

1 October 1997

TRADOC Plan for Reengineering
Information Systems Modernization

TPRISM

Deputy Chief of Staff for
Information Management

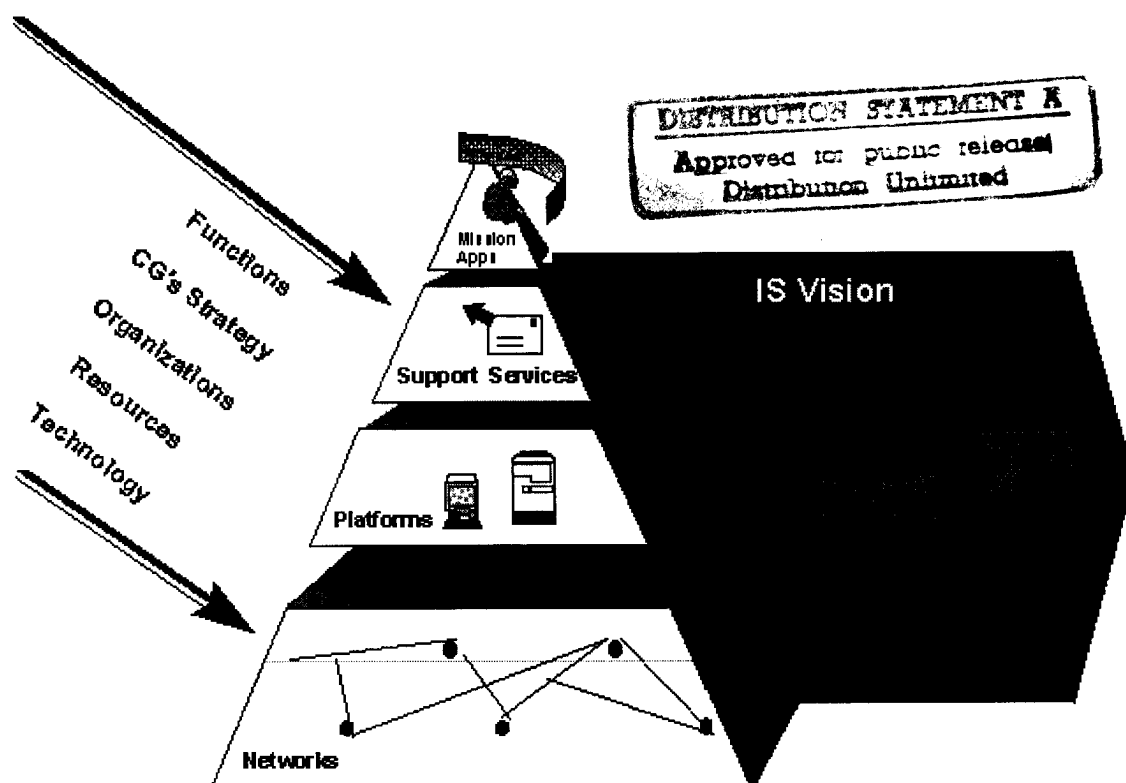


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1. Chapter One: Executive Summary

1.1 Vision

The Training and Doctrine Command's (TRADOC) core processes and products will continue to be information based. TRADOC will *acquire* information from worldwide external sources as well as from our own operations and experiments. TRADOC will analyze and *process* information to formulate new concepts, doctrine, organizational designs and materiel requirements. To create consensus for our products, TRADOC will *transport* information to worldwide destinations. To ensure products have a combined arms orientation and integrated intellectual content, TRADOC will require frequent, and sometimes large, information exchanges, internal and external to the command. While TRADOC will *generate* and *package* its products various ways, e.g.,

- doctrine as publications and computer media
- materiel requirements as documents and demonstrations
- training as institutional training lectures, videos and interactive courseware

--their common denominator will be their information content. In short, TRADOC's mission will keep the command squarely in the information management (IM) business.

TRADOC's *Strategic Plan 1997* recognizes the command's information systems (IS) architecture as a key enabler of mission execution. Our mission demands we build an IS architecture to acquire, process, transport, package, and protect the information we use and the information we generate. TRADOC's IS architecture will be sufficiently robust to enable execution of TRADOC's many processes, and sufficiently flexible to retain utility as reengineering improves our processes.

TRADOC's *Organization Guide 1997* gives insight into our organization for mission execution. The command is typified by decentralized execution at sixteen installations and other activities across CONUS, each engaged in coordination with the others and with organizations and units throughout the Army and DoD. TRADOC's decentralized organization will continue to drive distributed information processing and robust information transport capabilities. TRADOC will continue to rely on action officers as the subject matter experts that execute our processes and generate our products. Access to TRADOC's IS architecture will therefore extend capabilities down to the action officer level.

Commander's Intent

*"In the near term, we will...identify key enabling investments (such as **information architectures** and distributive interactive simulations) and press for their rapid integration..."*

*"In the mid term, we will...continue the expansion of **information architectures** and automation to increase connectivity to all training audiences--centers, schools, and the operating forces--across the Total Army..."*

TRADOC Strategic Plan, 1997

Consistent with our mission and organization, TRADOC's infrastructure of networks and computer platforms will provide a robust command-wide foundation for common user services and mission specific applications, and will remain open to information technology insertion to support uses as yet unimagined.

The networking infrastructure will have a common user approach that can provide bandwidth on demand, rather than the stovepipe approach that dedicates an asset to one application or set of users. The infrastructure will provide required links to external organizations so that TRADOC can transport its products wherever necessary and acquire information from the best data sources. The infrastructure will be accessible to TRADOC personnel from any location to which TRADOC's mission sends them.

The command's information resources, or data, will be available in the right format at the right time and place. Information will be structured according to standard formats so it can be shared and reused. Secured interfaces will ensure proper user access and data integrity while still maximizing seamless information transport. Data will be collected one time and then shared among applications to create a consistent picture of the command for its decision makers.

Common user support applications, e.g., e-mail and databases, will be interoperable and accessible where needed, whether at a fixed TRADOC building or at a remote training site. They will present a consistent interface to the users. They will enable command-wide coordination for distributed, collaborative approaches to mission execution.

Mission applications will optimize their domain specific architectures for the provision of unique capabilities, but will be capable of harnessing the standardized capabilities of the command's networks, computing platforms and data structures.

1.2 Status

TRADOC's current ISs are at the threshold of forming such a flexible and robust architecture. TRADOC is migrating away from its previous infrastructure, installed in the mid 1980s, which was based largely on dedicated circuits, proprietary standards and a mainframe system architecture. TRADOC's recent investment strategy, which emphasizes a flexible, open architecture of distributed components, linked over common user networks, is evident in improved assets and on-going modernization actions across the command.

TRADOC has achieved a common baseline for wide area network (WAN) and campus area network (CAN) capabilities at 14 of 16 installations. TRADOC's WAN architecture now maximizes use of the common user networks collectively managed by DoD as the Defense Information System Network (DISN). An immediate challenge is to ensure continued networking for distributed interactive simulations since DoD has stopped its central funding for the Defense Simulations Internet (DSI) WAN. The baseline CANs, based on fiber distributed data interface (FDDI) technology, accommodate data transfer, but do not support higher bandwidth requirements of video or distributed simulations required by the Army Distance Learning Plan (ADLP), Force XXI experimentation and other Army-level projects executed on TRADOC installations. To address this, TRADOC has planned insertions of asynchronous transfer mode (ATM) technology into key CAN segments, interfaced with switched Ethernet local area networks (LANs) to extend adequate bandwidth to the users' level. Although LANs are commonplace in TRADOC, networking capabilities have not been universally extended to action officer level. LANs will have to be modernized, inter-networked, and in some cases created, to provide connectivity and capabilities at the level required by users. Network security components, at WAN, CAN and LAN level, are inadequate to counter conceivable threats. Security devices are also required to realize the promise of intranets for command-wide coordination. Intranets employ familiar Internet technology, e.g., hypertext links, graphic user interface and file transfers, while controlling access to sensitive information.

Commander's Assessment

"Leading-edge IT [information technology] and connectivity is the fundamental multiplier for providing training and leader development programs...and weapons system development process.. To date we have accommodated basic needs at some of our installations across TRADOC by providing the requisite bandwidth and thruput needed to support rapidly emerging technologies. However, we still require funding to upgrade the remainder of our installations to this capability level. Staying in synch with technological change, as it occurs, is essential."

**CG TRADOC to CSA
3 Apr 97**

Although the IBM mainframes are still used to host several applications, installations have made significant progress in the migration to more distributed and open platforms. More platform insertions are planned in the near term by DA program managers but installations require even more distributed servers, particularly to provide e-mail compliant with the Defense Messaging System (DMS)

client-server architecture. DMS also poses a significant challenge for our client platforms, i.e., personal computers (PCs). There are about 35,000 PCs in use in TRADOC. Almost as many are Intel 386 and below as are 486 and above. 386 PCs are inadequate processing platforms for working with TRADOC's information based products. HQ TRADOC coordinated with TRADOC Directors of Information Management (DOIMs) to issue minimum specifications for ordering new PCs. These minimum specifications will help ensure PCs are supportable, interoperable and capable of running common software applications. However, there are inadequate funds to modernize sub-standard hardware and software at the user level. Besides slowing the migration to powerful new applications, this also prolongs our use of mixed generations of office automation packages and impedes free exchange of our information products.

Many of the mission applications managed by HQDA or DoD program managers have not reached initial operational capability, but they have potential to move TRADOC closer to an open architecture than the mission applications they replace. Even so, such systems often emphasize the optimization of their own stovepipe functional domains at the expense of the command-wide architecture, and interoperability problems do surface during integration into the installations' infrastructure. Pending DoD and Army fielding of mission applications fully compliant with open standards, TRADOC still uses Army and TRADOC applications that are based on a non-standard software engineering environment. TRADOC must integrate replacement capabilities. Additionally, these replacements must occur prior to the onset of problems associated with the change of the century.

The change of the century has the potential to make otherwise serviceable IS components obsolete unless fixes are made. In some cases, the problems will be too systemic to fix and replacement systems will have to be found. TRADOC information managers are still assessing the impacts to determine the scope of our challenge.

As yet, DoD and Army have fielded few capabilities to TRADOC via centrally managed programs, e.g., Power Projection Command, Control, Communications and Computers Infrastructure (PPC4I), Sustaining Base Information Services (SBIS), and DMS. TRADOC's own IM personnel have been reduced. TRADOC's IM funding, never equal to its requirements, continues to shrink, particularly the OPA, or investment, funds. Therefore, TRADOC is choosing its modernization investments carefully, emphasizing key enabling investments (KEI), that provide the best opportunity for immediate impact on mission essential capabilities. TRADOC analyzes each KEI to identify smart information infrastructure upgrades that must support the more visible mission applications. Resourcing will remain a limiting factor in modernizing TRADOC's system architecture. In the commanders' assessments for FY98, seven TRADOC installation commanders specifically included information technology modernization as an under resourced deficiency.

In summary, TRADOC faces significant near term resourcing and technical challenges to:

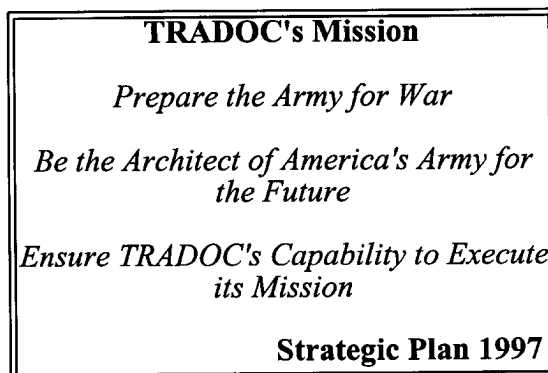
- Create infrastructure that supports high bandwidth video and simulation applications
- Exploit the Internet for information dissemination and document staffing
- Migrate to the DISN Enhanced IP Services (the DSI replacement), and fee-for-service
- Implement DMS
- Eliminate stovepipes
- Ensure information security
- Manage change of century (Y2K) transition issues

1.3 Modernization Drivers

To ensure the proper focus, IS modernization is driven by TRADOC's key *operational requirements*. Planning the solutions for these requirements is undertaken with a command-wide perspective, guided by an *architecture framework*, consistent with joint and Army IS architectural planning. Within this framework, TRADOC's specific modernization efforts are focused by a set of *strategic goals* for achieving the architecture and otherwise improving the command's IM processes. Like a combined arms team, our mix of information systems must collectively provide the right capabilities, correctly sized and orchestrated for an optimum response to mission requirements.

1.3.1 Operational Requirements

To meet the challenges of our mission, there are ongoing reengineering initiatives throughout TRADOC. These efforts are led by functional proponents, with the DCSIM assisting since nearly all will impact operational requirements for IM support. To **prepare the Army for war**, TRADOC will continue to *provide quality training* experiences in a variety of educational settings and worldwide locations. TRADOC will link its schoolhouses to soldiers and units in the operating force and implement the distance learning objectives of Classroom XXI and the ADLP. As the **architect of the future**, TRADOC will *design Force XXI and the Army After Next*. TRADOC will generate and gain Army-wide agreement for organizational and operational *concepts, doctrine, leader developments, materiel requirements, and force design*. TRADOC also must **ensure its own capability** to execute its mission, i.e., TRADOC must *manage installations* assigned to the command.



See also:

4.1 Operational architecture

1.3.2 Architecture Framework

To execute all the tasks implied in this mission, TRADOC needs IM tools that work in a command-wide interoperable architecture. In executing modernization efforts, TRADOC will apply principles that promote the creation of an open, standards based, architecture. This approach will best create the flexible capabilities and robust connectivity required by our information based mission and distributed organization. Analyzing TRADOC's resource environment, it seems unlikely we will field large systems, acquired centrally at one time, with all interfaces already designed and engineered for interoperability by the vendor. TRADOC will instead grow through relatively small, decentralized acquisitions phased over time. The only way to integrate the results of decentralized acquisition decisions is to establish and adhere to a standards profile, guided by an architectural framework for the creation of command-wide capabilities and information flow. TRADOC must build toward a flexible architecture into which small, affordable, components can be integrated. The set of architectures being developed as a result of HQDA's Enterprise Strategy provides the framework. This work is given an even broader applicability in joint architectures, particularly the *Joint Technical Architecture (JTA)*. As the world-wide information technology community settles on standards for each aspect of IM, incorporation of those standards into acquisitions permits greater reliance on advances in the IS marketplace for workable solutions to TRADOC requirements. TRADOC will also use preferred products lists to alert users/buyers about which products will have full DOIM support for maintenance, operations, training, etc. In August, 1997, HQ TRADOC issued the first such coordinated list for command-wide use. It addressed user level IS components. Products on the list included Microsoft (MS) Windows NT Workstation, MS Office applications, and MS Exchange.

See also:

2.1 Architecture Framework

4.4.3.2 Office Automation

1.3.3 Strategic IM Goals

TRADOC's strategic goals for managing IM are listed in Table 1. Goals 1, 2 and 4 target IS modernization specifically, while the others are aimed at improving IM processes that contribute to the efficiency and effectiveness of modernization. These strategic IM goals guide TRADOC's selection, approval and packaging of specific modernization efforts. Each goal from Table 1 is defined below.

See also:

2.2 Strategic Goals

Table 1. TRADOC IM Goals

--> 1	Improve interoperability of TRADOC's IS
--> 2	Modernize IMA infrastructure to meet mission requirements
3	Improve the process for managing IMA requirements in support of the command's mission requirements
--> 4	Better incorporate information technology in support of TRADOC business processes
5	Synchronize IMA actions within TRADOC
6	Design appropriate IMA organizations across TRADOC

--> Goal 1: Improve interoperability of TRADOC's IS

IS acquired by and fielded to TRADOC installations must form an integrated tool that cost effectively supports command-wide information flow as required by current missions and organizations; and is open to flexible technology insertions to retain its utility as reengineering improves our processes. The command must be able to generate and capture information once, and share it among all TRADOC activities. The infrastructure of networks and platforms must have interoperable interfaces with mission applications. Security features must control proper user access while still maintaining required information flow. There must be commonality among TRADOC's IS tools for office automation and coordination (e.g., e-mail, schedulers, document staffing) so that they can rapidly share products with all information content preserved, create virtual collocations of TRADOC personnel, and can be redeployed and reconfigured as necessary to flexibly support TRADOC's missions and organizations. TRADOC's IS must support required information exchanges with deployed forces and with the IS of units in garrison. TRADOC must be in compliance with the Army and Joint Technical Architecture.

--> Goal 2: Modernize IMA infrastructure to meet mission requirements

Infrastructure includes common user communications assets and processing platforms. Modernization is required to meet mission requirements, primarily for Classroom XXI, modeling and simulations and command-wide coordination capabilities. This implies increased connectivity, or access points, and capacity, or bandwidth, to support many current and planned applications and as importantly, to position the command to employ new, as yet undefined applications that will rely on robust information transfer and information processing capabilities. Platforms must be migrated toward open systems capable of supporting client server software architectures. Modernization must be implemented at all levels (command, installation, building) to create the required capability. TRADOC will migrate from many sole user (dedicated) links to fewer, but greater capacity, common user links capable of providing bandwidth on demand.

--> Goal 3: Improve the process for managing IMA requirements in support of the command's mission requirements

TRADOC will reengineer its procedures for defining and integrating IM requirements and for transitioning requirements documentation into planning, programming and resourcing documents. TRADOC must have clear procedures for deciding whether proposed solutions and procurement actions fit into our architectural framework and for rejecting those that do not. The procedures must ensure the requirements for infrastructure components associated with key mission applications are identified early and resourced. The requirements procedures must help decision makers identify the high payoff requirements, i.e., key enabling investments, that deserve a high priority. reengineering must be implemented in the context of TRADOC's increased role for Army-wide requirements management and the recent elimination of unique IS procedures in the AR 25 regulatory series.

--> Goal 4: Better incorporate information technology in support of TRADOC business processes

TRADOC will ensure its reengineering activities consider the impact that information technology can have. Information managers must advise TRADOC's decision makers and proponents in the analysis of alternatives, from the perspective of available technology and trends in the IS marketplace.

--> Goal 5: Synchronize IMA actions within TRADOC

TRADOC will foster the total system fielding concept to implement IS modernization. Implementation of solutions must consider the total defined requirement. TRADOC will define and use the least disruptive evolutionary growth strategy when resources constrain fielding complete solutions. TRADOC must coordinate the delivery of IS components to achieve initial operating capability as early as possible for each modernization action and to minimize downtime during modernization cut-overs. TRADOC must identify synergistic opportunities among disparate modernization programs. TRADOC must minimize program managers' "stove-pipe" approach in development and fielding actions that affect TRADOC installations. DCSIM, in coordination with HQ functional staff, must document pending IMA actions so that TRADOC DOIMs are aware of external agencies' plans for their installations. HQ TRADOC staff must coordinate with external agencies to resolve issues identified by DOIMs.

--> Goal 6: Design appropriate IMA organizations across TRADOC

TRADOC must ensure its organizations are tasked, designed, staffed, and funded to provide effective and efficient IM services and ensure its organizations have expeditious access to external talent (e.g., contractors, Defense Printing Service, Communications and Electronics Command (CECOM)).

1.4 TPRISM Organization

This document is one part of the TRADOC Plan for Reengineering Information Systems Modernization (TPRISM). It is the command level architectural framework document, DoD's recommended first step toward standards based planning in the information mission area (IMA). It is supported by more dynamically changing displays accessible through DCSIM's homepage on the Internet. For example, a graphic database tracks characteristics of the command's system architecture at the installation level and Gantt charts display the timelines for known IMA modernization actions.

For more information:

<http://www-tradoc.monroe.army.mil/netviz/index.html>

<http://www-tradoc.monroe.army.mil/netviz/syncmatrix/index.html>

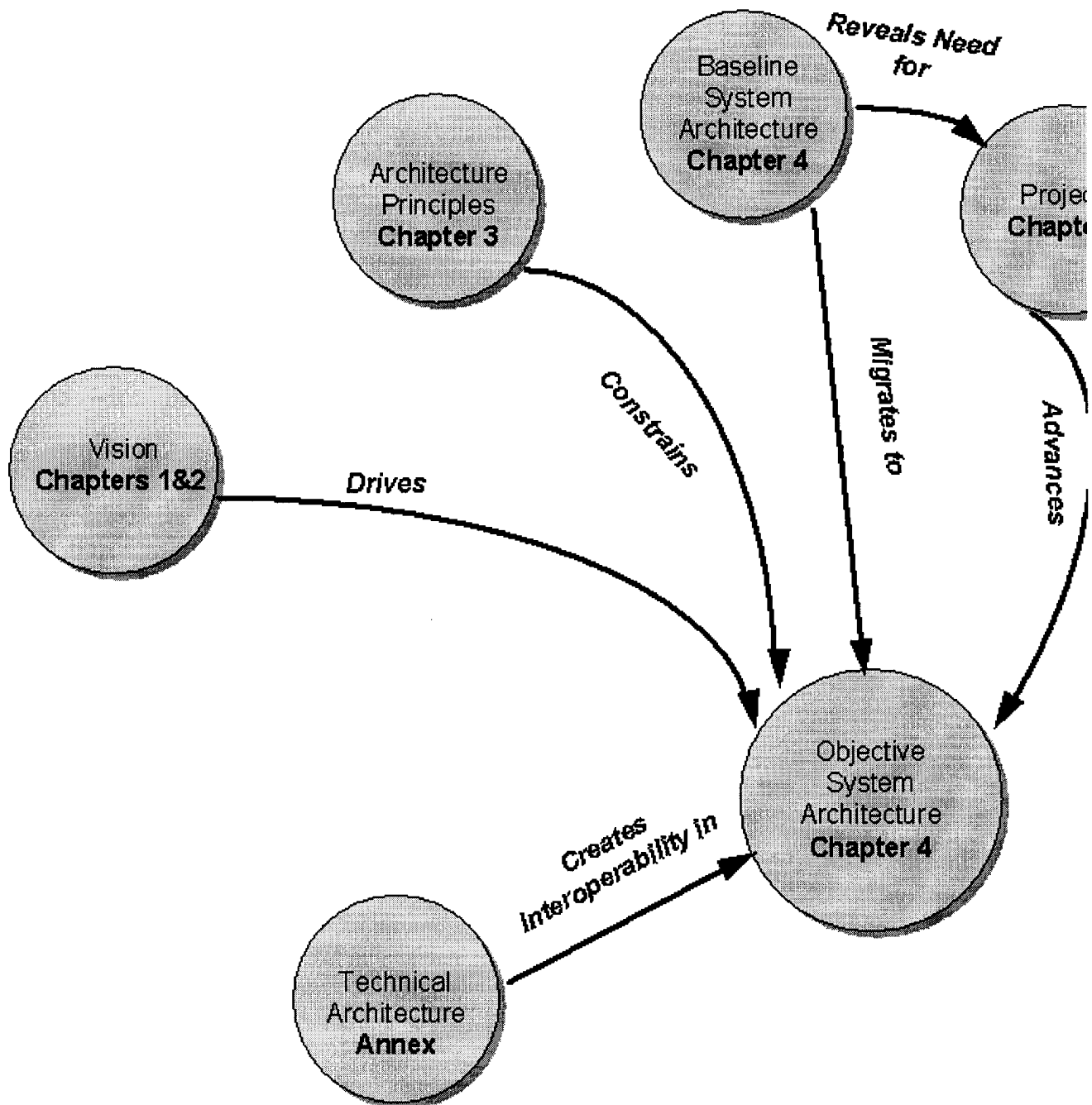


Figure 1. Organization of TPRISM

Figure 1 depicts how this document is organized. Following the summary in this chapter, Chapter 2 amplifies the context for TRADOC's IS modernization planning. It will help resource and requirements managers and installations understand DCSIM's management approach and goals for IS modernization.

Chapter 3 provides architectural principles. Since TPRISM cannot anticipate or discuss all decisions needed to modernize the command's IS components, the principles provide general guidance to help make specific decisions consistently with the command's architectural framework. This chapter provides guidance to external program managers on TRADOC's expectations for successfully inserting systems into TRADOC installations; and it provides installations and functional proponents guidance on the characteristics DCSIM is looking for in modernization proposals.

Chapter 4 looks at TRADOC's IS environment from several viewpoints:

- operational architecture (how mission affects information requirements)
- technical architecture (what standards must be observed for IS modernization)
- systems architecture (what IS components provide the baseline and objective IM capabilities)

These viewpoints, laid out in accordance with the framework discussed in Chapter 2, provide modernization planners at all levels (installations, external PMs, and staff functional proponents) the DCSIM's perspective on how the command will justify, design, and incrementally field IS capabilities. It discusses the command's entire objective architecture, from common user infrastructure to mission specific software, to help promote interoperability among all IS components planned for insertion into TRADOC operations.

Chapter 5 describes key modernization projects aimed at advancing our IS toward the objective architecture described in Chapter 4. It also provides an overview of resources and organizational responsibilities for modernization projects. It will help installations and activities understand projects that affect their IS architectures and identify opportunities for leveraging others' efforts.

TPRISM's appendices provide detailed information about standards, the command's baseline system architecture, mission applications and acronyms.

Chapter Two: TRADOC's IS Planning Context

This chapter introduces themes used throughout TPRISM as the foundation for its content and the framework for its organization. These themes provide a consistent context to analyze TRADOC's IS environment and plan its modernization.

2.1 Architecture Framework

In executing IS modernization efforts, TRADOC is migrating toward an open, standards based, architecture. This approach will best create the flexible and robust features and connectivity required to execute our mission. TRADOC's resource constraints preclude investments in large, single vendor solutions, acquired centrally at one time, with all interfaces already designed, engineered and standardized by the vendor. TRADOC must harness many smaller acquisitions by installations, functional proponents, and external activities into a command-wide information capability, with assurance that components can interoperate and exchange information. To do so requires adherence to technical standards and consistent architectural principles, executed through many decentralized decisions. An open systems architecture will improve TRADOC's ability to:

- Interface heterogeneous vendors' systems
- Execute information technology insertions
- Exchange information within TRADOC and with external activities
- Create a consistent user interface across the command
- Contract for maintenance, supplies and training
- Reuse components in different environments
- Grow or change IS components as TRADOC grows or changes
- Create common security policy and support services

The key concepts of this architectural approach are discussed below.

2.1.1 Standards Based

TRADOC is migrating to an IS architecture composed of open systems. This builds on the joint staff's vision of an infosphere, into which users can plug a variety of IS, regardless of where they are, and begin immediately to push and pull information. An open systems environment is not a particular automation or telecommunications topology nor a set of particular vendor products. In an open systems environment, the designers implement published, or non-proprietary, standards for interfaces, services

and information formats (e.g., data elements, messages) to enable properly engineered components to interoperate with other components.

TRADOC aims for joint interoperability by observing a hierarchy of standards profiles. The hierarchy starts with the Joint Technical Architecture (JTA) and the JTA-Army (formerly Army Technical Architecture (ATA)). Where those profiles permit choices, or fall short of the level of standardization TRADOC requires, then TRADOC augments them to meet the command's interoperability requirements.

Mandating use of open standards is not sufficient in itself to ensure interoperability. Components, even if compliant with open standards, do not necessarily directly interface. There are still implementation choices to be made. TRADOC will refine its standards profile as applicable to the particular set of components in our system architecture and enforce command wide compliance in acquisition decisions. However, **the intent is to standardize on "standards," not on systems.** That is, TRADOC will tolerate various vendors' systems as part of the architecture as long as they conform to the applicable standards, rather than demanding installations use a particular vendor's products to ensure interoperability.

If the JTA-Army and industry standards are insufficient to enable heterogeneous systems to interface sufficiently to implement a required command-wide capability, then selection of a product may become necessary for implementing a specific capability.

There will be some further narrowing of choice through other processes, e.g., the use of preexisting IDIQ contract products and DMS compliance. Also, since installation Directors of Information Management (DOIMs) cannot provide maintenance and training support for all vendor products, they may promulgate preferred products lists and restrict their support to the preferred products. However, in establishing levels of support, installations will not be so restrictive as to preclude use of WAN or CAN assets by any JTA-Army compliant IS. TRADOC organizations may deviate from preferred products lists, but doing so risks loss of compatibility with other TRADOC systems and reduced DOIM capability to support the non preferred product. To assist DOIMs in enforcing this approach, TRADOC CofS issued a memorandum, 15 Aug 97, stating the coordinated command-wide preferred products for hardware and software at the personal level. The memo included product configurations, reproduced in paragraph 4.4.2.5 (hardware) and 4.4.3.2 (software), which are supported by TRADOC DOIMs for FY98.

See also:

Appendix A: TRADOC's Technical Architecture Standards

2.1.2 Multiple Levels

IS are employed and integrated at various organizational levels. TRADOC's organizational levels include the personal, local (office or building), installation, mission and MACOM (or enterprise). So, for example, networks run at the local (i.e., LANs), installation (i.e., CANs), mission (e.g., DISN Enhanced IP Services for M&S) and enterprise (e.g., Defense Information System Network (DISN)) levels. This matrix of IS components and organizational levels impacts TRADOC's modernization planning in two important ways, evident throughout TPRISM:

- IS components (networks, platforms, applications) employed *within* each level (personal, local, installation, mission, MACOM) must be integrated to support mission execution at that level.
- IS components must be sufficiently integrated *among* the levels to achieve the interaction required for executing the command's mission.

2.1.3 Multiple Viewpoints

Architectures provide a framework for portraying the relationships among all entities of a complex system. DoD and Army guidance for defining architectures includes three viewpoints: operational, technical and systems. Each portrays different types of entities and relationships, as illustrated in Figure

2. A complete set of these architectural viewpoints for TRADOC will provide a comprehensive understanding of the IS components required and planned to achieve interoperable capabilities throughout the command.

For more information:

<http://www.cisa.osd.mil/cisa/itfnopass/archfwk.pdf>

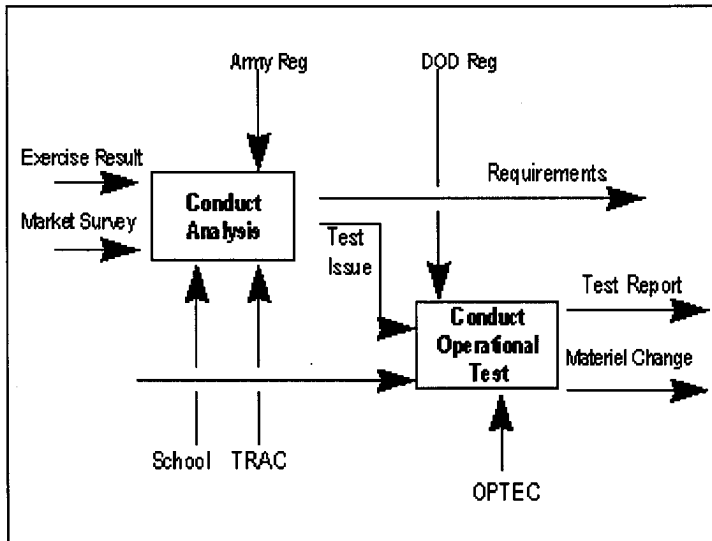
2.1.4 DoD Technical Reference Model

DoD has further refined the methodology for organizing IS architectures with its Technical Reference Model (TRM), described in the *Technical Architecture Framework for Information Management* (TAFIM). Since TPRISM uses the TRM to organize several sections, understanding it will help to keep the reader oriented. Figure 3 shows the DoD TRM, with some adaptations (*italicized labels*) for the TRADOC context. These added category labels should not be assumed to be comprehensive or static. TRADOC will migrate to specific system components that fit, functionally and technically, into this framework.

For more information:

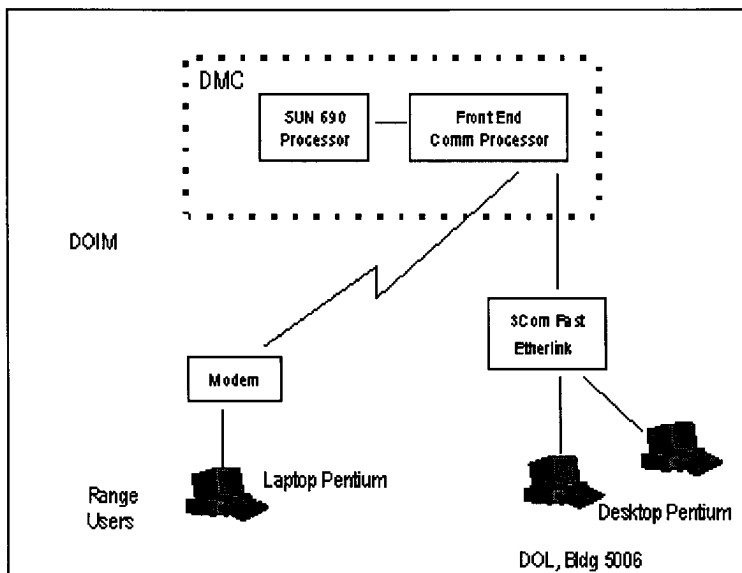
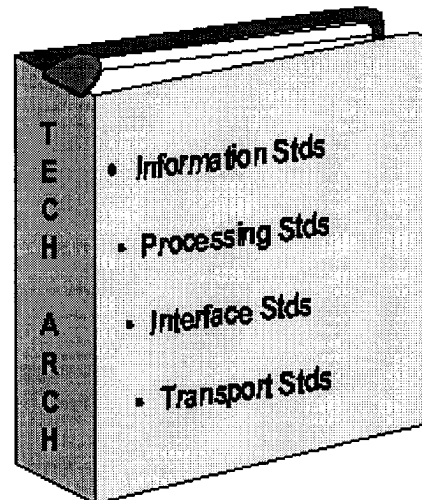
<http://www-library.itsi.disa.mil/tafim/tafim3.0/pages/tafim.htm>

Architecture: A framework that portrays relationships among the elements in its view.
Army uses three viewpoints for information.



