

Individual Army CSS systems have evolved separately during the emergence of the information age, and data cannot be efficiently transferred vertically or horizontally within a functional system or between such systems. Information flow is routinely impeded by antiquated, obsolete, and unlinkable computer systems, software languages, operating systems, and source data input and by the lack of communications connectivity and/or interfaces.¹⁸

The suggested solution for overcoming the integrated communication and automated equipment challenge, while keeping pace with technological developments, is to lease TAV automated information systems rather than buying them. Technological breakthroughs occur often. Consequently, the Army continually faces the dilemma of replacing recently fielded automated equipment with something better. The Army needs leasing arrangements that will improve the efficiency and effectiveness of automated information operating systems as technology changes. The goal must be fielding improved logistics automated information systems that will provide the best means of attaining seamless integration of automation and communication to meet Army XXI TAV requirements.

TRAINING

TAV automated system operator training programs must meet the needs of organizations responsible for providing TAV information. The Army needs TAV automated system operators who can manipulate shared database information quickly and provide useful information for decision-makers. In most cases, this will be a full-time job. Examples of situations requiring full-time operators include: Movement Specialists in emergency operation centers tracking shipments flowing into and out of the theater; Arrival/Departure Airfield Control Groups (A/DACG) and Port Movement Control Teams (MCTs) tracking flights scheduled to arrive at their location; and Supply specialist ordering supplies and adjusting reorder points as conditions change. These are only a few examples of the personnel who need intensive training on the capabilities of the TAV automated systems.

Recent operations have revealed that many personnel who will be in positions that require them to operate TAV automated systems do not know enough about the systems to manipulate the databases for useful information. The following report from an organization that deployed to Bosnia emphasizes this point:

The task force conducted extensive automation systems user training prior to deployment. User training reduced installation and network management problems compared to previous operations. Yet, some users still showed up with little or no automation training. These users expected to deploy, "plug in," and get immediate worldwide secure and nonsecure connectivity. Some users did not understand the capabilities and limitations of the network that they connected to.

The lack of adequate user training and understanding of the network slows down the staff process and decreases productivity. Much user computer time is spent figuring out how to manipulate office software, scan graphics and text, and display graphics once scanned. All TRADOC schools, particularly MOS producing schools, officer and NCO basic and advanced courses, Command and General Staff College, and the Army War College must increase the quality and quantity of information systems training.¹⁹

The suggested solution for improving operator training is to operate TAV systems in garrison like they will be operated during contingency operations. Emphasis needs to be placed on inputting accurate data into the systems, deploying to austere field environments, and operating in emergency operation center environments. Organizations required to provide TAV should rotate as many of their soldiers as possible through these scenarios to receive hands-on training with TAV automated systems. This will help prepare them for contingency TAV requirements. Additionally, the service schools should place more emphasis on training soldier how to use web-based automated systems. Upon arrival at organizations, these trained soldiers should be assigned into proper positions that require operating automated TAV systems as a part of everyday work, not just for deployments.

LEADER DEVELOPMENT

Similar to the operator training challenge, leader development programs need to be improved. Leaders must understand how the TAV automated process works and how to measure efficiency and effectiveness of their piece of the TAV process. Leaders must know how to use TAV data generated by the logistics automated systems in order to make decisions such as diverting shipments, increasing stockage levels, utilizing alternate sources of supply, replacing vice repairing damaged equipment, etc. To assess the efficiency and effectiveness of TAV automated systems, they must develop management tools that provide feedback concerning the usefulness of the systems.

Performance goals and objectives must be established and there must be a disciplined approach to implementing and managing TAV automated systems. Otherwise, leaders will blindly implement them without knowing what their contribution to the TAV process should be. According to a recent Government Accounting Office (GAO) Report, the DOD TAV goals have been established. The challenge for Army leaders will be quantifying these goals into measurable objectives and establishing procedures for meeting them. The following is an exert from the 1999 GAO Report:

The TAV initiative is also prominent in the DOD's 1998 Annual Report to the President and the Congress, and the Results Act Performance Plan in the 1999 Annual Report sets a goal of 90-percent visibility of and access to DOD materiel assets by 2000 while resupplying deployed troops and, at the same time, reducing the average order to receipt time of assets by 50 percent...²⁰

Leaders at all levels will implement automated systems to improve logistics support to the warfighters. At the strategic level, Inventory Control Points (ICP) and depot commanders should utilize automated systems that will minimize procuring more assets than the Army needs, while simultaneously getting assets to the warfighters faster. At the operational and tactical levels, CSS organizations should focus of capturing intransit visibility over assets enroute to the theater to facilitate swift distribution to requesting units. The aim is directing shipments to using unit level that bypasses warehouses. This will reduce order ship time and stockpiling of assets.

The key to developing leaders will be to let them know up front that someone is watching to determine if the TAV automated system initiatives are being implemented in accordance with established goals and objectives. The bottom line is to check and recheck to ensure organizations are not wasting time and energies on TAV programs that either do not support DOD goals and objectives or deliver what the Army XXI TAV system needs. As a result, warfighters will have more soldiers dedicated to the operational requirements versus "spinning their wheels" operating automated systems that do not help the fight. This requires a review of the TAV organizational concept design.

ORGANIZATIONS

The next TAV challenge for the Army will be organizational changes. Business will not be as usual. This means that some organizations must be restructured to support battlefield distribution (BD). "BD is a holistic concept of information exchanges, management procedures, functional organizational designs, and reengineered operational processes which enable U.S. forces to properly request, receive, redirect, track, distribute, control, and retrograde material, services, units, and personnel within a single distribution system."²¹ CSS functional components must be reorganized in some cases to provide a unified approach to managing assets in the logistics pipeline. For BD to be successful, all CSS components must understand what the Army wants BD to accomplish. The following is the U.S. Army Training and Doctrine Command (TRADOC) view of BD:

The key fundamental requirements of BD are an integrated architecture of management information systems, the merging of materiel and movement management systems, and tailored logistics force packaging The BD management system will utilize state-of-the-art technologies such as communication enhancements, automatic identification technology, automated source data input, and integrated standard Army information management systems to create a seamless flow of management information from the strategic to tactical levels of logistics ...²²

There are several organizations that help distribute assets. At the strategic level, the main ones include Defense Logistics Agency, DOD Depots, U.S. Transportation Command, Military Traffic Management Command, Military Sealift Command, Army Materiel Command, and supported and supporting CINC Joint Movement Centers (JMC). At the operational level, the main ones include Joint Task Force JMC, Theater Support Command, Theater Distribution Management Center, and Theater Movement Control Agency. At the tactical level, the main ones include: Corps Support Command, Distribution Management Center (DMC), Corps Support Groups, Division Support Command, Division Materiel Management Center, Corps Movement Control Battalion, Support Battalions, Movement Control Teams, Supply Companies, Ordnance Companies, Maintenance Companies, and Transportation Companies. Staffs at all levels also perform TAV functions.

The major organizational changes to facilitate BD include creating distribution management organizations at all levels. At the strategic level, the Joint Staff, Service Components, and DOD commodity managers track assets, spare parts, and requisitions, and redistribute supplies and materiel, as required. They will utilize the GCSS common database that links materiel and movement automated systems, such as ICP AIs, DSS, ATAV/GCSS-A, and GTN to accomplish these functions. Although they will operate from separate locations, they will execute TAV functions similar to the manner in which distribution management centers (DMCs) execute them.

At the operational and tactical levels, the DMC links materiel, movement, and distribution functions. The Materiel Management Center and Movement Control Battalion will either merge to form the DMC, or they will continue to operate as separate organizations under the supervision of the higher headquarters staff. The key thing to note about the DMC is that the commodity managers and the movement specialists are not required to co-locate to provide TAV for the theater or corps, as long as they have access to shared TAV databases. Commodity managers and movement controllers at this level need access to GCSS, ICP AISS, DSS, GTN, ATAV/GCSS-A, TC-AIMS II, MTS and other logistics automated systems to provide visibility over assets in the logistics pipeline.

Organizational structures will change to meet operational requirements. The Army will tailor CSS forces for future operations. Here is TRADOC's view of future CSS units:

The future Army will be smaller, yet have new, expanded, and diverse missions in an unpredictable rapidly changing world environment. These factors mandate changes to the way the Army organizes. CSS organizations will be modular, tailorable, and flexible to support future Army operations. Organizations design must facilitate operations in a split based configuration and employ Information Age technologies...²³

As the Army becomes leaner, more demands will be placed on logisticians to streamline operations, but it should not be at the expense of providing TAV. This means that organizations like the Corps Support Command will continue to deploy logistics task forces with TAV capability to meet Army XXI requirements. Modular organization such as the Material Management Center, Movement Control Battalion, and Corps Support Group and their respective Movement Management Teams, Movement Control Teams, Supply Companies, Ordnance Companies, Cargo Transfer Platoons, etc., must be included in the task force because all of these organization have TAV responsibility. This is key to effective implementation and management of TAV systems. The main point here is that CSS units must be able to adjust to changing operational requirements without losing their ability to maintain visibility over assets in the logistics pipeline.

DOCTRINE

Changing operational requirements will impact on doctrine. Doctrine must be updated, and in many cases established to formalize the Army XXI TAV Program. An example of this is the recent operator training requirements for SAARS. "Changes in SAARS have been happening so fast that changes to Users Manuals have not kept pace."²⁴ Presently, only a few publications, such as TRADOC Pamphlet 525-77 (Battlefield Distribution), FM 55-10 (Movement Control), and FM 100-10-1 (Theater Distribution) provide TAV information. The remainder of TAV information consists mostly of functional requirement documents, equipment need statements, information paper, briefings, etc. Army organizations need more guidance to implement TAV automated systems.

More guidance must be formalized and published to explain how Army XXI TAV processes will work at the strategic, operational, and tactical levels. Without formal documents, such as additional field manuals, technical manuals, technical bulletins, mission training plans, etc., organization will not have standard procedures for accessing TAV databases, providing TAV updates, downloading information, and maintaining equipment. Without formal doctrine, the Army XXI TAV program will not operate efficiently. There will be too many stovepipe automated systems operating guides and procedures, which may not be in congruent with Army XXI TAV doctrine.

CONCLUSION

In conclusion, logisticians will meet Army XXI TAV requirements. They will continue to leverage technology to ensure swift uninterrupted support to warfighters. There will be numerous automated systems available to assist logisticians at all levels with the important task of providing the right amount of assets to warfighters at the right time and at the right place. Logisticians will continue to knock down barriers to change with the times, and to take advantage of technology. Information fusion via web-based systems will simplify the process of providing visibility of assets and distributing supplies on the battlefield. As the Army rolls into the new millenium, warfighters can rest assured that logistics support will be there when they need them.

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ENDNOTES

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