Operational: Relationships among missions, functions, information and organizations.

Technical: Relationships among engineering standards used to build information products and systems.



System: Relationships among the systems (processors, software, communications) and organizations.

Figure 2. Army's C4 architecture viewpoints

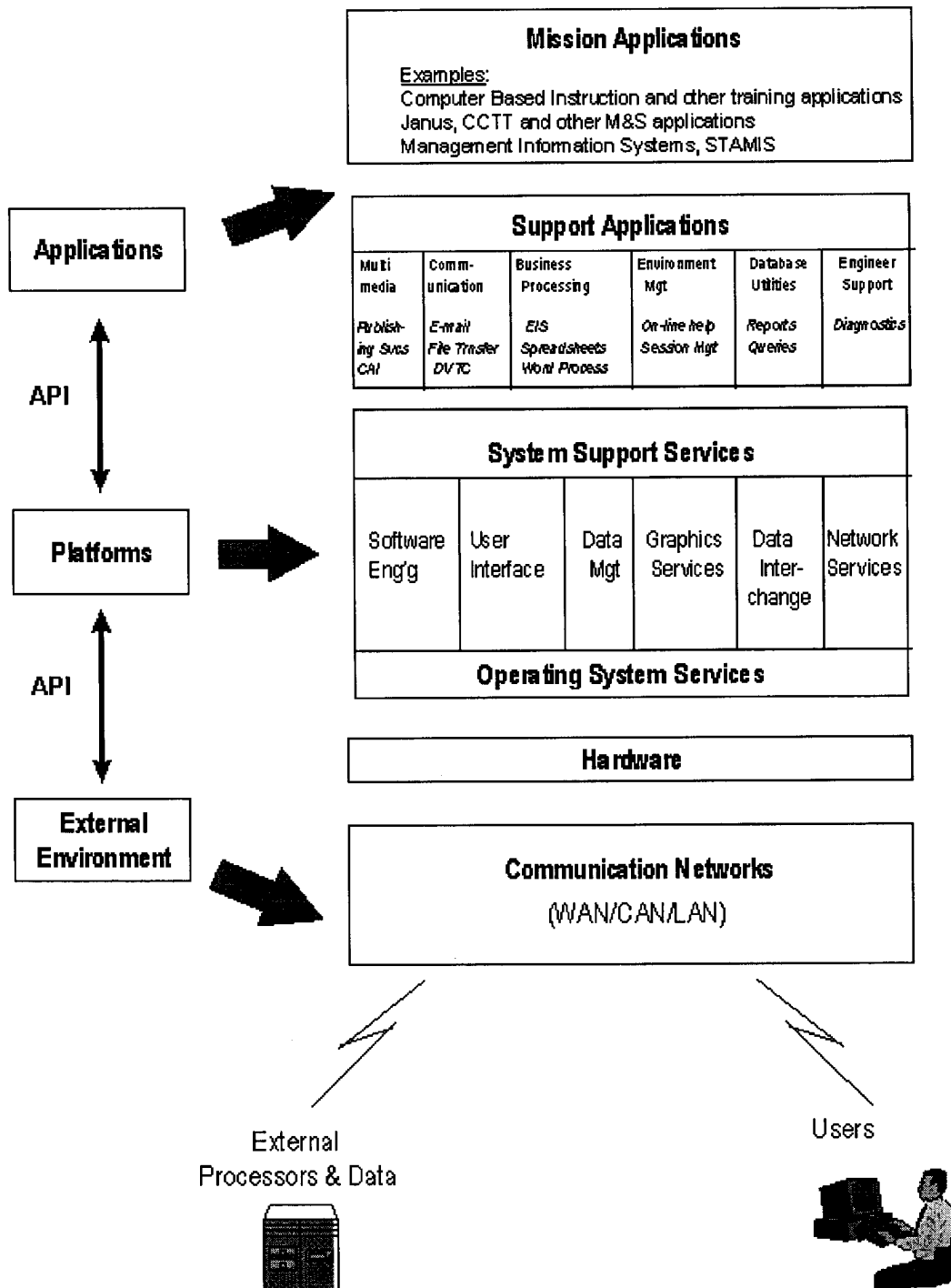


Figure 3. Technical reference model

2.1.4.1 External Environment Layer

At the foundation of the TRM (Figure 3), is the external environment. It is similar to what the joint staff calls the "infosphere" in their concept, *C4I for the Warrior*, in that it is everything an IS can plug into to perform its own mission. It encompasses external data stores and the networking that accesses them. Networks will be integrated at several levels, but all levels will interface sufficiently to support the seamlessly electronic flow of information that TRADOC's mission requires. Networking components occur at various levels, to include LANs that support buildings; CANs, or the backbone that connects an installation's LANs; and WANs to support command- wide, inter-installation information transfer.

WANs will generally be provided by access to commercial, federal or DoD networks. Interfaces among the networks will ensure both unstructured data, e.g., voice and e-mail, and structured data, e.g., computer graphic files and video images, can be transported command-wide with minimal demands placed upon the users.

2.1.4.2 Platforms Layer

At the next layer of the TRM are the computing platforms, which encompass the hardware, the operating systems software that provides hardware with its basic capabilities, and the system support services that provide fundamental services, usually transparent to the user, but relied upon by the higher level applications. Platforms are employed at all levels of TRADOC's baseline system architecture, but the objective architecture emphasizes the personal, local and mission levels. A uniform set of platform services will increase application portability and system interoperability so that MACOM level capabilities can be created using platforms employed at lower levels.

2.1.4.3 Applications Layer

The top layer of the TRM is applications, which is divided into mission and support applications. Mission applications implement specific end user requirements or functions. The Army's strategy for software architecture is that applications will use domain (function) specific architectures, usually integrated at the mission level, with standard application program interfaces (APIs) for exchanging services and information with other parts of the architecture. End user requirements within a functional area are subdivided further to determine a manageable set of capabilities for inclusion in any specific application. To help organize its discussion of mission applications, TPRISM uses three basic categories throughout: training applications, models and simulations (M&S), and installation management applications, which could also be put in the broader category of management information systems (MIS). These categories can be linked to the key functions used in the *TRADOC Strategic Plan 97*. To prepare the Army for war, TRADOC relies primarily on training applications and M&S; to be the architect of the future, TRADOC relies on primarily on M&S; and to ensure TRADOC's own capabilities requires use of MIS.

Support applications are common applications that can be standardized across all functional areas. Specific support applications are domain independent, i.e., they provide basic capabilities that satisfy requirements that remain the same for all functional areas. Examples include e-mail, distributed conferencing and database managers. The DoD TRM uses six support application categories: multimedia; communications; business processing; environment management; database utilities; and engineering support. Figure 3 is a modified subset that makes the application categories more obviously applicable to TRADOC. Almost by definition, support applications are integrated at the MACOM or enterprise level in order to work across functional domains.

2.2 Strategic Goals for IM

TRADOC's IMA planning is focused on the goals discussed in the subparagraphs that follow. The overall intent of each goal was defined in paragraph 1.3.3. Each goal description below includes the DCSIM's implementation strategies for achieving it.

2.2.1 Improve interoperability of TRADOC's IS

Develop baseline assessment

Complete and maintain accuracy of TPRISM system architecture database and display for each TRADOC installation.

Develop preferred products lists for command-wide use

Define, obtain required approvals, and publish preferred products lists to include such key capabilities as e-mail, word processing, graphics, project management, web browser, spreadsheets, multi-media authoring system and operating system.

Proliferate preferred products as widely and quickly as possible

Determine and execute actions within the DCSIM's authority and means to increase the use of products off the preferred products lists throughout TRADOC (e.g., resourcing priorities, approvals, centralized acquisition, technical assistance with command-wide interfacing). Define and seek additionally required means if necessary.

Ensure IMSC reviews systems for JTA-Army compliance

Define and implement a procedure to ensure IMSC reviews include consideration of JTA-Army compliance for each project reviewed. Define and implement a procedure, within DCSIM means, for developing staff recommendations to IMSC regarding technical issues of JTA-Army compliance. Define and seek additionally required means (e.g., contract funds, training or staffing) as necessary.

Employ common user networks as first priority

Determine and execute actions within the DCSIM's authority and means to increase TRADOC's use of common user networks vice dedicated circuits.

Manage TRADOC Project Change of Century

Manage TRADOC efforts to ensure all mission-critical automated systems and infrastructure operate properly after the Year 2000 (Y2K).

2.2.2 Modernize IMA infrastructure**Identify and obtain funding from all available sources**

Identify any/all sources of funds with potential for increasing the overall budget available for IMA infrastructure modernization. Expand DCSIM's competition for funds across the Headquarters and at HQDA, OSD levels, as necessary. Improve TRADOC's success in competing for external funding of our IS infrastructure modernization (e.g., PPC4I). Improve success of information management in competing for internal TRADOC funding (e.g., KEI, Bold Grant, NPR seed funding, etc.), and in obtaining a share of functional funds proportional to the impact on infrastructure (e.g., Army Distance Learning).

Bypass technology stages whenever affordable

Analyze strategy of projects within DCSIM's visibility to ensure DCSIM's objective architecture, vice an interim target architecture, is being planned for implementation. Analyze economics of using DCSIM's objective architecture whenever an interim architecture is being planned. Execute actions within the DCSIM's means and authority to ensure the objective architecture is fielded.

Influence national networks to ensure TRADOC's requirements are met

Determine, promote, and execute actions within DCSIM's visibility, means and authority for influencing the managers of national networks to satisfy TRADOC's requirements.

Eliminate gaps in CAN connectivity

Determine the minimal connectivity requirements that all TRADOC installation CANs must support. Determine and execute actions within DCSIM's visibility, means and authority to eliminate the gaps in capability. Define and seek additionally required funding and means as necessary.

Implement mainframe life cycle replacement.

Implement the approved course of action for eliminating the existing mainframes from installations' infrastructure, while continuing to modernize still required capabilities (ASIMS front end processing and remote job entry).

2.2.3 Improve the process for managing IMA requirements**Develop a process for requirements management**

Determine existing processes/procedures and policies governing identification of IM requirements within TRADOC. Define procedures for managing all types of IMA requirements with consistency and continuity across DCSIM. Define DCSIM's role in executing TRADOC's Army-wide requirements

management responsibilities, and integrate DCSIM promulgated procedures with Army-wide procedures. Justify unfunded requirements with a solidly defined and analyzed set of information technology requirements.

Create internal visibility for DCSIM requirements and projects

Define the procedures and develop the means for ODCSIM leadership to review requirements and project status and to stay abreast of issues appropriate for their level of attention. Institutionalize among DCSIM staff the practice of obtaining and displaying the information required for issue identification. Define and seek additionally required means as necessary to implement the procedures.

2.2.4 Incorporate information technology into TRADOC business processes

Obtain and publicize knowledge of current and emerging technologies

Determine the actions and means required for making ODCSIM a well known and used source of knowledge about current and emerging technologies relevant to functional staff's requirements. Implement actions within the DCSIM's means and define and seek other means as necessary.

Institutionalize the comparison of current processes with technology

Determine and implement a process to routinely alert functional staff about opportunities made possible through technology insertion and to inject DCSIM knowledge about current and emerging technologies into staff's on-going analyses and plans for functional improvements.

2.2.5 Synchronize IMA actions within TRADOC

Improve the process' visibility, display and credibility

Evolve the procedure that generates the DCSIM synchronization matrix. Increase the visibility among DCSIM staff of its data. Improve the value to DCSIM management of the Conference Room display (alert them to issues requiring their attention.) Improve the timeliness of the database and display. Improve the credibility of the data--its identification of synchronization issues and its timeliness, breadth and depth.

Obtain data on planned IS fieldings

Define and implement reliable procedures for obtaining data on a timely basis regarding fielding of IS on TRADOC installations, by any activity internal or external to TRADOC. implementation issues. Data includes locations, schedules responsibilities and known implementation issues.

Place fielding schedules on DCSIM home page

Load data obtained about fielding schedules and synchronization issues on the DCSIM home page, and provide a capability to search by system, installation or time period.

Coordinate solution to synchronization issues whenever possible and needed

DCSIM staff will get involved in resolving known synchronization issues. When solution lies outside DCSIM's authority or means, staff will coordinate the identification and implementation of solutions with the affected activities. Staff will continuously cultivate points of contact in external activities.

2.2.6 Design appropriate IMA organizations across TRADOC

Conduct an IPT with DCSIM and DOIMs to develop organizational options

Using an integrated process team (IPT) approach, DCSIM will organize and execute an effort to develop alternatives for supporting the command's increased reliance on information technology with decreasing resources. IPT will use the expertise of cluster center DOIMs.

Survey best practices of external organizations

Survey other Army MACOMs, the Air Force and large corporations on their current IMA planning and operations organization. Define opportunities for reengineering TRADOC's organizations in line with the best practices identified.

Execute staff development

Successful implementation of these strategies relies on informed and technically competent DCSIM staff members. DCSIM management team will execute staff development with aim of helping staff understand DCSIM's strategic direction and their role in its achievement, and developing competencies required to execute their role.

2.3 Outcome Monitoring

Table 2 provides the key outcome measurements that DCSIM will use to gauge progress toward the above goals

Table 2. Outcome measurements

Long term trend: 100% of new IS are based on an open architecture compliant with JTA-Army standards. Short term measure: Same.
Long term trend: 100% of currently employed IS that use a proprietary architecture are migrated to JTA-Army compliant IS. Short term measure: None. Achieve within HQDA target for installation systems: 2006.
Long term trend: 100% of TRADOC employees have adequate DMS capability. Short term measure: None-need to clarify specific goals for individual users.
Long term trend: 100% of voice and data transport requirements met Short term measure: 100% of requirements for core MACOM competencies (i.e., training, combat developments and doctrine), except for video teletraining and simulation by 1998.
Long term trend: Definition of impact on infrastructure, used to decide system approvals, is sufficiently accurate and comprehensive to preclude implementation issues. Short term measure: 100% of TRADOC requirements packages will project the impact on TRADOC's information infrastructure prior to approval.
Long term trend: Mix of IS investments optimizes architectural capabilities and return on investment. Short term measure: 100% of on-going IS projects, i.e., as visible at DCSIM level, have complied with the DCSIM requirements management process for analysis, prioritization and approval. Short term measure: DCSIM/DOIMs' recommendations on technology insertion are included in 100% of the known process reengineering projects conducted by functional proponents.
Long term trend: 100% of IS fielding actions are synchronized. Short term measure: 100% of IS insertions conducted at TRADOC installations have prior DCSIM/DOIM coordination. Short term measure: All fielding actions are executed without adverse effect of one action upon another, as measured by implementation feedback visible at DCSIM level.

Chapter Three: TRADOC's Architecture Principles

Architecture principles are the foundation of a standards-based architecture. They are necessary to achieve the organizational consensus required to move ahead with a command wide, standards-based architecture. This set of architecture principles sets the direction on how TRADOC will use information technology in the next 5 to 10 years. These principles establish a context for architecture decisions made throughout the command.

3.1 Apply total systems fielding concept

TRADOC does not accept standard (i.e., mandatory use) systems from external program managers prior to obtaining, or mutually planning the migration of, the infrastructure that is necessary to attain operational capability. TRADOC does not invest its own resources in IS without obtaining all components for a useful operational capability. TRADOC does not invest in the highly visible user application components of systems while neglecting the less visible, common user infrastructure.

3.2 Orchestrate modernization actions

TRADOC coordinates the delivery of IS components to achieve initial operating capability as early as possible for each modernization action and to minimize downtime during modernization cut-overs. TRADOC identifies synergistic opportunities among disparate modernization programs. TRADOC functional proponents minimize the "stove-pipe" approach in developing and fielding IS for improving their processes. HQ TRADOC tracks and publicizes pending IS actions so that TRADOC DOIMs are aware of external agencies' plans affecting their installations. HQ TRADOC coordinates with external agencies to resolve issues identified by DOIMs.

3.3 Manage key investments

IS modernization efforts are managed as investments. Within their cost threshold authority, HQ TRADOC and installations will consider the return versus the risk in the approval and resourcing of individual modernization projects. In considering projects for approval and resourcing, the review criteria include:

- *Mission Impact.* How will the IS investment support improved performance in specific outcome-oriented terms? Will it provide a new capability or enhance current capabilities? Is it mandated by law or executive directive? Is it required for mission-critical functions? What is the expected magnitude of the improvement in performance?
- *Consistency with Vision.* Does the project provide a capability that is expected to remain a useful component of the objective operational and system architecture?
- *Return on Investment (ROI).* Is the calculated ROI within expectations and analytically sound?
- *Modularity.* Is the project properly bounded, or segmented, to enhance executability and minimize risk?
- *Technical Risk.* Can the proposed technology be integrated with existing systems and the infrastructure? Does the project take advantage of proven commercial-off-the-shelf (COTS) products? How complex is the system architecture and software design?
- *Investment Risk.* Is the proposed IS investment affordable, particularly in comparison to the overall IS budget? Will the investment require future operational expenditures that are not affordable?
- *Organizational Impact.* Is the organization ready for the structural and procedural impacts of the investment?

3.4 Use open standards

TRADOC's standards profile is based on open standards. This is consistent with the Army's approach in the JTA-Army. For IS capabilities where open standards have matured sufficiently to control interoperability, TRADOC will use the standards to promote interoperability, rather than mandate vendor specific products. However, TRADOC will use preferred products lists as necessary to alert users about which products will have DOIM support for maintenance, operations, training, etc. Although standardization on a product often appears easier than using heterogeneous products that

conform to open standards, TRADOC adopts this approach since it is consistent with legal and regulatory requirements; is consistent with the underlying TRADOC objective to create an open system environment that supports portable, scaleable, and interoperable applications; and leaves our architecture more open for new technology insertions as the marketplace changes.

3.5 Execute distributed responsibilities

IS are pervasive in TRADOC. Many organizations play a role. Taskings must be clear to ensure collective decision making results in effective information management.

3.5.1 Command standardization

For IS components' capabilities that are integrated at the enterprise and mission levels, HQ TRADOC enforces compliance with TRADOC's technical architecture. This means that some characteristics of components, or systems, *fielded* at the installation, local and personal levels are subject to TRADOC command-wide standards. Enforcement will be exercised via requirements approval and prioritization, resourcing decisions and acquisition approvals. TRADOC's standards profile will be consistent with Army selected standards, as published in the *Joint Technical Architecture-Army (JTA-Army)*, augmented and tailored as required for TRADOC's mission. Further information on TRADOC's standards profile is in Appendix A.

3.5.2 Installation standardization

For IS capabilities that are *integrated* at the installation, building or personal levels, installations enforce compliance with the installation's technical architecture. Adopt installation standards profiles that ensure seamless interfaces between the installation/building/personal levels and the enterprise/mission levels. ("Seamless" means the interfaces permit continuous electronic transport of information through any combination of networks and platforms in a manner that is transparent to the application and the user. Seamlessness is achieved through use of standard communications protocols, data interchange formats, and distributed system interfaces). Installation commanders are authorized to develop lists of supported products (e.g., those for which the DOIM will provide help desk services), but, in establishing levels of support, installations will not be so restrictive as to preclude use of WAN or CAN assets by any JTA-Army compliant IS.

3.5.3 Command-wide capabilities

HQ TRADOC DCSIM, in coordination with the TRADOC Information Systems Security Program Manager (ISSPM), leads implementation for networking, platforms and support applications components that require integration at the command level.

3.5.4 Mission level capabilities

HQ TRADOC staff elements, and assigned integrating activities, manage implementation of requirements for IS components and capabilities that are integrated at the mission level. This includes representing users' interests for DoD/Army program manager systems. HQ TRADOC staff elements conduct business process reengineering as necessary to analyze the value of information technology insertions in improving TRADOC's mission execution within their areas of proponentcy.

3.5.5 Installation capabilities

Installations plan and implement capabilities that are integrated at the installation, building and personal levels. DOIMs, in coordination with the Installation ISSMs, integrate planning at this level.

3.6 Maintain common user assets

The mix of TRADOC investments will include common user networking and platforms that satisfy multiple missions, vice simply components designed for particular mission applications.

3.7 Manage user interface

TRADOC invests in IS components that promote a common user interface at the personal level work station, even if more expensive than alternative approaches.

3.8 Leverage the marketplace

TRADOC seeks first to satisfy functional requirements using COTS and non-developmental item (NDI) applications vice developing its own high order language applications. COTS and NDI includes both ready-to-use applications (e.g., commercial E-mail packages and Standard Army Management Information Systems (STAMIS)) and non-procedural tool kits for customizing within a set of capabilities (e.g., spreadsheets and database manipulations). As necessary, TRADOC will support system application design, development and maintenance as the Army proponent for training and doctrine. TRADOC will sustain its previously built applications until COTS/NDI replacement components are available, and as long as resourcing allows.

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Chapter Four: TRADOC's IS Architectures

This chapter looks at TRADOC's IS architectures using several viewpoints:

- operational architecture (how our mission affects our IS requirements)
- technical architecture (what standards our modernization efforts must observe)
- system architecture (what components we use)
 - => baseline (what we have now)
 - => target (what we know we need to field in the near term)
 - => objective (our vision for what we will use longer term)

4.1 Operational architecture

The major objective of an operational architecture is to analyze the enterprise's functions, processes and organizations from the viewpoint of requirements for information exchanges and distributed information processing capabilities.

4.1.1 TRADOC's Key Functions

As stated in TRADOC's *Strategic Plan 1997*, TRADOC has three key functions: prepare the Army for war; be the architect of America's Army for the future; ensure TRADOC's capability to execute its mission.

4.1.1.1 Prepare for war

Conducting training and leader development are constants of TRADOC's mission to prepare the Army for war. Even as resources decline, the quality of training provided by TRADOC must not. The means and techniques will change instead. We will invest in key enabling services to support distance learning, i.e., linking soldiers and units in the operating force at locations distant from the schoolhouse, so that the fighting force can be trained at their home station whenever possible. We will exploit education technologies, e.g., computer based instruction, interactive and multimedia courseware, and training capabilities embedded in materiel. We will develop distributive interactive simulations, with standardized, routine links among virtual, live and constructive simulations. These simulation tools will be employed not only for training, but for combat developments and mission analysis as well.

4.1.1.2 Be the Architect of the Future

As the Army's architect of the future, TRADOC must lead the way in designing tomorrow's Force. This requires rethinking all aspects of the force: its operational concepts, doctrine, organization, skills and equipment. To do so, TRADOC requires new and enhanced capabilities from its IS architecture. TRADOC cannot lead intellectual change without the right information tools to support analysis of alternatives, especially via interconnected models and simulations (M&S), and to create Army-wide agreement on new concepts.

4.1.1.3 Ensure TRADOC's own capabilities

Efficient and effective command and control and installation management processes ensure TRADOC has the capability to execute its mission. This function encompasses personnel, acquisition, resource management, supply, transportation and other functional areas, all of which include numerous processes and typically a high volume of transactions. TRADOC manages 16 Army installations with 2 million acres of land, 167 million square feet of facilities, \$8 billion of inventory and \$19 billion of real

property replacement value. Approximately 157,000 people work, train, and live on TRADOC installations. Twelve of the sixteen TRADOC installations serve as launch platforms to deploy soldiers beyond the borders of the United States with little advanced notice. TRADOC must provide cost effective, responsive, and efficient training and readiness support and services including ranges, training facilities, and training areas.

Management information systems help accomplish and coordinate the workload. TRADOC's management functions are generally the same as other MACOMs'. This commonality permits HQDA to promulgate Army standard management IS for many of these functions.

TRADOC is seeing significant manpower and funding reductions. TRADOC must make real the platitude, "Work smarter, not harder" to enable a reduced workforce to execute our mission. Improved information management can help through:

- exchange of information with external organizations working similar issues
- quick, efficient retrieval and presentation of information tailored for users ranging from CG to action officers
- virtual collocation of command personnel for ad hoc problem solving
- efficient management of mission support operations
- reuse of information content in briefings, concepts, materiel requirements, training materials, etc.

4.1.2 TRADOC's Key Processes

Since its creation, TRADOC has executed several key processes to implement its functions. TRADOC's key processes are *doctrine, training, combat developments and installation management*. There has been some variation over TRADOC's history, but these are the clear constants, sometimes called TRADOC's enduring domains. The start point for an operational architecture is a graphic decomposition, or node tree, of processes. Figure 4 gives the command level start point for such a node tree of TRADOC's key processes.

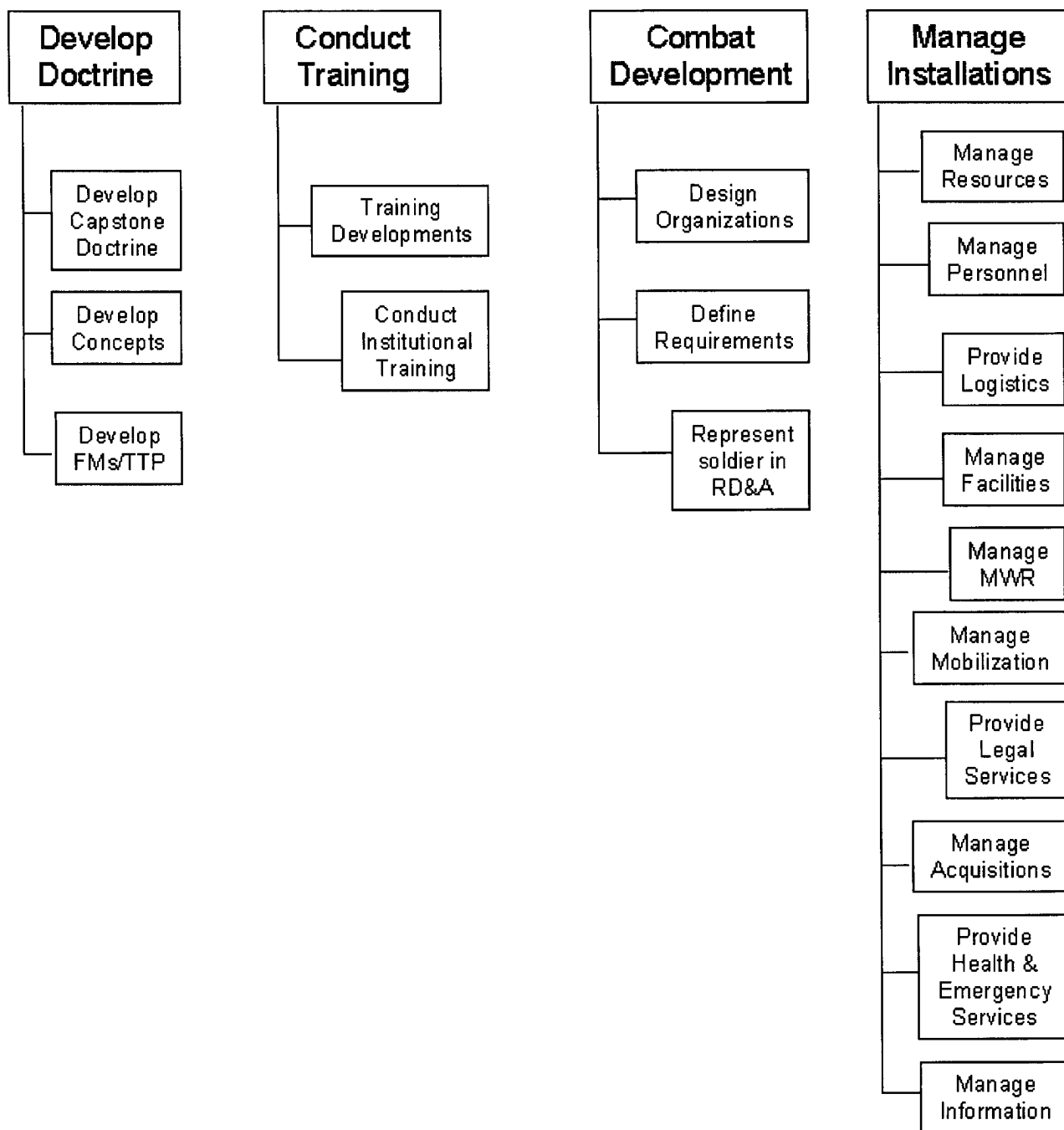


Figure 4. Node Tree of TRADOC Processes

4.1.3 TRADOC's Organization

TRADOC is spread across CONUS on sixteen installations. Installations host one or more schools and sometimes other analytical activities. Schools have a particular focus of expertise, often branch specific, and are responsible for producing TRADOC products within their area of expertise, e.g., courseware, materiel requirements and doctrine. Each installation has a DOIM, who reports to the garrison commander. HQ TRADOC staff includes several deputy chiefs of staff (DCS) organized by functional areas, including proponents for each of the core processes shown in [Figure 4](#) and the DCSIM. [Figure 5](#) provides a depiction of the HQ staff and schools in TRADOC.

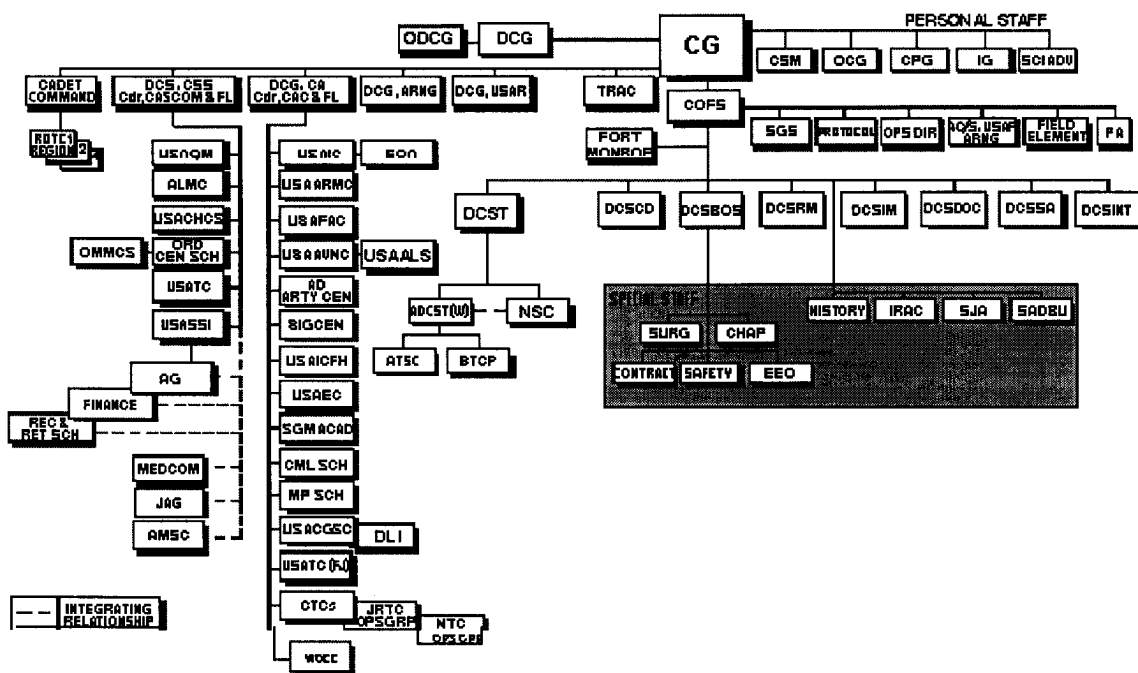


Figure 5. TRADOC Organization

TRADOC's reengineering alternatives include a concept in which TRADOC is divided into functionally related clusters. Each cluster would have a center that generated most TRADOC products, and several related satellite schools that continue to conduct training. Centers and satellites would not always be collocated on one installation. The rationale for organizing into clusters is to improve the integration of products and reduce redundant procedures and staff, but the analysis to support that rationale remains incomplete. Even where this particular reengineering concept is implemented, TRADOC will remain a geographically distributed organization and dependent on electronic exchange of information.

For more information:

<http://www-tradoc.army.mil/cmdpubs/97org/table.htm>

4.1.4 TRADOC's Information Exchanges

TRADOC's distributed organization places high demands on our information exchange capabilities. To ensure our products are integrated among all branches, and that daily operations are coordinated among our processes, TRADOC must exchange information:

- horizontally among all installations
- vertically between HQ TRADOC and all installations
- internally at installations, among the activities developing TRADOC products and providing installation support
- externally, from each TRADOC installation to joint and Army organizations, including units, HQDA and other MACOMs
- externally, from each TRADOC installation to the civilian world, e.g., academia and industry

Since TRADOC relies on process execution by action officers, connectivity must extend down to the personal level. In a cluster organization, more electronic exchanges would become supportable using LANs or CANs instead of a WAN, but the action officer must still have access to all three levels of networks. The following paragraphs discuss information exchanges associated with specific processes.

Common coordination capabilities - TRADOC relies on common coordination capabilities (e.g., e-mail and file transfers) available at all installations down to the action officer level. TRADOC leadership relies on a robust desktop videoteleconference (DVTC) network. Action officers rely on access to videoteleconference (VTC) capabilities, whether studio grade or at the office or desktop level. More coordination will be done using WWW type services, which, given requirements for protecting Army information, will require both Internet and intranet connectivity down to the action officer level. Coordination of TRADOC products requires the capability to move large compound files and for universal ability to read and manipulate the files. Increased use of integrated concept teams will require even more sophisticated coordination, centering more on collaborative generation of products than on post coordination of them.

Doctrine - TRADOC is moving more to electronic versions of its doctrinal products-both for their coordination and their distribution. TRADOC also seeks to electronically push its branch expertise out to the area of operations to augment commanders' staff in the development of planning alternatives; and to capture lessons learned from on-going operations for future doctrine development. Information exchanges include world-wide common user coordination capabilities, with emphasis on transfers of large compound documents and interaction with units.

Training - A fundamental piece of reengineering TRADOC involves the delivery of training using IS capabilities. Classroom XXI will be the focal point for modernizing institutional training. It will incorporate multi-point videoteleconferencing, delivery of multimedia interactive courseware and eventually student participation in distributed simulations and distributed exercises. As the instructional method shifts from its current instructor focus to a student focused approach, the information exchanges will grow considerably. In student focused instruction, each student may be using a tailored set of instructional material, requiring connectivity to each student, rather than each classroom. There must be libraries of training materials--not necessarily stored centrally, but retrievable using one search from the users' viewpoint. The system architecture must support the instructional methodology with point to point, multi-point, high volume, real time, high peak information exchange capabilities.

Combat Developments - CD products are becoming more dynamic. Emphasis on modeling and simulating concepts, prototyping and experimenting with solutions, and evolutionary development all affect the degree and types of information exchanges. Integrated concept teams (ICT) will bring together skills from various locations and disciplines. Electronic collocation will be essential for helping the teams work through the processes involved in the "build a little, test a little, field a little" approach to materiel development. Since much of materiel development is aimed at information dominance, many systems in development are IS. IS lend themselves to increased use of simulators and rapid prototypes, shared by developers across the development community. Members of ICT will also be coordinating extensively with members of integrated product teams (IPT) to continue to represent the soldier's interest throughout the system life cycle. All of this leads to information exchanges down to the action officer level with widespread points internal and external to the command. Content will include VTC sessions, simulation and simulator traffic and collaborative authoring of CD products.

Installation management - The characteristics of most information exchange requirements for installation management are not unique from those of other Army installations. Installation management involves many disciplines and processes, e.g., supply, personnel, financial management, facilities engineering and contracting. It includes processes for supporting power projection. Computer platforms are located in a variety of sites (Defense Megacenters, departmental LANs, personal computers). Connectivity must support one time capture/shared use for data across platforms and processes. Data transfers range from brief, interactive database query traffic to large database transfers. Connectivity must extend to the point of data collection and use. To enable information exchanges among the many processes and organizations involved in managing installations, connectivity must maximize access to the common user infrastructure.

4.1.5 TRADOC's Key IS Requirements

Considering TRADOC's key functions and processes, and overlaying its organization and information exchanges, an overview of required information processing capabilities and connectivity

emerges (Table 3). Individual projects (see [Chapter 5](#)) to realize these capabilities will specify requirements in greater detail, considering the exact performance and output required compared to the local baseline architecture.

Table 3. Key IS Requirements

TRADOC Process	Key Processing Capabilities	Key Network Connections
Doctrine	Collaborative authoring Document distribution Full text retrieval Electronic publishing	Inter-TRADOC Joint community Units
Training	Distance learning (VTT, CBI, Video) Modeling & Simulation Multimedia courseware development Courseware database	Inter-TRADOC NGB/USAR Units
Combat Developments	Modeling & Simulations Prototype test beds Collaborative planning Electronic coordination Expert systems	Inter-TRADOC Joint community RD&A community Industry
Installation management	High transaction processing Large databases Decision support	Inter-TRADOC Defense Megacenters
Common coordination	E-mail File transfers Office automation suites VTC access Internet/Intranet access	World-wide

4.2 Technical architecture

Figure 6. TRADOC DCG Memo on C4I Architecture



ATED-DC

18 March 1996

MEMORANDUM FOR THE DIRECTOR

SUBJECT: Army Command, Control, Communications, Computers, and Intelligence (C4I) Architectures

1. The Army Encompasses Strategy, approved by the Chief of Staff Army (CSA) in 1973, requires the following categorization process to reflect changing operational concepts, particularly digitizing the battlefield, force protection, special operations, and signaling communications. An architectural approach is needed to define our unique battle command operational requirements and develop their solutions. An architecture is a framework or context that portrays relationships among the elements within the scope of its view. The three Army viewpoints are designated operational, systems, and technical. Each shows relationships among a somewhat different set of elements. Overlaps in the maps provide a means to link all three.

2. The C4I operational architecture is a graphical description of the

"TRADOC DOIMs, through current authentication procedures, will ensure TRADOC's procurement actions are consistent with the technical architecture."

...will be issued in the near future. TRACOC, Office of Information Management, through current automation procedures, will ensure TRACOC's procurement actions are consistent with the DA.

4. The Technical Architecture is accessible on the internet;
<http://129.83.63.102> or <http://www.bqds.army.mil/pubs/techarch/>.

John F. Miller
John F. Miller
Lieutenant General, U.S. Army
Deputy Commanding General

By implementing well-defined, openly available and consensus-based standards, TRADOC can leverage the commercial marketplace's investments in new products and assure a migration path into the future. TRADOC will use the standards profile established in the JTA-Army. The JTA-Army is a set of standards, applicable to information processing, information transport, information formats, human-computer interfaces and information security. The JTA-Army applies to all soldier, weapon, and information system programs, whether employed in the tactical, strategic, or sustaining base environments. The applicability of the JTA-Army (ATA at that time) to TRADOC actions has been officially recognized (Figure 6). The JTA-Army is based on widely accepted commercial standards and implements the mandatory standards governing interfaces among the services as published in the JTA. TRADOC will make permissible refinements and additions to the JTA-Army as required to execute our mission and maintain command-wide information flow. By

adopting the *JTA-Army* as the guide for our acquisition decisions, TRADOC will improve the interoperability of its IS with:

- IS employed by other Army MACOMs
- IS employed in tactical units
- IS employed by other services and DoD agencies
- IS available in the future commercial marketplace.

Appendix A provides portions of the JTA-Army and TRADOC extensions, which are of primary importance within TRADOC for technical architecture compliance.

4.3 Baseline system architecture

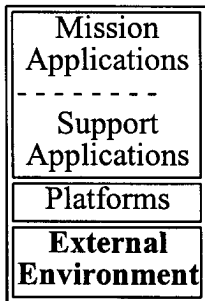
A system architecture is the set of specific system configurations designed to satisfy requirements identified in the operational architecture, within the standardization constraints imposed by the technical architecture. TRADOC develops few of its own systems. Most are developed by DoD and Army materiel developers and by commercial vendors. Most of TRADOC's system architecture effort is spent integrating and configuring these components for insertion into our baseline architecture.

Besides the text description in this chapter, written from the MACOM (vice installation) viewpoint, ODCSIM also maintains a database to portray selected aspects of installations' system architectures. The database uses a graphic front end. Icons in the graphics are linked to spreadsheets containing detailed data. The graphics that portray networks are accessible through the [DCSIM homepage](#). ODCSIM can provide printouts or electronic spreadsheets on request for other portions of the database. ODCSIM continuously updates data as changes become known throughout the year, and conducts an annual review of all data with the installations. Installations should provide information any time to ensure

DCSIM's modernization decisions and justifications are based on the most accurate data available.

The next two sections provide an overview of TRADOC's *baseline* and *objective* system architectures. The baseline system architecture covers the IS TRADOC relies on today to execute its mission, while the objective architecture portrays a vision for satisfying approved requirements. Migration from the baseline to the objective system architecture will proceed in many steps known as target system architectures. The following descriptions are organized according to the layers of the DOD Technical Reference Model (TRM) depicted in Figure 3.

4.3.1 External Environment



The external environment is at the base of the TRM. The external environment is anything outside the processing components of a system. It is the aggregation of components through which the information processor interacts with the world, primarily external data sources and communication networks.

4.3.1.1 External data sources

Most individual IS in TRADOC access data from external sources. Analogously, TRADOC's total system architecture relies heavily on data access, and TRADOC has IS components designed primarily as data sources. Key examples are CAC's Center for Army Lessons Learned (CALL) database for combat operations and exercises, and the Army Training Support Center's (ATSC) Army Training Digital Library (ATDL) for training and doctrinal products. Both are part of the baseline architecture, but are still early in their system evolution, so TPRISM discusses them more as part of the objective architecture.

TRADOC's school and technical libraries continue to provide the command access to external data sources, including indexes to scientific and business literature, the Defense Technical Information Center, and full text retrieval services such as NEXIS. Increasingly, the availability of Internet services is making access to external knowledge bases a distributed capability, available at the action officer level. Many action officers already depend on IS capabilities for identifying and accessing data sources on the Internet, pushing and pulling information products and manipulating the data pertinent to TRADOC actions.

See also:

4.4.1.1 External data sources

For more information:

<http://www.atsc-army.org/atdls.html>

<http://call.army.mil/call.html>

4.3.1.2 Networks--Enterprise Level

TRADOC relies on external providers for the circuits in its enterprise level networks. Although there are exceptions in the baseline system architecture, TRADOC generally accesses networks through federal, defense or Army management structures. There are two broad categories of required network capabilities: voice and data (including digitized images and video). The baseline network architecture uses mostly separate components for providing these capabilities: telephone networks and data distribution networks. The split is not total, but the distinction is real.

For more information:

<http://www-tradoc.army.mil/netviz/index.html>

4.3.1.2.1 Telephone Networks

TRADOC uses the Defense Switched Network (DSN) and Federal Telecommunications System (FTS) as enterprise level voice networks. All TRADOC installations have electronic switches for accessing DSN and FTS, provided by the Army's MACOM Telephone Modernization Program (MTMP). The Defense Information Systems Agency (DISA) manages the DSN. GSA manages the FTS. The DSN provides worldwide unsecured voice service to military subscribers. FTS provides unsecured voice service to all points within CONUS that are outside the DSN, although many DSN subscribers are also on FTS-- including all of TRADOC. TRADOC's equivalent of FTS OCONUS is International Voice Switched Service. FTS is the equivalent of obtaining routine commercial service. DSN and FTS can also be used for circuit switched data services, and, via Secure Telephone Unit (STU) III instruments, for secure communications.

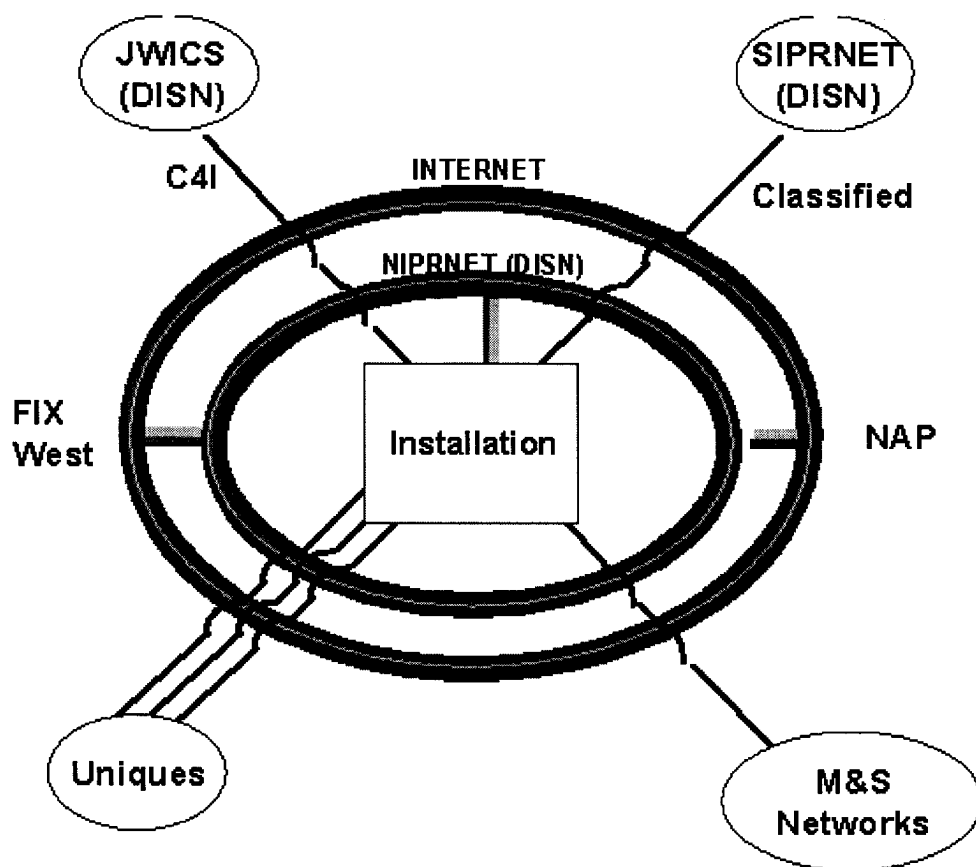
4.3.1.2.2 Data Networks

For an organization like TRADOC, with fixed installations spread across CONUS, the enterprise level data networks are commonly called WANs. As shown in [Figure 7](#), installations are typically linked to several WAN segments which are not necessarily interconnected themselves, nor connected in a consistent manner with the installation's CAN or backbone.

4.3.1.2.2.1 DISN Data Services

TRADOC uses DISA's worldwide Defense Information Services Network (DISN) as its primary enterprise level WAN to connect TRADOC installations, to connect to other military sites, and to provide Transmission Control Protocol/Internet Protocol (TCP/IP) gateways to the Internet. DISN includes three router network components for data traffic:

- Not classified but sensitive IP Router Network (NIPRNET) for unclassified traffic
- Secret IP Router Network (SIPRNET) for data up to secret classification
- Joint Worldwide Intelligence Communications Network (JWICS) for top secret and sensitive compartmented information (SCI)



**See Appendix B
for examples**

Figure 7. Baseline Architecture for WANs

Installations are connected to the DISN through an Army gateway. The Army DISN Router Program (ADRP) has provided TCP/IP routers to all TRADOC installations for accessing the NIPRNET.

The initial DISN started in 1992. It integrated a number of independent networks and migrated the Defense Data Network (DDN) to higher-speed, router-based technology. DISN circuits were provided through the Defense Commercial Telecommunications Network (DCTN) contract, followed by the DISN Transition Contract (DTC). The DTC was replaced during 1997 by four different contracts to implement the DISN vision.

Each DISN router network (i.e., NIPRNET, SIPRNET, JWICS) uses standard IP protocols to route subscribers' IP data packets across the network. DISN routers can interface with several standardized data link layers: Ethernet, Token Ring, Fiber Distributed Data Interface (FDDI), and serial interfaces including RS-232, RS-449, and V.35. Serial interfaces may be used to interface Army equipment with different framing to include HDLC, LAPB, PPP, and X.25. See [Appendix A, paragraph 6.1](#) regarding these standards.

Since fall of 1995, DISA has been upgrading many DISN circuits to T1s to resolve the most pressing bandwidth problems. But this is only a temporary fix because the network needs still more bandwidth. DISA is upgrading the DISN circuits again by installing a 45-megabit/sec asynchronous transfer mode (ATM) network to directly connect core NIPRNET routers in CONUS. Direct connection through this ATM backbone will bypass lower-capacity links and inefficient router hops. Long-haul

traffic will jump quickly through the ATM backbone, then exit at the NIPRNET router closest to its destination. Since DISN and its modernization stages will remain the primary TRADOC WAN, TPRISM discusses it more thoroughly as part of the objective architecture.

See also:

4.4.1.2.2 Data Network

5.1.1 DISN

4.3.1.2.2.2 DISN Video Service-Global

All TRADOC installations have studio grade VTC facilities. HQ TRADOC centrally funds their operation. DCSIM has also fielded desktop VTC (DVTC) systems among the TRADOC leadership. The DISN Video Service-Global (DVS-G), one of four follow contracts to the DCTN, provides continuation of the high bandwidth digital circuits required for video traffic, as they have existed under the DCTN. All TRADOC studio and desktop VTCs are scheduled to transition to DVS-G in 1997. DVS-G provides interoperability with FTS2000, commercial and tactical networks both in CONUS and OCONUS. Unlike the network provided under DCTN, DVS-G does not provide DVTC users direct dial access to FTS2000 and commercial AT&T users. Connectivity to these users is established through a hub.

See also:

4.3.3.4 Videoteleconferencing

4.3.1.2.2.3 Automatic Digital Network (AUTODIN)

AUTODIN was established in the 1960s to meet the DoD operational requirements for a secure messaging service. DISA operates the AUTODIN. It provides networking services for all security classification levels of messages. AUTODIN is interconnected through a worldwide network of store-and-forward switches. Other AUTODIN components include service and agency automated message handling systems, terminating message facilities (e.g., telecommunications centers (TCCs) and special security office (SSO) message facilities), and routing and addressing directory databases.

DISA has established a schedule that closes the AUTODIN by 2000, and has already closed three of the 14 AUTODIN automated switching centers (ASCs). The schedule is in synchronization with the phased implementation of DMS, the objective messaging system, operating over DISN. To prepare for the shut down of AUTODIN, TRADOC has reorganized its networking architecture for messaging and now uses the NIPRNET and dial-up connections over STU IIIs for much of its traffic. This has involved the establishment of TRADOC Message Service Centers (TMSCs), located at Forts Gordon, Leavenworth and Monroe. Each provides centralized message distribution services to several subscriber installations (see [Figure 8](#)). Only the TMSC remain directly connected to the AUTODIN. All TRADOC TCCs supported by a TMSC have disconnected their dedicated AUTODIN circuit and now process AUTODIN traffic as a dial-in subscriber to the ports on their assigned TMSC's classified processing terminal. STU-III devices are employed for transmission security.

As use of the AUTODIN continues to decline approaching its elimination, TRADOC plans to reduce the number of TMSCs. The remaining TMSCs will provide service to more installations. The target is an extremely small AUTODIN capability in TRADOC on the date the AUTODIN is replaced by DMS.

See also:

4.3.3.2 Messaging

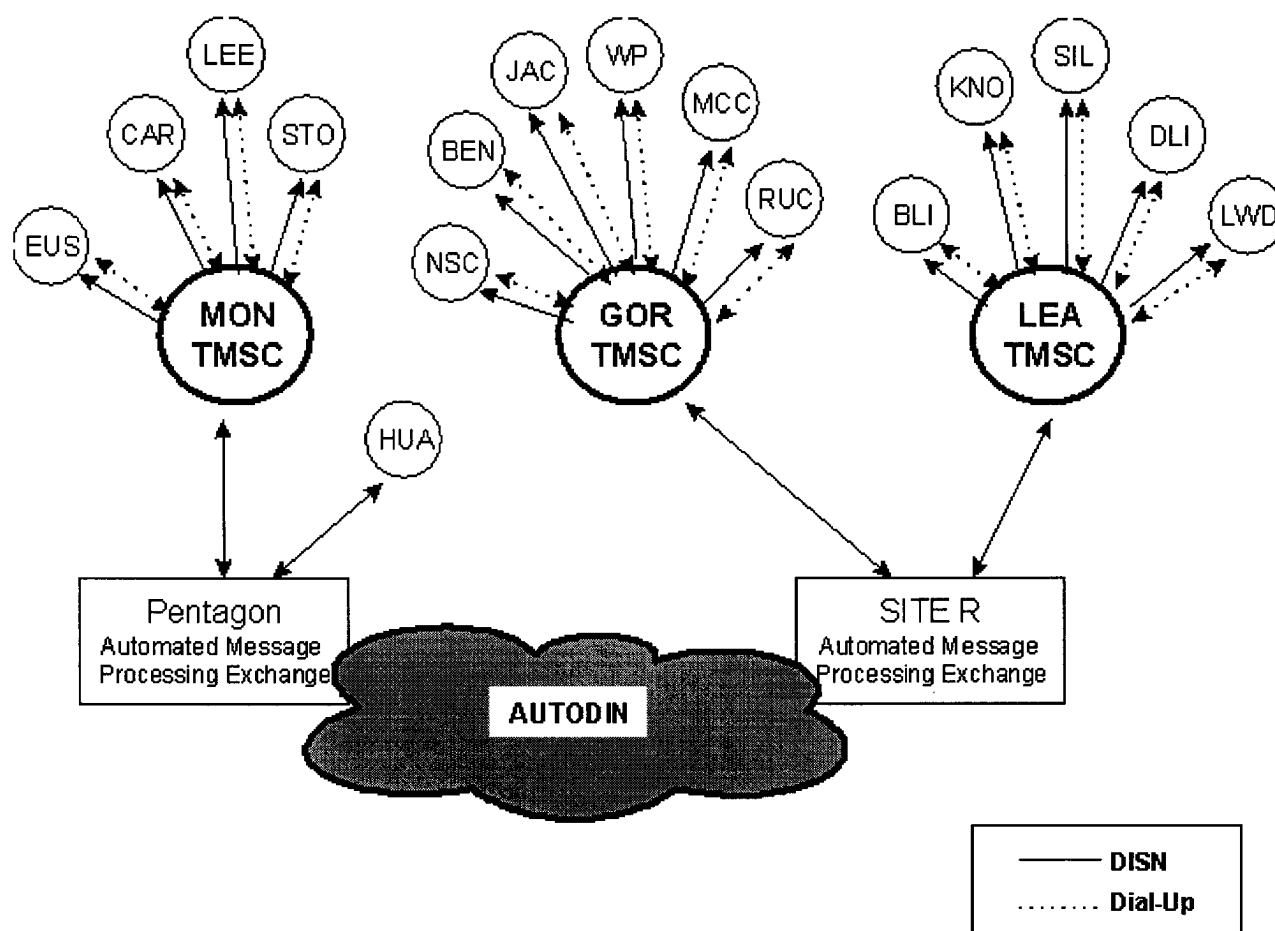


Figure 8. TMSCs and subscribers

4.3.1.3 Networks--Mission level

Since TRADOC is spread across CONUS, networks employed to execute mission level processes in the command are WANs. Although the use of dedicated (stovepipe) WAN segments is decreasing, examples remain in the baseline architecture to support various training, M&S and installation management applications.

See also:

Appendix B: Network Diagrams

4.3.1.3.1 Training Network (TNET)/Satellite Education Network (SEN)

TNET provides near full motion two-way video and audio, graphics, and computer-based teletraining and data transfer for courses, exercises, after-action reports, new equipment training, and simulations. Each TNET site can send and receive training from over 110 other TNET locations and over 300 sites in other military and state networks, including all SEN sites. It provides 2 way 384KBS video services. Other sites, including OCONUS, can be installed as training requirements dictate. TRADOC has 17 sites with access to TNET. Sites can be networked into various combinations. Army Training Support Center has operational control of TNET. Sprint became the support contractor during FY97. Sprint replaced TNET's previous satellite based network architecture with terrestrial circuits. Sprint uses its nationwide terrestrial ATM network with tail circuits from the closest Sprint ATM network point-of-presence to TNET subscribers.

SEN is a studio-based, one-way video network with return audio to the instructor over phone lines.

SEN broadcasts a full motion digital signal over three channels and can also deliver analog broadcasts. SEN's primary mission is to support logistics and acquisition courses taught by the Army Logistics Management College at the Defense Acquisition University. SEN broadcasts to 61 of its own downlinks, 40 additional downlinks in the DAU network, and all the TNET sites as well. SEN can also broadcast to all Government Education Training Network and Governmental Alliance for Training and Education sites. TRADOC has 14 SEN sites.

4.3.1.3.2 Joint Computer Based Instruction System (JCBIS)

JCBIS is a DoD system, for which TRADOC is the executive agent. JCBIS is a network of terminals providing access to a library of over 10,000 proprietary and government owned courseware. JCBIS offers standardized instruction that students can study at their own pace. The curricula includes basic skills, college preparation, job skills, high school completion and college level instruction. Subjects include foreign languages, maintenance, statistics, electronics, writing skills, management and supervision, computer literacy and others. There is also on-line practical exercises and testing. There are about 600 terminal access points throughout CONUS, connected via FTS2000 to a mainframe computer at Fort Leavenworth. PCs are used as the terminals.

4.3.1.3.3 DISN Enhanced IP Services

The Defense Simulation Internet (DSI) has been a standalone network specifically designed for operating distributed models and simulations among 123 worldwide organizations. TRADOC uses the connectivity to link into worldwide distributed interactive simulations (DIS) to support analysis, combat developments and training. TRADOC subscribers are at Forts Leavenworth (2 subscribers: TRAC and NSC), Knox, Rucker, Benning, Sill, Gordon, Leonard Wood, Huachuca, Eustis, Lee, Bliss, Carlisle Barracks and TRAC White Sands Missile Range. During CY97, the DSI will transition to the DISN Enhanced IP Services and in FY98 the DSI will terminate. The replacement architecture is discussed as part of the objective architecture.

See also:

4.4.1.3 Networks--Mission Level

4.3.4.2 Models and Simulations (M&S)

4.3.1.3.4 Army Standard Information Management System

Defense Megacenters (DMCs) host a variety of standardized mission applications, e.g., SIDPERS, STARFIARS and STANFINS, collectively called the Army Standard Information Management System (ASIMS). Dedicated circuits link fifteen TRADOC installations to the DMCs to use ASIMS. ASIMS networking currently uses the SNA protocol, employing low capacity (9.6KB) long haul circuits. ASIMS circuits are also used to interconnect the mainframe platforms that support TRADOC's Installation Support Modules (ISMs) and PROFS/OVVM e-mail users.

During 1997, TRADOC fielded 2,874 copies of a COTS software package across the command to support an alternative connection to ASIMS, via the NIPRNET, that will allow termination of the dedicated circuits after 1999. These TN3270E software packages are better described in the context of the mainframe replacement architecture (see paragraph 4.4.2.3).

See also:

4.3.2.3 Platforms--Installation Level

4.3.4.3 Installation Management Applications

4.3.1.4 Networks--Installation Level

Networks that span a TRADOC installation are referred to as a CAN. Operational requirements for action officers to reach worldwide destinations drive TRADOC installations to introduce CANs into their data transport system. There can be no "air gaps" between the data source and receiver. CANs provide data transport among an installation's LANs and link all connected LAN users into WANs.

There is no precise boundary between a LAN and a CAN, but the CAN is generally thought of as the outside cable plant that spans the installation, with extensions to user locations, and all equipment required to interface the independently operating LANs into the CAN. CANs also include network management components, and, depending on their architecture, may include area distribution nodes (ADNs) that concentrate data and provide the entry point into the CAN for end user systems within an area of the installation. The outside cable plant at a typical TRADOC installation includes a fiber optic ring to serve as a data distribution backbone. The cable plant required from the backbone, or ADNs, to user concentrations is then installed in prioritized stages.

There are two protocol environments in TRADOC for networks at the installation level: the older SNA network, and a newer set of networking components that are, or are capable of migrating to, an open architecture CAN.

4.3.1.4.1 SNA Network Segments

TRADOC installations still maintain SNA CAN segments to provide access to their IBM 4381 platforms (see [Figure 9](#)). These segments are becoming more mission specific (e.g., TRADOC ISM users) as common user applications (e.g., PROFS/OVVM e-mail) are migrated to open architecture segments. SNA users gain access to the host via an IBM 3278 terminal emulation environment. There are declining numbers of true IBM 327x terminals still in use. Most users instead access the network from a PC with a 3278 emulation card, connected to a cluster controller, e.g., an IBM 3174, connected in turn to a front-end communications processor (FEP), e.g., an IBM 3725. Other access methods include dial-up VT-100 emulation devices with protocol converters, SNA networks with dumb 3278 terminal devices, and SNA gateways to LANs.

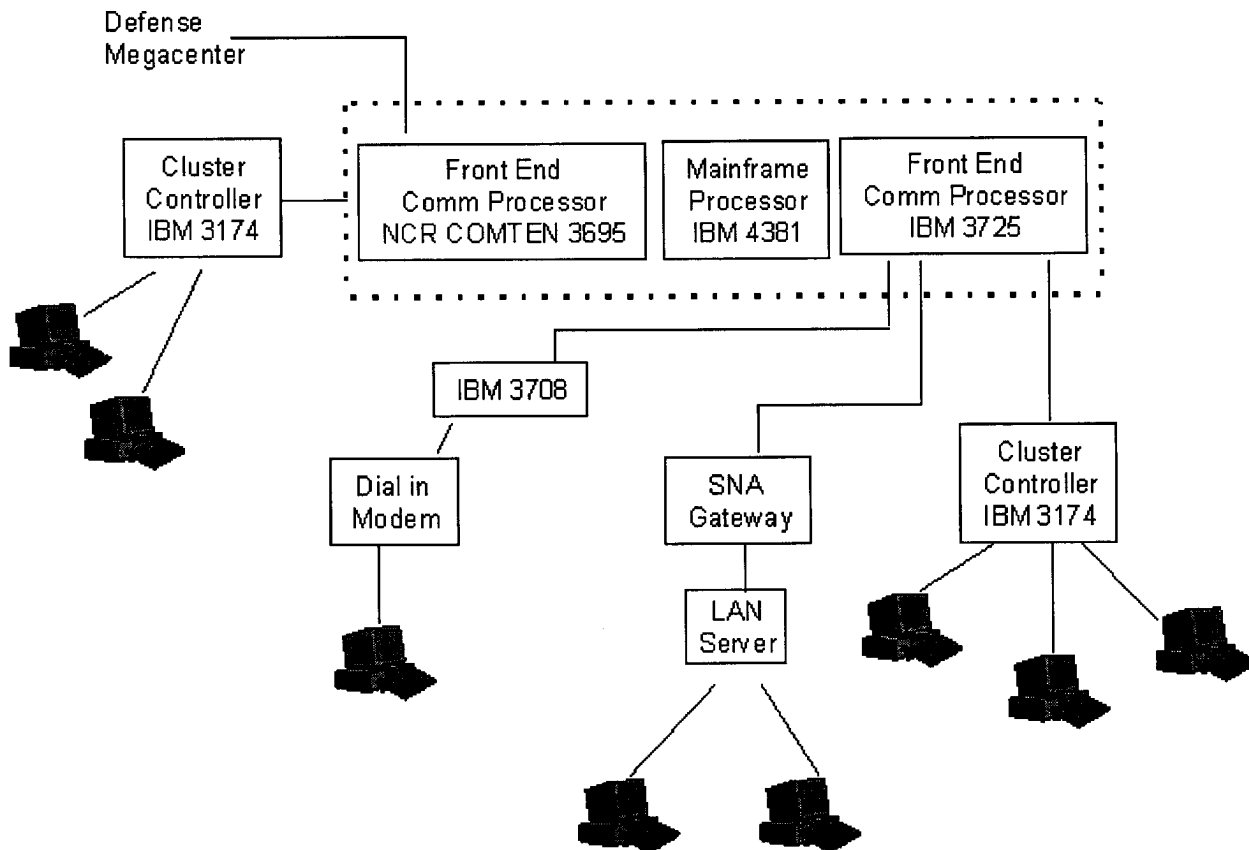


Figure 9. Notional SNA CAN segment

As described in paragraph 4.3.1.3.4, users may also connect, via an FEP over a dedicated circuit for SNA traffic, to a DMC to use ASIMS applications. Alternatives based on using the NIPRNET and the

internet protocol, rather than continued use of SNA, are also in the process of being fielded (see [4.4.2.3](#)).

4.3.1.4.2 Open Architecture CANs

TRADOC's strategy for interconnecting heterogeneous IS into a CAN is to emphasize a common user architecture, vice dedicated circuits, employing open interfaces in compliance with the JTA-Army.

In the baseline, most installations have a FDDI ring to use, or build upon, as the backbone of a CAN to interconnect user locations, carrying TCP/IP traffic ([Figure 10](#)). TRADOC has invested in common user connectivity from the backbone to key user locations.

In some locations, TRADOC has moved beyond FDDI to ATM. PM CUITN is currently upgrading the entire Fort Bliss CAN using ATM technology. HQ TRADOC is funding several insertions of ATM segments as well through KEI. Most migration to ATM has occurred through installation level efforts. Fort Gordon provides an example. Fort Gordon upgraded their backbone infrastructure to a 155mbps ATM cloud consisting of 5 ATM work group switches servicing ATM devices with 1 OC-3c port and 12 switched Ethernet ports. The ATM infrastructure upgrade is compatible with existing SBIS Ethernet, Schedule D VTC facilities, Educational Television network, and Fort Gordon's Professional Development Network (PDN).

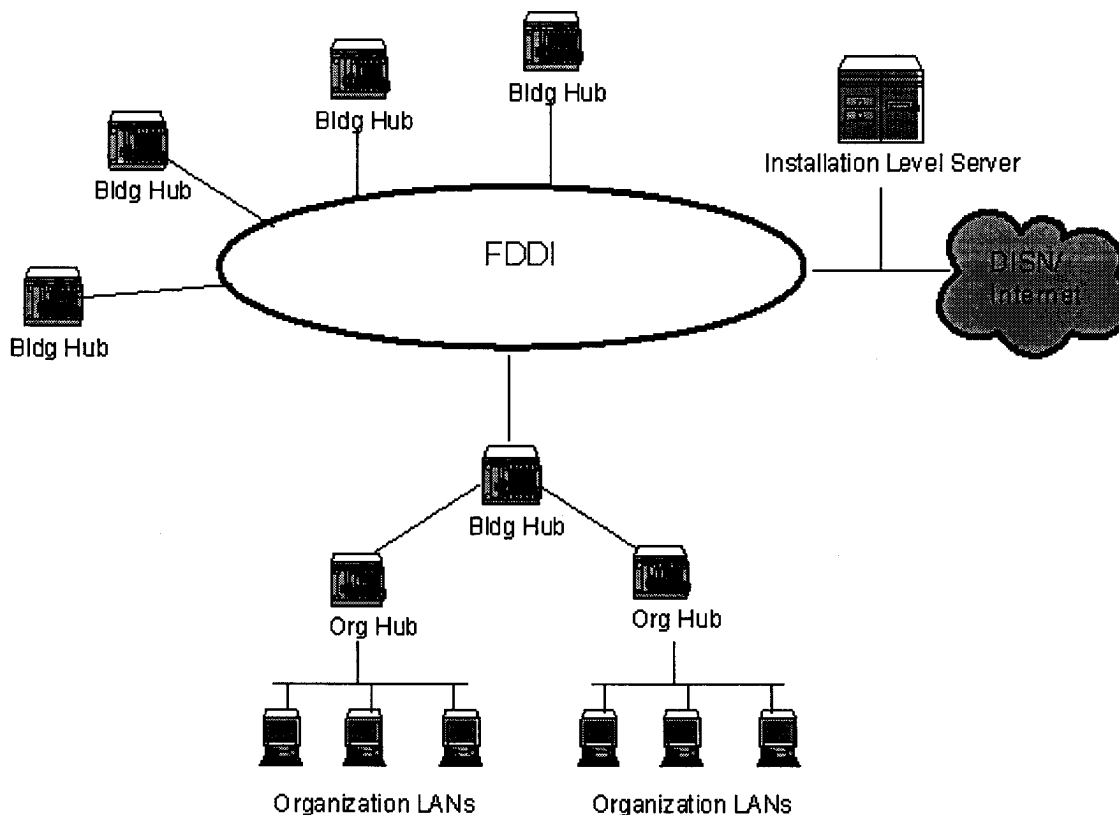


Figure 10. Notional FDDI CAN segment

TRADOC installations' baseline CANs are at various levels of capability. The "Fort TRADOC" project is the DCSIM's effort to create a standard baseline level of information transport at the installations. [Appendix B](#) provides a graphic overview of the baseline CAN at each TRADOC installation. Data from [Appendix B](#) is also maintained on the DCSIM homepage.

See also:

[4.4.1.4 Networks--Installation Level](#)

5.1.3 Fort TRADOC

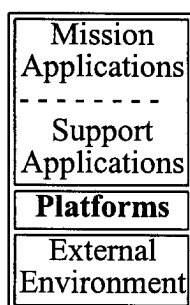
For more information:

<http://www-tradoc.army.mil/netviz/index.html>

4.3.1.5 Networks--local level

A network at the local, or building, level is generally called a local area network (LAN). In the baseline system architecture, the coverage and the architecture of LANs varies, with the Ethernet topology and the Novell operating system predominating, but with the Microsoft NT operating system showing a greater growth trend. According to data reported in the 1997 TPRISM data call, TRADOC operates 236 Novell LANs, 68 NT LANs, 36 Banyan VINES LANs, and 316 LANs with other, or unreported, network operating systems.

4.3.2 Platforms



Platforms are the next layer up from networking in the TRM. The platform layer encompasses computing hardware, operating system and system support service software. The discussion below is organized by integration levels.

4.3.2.1 Platforms--Enterprise Level

Computing is distributed in TRADOC. The command does not have a centralized enterprise level platform. In the 1980s, TRADOC completed a program to field common platforms, an IBM 4381, to support enterprise processes, but these platforms were distributed to each installation and operated at that level. That program, called TRADOC Information Systems Integration, supported the command level capability called TRADOC Decision Support System, primarily by running the PROFS/OVVM and ISM applications. These IBM 4381 computers remain in the baseline system architecture and are described below as installation level platforms in paragraph 4.3.2.3.

4.3.2.2 Platforms--Mission Level

While there are standard platform configurations associated with some mission level processes, TRADOC has no significant mission level platforms that are centrally operated by a functional proponent for the whole mission area. In some cases, the DMCs fill the role for centralized mission level platforms. DMCs host a variety of standardized mission applications, e.g., SIDPERS, STARFIARS and STANFINS, sometimes collectively called the ASIMS.

The most important mission level platforms operated by TRADOC are associated with installation management processes. The Army initiated a long range effort called the Sustaining Base Information Services (SBIS) to develop a full range of applications to support installation management processes at both the installation and MACOM level. The Army also initiated an interim effort, the Installation Transition Processing (ITP) Installation Support Modules (ISM) project, to enhance installation management Army-wide until SBIS was operational. Both the SBIS and ITP ISM programs field and employ mission level platforms.

SBIS platforms are scheduled for fielding during 1997-98. The platforms are therefore described as part of the objective architecture in paragraph 4.4.2.2.

As a phase within the ITP program, the DMCs centrally operate ISMs on SUN 690 platforms. PM SBA is just concluding the fielding for decentralized ITP platforms at TRADOC installations. These platforms are described as part of the objective architecture in paragraph 4.4.2.2. As the migration to

local operations is completed, and until all ISM applications have been developed and fielded for operation on ITP platforms, the baseline system architecture for ISMs continues to include centralized platforms at two DMCs (Huntsville and St. Louis), accessed by personal computers located at the installations.

There are scattered other mission level platforms fielded to TRADOC installations to host mission applications, e.g., the Automated Retail Outlet System (AUTOROS) and Automated Instruction Management System (AIMS). The AUTOROS platform is a Unisys Micro. AUTOROS supports the DOL and DIS with inventory management, parts accountability, receipts and issues and manpower utilization. The majority of the AUTOROS system, excluding inventory management, will be replaced by SAMS/I- TDA. HQ TRADOC will provide a replacement Y2K compliant system to support this function. The AIMS platform is a DEC VAX and supports DOTD's with academic data on students, audit trails for enrollments, attrition, graduation, test administration, effectiveness evaluation, and scheduling.

4.3.2.3 Platforms--Installation Level

The primary installation level computing platform in the baseline system architecture is an IBM mainframe in the 43XX (e.g., 4381) product line, with the VM/SP operating system, version 5.0 or higher. There are typically IBM 3380 disk drives and IBM 3422 tape drives associated with the mainframe. TRADOC provides centralized maintenance contract support for these mainframes. The most important applications on these mainframes are the PROFS/OVVM, for e-mail, scheduling and bulletin board support, and TRADOC's ISMs. DOIMs also developed applications unique to the missions of their serviced end users, some of which continue running on these platforms.

All of these mainframes will be phased out by 2000. Hardware fielding actions to prepare for that phase, although complete at several installations, are still on-going. The replacement hardware is therefore described in the objective architecture. Nine unique applications, a mix of mission and installation level, must be migrated to another platform or application. The TRADOC ISMs are being replaced by Army standard systems. Associated software migration is discussed in the objective architecture.

See also:

4.4.2.3 Platforms--Installation Level

4.4.4.3 Installation Management Applications

5.2.1 IBM mainframe replacement

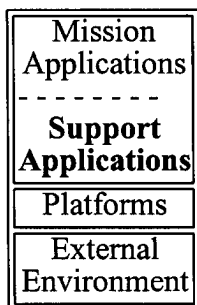
For more information:

<http://www-tradoc.army.mil/dcsim/mlcr/mlcr.htm>

4.3.2.4 Platforms--Personal Level

Throughout the command, there are about 35,000 personal computers. Most are based on Intel processors ranging from 286 to Pentiums and run MS-DOS or Windows as their operating system. The large majority of TRADOC PCs are acquired via Army's centralized IDIQ contracts, which has helped standardize on the Intel based machines. HQ TRADOC does not track more precise statistics for the distribution of PCs at TRADOC installations.

4.3.3 Support applications



The next TRM layer is software applications, which includes two sub-layers: support and mission applications. Support applications cut across mission areas, e.g., e-mail and word processing, while mission applications are designed for specific end user functions. This section discusses support applications in the baseline architecture.

4.3.3.1 E-mail

TRADOC had a recent ten year history of using PROFS/OVVM for its command-wide e-mail system. That is changing across the command as functional organizations install open networks and servers that can run open e-mail applications. Only about a third of TRADOC e-mail users still use PROFS/OVVM, which is hosted on the IBM 4381 mainframes. Figure 11 shows the distribution of users on various e-mail packages.

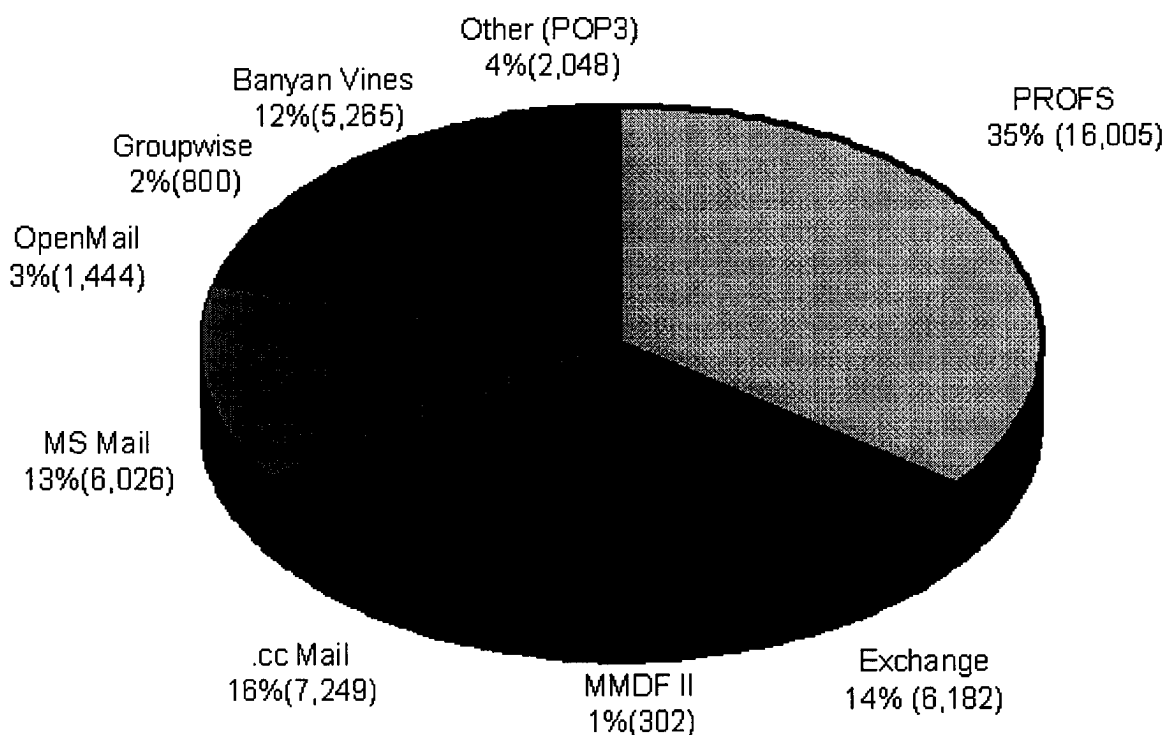


Figure 11. Distribution of e-mail users

4.3.3.2 Messaging

TRADOC reconfigured its messaging architecture during 1997 to introduce the TRADOC Message Service Center (TMSC) concept. The new architecture provides efficiencies that enable DOIMs to reprogram TCC personnel for the simultaneous operation of current e-mail systems, the TCC, and DMS as it evolves.

Figure 12 illustrates the typical TCC architecture prior to implementation of TMSC concept. Each TCC operated an independent messaging configuration directly connected to the AUTODIN.

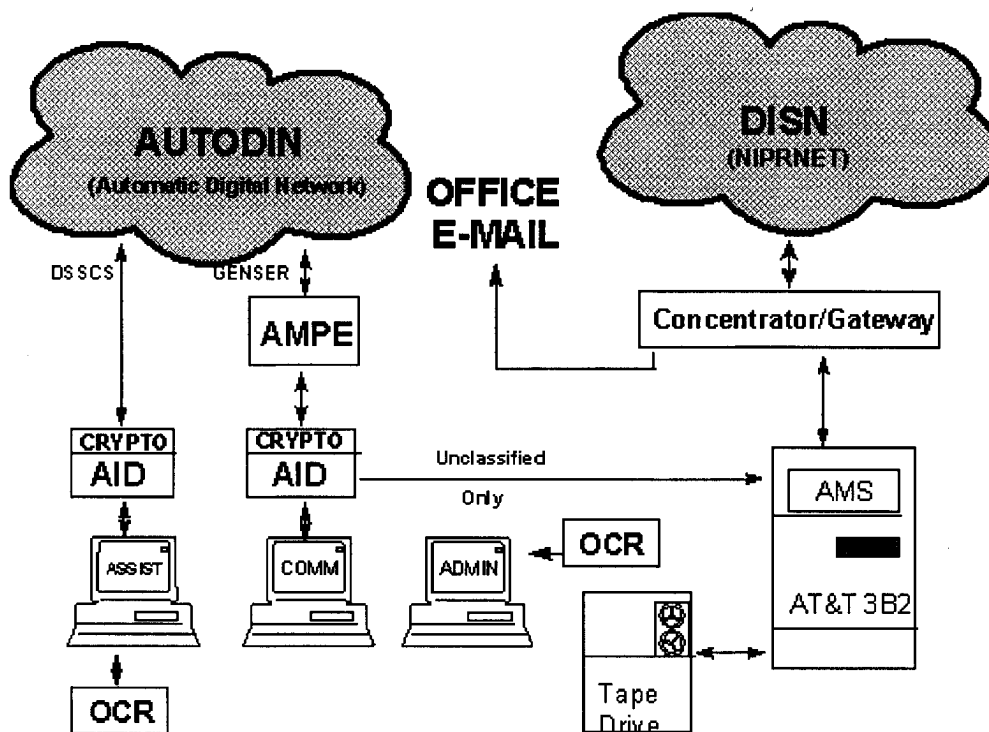


Figure 12. Typical TCC configuration in 1996

The TMSC concept makes five key modifications, described below, nearly all of which are now completed at each TRADOC installation.

=> Relocation of ASSIST Terminals to SSOs

The Automated Special Security Information Systems Terminal (ASSIST) equipment, used exclusively to process Defense Special Security Communications System (DSSCS) traffic, is being relocated to the installation SSO. This action reduces the workload in the TCC, permits downgrading the security level of the TCC to a secret-high and improves the capabilities and efficiency of the SSO.

=> Establishment of TRADOC Message Service Centers

TMSCs (see also paragraph 4.3.1.2.2.3) are located at Forts Gordon, Leavenworth and Monroe. Each provides centralized message distribution services to several subscriber installations. Figure 13 depicts a TMSC and a typical subscriber. Subscriber installations process their AUTODIN traffic through their assigned TMSC, which is directly connected to the AUTODIN. TMSCs provide dial-in service to subscribers for classified and outgoing unclassified messages. Unclassified incoming message traffic is processed by the AUTODIN Mail Server (AMS) at the TMSC and routed to the subscriber's Army Standard Electronic Mail Host (ASEMH). The ASEMH is a transitional DMS server used for the receipt and onward delivery of unclassified messages using X.25 protocols.

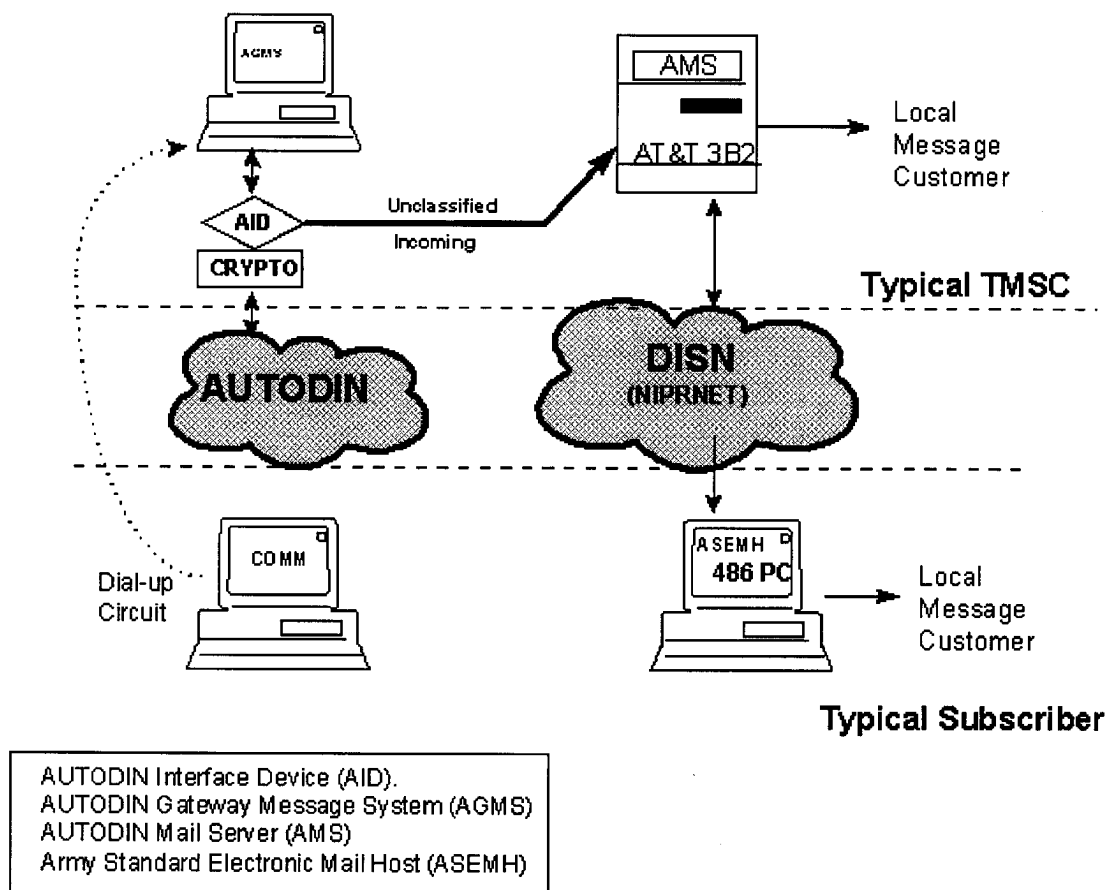


Figure 13. Typical TMSC and subscriber TCC configurations

An important part of this architecture is maintaining high quality messaging during exercises, mobilization, and military operations. TMSCs provide "message watch" for specific types of messages to enable connected stations to take full advantage of part-time operations. Maximum use of secure and non-secure facsimile, administrative telephones, and STU-III communications are employed to permit reduced operations at supported stations. TMSCs will directly contact subscribers' on-call TCC personnel and/or duty officers to determine appropriate actions on incoming messages. TMSCs operate on a part-time schedule in a reduced threat (peace time) environment. Operations during network interruptions, facility impairments, periods of increased missions and/or political tensions, to include mobilization, may require extended hours of TMSC operation.

=> Replacement of AMSs with ASEMHs

All TRADOC installation TCCs other than those designated as TMSCs, have had the AMS in their TCC replaced with an ASEMH.

=> Consolidations of TCC/DPI

Since TRADOC installations' TCCs are now using portable equipment, they have the opportunity for a simple self-help consolidation of the TCC with the DPI's e-mail processing section. This action has been successfully completed at TRADOC installations with benefits including shared operations and maintenance capabilities, resource savings and improved efficiencies in systems administration.

=> Conversions to Dial-Up Service

All TRADOC TCCs supported by a TMSC have disconnected their dedicated AUTODIN circuit

and now process all their classified and outgoing unclassified AUTODIN messages as a dial-in subscriber to the ports on their assigned TMSC's classified processing terminal. STU-III devices are employed for transmission security. This, and other networking aspects of the TMSC architecture, were discussed together with AUTODIN.

See also:

4.3.1.2.2.3 Automatic Digital Network (AUTODIN)

4.3.3.3 Office Automation

TRADOC uses a variety of COTS products for office automation applications, e.g., word processing, graphics and spreadsheets. The specific applications vary by vendor throughout the command and even at installation level. Thus, it is not uncommon to find several vendor specific support applications and resultant file formats in a cross section of TRADOC organizations. Most TRADOC PC users already have, or can access, capabilities for generating and reading a variety of common office automation file types. However, in the acquisition process that has led to the baseline architecture, there have been no constraints to ensure common capabilities are acquired. The migration strategy for achieving the objective architecture includes tighter enforcement of product selection based on capabilities for generating and reading the JTA-Army standard file formats, listed in Table 16, and publication of command-wide preferred products lists (see Table 6).

4.3.3.4 Videoteleconferencing

TRADOC has eighteen studio grade VTC facilities, which can connect to facilities worldwide via military operated networks (see paragraph 4.3.1.2.2.2). TRADOC has also installed desktop VTC equipment that supports point to point and multipoint VTCs among TRADOC commanders and HQ TRADOC staff principals. The DVTC common user unit is the PictureTel Live 50, which began shipment to TRADOC users in July 1997. Until recently, the primary system in the baseline system architecture was AT&T's VISTIUM. The minimum PC requirements for the PictureTel unit are: 386 or faster CPU, 8 megabyte (MB) random access memory (RAM), ISA or EISA Bus, VESA Advanced Feature Connector, 20MB Disk Space, and SVGA or VGA Monitor. The current version of PictureTel requires Windows 3.1 or Windows 95 operating system. However, PictureTel has issued a product announcement for a Windows NT version to be available in the fall 1997. The PictureTel unit will interface to other vendors' systems that conform to the International Telecommunications Union (ITU) H.320 standard for video data. It supports data sharing and collaboration on files from other applications, e.g., word processing documents. To support multipoint VTCs, TRADOC also installed at Fort Monroe AT&T's Multipoint Control Unit. This unit will connect multi-vendor products via the H.320 standard. Each caller dials into the control unit and the multipoint connections are established. Figure 14 shows the distribution of DVTC in the baseline system architecture.

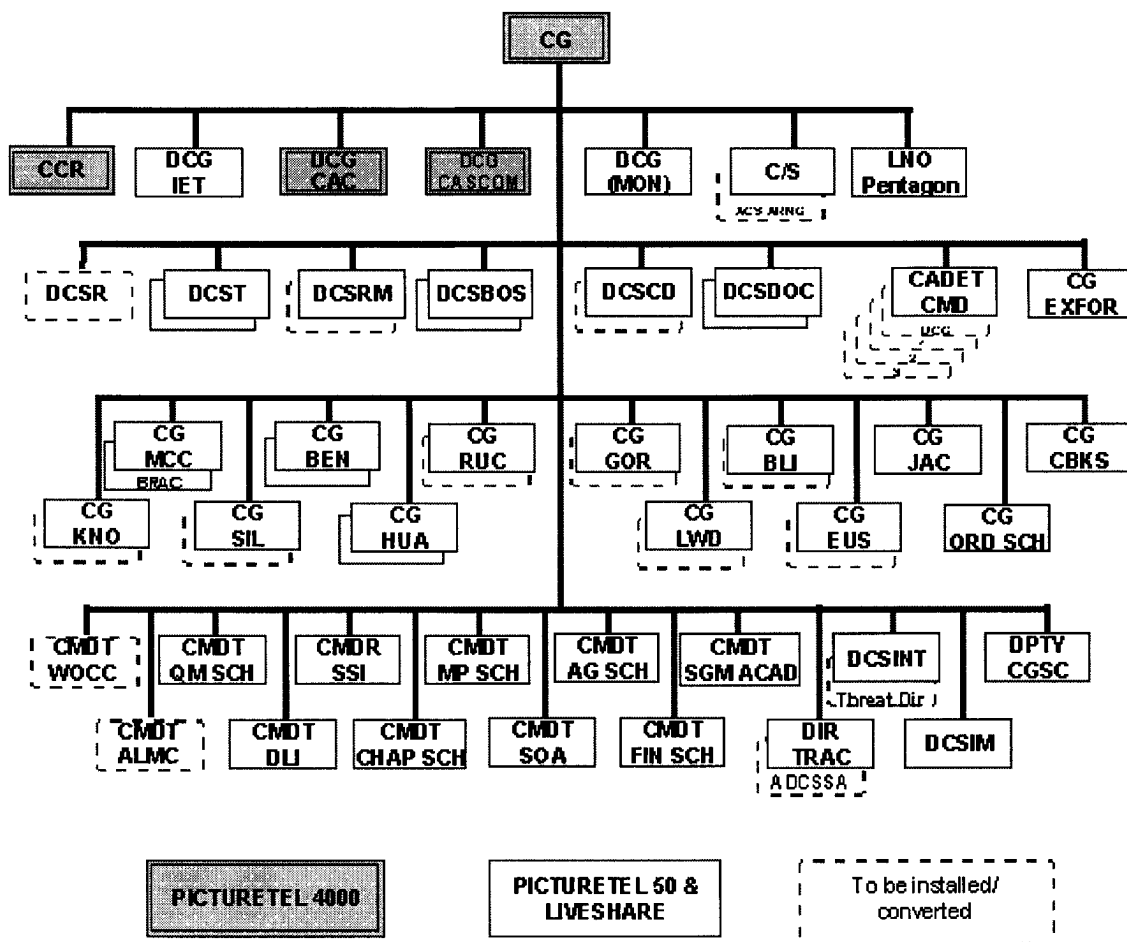
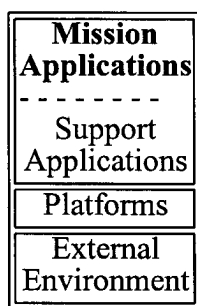


Figure 14. DVTC Distribution

4.3.4 Mission applications



TRADOC uses mission applications that are developed and supported by a variety of sources. TRADOC's ATSC has developed many of our training applications. TRADOC still relies on a set of installation management applications that were developed by TRADOC programmers at the Ft. Sill DOIM. Ft. Monroe DOIM also supports some MACOM level and Cadet Command applications. Most mission applications, e.g., battle simulations and STAMIS, are developed and sustained outside of TRADOC or are tailored adaptations of commercial products. The discussion below briefly describes how some major types of applications are used in TRADOC.

Appendix C provides a list, with brief descriptions, of most mission applications used in TRADOC.

4.3.4.1 Training Applications

Although the categories are not entirely mutually exclusive, training applications can be grouped as follows:

- Management information systems (MIS) to support high transaction processes, e.g., managing correspondence courses, scheduling classrooms and equipment, and maintaining student records. Example MIS applications include: AIMS, TREDs-R, RECBASS and TMWS. AIMS-R is the

cornerstone for modernizing training MIS and will absorb the functions of many MIS in the baseline architecture.

- Database management systems to catalog and track various training entities, e.g., devices, course materials, course descriptions, requirements and resources. Example database applications include ATDL, ATRRS, STAARS, and TEXMIS.
- Training development tools that support the preparation of training materials, e.g. ASAT and COTS products for multimedia courseware development.
- Training tools that assist in the conduct of training, e.g., simulations and simulators (see paragraph 4.3.4.2), and computer based instruction. Training tools are at a very immature state compared to the vision for Classroom XXI.

Refer to Army Training Information Management Program (ATIMP) documentation for detailed information on training MIS and databases.

See also:

Appendix C. 8.1 Training Applications

For more information:

<http://www.atimp.army.mil/>

4.3.4.2 Models and Simulations (M&S)

M&S applications are used in three of TRADOC's four key processes: combat development, doctrine and training. The Army categorizes M&S into three domains. The Advanced Concepts And Requirements (ACR) domain deals with strategy (developing concepts, military options, and force requirements in theater and regional contexts); force development (assessing improvements in operational and tactical capabilities) and requirements generation and materiel development (assessing system performance, developing cost analyses, determining logistics for sustained operations). The Training, Exercises And Military Operations (TEMO) domain supports individual and collective training, exercises and mission rehearsal. The Research, Development and Acquisition (RDA) domain covers analytical capabilities for: science & technology thrusts, weapon systems developments and test & evaluation. Mapping these domains into TRADOC's processes, combat developers and doctrine developers are the largest users of ACR M&S and trainers use TEMO M&S, but individual applications may be used by more than one set of functional end-users. Users outside TRADOC are the primary users of RDA M&S, e.g., Army Materiel Command, acquisition Program Managers, Operational Testing and Evaluation Command, and Space and Strategic Defense Command.

M&S are generally divided into three types:

- *Constructive*: mathematically oriented tools for analysis, e.g., war games. They are usually identified with the large scaled, complex computer-driven models most often associated with exercises dealing with battalions, brigades, divisions, corps, and EAC. Constructive simulations are in wide-spread use in the Army and in TRADOC.
- *Virtual*: manned simulators interacting within a synthetic environment. Virtual simulations are often associated with crew-served weapons systems and focus on skill development and practice. These simulations closely replicate all or parts of tanks, armored personnel carriers, aircraft, and other equipment and normally require the trainee(s) to immerse into the simulation. Virtual simulations are often referred to as simulators. Examples are found in flight simulators at Fort Rucker, tank simulators at Fort Knox, infantry fighting vehicle simulators at Fort Benning, and engineer vehicle simulators at Fort Leonard Wood.
- *Live*: soldiers and equipment operating together against an actual force for purpose of training or experimentation. Live simulations primarily use simulators to replicate weapons effects. Live

simulations can take place almost anywhere the maneuver space is available, but the primary training facilities in the Army that use live simulations are at the National Training Center (NTC), the Joint Readiness Training Center (JRTC), and the Combat Maneuver Training Center (CMTC). At these facilities, much of the battlefield is instrumented, primarily by Multiple Integrated Laser Engagement System 2000 (MILES 2000) and Core Instrumentation Systems.

4.3.4.2.1 Distributed Interactive Simulation

The Army's core Distributed Interactive Simulation (DIS) Facilities (CDF) are located on TRADOC installations at Forts Knox, Benning and Rucker. Other nodes with long haul connectivity include Forts Bliss, Huachuca, Sill, Leavenworth, Leonard Wood, and Gordon. DIS is a communication protocol that supports Advanced Distributed Simulation technology in which operators interact through interconnected simulators and simulations (constructive, live and virtual) tied together through a standard communication design. DIS technology enables combat, doctrine and training developers to simulate innovations required for designing Force XXI. It supports mission area analyses, concept formulation, requirements definition, and prototyping. Each core site is equipped with crewed simulators, semi-automated forces (SAF) simulators to provide computer generated forces, display systems to provide experimenters a view of the virtual battlefield and data collection and analysis tools. Crewed simulators are available for tanks, helicopters, air defense systems, communication systems and a generic command and control console. STRICOM manages the CDFs.

4.3.4.2.2 Family of Simulations

The Family of Simulations (FAMSIM) is the collective name for many of the M&S applications used in TRADOC's baseline architecture. FAMSIM simulates operations at the tactical, operational, and theater levels. It is a set of constructive models: Corps Battle Simulation (CBS), Brigade/Battalion Battle Simulation (BBS), Janus, Tactical Simulation (TACSIM), Combat Service Support Training Simulation System (CSSTSS), and Spectrum.

BBS is used for command post exercise (CPX) training for BDE/BN commanders/staffs. It is used at Corps, in conjunction with CBS, Division in conjunction with CBS, Reserve battle projection centers, as well as TRADOC schools. BBS is a fully distributed system of five MicroVax 3100-40s utilizing a LAN to drive a standard configuration of 10 workstations (DEC VT 320 terminals). It uses the Virtual Memory System (VMS) 5.5 operating system. In TRADOC, BBS suites are currently employed at Fort Leavenworth, Chemical School, Infantry School, Engineer School, Artillery School, Air Defense Artillery School, Armor School, Aviation School, Academy of Health Sciences and the Sergeants Majors Academy at Fort Bliss, TX.

CBS is used for training corps commanders and battle staff, major subordinate commands, and major subordinate elements of headquarters of the corps. It exercises command and staff skills in control of joint operations, tactical forces, combined arms forces, maneuver forces, and the combat support and combat service support systems in an operational/tactical environment. CBS Version 1.5.3 runs on a network of DEC Virtual Address Extension (VAX) 7620 with the VMS operating system. In TRADOC, the only CBS suite is installed at National Simulation Center (NSC).

Janus is targeted to company/team level training. Janus runs under the UNIX operating system on Hewlett Packard 715/50 microcomputers. TRADOC schools have two each eight workstation suites.

The TACSIM is the Army's leading intelligence collection and dissemination model. TACSIM aids in the training of intelligence staff skills from the design of collection requirements to the analysis of raw intelligence. It supports intelligence training from MI Battalion through Echelons Above Corps. The TACSIM equipment suite includes; DEC ALPHA 1000, VAX 3196, VAX 3140, three SUN SPARC II CEs and SUN SPARC 20. It is used at NSC and USAICS.

CSSTSS is a combat service support (CSS) CPX driver which can be used as a stand-alone simulation or to stimulate exercise play for the collective training of CSS commanders and staffs in Echelons Above Corps, Corps, Corps Support Commands, Divisions, and Division Support Commands

as well as their subordinate headquarters down to the battalion level. CSSTSS 1.5 is an IBM-based system. It is run on an AMDAHL 5890 computer mainframe that is fielded at the Fort Leavenworth and Fort Lee. Exercises are supported by remote connection to either host.

Spectrum is used to train operations other than war. It runs in a Windows environment on IBM Pentium 133 MHz processor.

4.3.4.2.3 Analytical M&S

TRADOC uses a group of applications for analysis, e.g., to produce Cost and Operational Effectiveness Analyses. The primary user is TRADOC Analysis Center (TRAC) at Ft. Leavenworth. Operators typically use SUN, Hewlett Packard or Silicon Graphic workstations connected to VAX or Cray platforms running the model. Specific applications represent various echelons with different degrees of resolution as depicted in Figure 15.

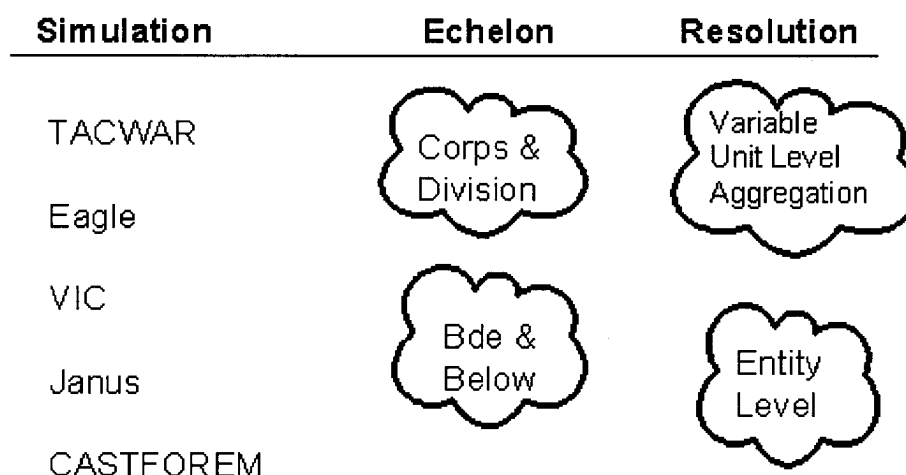


Figure 15. Analytical M&S

TACWAR models theater joint and combined operations, including ground combat, air combat, logistics, command and control and chemical warfare. Users include TRAC, the Army War College and various warfighting commands.

Eagle models corps and division in joint and combined scenarios. It includes command and control, maneuver, direct and indirect fires, helicopter warfare, air defense and intelligence fusion.

Vector-in-Commander (VIC) models corps operations with a theater slice, in a joint context. Operations include maneuver, fire support, command and control, engineering, air defense, combat service support and chemical warfare. Users include TRAC, Engineer School, Artillery School and Intelligence School.

The Combined Arms and Support Task Force Evaluation Model (CASTFOREM) is a high resolution model used for representing direct and indirect fires, maneuver, fixed wing aircraft and helicopters, information operations and limited combat service support. Although its resolution is down to item level, CASTFOREM is not yet DIS compliant.

4.3.4.3 Installation Management Applications

Installation management is the TRADOC mission area with the longest automation history. As a result, the baseline architecture is a variety of applications from several programmatic sources used in a

diverse set of functional areas.

PEO STAMIS is charged with fielding STAMIS and other standard applications for use Army-wide. Some STAMIS have been adopted as DOD migration systems, either in current or improved form. Some STAMIS that TRADOC uses are hosted on centralized processors operated at the DMCs (see Table 4) and are collectively known as ASIMS. TRADOC installations access ASIMS through the communications processor associated with the installation level IBM 4381 mainframe or the replacement equipment currently being fielded by TRADOC. Other STAMIS are written for local operation, or can be operated in two architectures. Appendix C gives a brief description of various STAMIS applications.

Table 4. STAMIS Use

	BEN	BLI	EUS	GOR	HUA	JAC	KNO	LEA	LEE	LWD	McC	MON	POM	RUC	SIL	CAR
AMEDDPAS	X	X	X		X	X				X				X		X
IFS-M																X
IMCSRS										X						
ITAADS		X				X		X			X			X		
RAPS	X	X	X	X		X		X	X	X	X	X			X	X
SAILS				X	X		X	X	X	X	X		X			
SIDPERS	X	X	X	X	X		X	X	X	X	X		X	X	X	X
STANFINS	X	X	X	X	X	X	X	X	X	X	X		X	X	X	
STANFINS-R	X		X	X	X	X			X					X		X
STARFIARS	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X

Several PEO STAMIS applications, collectively called ITP ISMs, are currently hosted on platforms at the DMCs but are scheduled to migrate to a distributed architecture fielded to installations. Most have already been fielded to TRADOC installations. Another PEO STAMIS set of applications, the SBIS modules, are designed to be run at installations. Most are also scheduled for fielding during 1997 coincident with the fielding of platform suites. Appendix C gives a list and brief description of applications in both programs.

At the other end of the integration spectrum, TRADOC still employs installation unique applications, developed by TRADOC DOIMs for local operation. These applications support mission requirements unique to specific installations and typically run on the installation level IBM mainframes. There are about 70 such installation unique applications. As part of its Project Change of the Century, TRADOC is evaluating all of these applications. Many will be retired.

To standardize the most common installation management applications used in TRADOC, Fort Sill and Fort Monroe DOIMs developed about 25 TRADOC installation support modules (ISM) in the 1980's. See paragraph 8.6 in Appendix C for a list of TRADOC ISMs. These were the primary applications run on the installation level IBM mainframes discussed in paragraph 4.3.2.3. Use of the TRADOC ISMs is declining as replacement applications become available. All TRADOC ISMs will be retired as the replacement applications are fielded prior to 2000 (see Table 7). Most TRADOC ISMs interface with STAMIS systems, running at DMCs, to retrieve current information for the local TRADOC ISM database tables and return transactions and updated information to the STAMIS. These information exchange requirements are a large part of the traffic carried on the dedicated circuits described in paragraph 4.3.1.3.4.

See also:

5.2.2 SBIS

5.2.3 ITP

5.4.5.1 Installation Support Modules

Appendix C: Mission Applications

For more information:

<http://www-tradoc.army.mil/dcsim/y2k/restrict/y2k-ais/y2k-ais.html>

4.4 Objective system architecture

In TPRISM, the "objective" system architecture is the vision of the future that is driving our current planning and programming. It is not determined by an arbitrary time boundary, e.g., 10 years out. If the migration strategy includes a near term target architecture as a transition to reach the objective end state, that is described in this section as well. To make the migration strategy more evident, the discussion of the objective architecture below is organized into the same categories as were used throughout section 4.3 for the baseline system architecture. Refer to Chapter 5 for management information on projects mentioned below as the means for achieving parts of the objective system architecture.

The most fundamental changes to TRADOC's baseline system architecture are those required to migrate toward a standards based architecture that maximizes common-user assets and extends client-server capabilities to the action officer level. This means steady improvement and maintenance of installation CANs and LANs, and personal level computers. A solid infrastructure of these components will position TRADOC for future growth, interoperability and exploitation of DoD, Army and commercial investments in new products. Generic system components that are important pieces of this objective architecture include:

Wide Area Network (WAN) - interconnect geographically-dispersed CANs and servers. WANs can range from a complex structure of packet switches to simple point-to-point lines.

Internet - a worldwide public network of interconnected servers. The servers provide various services to heterogeneous client platforms. Notable services include file transfers and information searching using hyperlinks (world wide web).

Intranet - a network limited to servers inside security devices designed to control access to a specific set of users. Servers on an intranets can offer the same type of user services as on the Internet. Network segments may be shared with public networks since the security devices protect access to data and services on the servers.

Campus Area Network (CAN) - interconnects LANs using a broadband network (often referred to as an installation backbone) covering a geographic area larger than that of the individual LANs, but usually restricted to a geographic region about the size of a campus or military installation. The CAN includes cabling (usually single-mode fiber) and network devices (routers, gateways, and bridges) which enable information transport in accordance with protocols (e.g., FDDI or ATM/Synchronous Optical Net (SONET)). If the function of a component is to provide an inter-network interface into the common user installation level network, then TPRISM categorizes the component as part of the CAN.

Area Distribution Node (ADN) - concentrates the data from end user systems and lower level networks and provides their entry point into a higher level network, i.e., CAN.

Switch - provides a bridge, or connection, among multiple networks.

Router - interconnects two or more networks and passes data packets between them. A router performs two distinct functions: route processing and packet switching. Route processing determines the next hop, i.e., where to forward a packet that is received. Routers exchange connectivity information with other routers to determine network addresses and adapt to changes. Packet switching is the actual forwarding of a received packet on the basis of the source and destination addresses of the packet, and the next hop routing information in the router. A number of other packet-level functions (such as filtering) may also be performed during the forwarding operation.

Hub - Hubs are networking devices to connect a group of circuits at one point on a network, and

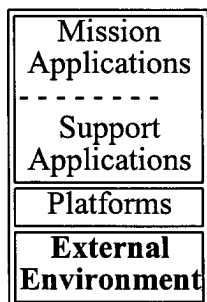
typically include a chassis, power supplies, management and host modules. Hubs are often repeaters, bridges or routers. Hubs enable single point management functions, e.g. changing connections. Hubs can come bundled with various degrees of capabilities, e.g., an intelligent hub will communicate network management information to a network administrator's workstation. Hubs can be employed at all levels of networking, i.e., WAN, CAN, LAN.

Local Area Network (LAN) - interconnects clients and servers within a small geographical area, usually within a building. There is no universally accepted boundary between a LAN segment and a CAN, but TPRISM generally uses the term LAN for the network segment among collocated end-users, while CAN is the term used for the installation's data backbone network that inter-connects the users' LANs.

Server - a host or computer that processes information and shares information with other servers through communications media. A server generally executes aspects of application programs used by a group of users, although there are a variety of other server capabilities, e.g., data storage. A server can also act as a router.

Client - a computer, often a PC at the action officer level, that makes requests for services (e.g., for a database record) to a server. The server, often a higher performance computer, fills those requests and sends the result via a network. Since the client and server must cooperate, both follow standardized protocols.

4.4.1 External environment



The TRM includes networking and external data sources in the external environment layer.

4.4.1.1 External data sources

External data sources will be important components of the objective system architecture. Software architectures will increase reliance on external data sources from which client applications can pull data. External, distributed databases will also be used extensively for electronic coordination and information dissemination and reuse. Centralized search engines and gateways, e.g., TRADOC's CALL Gateway and commercial services like Web Crawler and Yahoo!, will help direct users to specific information sources.

4.4.1.1.1 CALL Database

The CALL Database operations are centrally executed at Ft. Leavenworth. The objective of the CALL Database is to enhance the Army's corporate memory by digitizing records from both actual and synthetic operations. Actual operations include material from Desert Storm, Rwanda, Haiti, and Hurricane Andrew. Synthetic operations are mainly those conducted at Combat Training Centers. The primary collection and analysis tool is the CALL Collection and Observation Management System (CALLCOMS). It assists Combined Arms Assessment Teams (CAAT) in formulating collection plans, categorizing observations and identifying trends. It can run on a stand-alone PC for individual observers or from a local area network to better support the massive amount of data collected by a CAAT. All data produced through CALLCOMS is fed directly into the CALL database. Although products will continue to be produced in paper format for some time to come, electronic access and dissemination is the objective architecture. CALL will support four different electronic access capabilities: e-mail, World Wide Web, an on-line document management and retrieval system, and the master database.

Every publication that is produced in paper form is also being produced in multiple electronic forms, including hypertext. CALL is using the WWW for its primary distribution means. Many supporting documents are also available in the Automated Historical Archives System (AHAS), a document management and retrieval system. AHAS contains the most recent collection of contingency operation documents. It is operated by the Combined Arms Center Historian and has a collection of over

500,000 pages of documents dealing with topics such as disaster and humanitarian assistance and the Gulf War. For qualified users, CALL will provide direct access to the master CALL database. Access will be through a windowed graphical user interface, allowing the researcher to sort, filter, and retrieve the same data, in its original format, that CALL uses to publish its finished products. The objective architecture capability is information on demand from any authorized user from any PC. All forms of written, video and audio products supported by multiple data bases will be available to worldwide tactical operations centers (TOCs), staff sections, schools and individuals. The CALL Database will access a large volume of information, but will assist the user in tailoring the search and the retrieved results to specific information requirements.

For more information:

<http://call.army.mil/call.html>

4.4.1.1.2 Army Training Digital Library (ATDL)

The ATDL will provide worldwide access to a distributed digital repository of training and doctrine knowledge. It will provide WWW-type search and retrieval services. The ATDL, centrally operated at Ft. Eustis, will provide transparent access to the distributed training products and courseware of all TRADOC schools and therefore is an important enabler of distance learning. As part of the WARNET initiative of Army Training XXI, ATDL is linked to implementation of the Army Distance Learning Plan's (ADLP) development of infrastructure and delivery technologies for the Total Army School System (TASS).

The ATDL will contain approved Field Manuals (FM), Training Circulars (TC), Drills and Officer Foundation Standards (OFS) and Army Correspondence Course Program (ACCP) materials. ATDL will also store training scenarios for reuse in developing Mission Training Plans (MTP) and Training Support Packages (TSP) for unit and institutional training. MTP, OFS and Soldier Training Publications (STP) will be available only as "virtual" HTML documents through ATDL. The ATDL will eliminate the resource intensive process of distributing doctrinal and training information in printed form. The ACCP will ultimately offer over 2600 subcourses to enrolled students through the ATDL.

The ATDL will provide an intelligent gateway to other training related systems. For example, ATDL users will be able to view data on-line from the Training Module (TRAMOD) Executive Management Information System (TEXMIS). The user will submit a request for data to ATDL, which will connect to TEXMIS, locate and extract the data, add the HTML tags, and display the data. Retrieved data can also be imported to other training applications, e.g., SATS and ASAT.

For more information:

<http://www.atsc-army.org/atdls.html>

4.4.1.1.3 Internet/intranet access

Servers connected to either the Internet (within DOD, the DISN) or to a TRADOC intranet will continue to be important data sources. Open protocols, e.g., TCP/IP, FTP and HTTP, to manage transactions will enable increased use of shared data among heterogeneous systems. PC's and networks available at the action officer level will support Internet/intranet access. Military activities, including HQ TRADOC, will continue to push information required for effective mission accomplishment through websites. Intranet access is distinguished from the baseline's Internet access by its limitation to servers inside a network firewall, as designed by the using organization. Intranets can be integrated at any level (command, installation, etc.), but the key is that access is purposely controlled to a specific set of users who are authorized to use the data found on the servers. Intranets will allow TRADOC to electronically share data that cannot be posted on a publicly accessible internet site, e.g., draft doctrine, system priorities, and meeting schedules. The same kind of information retrieval services, using the same protocols, that are available on the Internet can be made available on intranets, so that users can locate and pull authorized information using the same skills. End users will use the same platform and software for accessing both the internet and TRADOC intranets. Implementation of intranets will require network security devices beyond those available in the baseline system architecture.

4.4.1.2 Networks--Enterprise Level

The enterprise level includes networks for telephone, or voice, and data transport. However, the distinction will become increasingly meaningless in the objective system architecture. Networks will evolve toward a broadband integrated services digital network (BISDN) capable of providing the bandwidth for high speed data applications and voice, plus the video transport included in TRADOC's information exchange requirements. ATM, a fast packet, or cell, switching technique, is the objective solution for implementing BISDN at the enterprise level. BISDN, using the ATM protocol, permits the transmission of voice, data, video, and imagery services over a single network and allows the use of a single switch configuration for all network services. SONET will be the predominant transmission standard for WANs. The ATM cells are statistically multiplexed, without pre-assigned time slots, and synchronously inserted into a SONET frame. This enables dynamic allocation of capacity. SONET provides a complete set of standard optical interfaces without redundant electronics. Competition among vendors who offer standardized equipment will reduce future costs. Industry is already attempting to realize these advantages by developing SONET-based products and services as the standards become available. For example, AT&T, MCI, and US Sprint have announced SONET-based network support and have begun conversion to SONET standards.

4.4.1.2.1 Telephone Network

The Army's MACOM Telephone Modernization Program (MTMP) provides TRADOC installations with telephone switch upgrades. The architecture will be a distributed configuration, with a dial central office (DCO) and ADNs to support user concentrations and remote locations. All MTMP switching upgrades will use ISDN equipment capable of end-to-end digital N-ISDN. MTMP provides interfaces with existing telephone outside cable plant at ADNs and interfaces with WAN ISDN. The standard user telephone interface will continue to be two-wire analog at an RJ-11 connector for voice communications. Users who need a digital connection should be provided a two-wire narrowband-ISDN (N-ISDN) 2B+D U interface at an RJ-11 connector or an N-ISDN 2B+D S or T interface with two four-pair cables at RJ-45 connectors.

4.4.1.2.2 Data Network

TRADOC's enterprise level network for data transport will be a WAN, or combination of WANs, engineered and managed at a higher level of integration than TRADOC itself. A study being conducted by the TRADOC Analysis Center (TRAC), in coordination with the DCSIM, will help establish requirements, costs and alternatives for TRADOC's WAN usage during FY99 through 2005. The study results are scheduled to be reported out in January 1998. The scope of the study originated with M&S communication requirements, but its scope was expanded and the study results are expected to influence TRADOC's broader WAN modernization strategy.

TRADOC will continue to use the DoD's DISN as its common-user WAN. DISN is a set of digital communications networks maintained by DISA, providing high speed, high bandwidth transport for data and video. The objective architecture continues the same three major router network components as the baseline (see [Figure 16](#)):

- NIPRNET for unclassified information transport
- SIPRNET for secret
- JWICS for top secret and sensitive compartmented information.

Every TRADOC installation will have access to the NIPRNET. NIPRNET will carry the bulk of TRADOC's traffic above the installation level. The Army's Circuit Bundling Initiative (CBI), formerly called the Army Regional Transition Network (ARTNET), may provide WAN service in a target architecture leading to NIPRNET improvements. At least nine TRADOC installations will access the SIPRNET to support their Threat Management Office: Bliss, Knox, Rucker, Sill, Huachuca, Lee, Gordon, Benning, and Leonard Wood. TRADOC activities at Redstone and Aberdeen Proving Grounds will also access SIPRNET. JWICS nodes will be at Forts Huachuca, Monroe and Leavenworth. Each of

these will serve as an access point for 2-3 other TRADOC sites. Monroe serves Knox, Rucker and Benning. Leavenworth serves Leonard Wood and Sill. Huachuca serves Bliss and White Sands Missile Range. Since terminating equipment must be in a Sensitive Compartmental Information Facilities (SCIF), sites without a SCIF are not currently planned for JWICS access: Carlisle, POM, Jackson, Eustis and Lee.

All three network components share a common backbone. The data flow is kept separate by the router logic. The routing tables in each network list only other routers in the same network. NIPRNET has two Internet gateways, known as Fix-West and New York network access point (NAP). TRADOC users will access Internet hosts and services through these NIPRNET gateways.

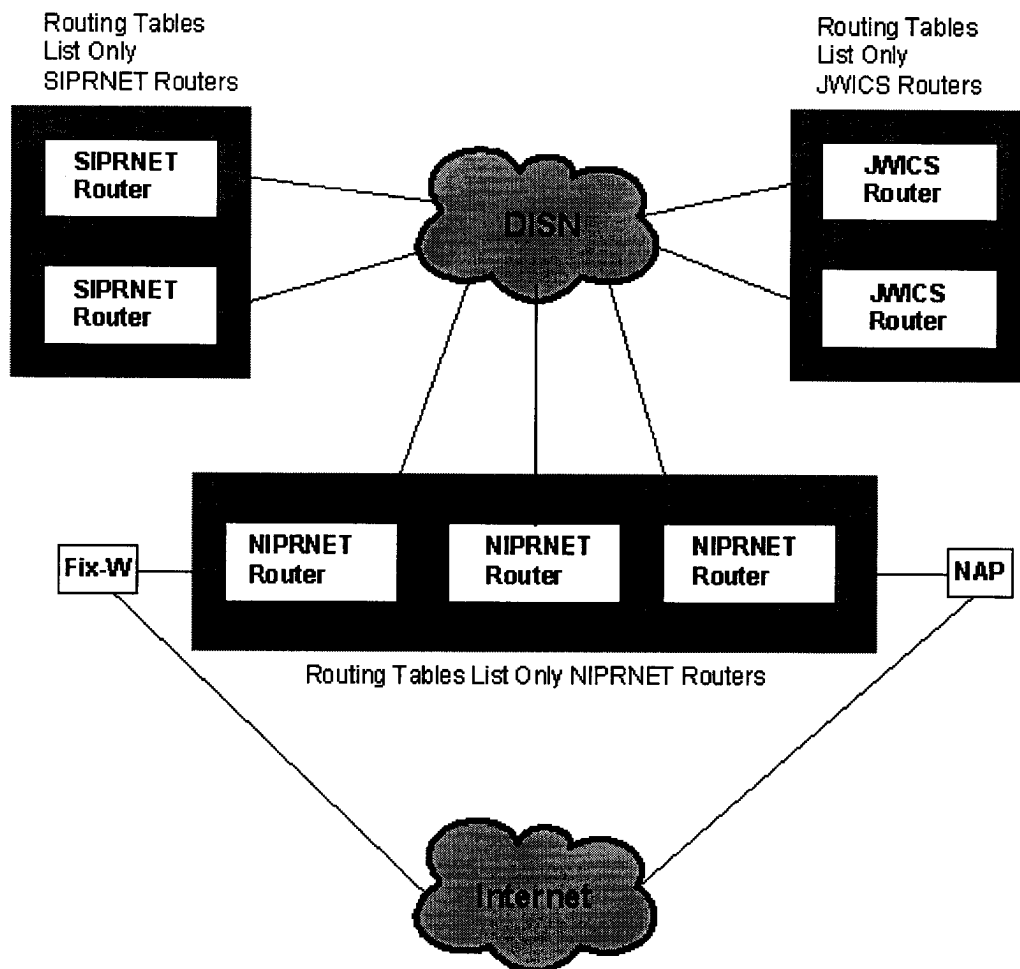


Figure 16. DISN components

The DISN evolutionary strategy will be executed in stages. The near term (through 2000) architecture is essentially a modernized baseline DISN. It replaces the DCTN services and consolidates about 200 individual networks within DOD. The cut-over of current circuits from the expiring contract into the new DISN infrastructure is scheduled to be completed in eight regionally defined phases. This transition involves cut-overs at over 500 sites across the CONUS. [Figure 18](#) shows the eight regions being used to schedule the transition.

The mid term (2001-2005) architecture services and capabilities will include:

- Intelligent directory service
- NISDN/BISDN services (fixed environment).

- Initial ATM network (deployed environment).
- Multilevel security.
- NISDN secure terminal equipment.
- Distributed interactive simulation.
- Multipeer/multicast service for data conferencing.
- Automated provisioning and bandwidth management.

The far term architecture (2006-2010) will achieve BISDN services in the fixed network segment and an ATM capability for the deployed network segment.

The DISN CONUS infrastructure includes circuit switches (SWs), bandwidth managers (BWMs), and DISN CONUS Regional Control Centers (RCCs). On the installations, the infrastructure is connected to private branch exchanges (PBXs), 4-wire subscribers, dedicated services, VTC hubs, network management systems, and access and backbone transmission services. A SONET backbone will connect the BWMs to each other and to installations. [Figure 17](#) depicts these components in a logical graphic while [Figure 18](#) shows physical locations.

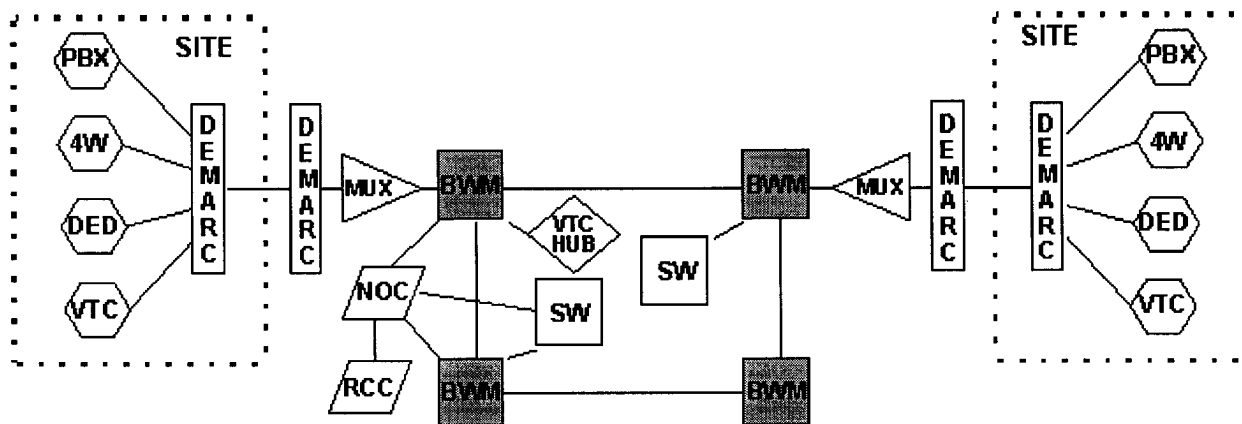


Figure 17. DISN CONUS architecture

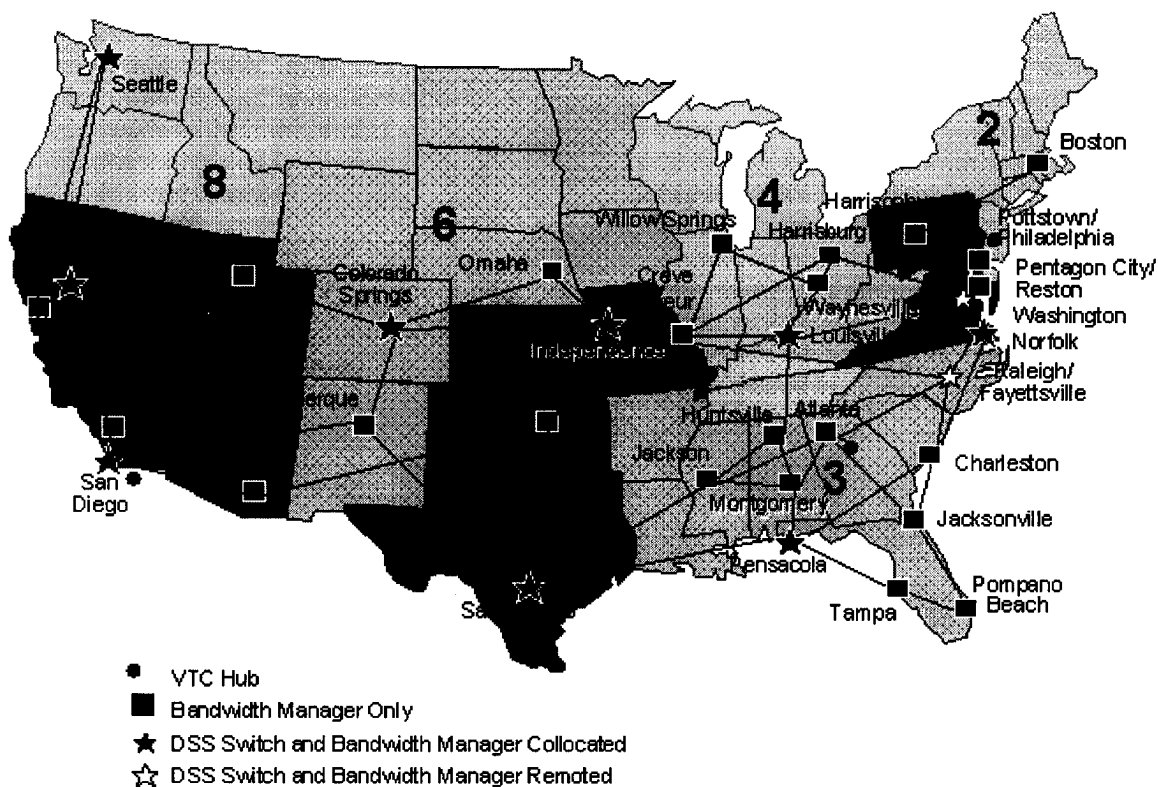


Figure 18. DISN regions and switch locations

- **Switches.** Each of the DISN CONUS Switched Service (DSS) switches are connected to two or more other switches by a SONET transmission backbone through the BWMs. Each switch is designated as the access area switch for a group of using sites.
- **Bandwidth Managers.** The BWM is a digital cross-connect system that manages the access and backbone links. The initial BWM installation will support Optical Carrier Level 3 Signal (OC-3) circuits from the access and backbone contractor (AT&T Federal Services) and Digital Signal (Level 1) (DS1) circuits for the test network. The test network is used to insert new technology into DISN operations. The BWM sites have three different configurations: 23 sites have a BWM only, 9 sites have a BWM with a switch collocated, and 3 sites have a BWM with a switch remotely located.
- **Videoteleconferencing Services.** Initially, video services will provide H.320 standards based, unclassified and secure, multi-point services for dedicated and dial-up connections via three CONUS video switching hubs. The VTC network transition has three target stages:

=> VTC Hubs. Installation and testing of the three VTC hubs and their inter-nodal backbone.

=> Circuit Transition. Installation and testing of local access circuits to sites for dedicated or dial-up connections.

=> Videoteleconferencing Facilities (VTF) Transition. Upgrading the VTF coder/decoder (CODEC) to incorporate H.320 standard conference controlling, testing the access to the new DISN circuit, and installation and testing of the DVS-G reservation and scheduling system.

TRADOC installations will own and manage customer premises equipment (CPE) necessary to interface their installation level servers with WANs. TRADOC CPE and servers must support the

TCP/IP protocol interface. The network access can take several forms, including ATM, FDDI, a serial direct connection (X.25) or Ethernet (IEEE 802.3). CPE will link to a router provided by the ADRP, manufactured by Cisco Communications. The Army's strategy for installations' system architecture is to connect all Army servers to Army CPE rather than to connect directly to a DISA router. ADRP routers will provide each installation a single, common user access point for multiple hosts and LANs. This internetworked architecture allows the Army to pay for only one long haul connection rather than individually for each host or LAN with DISN connectivity. Installation DOIMs will be responsible for installation level management of ADRP routers. Their configuration will vary according to the installation, but as a minimum, each will provide IEEE 802.3 and serial link switches.

See also:

5.1.1 DISN

For more information:

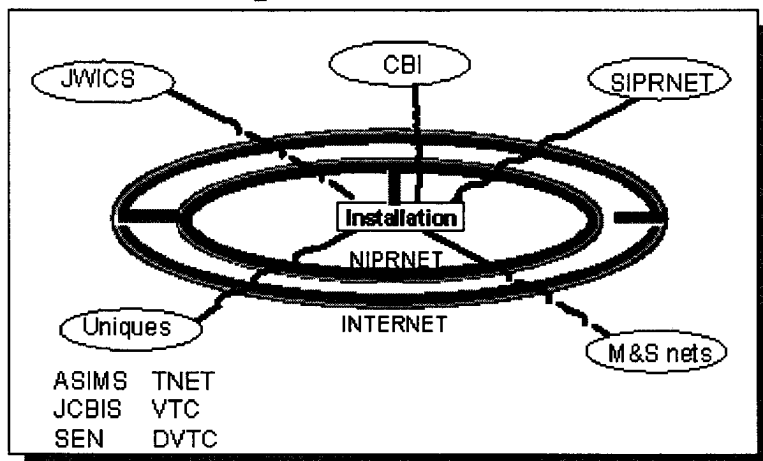
<http://www.disa.mil/DISN/dishome.html>

4.4.1.3 Networks--Mission Level

Increasingly, unique mission level networks will become logical sets of connectivity, physically carried over the integrated DISN. Unique circuits, e.g., ASIMS and TNET, coming into the installation to support stovepipe applications will be reduced (Figure 19). The scheduled transition from DSI to DISN Enhanced IP Services provides an example.

During CY97, the DSI will transition to the DISN and DOD will stop its centralized funding of the networking. Current planning indicates about 40 subscribers will remain after the transition. All fourteen of TRADOC's subscribing organizations have committed to transition. The DSI services (networking, VTC, help desk support, scheduling) will be provided as DISN Enhanced IP Services. Sites will be interconnected through the NIPRNET 45mbps ATM backbone. The existing Bay Networks T/20 tail site routers will be replaced with Cisco 7204/4500 routers, using the Resource Reservation Protocol (RSVP). RSVP provides bandwidth reservation between the sender and receivers through RSVP-capable routers. RSVP allows end-users to request membership in a multicast group at any time. Multicast groups are dynamically established via a multicast routing protocol, such as the Distance Vector Multicast Routing Protocol (DVMRP) or Protocol Independent Multicasting (PIM). The Motorola Improved Network Encryption System (INES) will be upgraded from release 1C to 1D. The INES supports classified communications. Existing VTCs will be replaced with H.320 compliant desktop VTCs, which are can be upgraded to H.323 compliance.

Baseline/Target WAN Architecture



Migrates to

Objective WAN Architecture

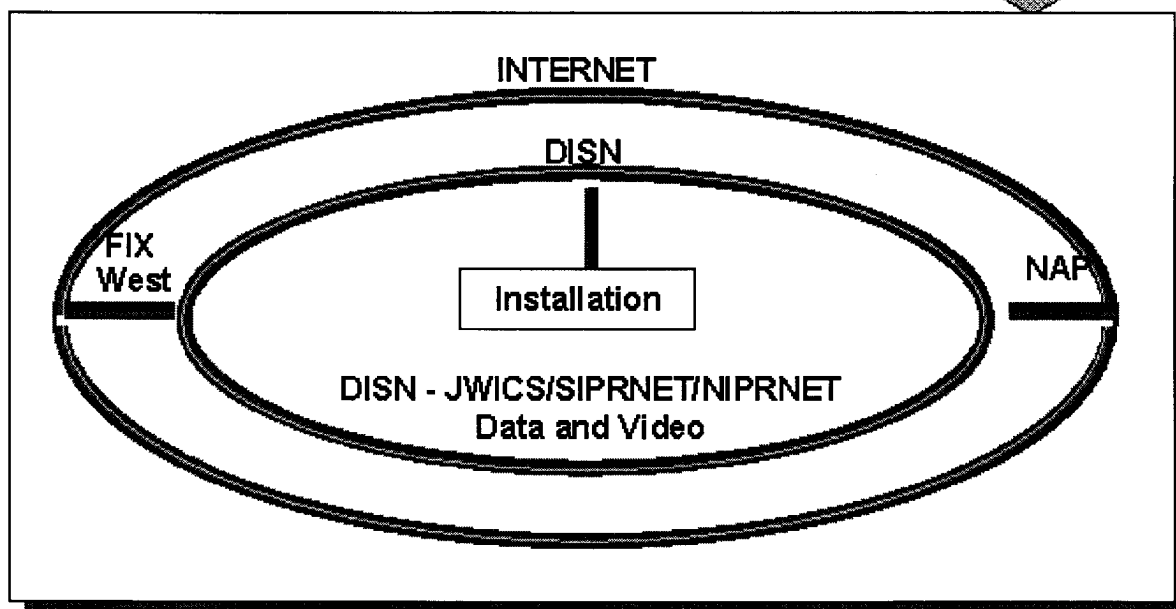


Figure 19. Objective WAN Architecture

4.4.1.4 Networks--Installation Level

The WANs will bring data to TRADOC installations, but once at the gate, data will still need a means of transport throughout the installation. The network component for this is the CAN. TRADOC's CANs will be consistent with the JTA-Army and compatible with DISA and Army managed network programs. Given our resource constraints, TRADOC's strategy for installing installations' CANs is to bring all installations up to the baseline architecture centered on a FDDI backbone, and then migrate over time to an objective system architecture using ATM technology. Figure 20 provides an overview of the migration path. To implement the target phase, TRADOC is seeking funding for a command-wide package of requirements titled "Fort TRADOC" through the KEI process (see paragraph 5.1.3) and the insertion of a more robust "Fort TRADOC" package into the Army's installation sequence list (ISL) for PPC4I's fielding schedule (see paragraph 5.1.2). The objective architecture depends on the full fielding of PPC4I throughout TRADOC.

BASELINE	TARGET	OBJECTIVE
KEI 96-97	Fort TRADOC	Full PPC4I
FDDI Backbone 100MBs thru put	Limited ATM Backbone at SONET Speeds	Full ATM CAN at full SONET Speeds
Limited access switched data	Limited access switched data, video	Full access switched data, video, voice
1.54 MBs WAN Access (T-1)	45 MBs WAN Access (T-3)	155 MBs WAN Access (OC-3)
Supports	Supports	Supports
E-Mail Internet/DISN Access Limited SIM On-Post Limited Video On-Post Limited Video Off-Post	E-Mail Internet/DISN Access Full SIM On-Post Limited SIM Off-Post Full Video On-Post Limited Video Off-Post	E-Mail Internet/DISN Access Full SIM On & Off-Post Full Video On-Post Full Video Off-Post VR

Figure 20. Migration Path for CANs

FDDI CANs are defined by open standards and will remain the basis for many segments of TRADOC's CANs for several iterations of installations' target architectures. Gradually, through Fort TRADOC, CUITN and functional proponents' and installations' efforts, ATM segments will be introduced, beginning with high priority, high bandwidth users. ATM segments will migrate TRADOC installations closer to the objective architecture, which is based on the PPC4I program's design decisions and TRADOC's own operational requirements for moving large amounts of information down to the action officer and student levels. The Army's largest provider of networking components to installations is the Common User Installation Transport Network (CUITN) program, part of the PPC4I. Its architecture must influence TRADOC's objective system architecture, so that TRADOC's own investments will increase our readiness to accept and integrate networking components provided by this program.

When the PM for CUITN fields a CAN to an installation, all components required to bring the installation up to CUITN's design standards are inserted. The PM uses components that comply with JTA- Army standards to create a CAN based on ATM switching. CUITN fields dual ATM switches as the heart of the CAN in CUITN DCOs (C-DCO). One C-DCO is collocated with the existing DCO facility and another is generally placed in a facility that already houses other IS, e.g., a DPI or an RSU. In this way, the C-DCO collocates several components for centralized access and management, e.g., a telephone switch, router, DISN gateway and installation level e-mail host(s). The C-DCO are interconnected to distributed ADNs via single mode fiber optic (SFMO), supporting SONET/ATM transmission at optical carrier-3 (OC-3) capacity (155Mbps), scalable to OC-48 (2.5Gbs). ADNs concentrate data from building level systems and provide the entry point to the backbone CAN. Small installations require one, two, or three ADN locations for the entire installation. A medium installation has four to fifteen ADN locations and a large installation has 16 or more. [Figure 21](#) provides an abbreviated view of the major components, or levels, in the CUITN architecture.

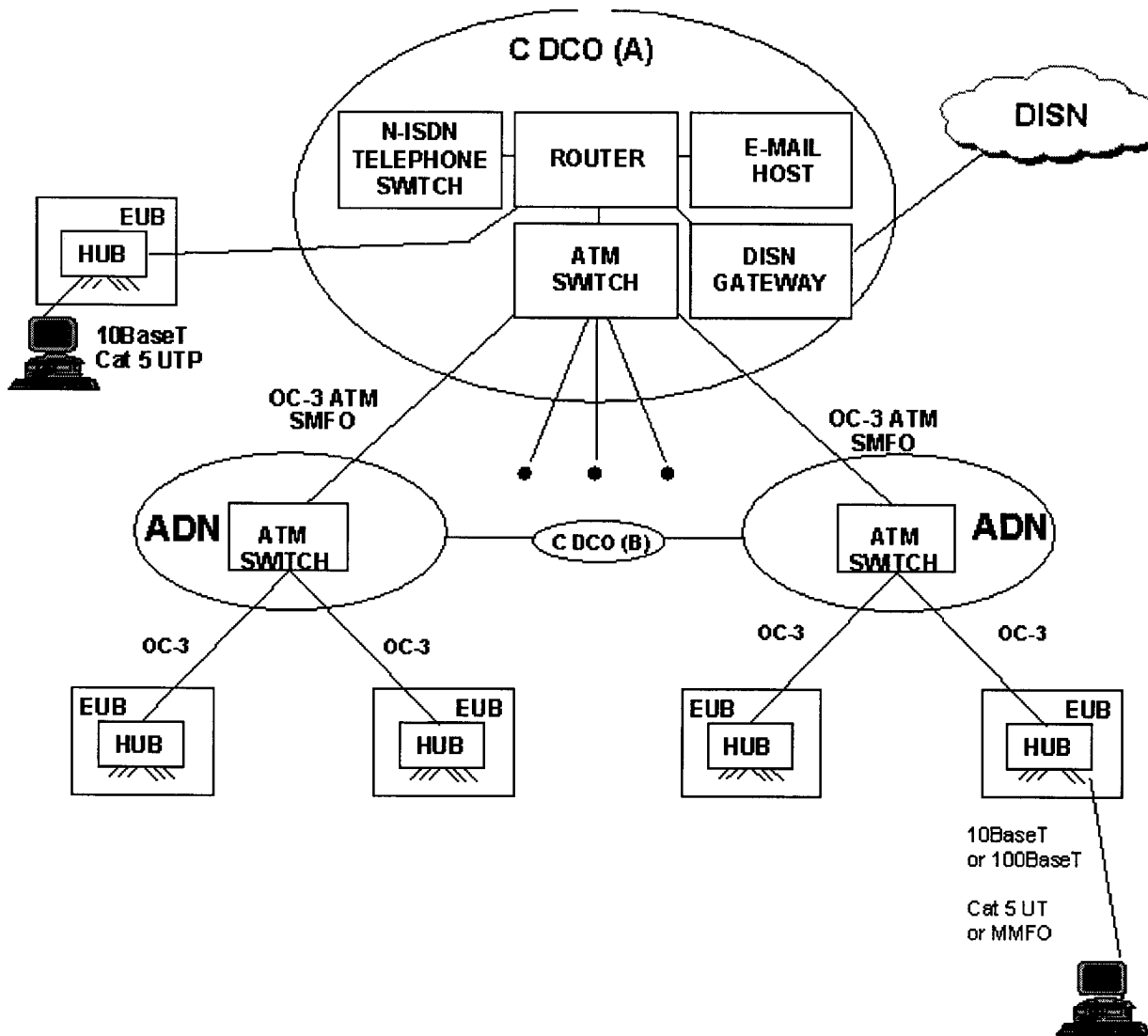


Figure 21. Generalized CUITN ATM CAN design

The DCOs and ADNs are connected in a hierarchical meshed star topology (see Figure 22.) The hierarchical aspects are connections from DCO to ADN, ADN to primary and secondary hubs in end user buildings (EUB), and hubs to servers and user workstations. The mesh aspect is ADN to ADN cross-connections for survivability and load leveling, as well as primary building hubs to alternate ADN, if required, for survivability. DCO, ADN, and hubs are equipped with an Intelligent Operation, Administration, and Maintenance (IOA&M) capability. LAN Emulation (LANE) makes the protocol conversions that permit existing applications to run over the ATM CAN.

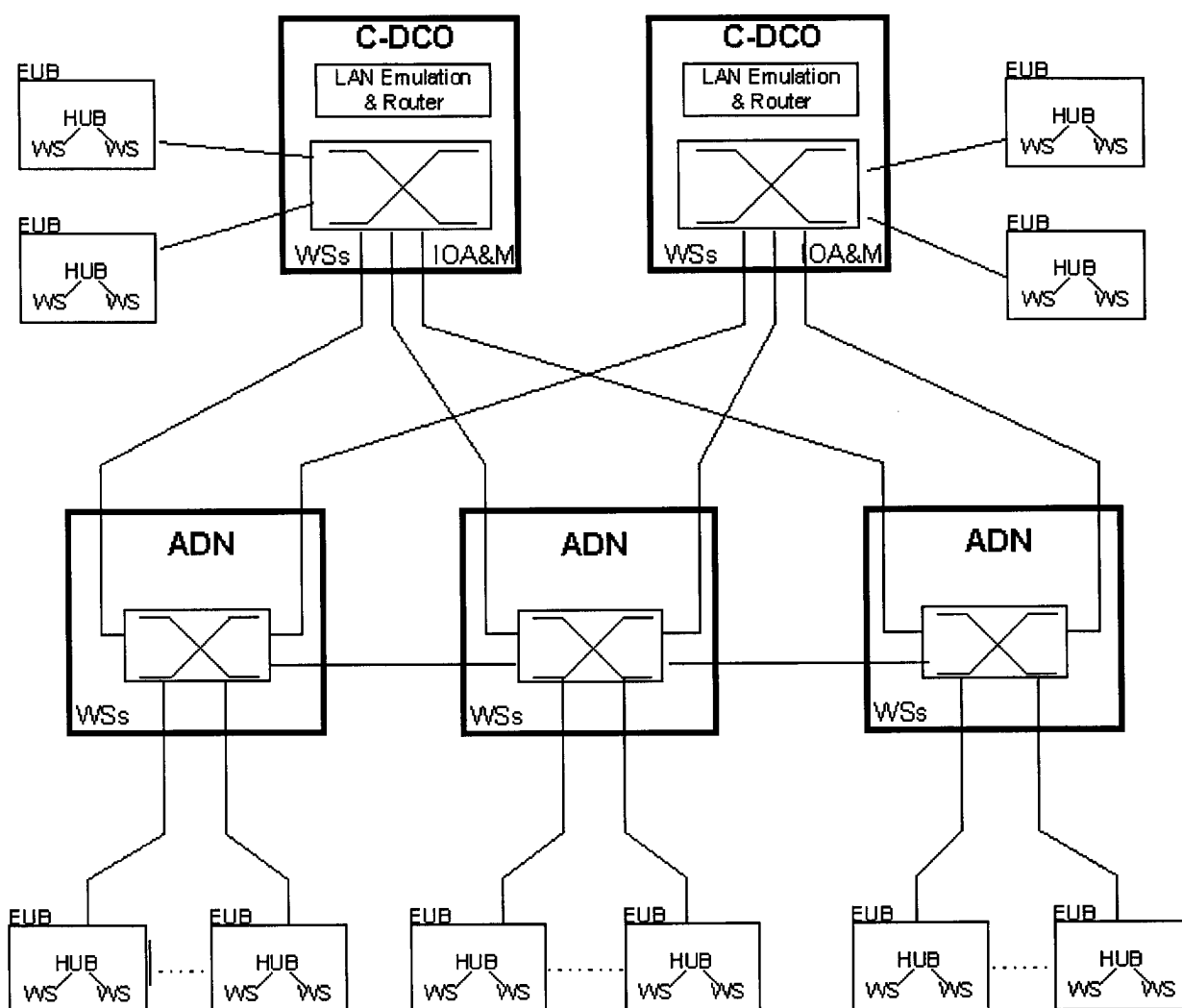


Figure 22. CUITN's hierarchical meshed star topology

The ADNs in turn interface with scalable media that extend service to end user buildings through a hub (see Figure 23). Inside the building, service is extended to user locations by switched 10Mbps/100Mbps Ethernet or is continued as ATM service, depending on the bandwidth requirement and available ports on the hub.

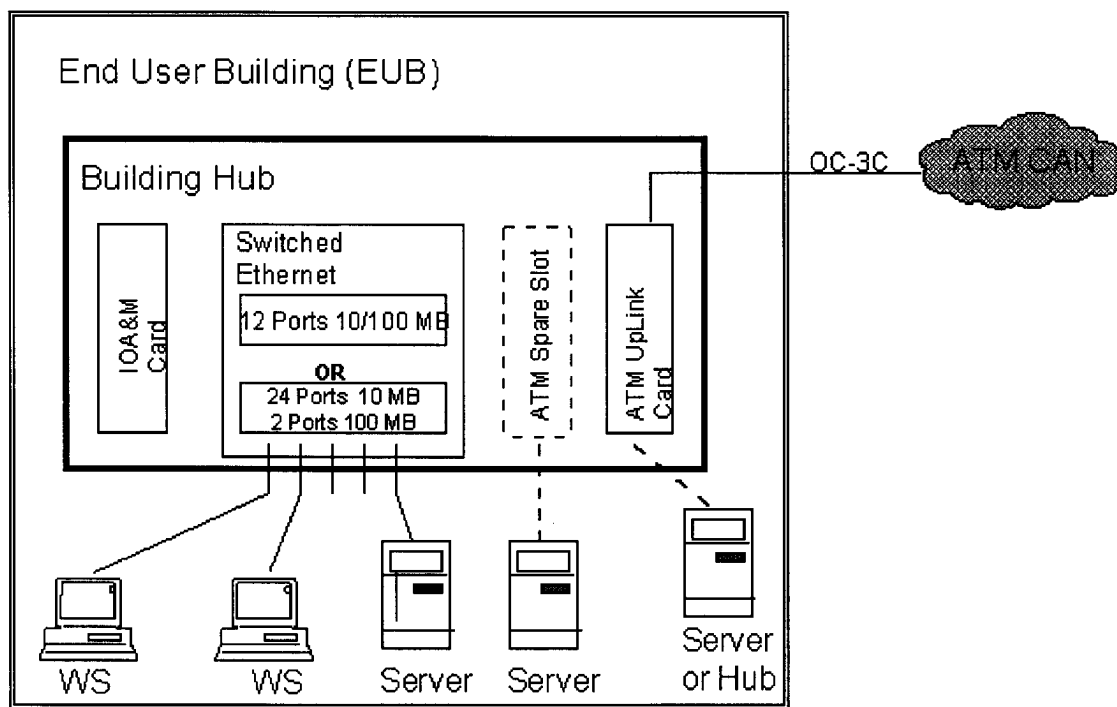


Figure 23. CUITN building hubs

For more information:

<http://138.27.209.61/integ/tmpl/appenx-a.htm>

4.4.1.5 Networks--Local Level

LANs will remain a fundamental building block for creating command-wide networking capabilities. The discussion of WANs and CANs above showed LANs as the "on and off ramps", providing the ultimate connection with the user. As building blocks, it is essential that LANs fit into a larger system architecture, which itself is constrained by the technical architecture. TRADOC's objective system architecture will contain a heterogeneous mix of vendors' LAN products, but they will all connect to the higher level networks via interfaces defined by open standards. The technical architecture, paragraph 6.1.1, provides the required standards and protocols, but to reiterate the most relevant, TRADOC will install LANs that conform to IEEE 802.3, and support TCP/IP interfacing, implement the SNMP set of management protocols, and have a network operating system (NOS) that can run applications using Win32 or POSIX compliant application program interfaces (APIs).

Aside from these standard capabilities required for command-wide interoperability, the system architecture for LANs is decided at installation level, or lower. ISEC has issued useful guidance for local consideration in *Design Guidance for Local Area Networks*, Version 1.0, 31 October 1996. For example, to facilitate LAN user moves, additions, changes, and future equipment upgrades, the LAN should be laid out in a star topology with an intelligent hub at the center.

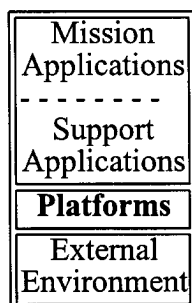
Select the cable type that suits the distances and bandwidth requirements. Useful, but not exclusive, options include multi-mode optical fiber and twisted pair. Multimode fiber is good for distances up to 1.25 miles. It can be used for data, voice, and video traffic. There are two types of twisted pair cable: unshielded twisted pair (UTP) and shielded twisted pair (STP). The cost of UTP will usually be less than any other cabling. UTP cable is familiar to installers, small in diameter, lightweight, and simple to connect and terminate. The Electronics Industries Association (EIA)/Telecommunications Industry Association (TIA) category 5 UTP cable will cost a little more than Category 3 UTP cable, but the extra cost will be worth it over time. Category 5 UTP cable can transmit data at 100 Mbps to support emerging technologies like Fast Ethernet and ATM. Category 3 UTP cable is limited to transmission speeds of 16 MHz, does not scale upward, and is rapidly falling into disuse. STP cable is good for

applications that require high-speed data rates, but STP cable is considerably more expensive than UTP. Based on the above considerations, TRADOC DCSIM recommends using category 5 UTP to install most LANs in TRADOC facilities.

TRADOC expects most LANs in the objective architecture will include a cable plant, although wireless LANs may find a niche where PC mobility is a major requirement or in specific applications where network cables are impossible or difficult to install. Wireless LANs may also be used to augment or back up wired LANs for lower bandwidth applications.

For more information:
<http://138.27.209.61/integ/>

4.4.2 Platforms



Platforms are the next layer of the TRM after networking. The platform layer encompasses computing hardware, operating system and system support service software.

4.4.2.1 Platforms--Enterprise Level

TRADOC does not have enterprise level platforms in the baseline and has no plan to create any in the objective system architecture. TRADOC's preferred approach is to leave information processing and data on platforms under the control of the installation commanders. TRADOC will continue to use the centralized platforms run by DISA Megacenters for standardized DoD and Army applications. These platforms are, strictly speaking, outside this enterprise, i.e., TRADOC.

4.4.2.2 Platforms--Mission Level

With the trends toward more distributed, client-server software applications, increased processing power of smaller platforms, and increased connectivity via LANs, functional proponents are more likely to field standard platforms to perform specific mission related tasks.

For example, trainers are considering the standard platform configurations for conducting training in a Classroom XXI facility, to include servers for the classroom and the Digital Training Access Center. Other training platforms will be distributed at the personal level, but will have configurations standardized at the mission level, e.g., the instructor preparation workstation, instructor control/multimedia workstation and the student's multimedia workstation. In general, the configurations center around a platform with a Pentium 166 or 133 MHz processor, depending on the workstation's role as server or client. See the *Army Distance Learning Program Master Plan* for the details on this set of mission level platform architecture recommendations.

Combat developers and trainers will field platforms, e.g., Silicon Graphics computers, with special features, e.g., image generators, for modeling and simulation. Doctrine writers will use multi-media platforms for authoring and coordinating compound documents. While these examples may sound reminiscent of the "stovepipe" approach, it is important to note that interoperability with other platforms and with the infrastructure will be maintained by adhering to an open architecture approach. Platforms sized and acquired to satisfy a specific mission requirement across the command will be integrated into the larger networking and processing environment by openly defined interfaces.

Platforms for the installation management mission area deserve a fuller description. The PEO STAMIS selected servers from the International Business Machines Corporation (IBM) reduced instruction set computer (RISC) 6000 series to run ITP and SBIS applications. SBIS is using the IBM RISC 6000 59H/R24 server suite. ITP is using the IBM RISC 6000 39H server, which is compatible with the SBIS platform. The 39H platform has 128MB of system memory and 9 gigabyte (GB) of disk

storage, while the 59H and R24 have 256MB of system memory and 6GB and 13.5GB of disk storage respectively. Each of the selected suites includes a 5GB internal 8 millimeter (mm) tape drive; a 1.44 megabyte (MB) 3.5-inch disk drive; a 2X compact disk - read-only memory (CD-ROM) drive; and communications adapters for ATM, FDDI, or Ethernet 10Base-T media. Since the PM sizes the platforms to run the applications fielded with the platforms, they are not used for other mission applications. The installations shown in Figure 24 will receive SBIS platforms. This fielding plan ensures standard applications can be run at installations that are power projection platforms (PPP) and power support platforms (PSP). In TRADOC, Ft. Leavenworth will also receive an SBIS platform configuration. By the end of FY97, ITP platforms will be operational at 33 CONUS Army installations to run the ITP/ISM applications.

The IBM AIX version 3.2.5 is the installed operating system. It is POSIX-compliant, i.e., with IEEE Standard 1003.1-1990 (POSIX.1). It is based on the AT&T UNIX operating system V (including release 2 and release 3 extensions) with exceptions as required for POSIX compliance.

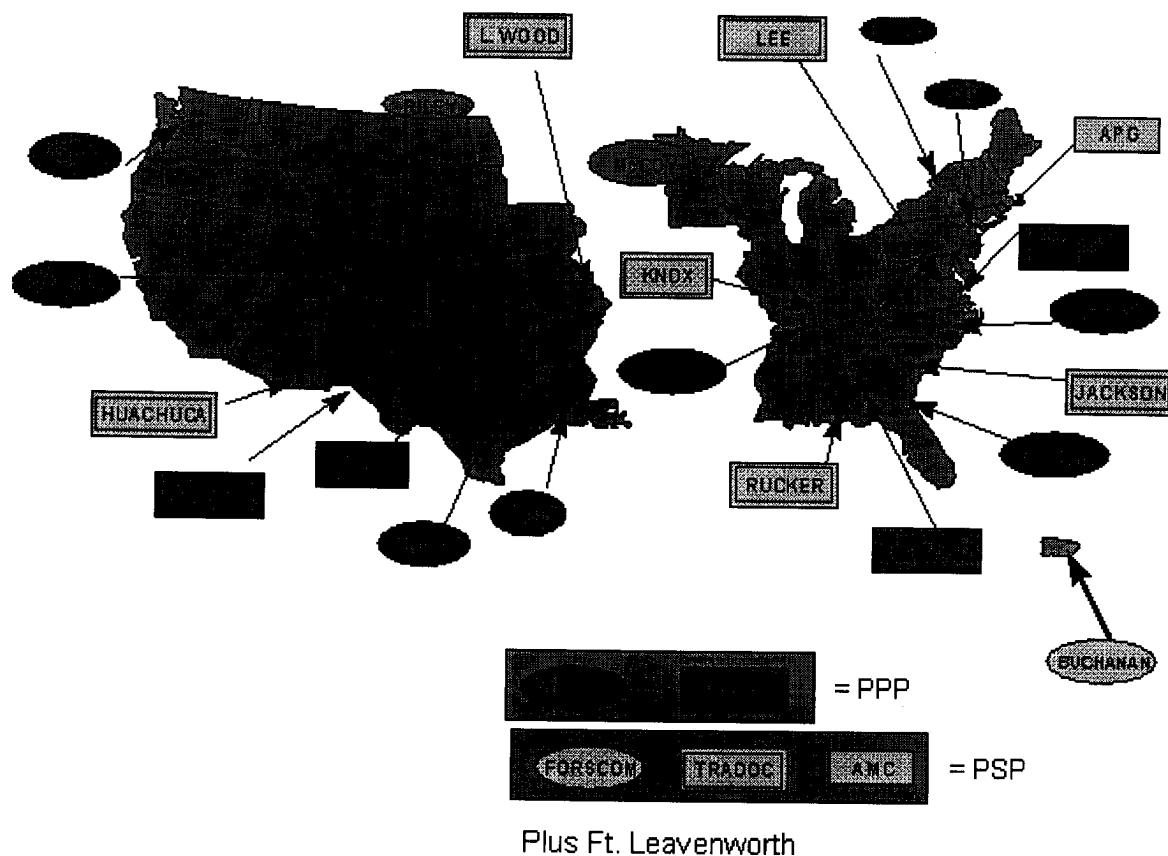


Figure 24. SBIS Sites

For more information:

<http://www-dcst.monroe.army.mil/crxxi/toc.htm> (regarding Classroom XXI platforms)

<http://138.27.209.61/integ/tmpl/appenx-c.htm> (regarding installation management platforms)

4.4.2.3 Platforms--Installation Level

TRADOC will migrate away from this architectural niche, and specifically away from the IBM mainframe platform that has been the centerpiece of baseline data processing installations (DPIs). These machines are inconsistent with goals for interoperability, and, if nothing else, use an operating system with no fix for the year 2000 problem. HQ TRADOC will discontinue the contracted maintenance of these mainframes after 1999. In the objective system architecture, installations will use a combination of platforms at the mission and local levels to perform the functions that installation level mainframes have

done in the past. The degree of centralization in locating and operating replacement servers is an architectural decision made at each installation. A high degree of centralization, e.g., server farms, would approximate an installation level platform.

HQ TRADOC is making several architectural changes to continue support for interfacing with the DMC ASIMS applications and for remote job entry (RJE) processing, which are currently supported by the installation level IBM mainframes.

TRADOC is taking two steps to support continued interfacing with DMCs. HQ TRADOC is fielding at installation level a communications front end processor (FEP) (Figure 25), i.e., a router, for information exchange over the NIPRNET between TRADOC users and DMC platforms that run the ASIMS applications. The FEP will help absorb the load associated with connecting ASIMS users to the NIPRNET. Additionally, during 1997, TRADOC fielded 2,874 copies of TN3270E software across the command to support connectivity down to end users' LANs. Since DMCs are equipped with IP routers connected to the NIPRNET, the TN3270 software permits end users to emulate IBM3270 terminals and to conduct TELNET sessions with ASIMS applications over the NIPRNET using the IP protocol. The TN3270E variant purchased by TRADOC also supports printing on local devices as an alternative to using the RJE services generally centralized in the DPI.

TRADOC is also fielding a PC based RJE configuration (Figure 26). It consists of two PCs with specialized hardware and software to continue producing micro fiche and tape backups, and using high speed printers, while running ASIMS applications hosted at a DMC. Fielding for the RJE equipment was completed 4Q97.

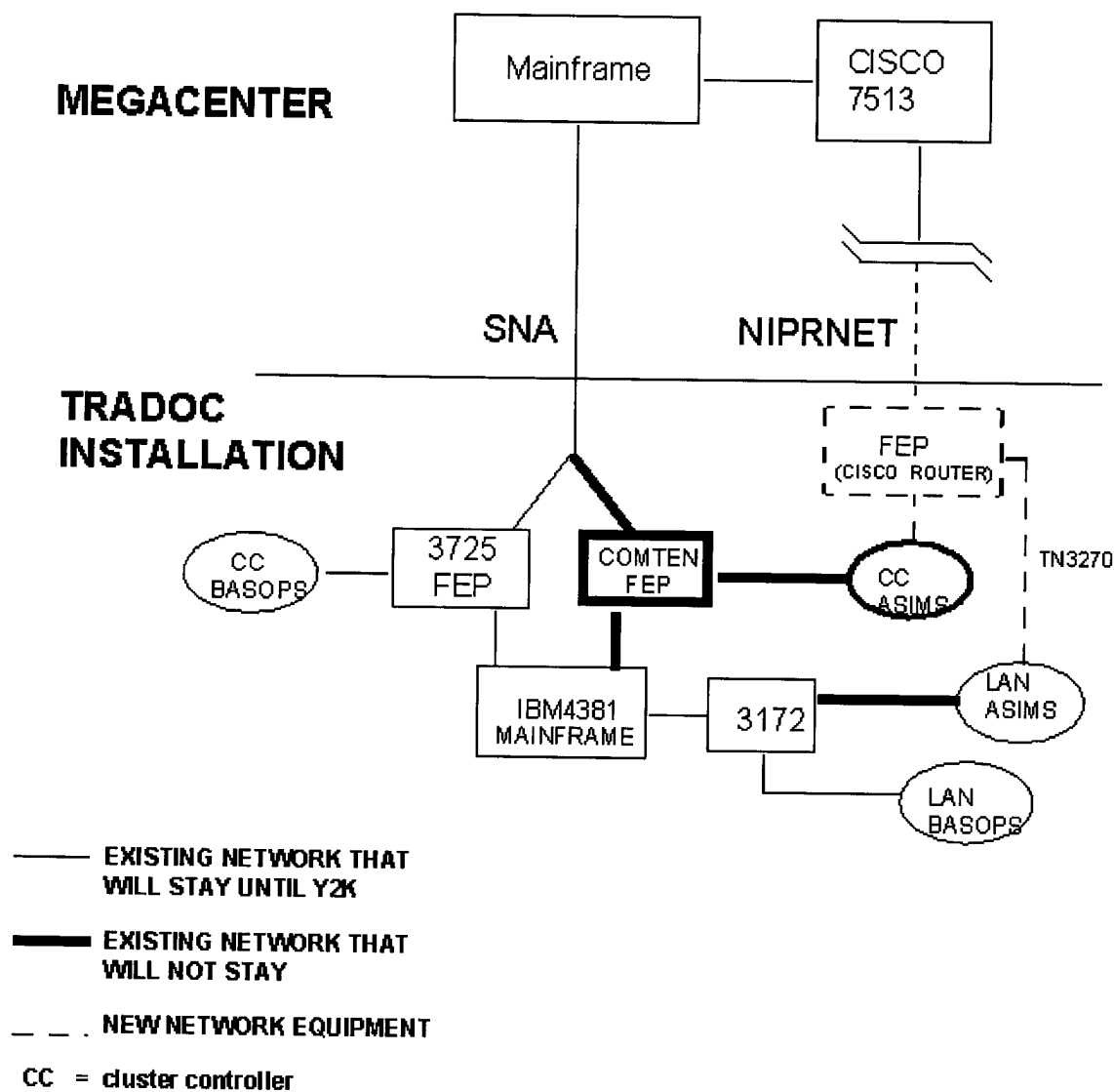


Figure 25. Mainframe replacement FEP configuration

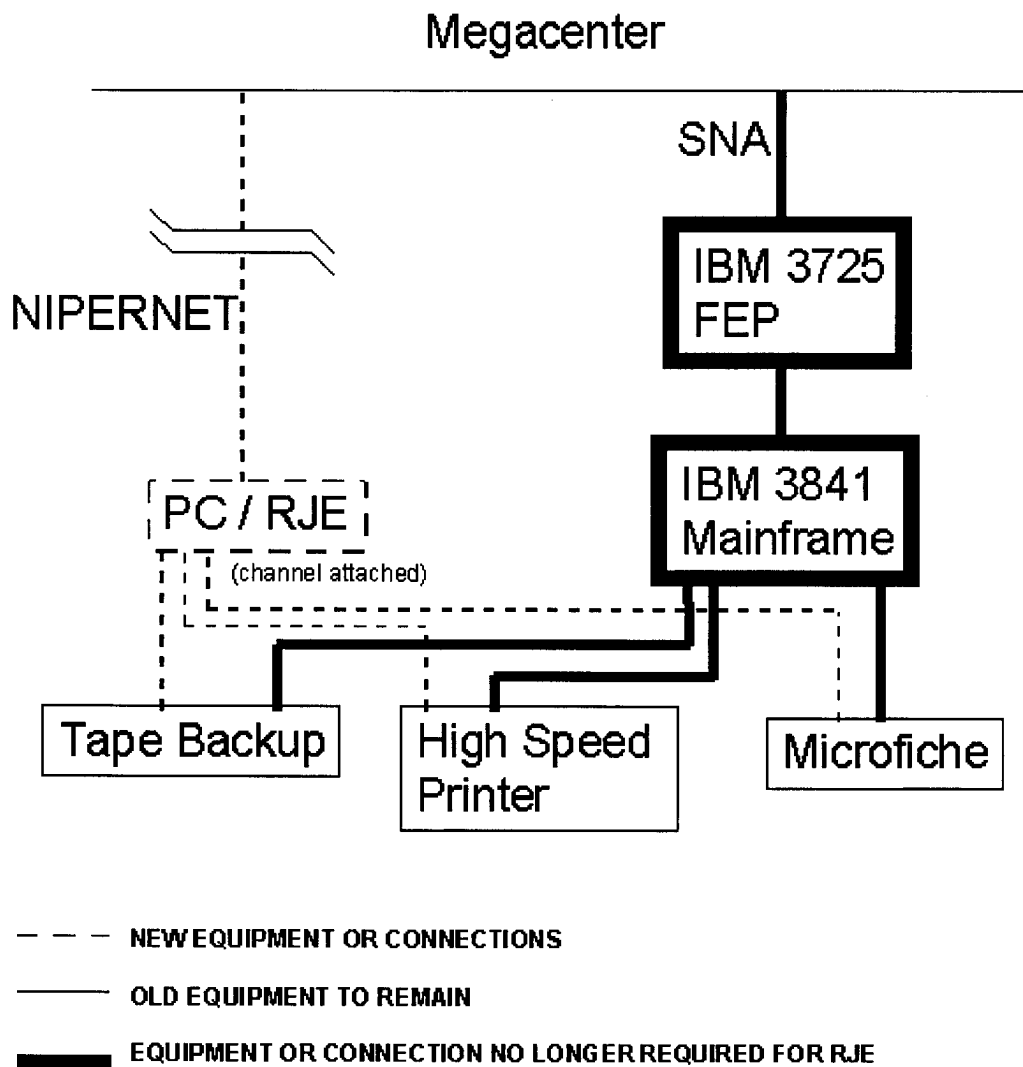


Figure 26. Mainframe replacement RJE configuration

See also:

4.3.1.3.4 Army Standard Information Management System

5.2.1 IBM mainframe replacement

Appendix C: Mission Applications-ASIMS

4.4.2.4 Platforms--Local Level

Platforms at this level will become increasingly important IS components for providing processing power to action officers. Local servers will be networked with users via LANs and will support many common user support applications, e.g., e-mail, office automation and network access. The degree of centralization used in locating and operating such platforms is an architectural decision made at each installation. The selection of system configurations is left at the local level, within the constraints of the JTA-Army.

4.4.2.5 Platforms--Personal Level

In the objective system architecture, every action officer in TRADOC will have processing power available, where and when they need it. In a client-server architecture, the primary client device will be a PC, which can take the form of desktops, notebooks, hand-helds or personal assistants. Since the

objective system architecture is one PC per action officer, PCs must be sufficiently robust to run a variety of applications for common capabilities (e.g., word processors, databases, spreadsheets, graphics) as well as supporting client functions for mission specific applications. PCs will also be the users' tool for accessing network services, e.g., e-mail, file transfer, and the Internet.

The ability to run DMS and multi-media software may prove to be the drivers in specifying PC characteristics. *Department of Defense Personal Computer Policy Implementation Plan FY 1995 - FY 2000*, March 31, 1995 established performance standards for PCs, largely based on running DMS. Using the DoD configuration, TRADOC coordinated and issued recommendations in a memo, SUBJECT: TRADOC FY98 Desktop Computer Preferred and Supported Product List, 15 Aug 97, as shown in Table 5. TRADOC DOIMs can support this configuration and it can be acquired using standard DoD requirement contracts. The same memo promulgated Microsoft Windows NT Workstation as the preferred client hardware operating system.

For more information:

<http://www.dtic.mil/c3i/pcppmo2.html>

4.4.3 Support Applications

Table 4. STAMIS Use

Mission Applications

Support Applications
Platforms
External Environment

The most important support applications for TRADOC will continue to be e-mail, now including messaging, and office automation tools. Videoteleconferencing can also be considered a support application, since, although not solely a software application, it is a capability that rides on the networking and platform infrastructure and crosses mission areas. Lastly, as more documents are digitized, printing will take new approaches.

4.4.3.1 E-mail

In the objective system architecture, TRADOC will use DMS compliant products to provide e-mail, or individual messaging. DMS will also be the organizational messaging system, i.e., the replacement for AUTODIN, DoD-wide. TRADOC will migrate toward its DMS compliant objective architecture using the following target architectural phases:

Table 5. Recommended PC configuration

DoD MINIMUM CONFIGURATION	TRADOC PREFERRED AND SUPPORTED HARDWARE CONFIGURATION FY98
SPECint95 >= 3.2, SPECfp95 >= 2.5 or CPU mark 32 >= 220, or lcomp >= 800	At least 166 MHz Pentium-class
At least 24M RAM	At least 32 MB RAM expandable to 128 MB
At least 1 GB hard drive	At least 1.6 GB Hard Drive
LAN interface	Ethernet LAN interface 10/100 BASE 5,2 & T
2-PCMCIA type II slots	1 PCMCIA adapter supporting 2 type II and 1 type III
Video controller - minimum 256 colors, 1024x768 pixels; 3MB memory, drivers for operating system	Video controller - minimum 256 colors, 1024x768 pixels; 2MB memory, upgradable; drivers for operating system
At least 4X CD-ROM Reader	At least 8X CD-ROM Reader
3.5" Floppy Drive capable of reading and writing both 1.44MB and 720KB diskettes	3.5" Floppy Drive capable of reading and writing both 1.44MB and 720KB diskettes
1-parallel and 2-serial ports	1-parallel and 2-serial ports
Pointing device with a minimum of two buttons	Pointing device
17" color monitor	17" color monitor, SVGA
16-bit sound card (for multimedia applications) and drivers for operating system	16-bit sound card (for multimedia applications) and drivers for operating system
expansion slots: 3 PCI	expansion slots: 3 PCI (2 shared)

- *Phase one* (present through 31 Dec 1999) installs/upgrades the installation infrastructure to the level needed to support organizational DMS.
- *Phase two* (present through 30 Sep 2004) consists of two elements.
 - => Upgrading/expanding the installation infrastructure and PCs to the level needed to support individual messaging.
 - => Fielding non-DMS versions of the PC software available on the DMS contract. Fielding will support the migration to an installation standard e-mail/message product while using lower-cost commercial versions of the DMS software, e.g., Microsoft Exchange.
- *Phase three* (1 Oct 2004 through 30 Sep 2007) provides FORTEZZA cards and DMS-compliant versions of the user agent software to individual messagers. Use of DMS-compliant products by

all individual messengers is needed to realize command-wide operational benefits of application interoperability.

Within the DMS program, DoD has determined that open standards are sufficiently mature to tolerate a wide mix of vendors' products and still achieve an acceptable level of interoperability for e-mail. However, extended capabilities of the vendors' packages lack a solid basis in open standards to ensure their interoperability in a heterogeneous environment. To ensure all capabilities are integrated at the command level, both at program initiation and during successive target architectures, selection of a preferred product is the surest course. As mentioned above, TRADOC DCSIM will work with the installations to determine the product(s) that can best ensure required interoperability. Per TRADOC memo, SUBJECT: TRADOC FY98 Desktop Computer Preferred and Supported Product List, 15 Aug 97, the preferred vendor package is MS Exchange. It appears to be the only product that puts TRADOC on a clear migration path to DMS and provides the required extended functionality. HQ TRADOC (Fort Monroe) is actively pursuing its own migration to MS Exchange and it is the target product chosen by 15 of 16 TRADOC DOIMs for support.

DMS compliant products use electronic messaging (X.400) and directory (X.500) components that have undergone DMS conformance, interoperability and compliance certification by the DISA Joint Interoperability Test Center (JITC). At this writing, DMS compliance testing is incomplete and an official list of products does not exist. The application software uses a client-server architecture, meaning modules of DMS run on platforms distributed throughout the system architecture. Following are the various platform and application components that comprise DMS. Usually, for each component, there are several vendors that have designed compliant products.

MTAs: Message Transfer Agents. MTAs route messages from the source to its destination. DMS uses three levels of MTAs:

SMTA: Subordinate Message Transfer Agent. At the local level the Subordinate MTA (SMTA) interfaces directly with the User Agents (UAs) and Message Stores (MSs) and routes messages locally or upward within DMS. SMTAs are collocated with the MS at the local user's server.

IMTA: Intermediate Message Transfer Agent. IMTAs provide base access and switching.

BMTA: Backbone Message Transfer Agent. BMTAs provide for global message switching. About 50 BMTAs are planned to be installed worldwide. Both IMTAs and BMTAs are dedicated to message switching, are hosted on HP 9000 Model 800 servers and may be thought of as relays.

MLA: Mail List Agent. Functionally similar to AUTODIN Address Indicating Groups/Collective Address Designators. Manages mailing lists to support the distribution of messages throughout DMS. Messages that go to large groups of users are routed to the MLA where the header of the message is expanded to include the address of each recipient.

MFI: Multi-Function Interpreter. MFIs convert messages from one protocol to another and allow the DMS to share messages with systems which are not X.400 compatible. Within the DMS the MFI functions as the MTA and appears to the AUTODIN as a Mode 1 terminal. For E-Mail the MFI acts as a SMTP-to- X.400 gateway.

CAW: Certification Authority Workstation. Records information on the Fortezza cards.

MWS: Management Workstation. The MWS provides local and remote control and monitoring of the DMS components. It provides configuration, fault, performance, accounting and security management capabilities to support monitoring and control, system administration and customer service. The MWS interfaces to the DMS components using the SNMP management protocol.

DSA: Directory System Agent. The DMS directory system stores information in a distributed, hierarchical structure known as the Directory Information Tree (DIT). Entries describe users, groups or network resources, stored in three formats: X.400, AUTODIN and SMTP. The Directory User Agent

(DUA) is the application which provides the user a means to access information stored in the directory. The DUA is integrated with the UA. DSAs are geographically distributed and are also hierarchically structured into root, global, regional and site DSAs. The site DSA communicates with a network of DSAs to satisfy the DUAs request.

MS: Message Store. Stores messages much like a mailbox. Messages are submitted through the MS. The MS will reside on a server accessed by the UA.

PUA: Profiling User Agent. PUAs provide the features needed to handle profiling and message dissemination of organizational messages. Profiles and distribution information are built for a given organization and activated at the PUA. Upon receipt of a message, the PUA decrypts the message and activates the profile. The profile can trigger searches for key words in the subject area and text, as well as trigger on precedence. If the profile determines a "hit" then the message is disseminated based on the distribution information associated with the profile. The PUA can reduce bandwidth requirements by limiting distribution to a small group of need-to-know individuals.

Base-Level MWS: The Base-Level Management Work Stations provides both local and remote, control and monitoring of the DMS components. It provides configuration, fault, performance, accounting and security management capabilities to support monitoring and control, system administration and customer service. The MWS interfaces to the DMS components using the SNMP management protocol.

UA: User Agent. Desktop graphical user interface application that enables users to create, release and receive messages. It is bundled with the DUA for accessing X.500 directory services.

Similar to the DISN system architecture, TRADOC will not own all the components of DMS. TRADOC will own the PCs that run the UA software and the servers that run the SMTA software. Since the UA resides on a TRADOC owned platform, TRADOC PC acquisitions will have to provide certain features, e.g., PCMCIA readers for reading security data from a FORTEZZA card and sufficient RAM to run Windows operating system. These features were discussed in paragraph 4.4.2.5 regarding personal level platforms.

Figure 27 shows how key applications are distributed in the DMS client/server architecture.

See also:

5.3.1 Defense Messaging System (DMS)

For more information:

<http://www-tradoc.monroe.army.mil/dcsim/dms/dms.htm>

<http://www.monmouth.army.mil/dms/>

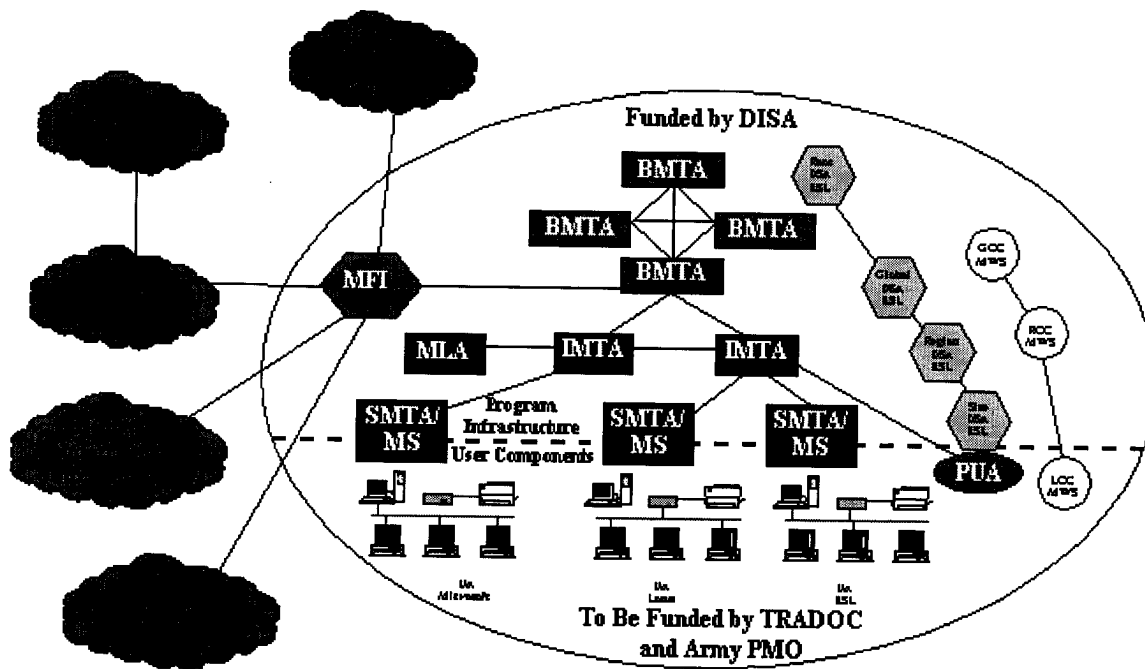


Figure 27. DMS architecture

4.4.3.2 Office Automation

In the objective system architecture, all TRADOC action officers will have a computing platform with access to an office automation suite suited to their tasks. As in the baseline, common office automation capabilities will include word processing, spreadsheets, graphics, and access to network services, e.g., e-mail, scheduling, web browsing and electronic coordination. Installations are likely to use a mix of vendors' office automation applications. DOIMs can issue lists of products they will support. To assist DOIMs in enforcing this approach, HQ TRADOC coordinated and issued a memorandum, SUBJECT: TRADOC FY98 Desktop Computer Preferred and Supported Product List, 15 Aug 97, stating the preferences shown in Table 6.

Table 6. Preferred Office Automation Applications

CATEGORY	TRADOC PREFERRED AND SUPPORTED DESKTOP SOFTWARE AND OPERATING SYSTEM
Office Suite	Full Suite: Microsoft Office Word Processing: Word Spreadsheet: Excel Presentations: PowerPoint Data Base: Access Project Management: Project
Office Management	Microsoft Exchange (1) Schedule+ (2)
Internet Browser (Includes FTP and Newsgroups)	MS Explorer (3)
Forms	FormFlow
Multimedia Authoring	Asymetrix Multimedia Toolbook, CBT Edition
Security	McAfee (4)

(1) Must be DMS compliant and/or upgradable to DMS compliance.

(2) Provided with MS Exchange and DMS-compliant version.

(3) Provided as a component of NT Workstation 4.0.

(4) Available for download at <http://199.211.123.12/Virus/avirous.html>

4.4.3.3 Videoteleconferencing

TRADOC will make increased use of desktop VTCs, linking selected TRADOC offices and personal level users into a command-wide network, with access to users outside the command. The baseline architecture, installed as a HQ TRADOC managed initiative, already reaches the TRADOC leadership (see Figure 14). Additional nodes will be added through distributed acquisitions as network capacity and connectivity make it feasible. Not only will connectivity increase, but also the capabilities for sharing applications via standardized, PC-based DVTC workstations. VTC and DVTC will be enablers for electronic coordination of TRADOC products and electronic collocation as part of new organizational concepts. Proliferation of DVTC components to support communities of users, e.g., combat developers' integrated concept teams and integrated product teams, will increase. VTC will be a necessary enabler of distance learning also, and will be inside Classroom XXI (see paragraph 4.4.4.1).

4.4.3.4 Printing

During 1997, TRADOC initiated an effort to ensure connectivity from the installations' CANs to their supporting Defense Automated Printing Service (DAPS) service centers. For most installations, this connectivity is now part of the baseline architecture. It enables CAN users to forward files, containing formatted documents, to the DAPS for printing. Additionally, DAPS is investing in WAN connectivity to link its distributed service centers and printing plants. DAPS can use digital files to produce high quality first generation copies on their automated printing equipment. In the objective architecture, TRADOC and DAPS will combine the capabilities of electronic authoring, digital file transfer, distributed file servers and printing equipment, along with an automated system for submitting and managing print work orders, into new approaches for printing and distributing our publications.

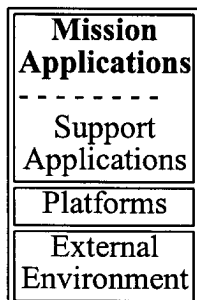
=> **Print-on-demand.** TRADOC organizations will provide files to DAPS for printing. For example, TRADOC service schools will electronically forward student hand-outs, student texts, and extracts from

TRADOC publications. DAPS will use the files to print only in the quantities immediately required and will store them for future use. As courses are scheduled to begin, schools can request additional printings. TRADOC will save warehouse space, labor, and printing costs, and will improve the currency of printed publications.

=> **Distribute and print.** DAPS can distribute files electronically among its service outlets. A file provided by a TRADOC organization at one location can be quickly and cheaply sent to many other locations. Printing of the file can occur in many places distant from where it was authored, but closer to the site where the documents will be used. In cases where TRADOC must distribute publications (e.g., schools distribute instructional material to reserve components), TRADOC will save mail and storage costs. This distribute and print approach can be combined with print on demand to realize more efficiencies for TRADOC and the users of TRADOC products. DAPS will store files of TRADOC products which will be available for print on demand at any DAPS outlet by any customer.

=> **Tailored products.** Since DAPS will be working from digital input, the output can be tailored as required to suit the immediate requirement. Users can demand any media DAPS is capable of producing, including paper, disks and CD ROM. Documents can be collated and packaged for specific uses, e.g., course book sets can be assembled from diverse sources and bundled for distribution to individual students. Instructors can tailor course sets even further by requesting relevant chapters from TRADOC regulations or doctrine, and having them collated into a new book for use in a course, with assurance they are using the latest document sources.

4.4.4 Mission applications



As in the baseline system architecture, TRADOC will use software from a variety of mostly non-developmental sources as its mission applications. COTS applications will provide much of the capability needed, although some customization of applications, e.g., user interfaces, database structure or report generation, may be required. DoD and Army materiel developers will provide standardized GOTS applications for other missions, e.g., STRICOM for simulations and PEO STAMIS for installation management. Consistent with the categories used throughout TPRISM, this section is organized into paragraphs on training, M&S and installation management applications.

4.4.4.1 Training Applications

In the objective environment, MIS to manage training will have been consolidated into several key applications. All rely on ATDL (see paragraph 4.4.1.1.2) as an external source of training information. All will be redesigned to share data in a client-server architecture and make greater use of shared data and processing capabilities. The target architectures are described in the *Army Training Information Management Program*. The objective architecture is depicted Figure 28.

See also:

Appendix C: Mission Applications

For more information:

<http://www.atimp.army.mil/>

FUNCTION

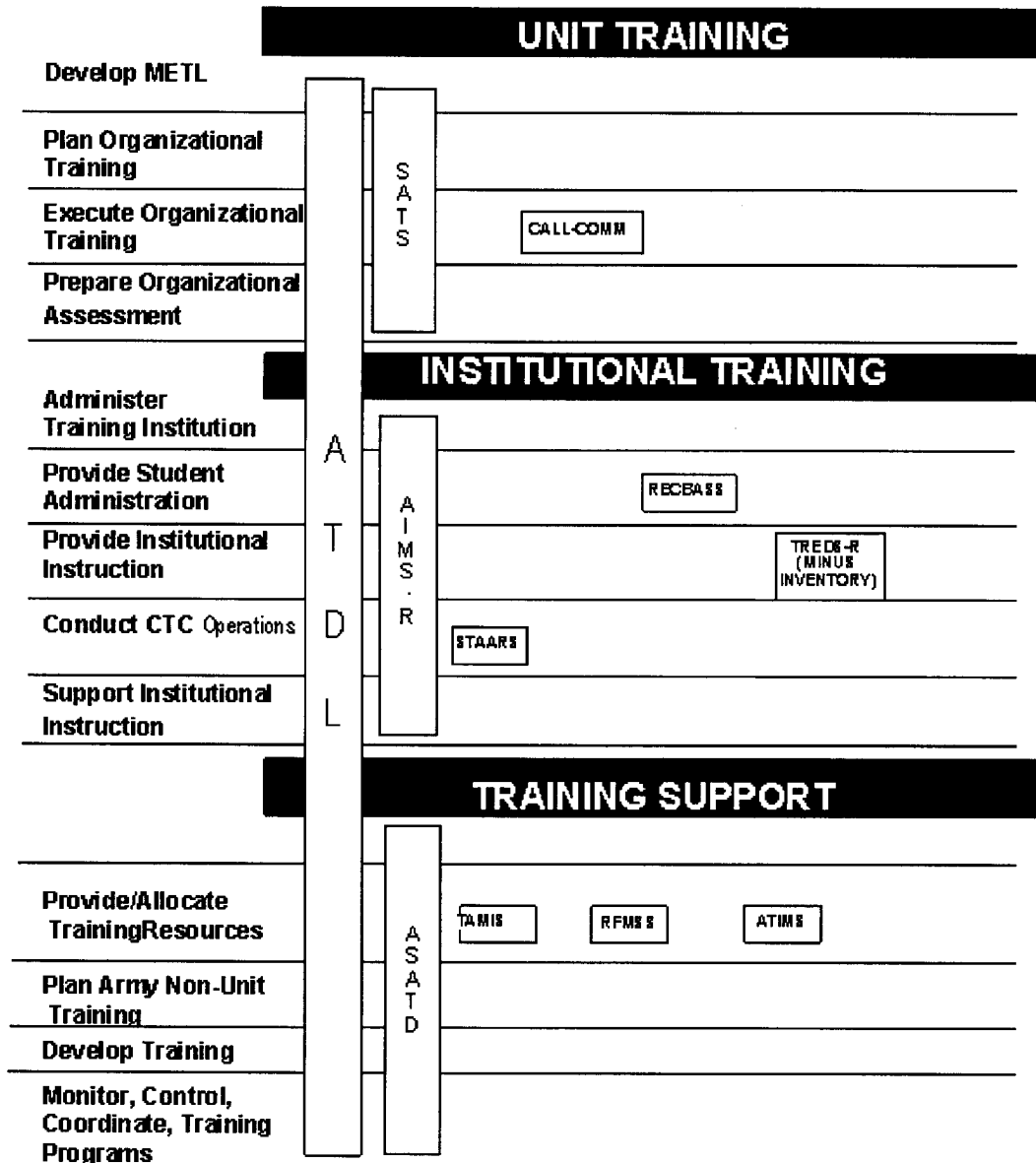


Figure 28. Migration of Training Mission Applications

There will be widespread use of automation by training developers in preparing training materials, including interactive courseware and other distributed learning products. DCST anticipates this function will be accomplished using a suite of COTS tools. For example, the training developer's toolkit might include:

- Integrated Office Automation Suite: (Word Processor, Spreadsheet, & Graphics)
- HTML Editor
- Hypertext Editor
- Multimedia Production Creator (e.g., Toolbook II)
- Graphics Editing Package (e.g., CorelDraw)

Instructors will routinely incorporate automated tools into classroom instruction. Institutional classrooms will be designed to leverage technology although not every classroom will have maximum

technological capabilities. Schools will modernize those classrooms which technology can provide the greatest return on effectiveness and efficiency. In TRADOC's objective system architecture, these new approaches to training will be enabled by a project called Classroom XXI. In this concept, the classroom will harness all the components discussed above (WANs, CANs, LANs, computing platforms, and VTC) to enhance TRADOC's execution of its training mission. In turn, Classroom XXI is a major functional driver shaping the objective system architecture for TRADOC's common user networks. Classroom XXI must also integrate mission applications unique to the training domain, e.g., computer assisted instruction, automated student response systems, multimedia courseware and, at the highest level of maturity, interactive models and simulations and virtual reality.

There will be five levels of IS capabilities in Classroom XXI facilities. Each level cumulates the capabilities of the lower levels.

=> Level 1, the instructor has a multimedia workstation and controls the pace of the instruction. The workstation will be capable of working with videotapes and cable television access, an electronic white board and projection system. The students will participate in automated response systems.

=> Level 2 adds capabilities to move toward student controlled learning. In addition to the instructor's multimedia workstation, students will have individual multimedia workstations connected to the instructor via a LAN. The student response system will be integrated into the student software.

=> Level 3 connects both the student and instructor to resources outside the immediate training environment to enable distance learning, e.g., VTC and video teletraining.

=> Level 4 allows the student to participate in simulated exercises via interactive access to M&S.

=> Level 5, though undefined, will include virtual reality capabilities.

Additionally, Digitized Training Access Centers (DTAC) are a key element of the Classroom XXI environment and the distance learning infrastructure. It is envisioned that each installation will have a DTAC providing a central service for multiple classrooms. DTAC services include connectivity, transfer and storage of proponent training materials, dial-in or remote access capability and centralized administration and maintenance. The DTAC serves as the central hub for the school's Classroom XXI network and the gateway to the distance learning network. The DTAC allows users to share information and resources. The DTAC must be connected to the CAN and the distance learning gateway. DTAC contains servers that provide centralized storage of the school's digitized products. These products include training presentations, training support materials, electronic technical manuals, and videos. Users will be able to access material from anywhere on the network. A dial-in capability will provide a central point for external users to access training materials stored in the DTAC's servers. From remote locations, users will be able to dial-in and log on the network to access training and reference materials.

DCST's draft *TRADOC Classroom XXI Installation Master Plan* provides further descriptions of capabilities and recommended equipment configurations.

See also:

5.4.2 ATIMP

5.4.3 Classroom XXI

For more information:

<http://www-dcst.monroe.army.mil/adlp/adlp.htm>

4.4.4.2 Models and Simulations (M&S)

M&S in the objective architecture will become federations among live, virtual, and constructive simulation systems that realistically portray warfighting operations. Integrated M&S tool suites will support exercise requirements definition, scenario design, database development, exercise control, critical event generation, after action review, and feedback. The distinction among separate M&S

applications will blur as the infrastructure and architecture for M&S becomes standardized and as M&S developers adopt common architectures in which battlefield "objects" are shared among M&S applications. In the target architecture, distinct M&S applications will persist in accordance with users' requirements for differing levels of resolution, echelons, functional areas, and human interaction.

4.4.4.2.1 Migration to High Level Architecture

In the baseline and target architectures, the protocols for linking M&S are distributed interactive simulation (DIS) and Aggregate Level Simulation Protocol (ALSP). In the objective architecture, the High Level Architecture (HLA), as prescribed by the Defense Modeling and Simulation Office, will supersede both ALSP and DIS. HLA is being developed by DoD to provide a common framework for all DoD simulation. To prove that the HLA is a viable concept, DoD is currently sponsoring prototype implementations. It is DoD policy that all M&S must comply with the HLA, receive a waiver, or be retired by 2001 (see paragraph 6.3.4).

DIS is a set of communication standards and protocols for interaction among distributed virtual M&S. Among DIS compliant systems, there is no central computer for event scheduling or conflict resolution. Each autonomous simulation node is responsible for maintaining the state of one or more simulation entities and broadcasting changes in their states. An example DIS environment would be vehicle simulators at several sites manned by crew members. Each simulator is under the full control of the individual vehicle commander and communicates with other collocated vehicle commanders through a LAN. Through the WAN, vehicle crews from multiple sites can communicate with each other and participate in a common exercise, fully interactive with simulators at each site. There will continue to be DIS exercises run during the period of transition to HLA. Also, there are DIS to HLA conversions being developed to support DIS based federates used in prototype HLA federations, which suggest that commercial products will become available to ease the migration from DIS to HLA.

ALSP is a protocol designed to permit multiple, existing (legacy) warfare simulations to interact with each other over networks. ALSP originated with the need to provide more exercise realism through the interaction of various service owned simulations, e.g., the Marine Air Ground Task Force Tactical Warfare Simulation, Air Force's Air Warfare Simulation, the Army's CBS and TACSIM, and the Navy's Research, Evaluation, and Systems Analysis model. The concept of ALSP is to allow each simulation to control its own objects, as originally designed, but to share information about its operation with other models.

Standardized architecture will enable experimentation and training with selected combinations of the live, virtual, and constructive M&S, with interfaces to real world C4I systems. The objective architecture for TRADOC M&S users includes new Army and joint applications grouped under the Combined Arms Tactical Trainer (CATT), Joint Warfare System (JWARS) and Warfighters' Simulation (WARSIM) 2000 programs. TRADOC's objective architecture also includes a set of reconfigurable simulators the Battle Labs, still in the planning stages.

4.4.4.2.2 Battle Lab Reconfigurable Simulators

In the objective architecture, Battle Labs throughout TRADOC will have reconfigurable simulators for analyzing and experimenting with new concepts for Force XXI and new requirements for doctrine, training, leader development, organizations and materiel. These tools will extend the use of simulators and simulations, which is currently dominated by TEMO applications, and will help involve the warfighter in the materiel acquisition process.

A reconfigurable simulator will be a virtual, man-in-the-loop simulator which can be rapidly reconfigured to represent, to varying levels of fidelity, current and future configurations of a given vehicle or weapon system platform. These simulators will use a common core object oriented software architecture but will have modules specialized for representing specific systems, e.g., tracked and wheeled ground vehicles; rotary wing aircraft; command, control, communication, computer and intelligence systems; or dismounted infantry soldiers. The Battle Labs' reconfigurable simulators will be interoperable with the Close Combat Tactical Trainer (CCTT) and compatible with the HLA standards.

The precise performance specifications are still being worked by the combat developers.

4.4.4.2.3 Combined Arms Tactical Trainer (CATT)

CATT will be a family of virtual simulators. CATT will be geographically dispersed at TRADOC schools and tactical units. CATT will provide commanders, up to battalion task force level, the opportunity to train in a realistic, force-on-force, virtual battlefield environment. CATT uses a combination of manned simulators, workstations, semi-automated forces, and DIS technology, for both proficiency and sustainment training of selected individual, crew, collective, staff, and combined arms tasks. By linking functional modules, combined arms exercises can be done using CATT. Linkage is facilitated by use of DIS technology in all CATT modules. The five CATT modules are:

- The Close Combat Tactical Trainer (CCTT).
- The Aviation Combined Arms Tactical Trainer (AVCATT).
- The Air Defense Combined Arms Tactical Trainer (ADCATT).
- The Fire Support Combined Arms Tactical Trainer (FSCATT-Phase II).
- The Engineer Combined Arms Tactical Trainer (ENCATT).

CATT uses many IS components which can be grouped into two categories - manned simulators and the CATT core environment. The manned simulators are vehicle and weapon system simulators. As proponents assess their task based training requirements, manned simulators will exhibit the required fidelity to train individual, crew, collective, and combined arms tasks. The CATT core environment consists of elements common to all proponent modules, e.g., semi-automated forces (SAF), terrain databases, rapid database generation tools, and the Standard Army After Action Review System (STAARS). SAF allows a single operator to create and control the actions of a number of virtual combatants. Each SAF entity (tank, helicopter, etc.) or small unit executes realistic battlefield behaviors in response to the operator's controls. There is an initiative underway, called OneSAF, to combine several SAF applications into one for shared use. It will create a wide variety of OPFOR and BLUFOR vehicles and units which units can train against or with.

Migration to the objective architecture will be phased, with the CCTT being fielded first. CCTT will train more than 80% of the Armor, Cavalry and Mechanized Infantry Platoon and Company/Team collective tasks. CCTT is the first fully DIS compliant training system and consists of networked, manned vehicle simulators for the M1A1, M1A2, M2/3A2, FIST-V, M113A3, and the HMMWV. These work in combination with SAF and STAARS.

4.4.4.2.4 Joint Warfare System

The Joint Warfare System (JWARS) will be an HLA compliant system that includes modules for many of the analytical functions currently performed by TACWAR, Eagle, VIC and CASTFOREM. JWARS will include representation of all joint warfare mission areas. JWARS will be a closed-form, constructive simulation of multi-sided, joint warfare used throughout the DoD and services. JWARS will not be interactive, support real-time mission execution, or be linked directly to real-world systems.

The Army Warfare System (AWARS) will merge VIC and Eagle and become the operational land warfare representation in JWARS. The migration toward the objective architecture for JWARS and other ACR applications is depicted in [Figure 29](#). Planning for the objective architecture is based on 2005 for full operational capability.

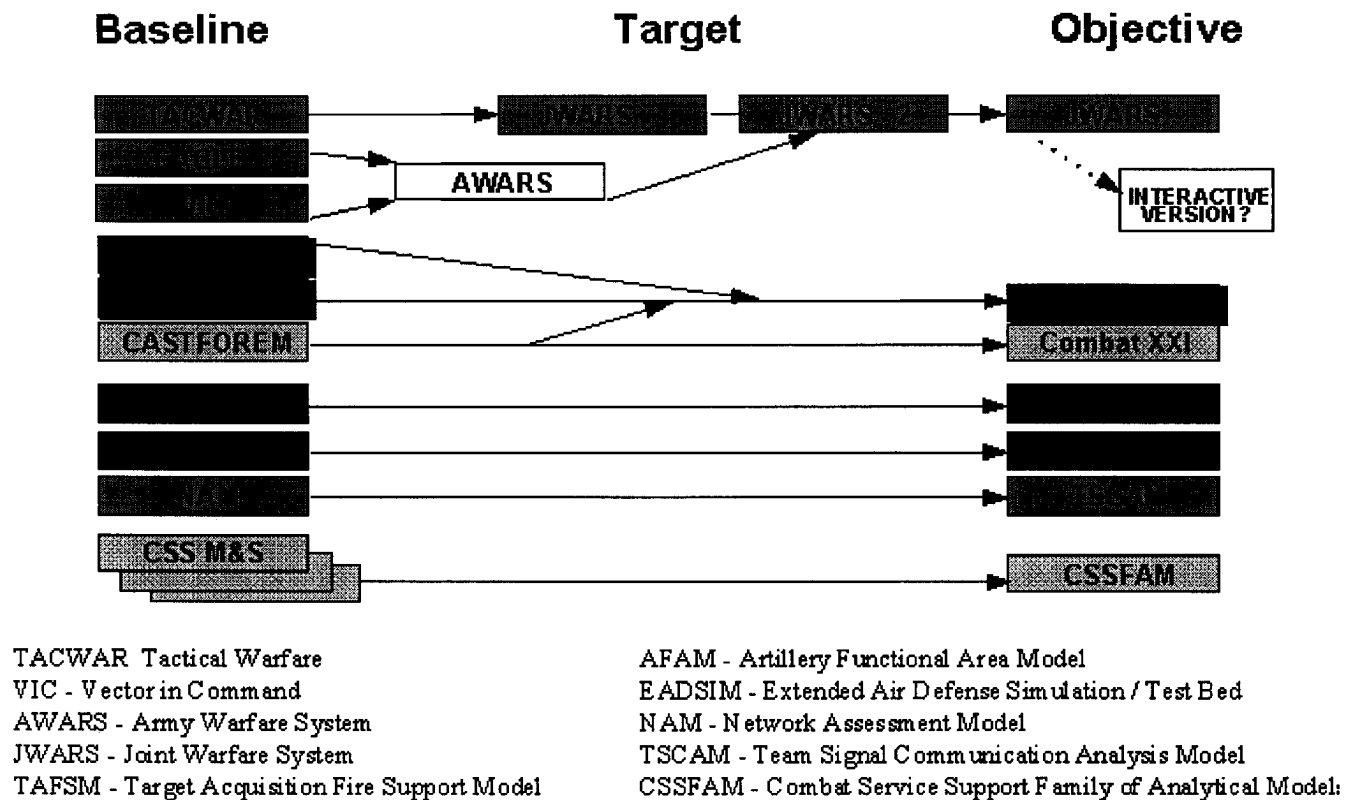


Figure 29. Migration of ACR M&S

4.4.4.2.5 Warfighters' Simulation (WARSIM) 2000

WARSIM 2000 is the Army's objective architecture M&S application for command and staff training. It is scheduled for fielding in 2000. It will train Army battle staffs at all echelons, from Battalion to Echelons Above Corps (EAC). It will replace the baseline architecture of FAMSIM applications. In the target architecture, WARSIM will integrate M&S applications using ALSP and will be DIS compliant. WARSIM 2000's design will allow command posts to interact with the simulation using their TOE equipment so that they can train in the field, not just in simulation centers. As shown in Figure 30, several baseline battle staff simulations will remain in the architecture until replaced by WARSIM 2000.

TRADOC schools will use WARSIM 2000 to conduct leader training and CPXs for students at officer basic and advanced courses and NCO advanced courses. The individual institutional strategy will determine whether a school needs dedicated systems or can link to a supporting Regional Simulation Center. Schools will use their personal level computers and networks in lieu of TOE battle command systems as their interface for WARSIM 2000. All schools will be able to link their training to exercises being conducted by field units or other schools. For example, students at the Battle Staff NCO course or CAS3 could represent an additional brigade in a division level exercise.

WARSIM 2000 is the Army component of the Joint Simulation System (JSIMS), which will provide command and staff training to all of the services. It will provide a core of common representations for air/space, land, and sea warfare to support training for unified/specified commands and Joint Task Forces in all phases of military operations. It is scheduled for initial operational capability in December 1999.

The WARSIM Intelligence Module (WIM) will replace the TACSIM.

CSSTSS will continue to be used in the objective architecture. Its functionality was described as part of the baseline architecture. CSSTSS architecture will be brought into conformance with WARSIM standards.

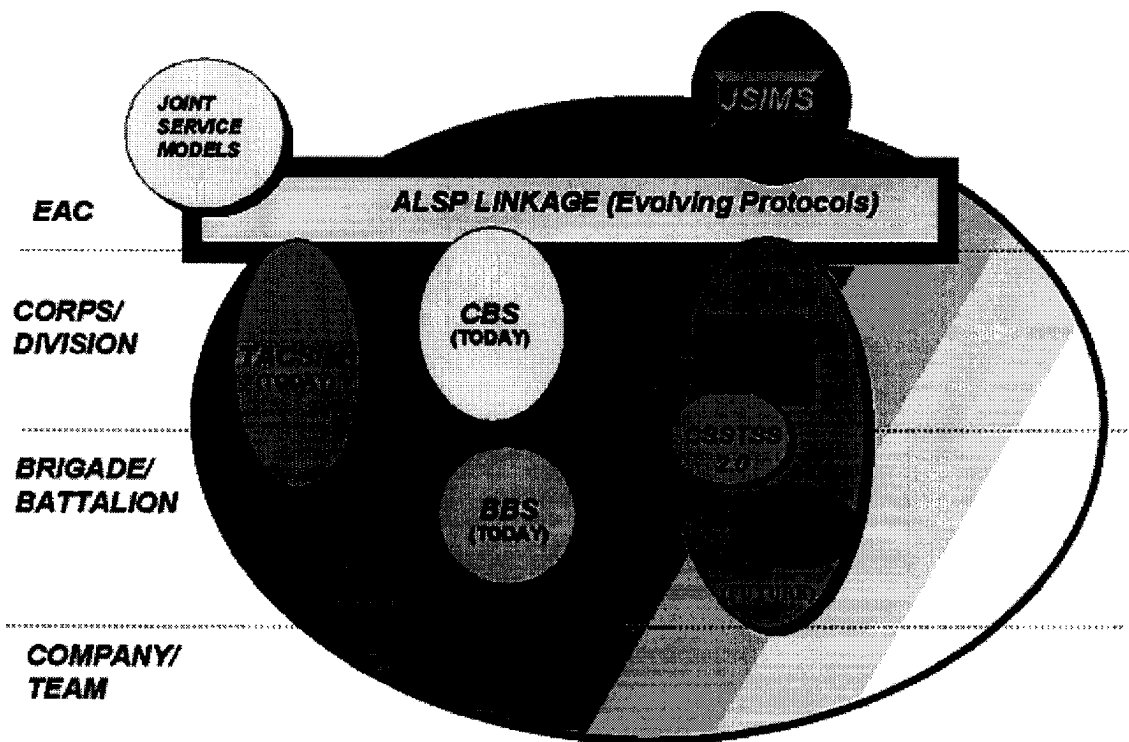


Figure 30. Migration of battle staff M&S

4.4.4.3 Installation Management Applications

In the objective system architecture, TRADOC will employ a standardized library of installation management applications, built on a common operating environment, with well encapsulated modules that maximize the reuse of common capabilities and shared data. Each installation will have an integrated logical database populated with standardized database schemata and data elements. As necessary, HQ TRADOC will have the MACOM version of the database.

This vision of the objective architecture is beyond the capabilities of applications that are currently planned and funded. Nevertheless, there are significant actions underway that will change the architecture for installation management applications. Described in the sub-paragraphs below are modernization efforts impacting the replacement of TRADOC's ISMs and the extension of applications in several functional areas.

Most installation management applications are program managed by organizations external to TRADOC. TRADOC must integrate the mission applications into its information architecture. This means ensuring that the information exchanges required to implement the functional process are supported with network connectivity at the LAN, CAN and WAN levels and that platforms are distributed as necessary to provide processing power at the users' locations. TRADOC must work with external program managers to insert the new application into available infrastructure, identify gaps in required infrastructure and plan modernization required to fill the gaps.

4.4.4.3.1 Replacement of ISMs

TRADOC's own ISMs have been, or will be, replaced by applications from a variety of sources, but

primarily by the SBIS and ITP ISM programs. Table 7 provides an overview of the objective replacement applications, and their status. Army funding to support development, fielding and post deployment software support (PDSS) of many installation management applications will be terminated after FY 98. Even so, applications fielded as SBIS and ITP modules are anticipated to be part of TRADOC's target system architecture for many years. Appendix C provides a complete list and brief description of applications in the SBIS, ITP and several other Army programs for standardized applications.

See also:

4.4.2.2 Platforms--Mission Level

5.2.2 SBIS

5.2.3 ITP

5.4.5.1 Installation Support Modules

For more information:

<http://www-tradoc.army.mil/dcsim/y2k/restrict/y2k-ais/y2k-ais.html>

4.4.4.3.2 Personnel Management

DoD operating level Civilian Personnel Offices are being redesigned to adapt to resource reductions. Army has established seven geographically based regions in the continental United States and three overseas. Regional centers will provide services that do not require face-to-face interaction. Small on-site staffs will remain at TRADOC installations to serve as part of the management team and provide advice to the commanders. IS support is required to implement the new organization and process. DoD is developing the objective system. It will interface with other systems, such as payroll, to share information vertically and horizontally across the DoD. It must be accessible to managers, supervisors, and employees for information update and retrieval. It will incorporate electronic forms processing and coordination capability for customer organizations and the personnel office. Network servers, among other tasks, provide electronic processing of personnel action requests, position descriptions, position applications, reduction-in-force actions, and retirement applications. While the objective system is being developed, a hardware and communications infrastructure is being installed, within civilian personnel offices, to operate under the current Defense Civilian Personnel Data System (DCPDS) in support of regionalization efforts. The DoD selected Oracle Human Resources (Oracle HR), a commercial off-the-shelf (COTS) product as the software environment for the modern system. A collection of Personnel Process Improvements (PPI), called the Integrated PPI Suite, provides interim automation support for regionalization prior to deployment of the modern system. The function of the Suite will be migrated to the objective application. The objective system will be fielded in four phases to reach its objective architecture:

- (I) Proof of Concept which includes a demonstration package and MAISRC satisfaction.
- (II) System Foundation which includes DoD organizational structure, position hierarchy and system security.
- (III) Basic Personnel Applications which includes recruiting and staffing, basic pay and benefits, and appraisal and performance and;
- (IV) Additional Personnel Applications which include separations and retirement; change in appointing office; awards and employee relations.

4.4.4.3.3 MWR Management

The objective architecture includes an integrated MIS for managing MWR functions. The MWRMIS will be an integrated suite of applications. The applications are fielded separately. Some are already fielded while others are still in development. In the objective architecture, the modules will be integrated and networked, with links to include MACOMs, Defense Finance and Accounting System and the Army Community and Family Support Center at HQDA. Individual modules are listed in

Appendix B. DCSBOS has identified the user locations that require CAN connections on each TRADOC installation. MWRMIS applications are PC based, and in varying degrees of migration toward JTA-Army compliance.

Table 7. TRADOC ISM Replacements

TRADOC ISM	REPLACEMENT APPLICATION	STATUS
AVLS/WOMS	TBD	Eliminate. Will use FORSCOM system
BATCH MIL PER	*	N/A
CIF	DA ISM - CIF	AVAILABLE
CIV PERS INQ	NONE REQUIRED	
DD1556 TNG	TRAIN	FIELDED
DD1556 TNG HST	TRAIN	FIELDED
DENTAL MGT	DA ISM - DENTRAD	AVAILABLE
ENL STU ENTAC	DA ISM - SECCLEAR	IOT&E: 5/96
INPROCESS	DA ISM - INPROC	FIELDED
INST CLEARANCE	DA ISM - OUTPROC	FIELDED
ORB	SIDPERS-3	TESTING
ORDERS	SIDPERS-3	TESTING
OUTPROCESS	DA ISM - OUTPROC	FIELDED
POST LOCATOR	DA ISM - PERSLOC	FIELDED
PROPERTY BOOK	SPBS-R	FIELDED
RAIDERS	SPBS-R	FIELDED
REASSIGN	SIDPERS-3	TESTING
RECORDS INQ	SIDPERS-3	TESTING
RECORDS MGT	SIDPERS-3	TESTING
SECURITY MGT	CCF: "SOI"	TESTING
STD INSTL BUDGET SYSTEMS	DCAS	FIELDED
SPECIAL DUTY	SIDPERS-3	TESTING
STATION UNIQUE	*	N/A
UIC/DoDAAC	*	N/A
UPC	*	N/A
VEHICLE REGIST	MPMIS-RACS	FIELDED

* REQUIRED ONLY IF OTHER TRADOC ISMs ARE RETAINED.

4.4.5 System Architecture Report Card

Comparing characteristics of the baseline to the objective system architecture shows that TRADOC has significant IS modernization tasks ahead. It is worth noting that TRADOC is not unique in this position. Nearly any organization, public or private, of TRADOC's size, distribution and complexity that

has an open standards based architecture as its objective will find significant shortcomings in its baseline.

Networking components are key enablers for TRADOC's modernization. By leveraging DoD investments, TRADOC has created serviceable WAN coverage. TRADOC will need higher bandwidth access to WANs, but not a significantly different architecture. At 14 of 16 installations, TRADOC achieved a baseline infrastructure capability for CANs and WAN access consisting of a 100mbps FDDI backbone with 10mbps connection tails to the highest priority buildings. This baseline infrastructure accommodates most data transfer, but does not support the higher bandwidth requirements of video or distributed simulations required by the ADLP, synthetic environment, and other Army-level projects. Most high priority user locations have open architecture LANs that will support TCP/IP traffic. Open connectivity is not universal however and will have to be expanded to reach more user locations, to increase coordination capabilities and to enable employment of new platforms and applications, e.g., SBIS and ITP. Network security components, at WAN, CAN and LAN level, are inadequate to counter conceivable threats.

TRADOC needs to modernize its server platforms. We need servers that comply with the technical architecture and that are part of a robust network that puts computing power and data manipulation capabilities at the user level. As any large organization, TRADOC is running hard to keep pace with platform hardware evolution at the user, or client, level. That pace cannot slow down if TRADOC is to employ software with a client-server architecture and graphic user interface. There are about 35,000 PCs in use in TRADOC. Almost as many are Intel 386 and below as are 486 and above. 386 and below is an inadequate processing platform for working with TRADOC's information based products. Sub-standard platforms, combined with inadequate funds for software upgrades, necessitate our continued use of mixed generations of networking services and office automation applications that impede free exchange of information.

TRADOC must proliferate the DMS throughout the command. Again, this implies the right networking and platforms, as well as the application software. TRADOC can leverage partial fieldings of DMS by DoD resources, but has a substantial role to play in proliferating it to the majority of TRADOC users.

Many TRADOC mission applications were developed for use in an older architecture. They still provide required functionality, but they need to be modernized to operate in an open architecture and in the new millennium, to exploit the possibilities of newer software architectural approaches, and to exploit newly understood opportunities for inserting information technology into operational processes. Many MIS applications for installation management, and some for training, are being developed but nonetheless appear to be at risk for fielding to TRADOC installations. Under funded PDSS for MIS will hinder the migration of fielded capabilities to an open architecture. TRADOC has lost most of its internal MIS development capability to make the fixes. Without external efforts to leverage, TRADOC's modernization task for MIS type applications will be short of operational requirements and realistic opportunities for process improvements. Regarding other mission applications, particularly Classroom XXI and the synthetic environment, TRADOC is only at the very beginning of achieving the vision. Underneath all applications is an increased dependence on a robust network to satisfy the operational concept.

Resourcing is a limiting factor in modernizing the system architecture and making the fixes discussed above. In the commander assessments for FY98, seven TRADOC installation commanders specifically included information technology modernization as an under resourced deficiency. TRADOC's key enabling investments have emphasized the insertion of IS into functional processes, but the ideas quickly absorb the available OPA funds command-wide. The next section will describe the various efforts underway, using TRADOC resources and other organizations' resources, to modernize TRADOC's system architecture consistently with the vision.

Chapter Five: IS Modernization Projects

This chapter looks at specific projects that will advance TRADOC's baseline system architecture closer to the objective architecture described in [Chapter 4](#). This chapter includes key projects, but should not be considered exhaustive. There are other important efforts not described in TPRISM, although all such efforts must be architecturally consistent with TPRISM. After describing specific key projects, this chapter briefly discusses resources and organizational responsibilities for IS modernization that are not specific to one project. For a description of the approval process that governs TRADOC initiated IS modernization projects, see [TRADOC Pamphlet 25-72](#), scheduled for publication 1Q98.

The project descriptions in this chapter are categorized according to the TRM (see [Figure 3](#)), as was the description of the system architecture in [Chapter 4](#). Table 8 provides an alternative categorization to emphasize the relationships between our strategic IM goals and IS modernization projects. Recall, from [Table 1](#), that TRADOC's IM goals most relevant to IS modernization are:

- improve interoperability of TRADOC's IS
- modernize the IMA infrastructure to meet mission requirements
- incorporate information technology in support of TRADOC business processes

Table 8. Crosswalk between IM goals and projects

TRADOC IM Goal	Modernization Project	TPRISM Paragraph
Improve interoperability	DMS DVTC Y2K HLA	5.3.1 5.3.2 5.4.1 5.4.4
Modernize infrastructure	DISN PPC4I Fort TRADOC ASIMS FEP PC based RJE	5.1.1 5.1.2 5.1.3 5.2.1 5.2.1
Incorporate information technology into business processes	DISN Enhanced IP Services JWICS SBIS ITP CRXXI ATIMP M&S Modernization	5.1.1.1 5.1.1.2 5.2.2 5.2.3 5.4.3 5.4.2 5.4.4

5.1 Projects--Networks

There are a variety of on-going projects to modernize TRADOC's networks at all levels of integration, and to ensure mission applications have access to network capabilities that support their particular requirements.

5.1.1 DISN Projects

The DISN is TRADOC's primary WAN. Its architecture was described in paragraph 4.4.1.2.2. DISA manages the program for DISN's modernization, but TRADOC must plan for installations' access and use of DISN. This is a shared effort between the installations and HQ TRADOC.

Since July 1995 when the DISN strategy was announced, DISA has awarded four initial DISN contracts, clustered by capabilities as follows:

(1) DISN Switched/Bandwidth Manager Services-CONUS (DS/BMS-C). This contract, awarded to MCI Telecommunications Corporation, to provide and manage transmission bandwidth managers at selected locations within CONUS that form the long-haul backbone of the DISN transport layer. MCI is responsible for DISN CONUS implementation planning and support activities. Additionally, the DS/BMS-C contract will provide within CONUS the tandem circuit switch backbone element of the Defense Switched Network, the voice communications service.

(2) DISN Transmission Services-CONUS (DTS-C). DISA awarded DTS-C to AT&T Federal Systems to provide backbone and access area transmission services at T-1 and above bandwidth rates. AT&T will provide wideband fiber based transmission bandwidth for a DISN CONUS SONET backbone and wideband, generally fiber based, transmission bandwidth connectivity to user locations at approximately 600 DoD user locations in CONUS. The SONET backbone will employ optical fiber and provide information transport between the DISN Bandwidth Managers acquired under the DS/BMS-C contract.

AT&T will provide information transport for the aggregate bandwidth of all Service Delivery Points in the access area served by each of the Bandwidth Managers. To take advantage of bulk transmission rates, AT&T will bundle the access transmission into SONET for delivery to the Bandwidth Managers. At the customer access locations, transmission bandwidth interfaces at T1, T3 and SONET will be provided. AT&T will team with Local Access Providers as required to accomplish the access area bandwidth requirements.

(3) DISN Video Services-Global (DVS-G). The DVS-G contractor, also AT&T, will provide multi-point dedicated and dial-up video services, as well as a reservation and scheduling system. As of 24 Jul 97, this DISN contract was under negotiation since AT&T is unable to provide service in required time frame. DISA is looking at a 60-90 day delay for backbone support.

(4) DISN Support Services-Global (DSS-G). The DSS-G contract, awarded to Boeing Information Services, provides integration, technical, programmatic, and operations support for the DISN worldwide. The DSS-G contract is the vehicle to support DISA's life-cycle management of the DISN. DISA will order support services from this contract on a delivery order basis with specifically defined performance requirements and schedules. The Army may also acquire support services under this contract through DISA.

The CONUS transition will integrate the separate contract activities (DS/BMS-C, DTS-C, and DVS-G) to build the new DISN CONUS to which the current DISN Transition Contract services will migrate. The transition is on-going and will be completed during this year. It includes three stages: Installation, Systems Configuration, and Cut-over.

(1) Installation includes the installation of 12 switches, 35 BWMs, and establishment of the primary and alternate DISN Network Operations Centers (NOCs), as well as installation of initial backbone and access transmission services.

(2) Systems Configuration is the phased-in configuration of network infrastructure elements and establishment of overall network connectivity in preparation for the switched and dedicated service cut-over of individual end-user SDPs. It includes backbone and access paths between and to BWMs, and bridging ISTs that connect DISN CONUS switches to DTC switches to prevent interruption of current service through the transition.

(3) Cut-over Stage is the cut-over of switched, dedicated, and VTC services from the DTC to DISN.

Two types of cut-overs will be completed in parallel: switched network services and dedicated services. Switched services require the rehomeing of end office PBXs and 4-wire circuits. Dedicated services, to include dedicated VTC require the cut-over of fixed transmission facilities. These two service cut-overs will be accomplished based on the site's geographic location. CONUS has been divided into nine areas, and the cut-overs are scheduled in nine sequential phases corresponding to those areas. Video cut-overs will take place as a separate, but simultaneous transition, and video facilities will be transitioned by VTC communities of interest. Cut-over of the local access transmission extension pipes will be phased in sequentially with the sites prior to the cut-over of the switched and dedicated services.

5.1.1.1 DISN Enhanced IP Services

DISN Enhanced IP Services is DISA's replacement for the DSI, as described in paragraph 4.3.1.3.3. Services are offered through the DISN, but are designed specifically to support the kind of traffic generated by M&S. The transition will occur in FY98. TRADOC has 14 DSI nodes, all of which are committed subscribers to DISN Enhanced IP Services in FY98. Upgrades in site routers, Improved Network Encryption System (INES), and VTC equipment are required to make the transition. DISA has scheduled these upgrades for all TRADOC sites prior to 1Q98.

The transition will also include the new fee-for-service approach. The DSI had previously been centrally funded for all subscribers at DoD level. With the transition, subscribers must pay the bill. For FY98, HQ TRADOC will centrally fund continued use for TRADOC subscribers. A study being conducted by the TRADOC Analysis Center (TRAC), in coordination with the DCSIM, will help establish requirements, costs and alternatives for FY99-2005. The study results will be presented to the TRADOC M&S Advisory Council in January 1998.

5.1.1.2 JWICS

JWICS provides SCI level networking as described in paragraph 4.4.1.2.2. The TRADOC DCSINT leads the effort to provide JWICS access to TRADOC installations as part of the TRADOC Intelligence Network Architecture (TINA) project. JWICS nodes have been installed at Fort Huachuca and Monroe. Installation of a node at Fort Leavenworth is scheduled before 1Q98. Satellite sites at Knox, Rucker, Leonard Wood, Sill, Bliss and White Sands Missile Range are scheduled for connection before 1Q98. TINA also requires fielding of Sun Ultra 1 Model 140 platforms with an Ultra SPARC-1 processor. These platforms are scheduled for delivery prior to 1Q98. The Ground Intelligence Support Activity (GISA) is doing the installation, and will schedule training during FY98.

5.1.2 PPC4I Projects

CECOM manages PPC4I Army-wide. PPC4I installs networking components, mostly though not exclusively CANs, as described in paragraph 4.4.1.4. PPC4I has four sub-programs, each fielding separate components of installations' network infrastructure: (1) telephone switch; (2) the outside transmission media cable plant; (3) the installation's backbone data network; and (4) the gateway to external data networks. The four sub-programs are discussed below.

- *MACOM Telephone Modernization Program (MTMP)* provides TRADOC installations with telephone switch upgrades.
- *Outside Cable Plant Rehabilitation (OSCAR)* was originally designed to upgrade the cable plant in support of telephone systems upgrades. The scope has been expanded to include "dark" and "lit" fiber in support of both telephone and data users.
- *Common User Installation Transport Network (CUITN)* provides an installation backbone data network to interconnect LANs, hosts, and gateways. CUITN installs a high bandwidth data network with single-mode optical fiber cable using ATM/SONET technology switches/routers collocated with the telephone DCO and RSUs. The CUITN will provide:

=> the ADN and interconnecting fiber-optic cable

- => connectivity from the ADN to each electronic mail (E-mail) host
- => connectivity from the ADN to each DDN gateway
- => connectivity from the ADN to N-ISDN 2B+D service
- => connectivity from the ADN to selected war fighter and power projection critical LANs

- *Army DISN Router Program* (ADRP) provides the components necessary for Army installations to access the NIPRNET.

5.1.2.1 Status

All TRADOC installations have received MTMP switch replacements and all telephone systems are NANP compliant. Total OSCAR contract expenditures on TRADOC installations since FY91 is \$31.4 million. One third of these funds were provided by TRADOC installation users. The remainder was provided by DA under the OSCAR national infrastructure program. A CUITN upgrade is in progress at Fort Bliss. CUITN has not fielded much inside TRADOC due to its fielding approach, explained in the next paragraph. The initial ADRP upgrades for TRADOC installations are complete.

5.1.2.2 Schedule

The schedule for PPC4I is determined by the installation sequence list (ISL) ([Table 9](#)), as ranked by DA DCSOPS. Only four TRADOC installations (Forts Bliss, Benning, Gordon, and Sill) are in the ISL top 20. The likelihood of other TRADOC installations receiving PPC4I funding for CUITN prior to FY99 is low. Deepening TRADOC's problem is the PM's approach to fielding, which has been a total solution to the high ranking installations, leaving lower installations without even the most critical improvements. There are no firm fielding dates associated with these rankings and the pace is dependent on continued Army funding. For purposes of gauging, we know PPC4I has existed four years and Ft. Bliss, TRADOC's highest ranking installation, began work during FY97.

Table 9. Installation sequence list

3. Ft Stewart	96
4. Ft Campbell	96
5. Ft Lewis	96
6. Ft Bliss	97
7. Ft Drum	99
8. Ft Carson	99
9. Schofield Bks	00
10. Ft Wainwright	01
11. Ft Riley	01
12. Ft Shafter	02
13. Ft Benning	02
14. Rock Island Ars	
15. Redstone Ars	
16. Anniston Depot	
17. Ft Gordon	03+
18. Fort McPherson	
19. Ft Sill	03+
20. Ft Polk	
21. Ft Lee	03+
22. Ft Knox	03+
23. Dahlongo RTA	03+
24. Ft Monmouth	
25. Sunny Point Term	

26. Ft Irwin & NTC	
27. Ft Jackson	03+
28. Ft Lnrld Wood	03+
29. Ft Sam Houston	
30. Ft Eustis	03+
31. Yakima Firing Ctr	
32. Ft Detrick	
33. Yuma Proving Grnds	
34. Ft Gillem	
35. Ft Rucker	03+
36. Ft Huachuca	03+
37. Ft McNair	
38. White Sands MR	
39. Ft Myer	
40. Ft Leavenworth	03+
41. Ft Meade	
42. Walter Reed AMC	
43. West Point Mil Res	
44. Ft Story	03+
45. Carlisle Bks	03+

NOTE: Funding year is "Best Guess" based on funded program levels.

63. Ft Monroe	03+
64. Ft Richardson	
65. Tobyhanna AD	
66. Watervliet Ars	
67. Crane AAA	
68. Lake City AAP	
69. Presidio/DLI	03+

Improving TRADOC's individual installations' ISL rankings is unlikely. Instead, TRADOC has recommended to HQDA that a package of capabilities encompassing all TRADOC installations, although well short of full-up CUITN upgrades, be ranked as TRADOC's highest "installation" on the ISL. The package, known as "Fort TRADOC", would improve the command's CAN architectures as justified by TRADOC's role in architecting and training Force XXI, emphasizing user locations for distributed learning and M&S. The capabilities and architecture were discussed in paragraph 4.4.1.4. The precise location of upgrades (i.e., buildings) is subject to change since TRADOC's KEI funds are also used each year to incrementally implement the Fort TRADOC approach.

5.1.3 Fort TRADOC (KEI Package)

TRADOC DCSIM competes annually in the CG's KEI process for funds to insert technology into installations' IM infrastructure. In KEI96 and KEI97, the emphasis was on CAN upgrades to support Classroom XXI user locations. Other DCS also compete for KEI funds, which often involves modernization that must be synchronized with Fort TRADOC. Most notably, DCST has been successful in funding inside the building infrastructure (LANs and platforms) to support Classroom XXI. Using KEI funds, TRADOC has moved from a fragmented set of CAN capabilities, to a minimum architecture that provides access to a FDDI backbone to high priority users and a T-1 WAN connection into the backbone. As shown in [Figure 31](#), KEI96 funds were used to install fiber to 61 buildings on TRADOC posts, and to provide T-1 NIPRNET connectivity at seven posts. KEI97 funds were used to provide fiber connectivity to an additional 44 buildings, T-1 NIPRNET access at seven additional posts, and SIPRNET access for nine.

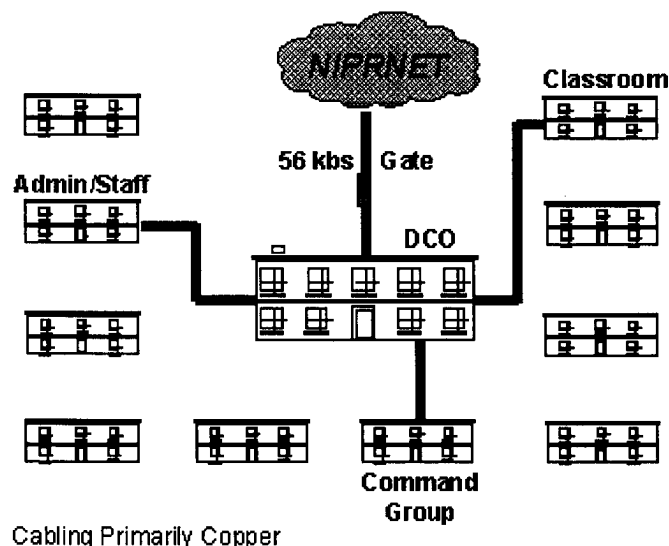
In the KEI competition for FY98, TRADOC packaged into one submission its highest priorities for achieving the Fort TRADOC target CAN architecture. The KEI submission is a subset of the "Fort TRADOC" package TRADOC has requested DCSOPS rank as our next CUITN effort. This KEI increment is potentially within TRADOC's own means to implement, while the CUITN version will require external support. In generic terms, KEI98 starts TRADOC's post-FDDI CAN migration by inserting ATM technology to reach about 36 buildings with user groups requiring high bandwidth capabilities. [Figure 32](#) portrays the approach graphically.

Beginning at [Figure 33](#), the KEI investments made at each installation are depicted together with the FY98 Fort TRADOC objectives.

See also:

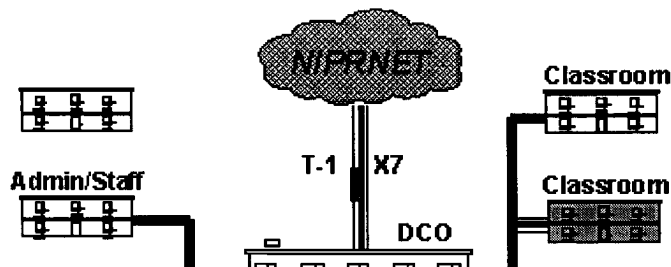
4.4.1.4 Networks--Installation Level

Generic TRADOC Installation Pre-KEI (95)



Cabling Primarily Copper

KEI 96 IM Improvements



5.1.3.1 Responsibilities

DOIMs, in close association with functional users, define detailed requirements and manage local arrangements for installation of networking components. DOIMs are responsible for identifying requirements and executing funds for inside the building acquisitions, in coordination with installation and HQ TRADOC staff functional proponents. The DCSIM, FSSD is responsible for overseeing the execution of the KEI funds associated with common user network upgrades.

5.1.3.2 Status

The FY98 Fort TRADOC package was validated for funding by the KEI SPRAC. The available funds are not sufficient to implement all the requirements. Regardless of how far KEI funds stretch in satisfying these approved requirements, they remain high priorities for modernizing installations' CANs. Therefore, the full package is displayed in the series of figures below.

5.1.3.3 Schedule

KEI prioritization is an annual resource competition. Requirements are collected during the summer months from installations and worked by the HQ staff in time for the new fiscal year. Individual projects are executed by installations in accordance with their own time requirements.

Figure 33. KEI--Aberdeen Proving Grounds

Figure 34. KEI--Fort Benning

Figure 35. KEI--Fort Bliss

Figure 36. KEI--Carlisle Barracks

Figure 37. KEI--Fort Eustis

Figure 38. KEI--Fort Gordon

Figure 39. KEI--Fort Huachuca

Figure 40. KEI--Fort Jackson

Figure 41. KEI--Fort Knox

Figure 42. KEI--Fort Leavenworth

Figure 43. KEI--Fort Lee

Figure 44. KEI--Fort Leonard Wood

Figure 45. KEI--Fort Monroe

Figure 46. KEI--Redstone Arsenal

Figure 47. KEI--Fort Rucker

Figure 48. KEI--Fort Sill

Figure 49. KEI--White Sands Missile Range

Figure 50. KEI--Presidio of Monterey

5.2 Projects--Platforms

With increased use of client server software architecture and connectivity of LANs, platform architecture is shifting from installation level platforms to mission, local and personal level platforms. It is common that Army and DoD PM's field platforms sized as servers for their mission applications, e.g., ITP, SBIS and DMS, which are combining to reduce dependency on installation level mainframes. PM's assume platforms at the personal level, or the client portion of the overall system, are already there or will be provided by the installation. TRADOC must continue to upgrade its personal computer base, but there is no formal project to do so.

5.2.1 IBM mainframe replacement

IBM mainframes purchased in 1985 and currently used at 14 TRADOC installations, will not run after CY 1999. In the baseline system architecture, these mainframes run several applications: Professional Office Systems (PROFS) e-mail, TRADOC ISMs, and installation unique applications. They also provide the front end processor (FEP) and remote job entry (RJE) components required to communicate with ASIMS running at the DMCs.

On 10 Dec 96, HQ TRADOC Chief of Staff approved a mainframe replacement strategy in which the DCSIM will field replacements for the ASIMS FEP and RJE components. The applications that run on the mainframe will be replaced by other decentralized efforts:

=> PROFS e-mail system will be replaced by the DMS program and installations' acquisition of client server e-mail systems consistent with the DMS architecture.

=> TRADOC ISMs will be mostly replaced by DA fielded applications, such as SBIS and ITP modules and Standard Installation Division Personnel System 3 (SIDPERS3).

=> Installation unique applications will be migrated in various ways to other applications and platforms. These migration efforts are tied up with questions of Y2K readiness as well as mainframe replacement.

DCSIM arranged for Information Systems Engineering Command (ISEC) to perform FEP and RJE site surveys and to install the necessary components. ISEC conducted the site surveys from Dec 96 to Jul 97. The components necessary for PC based RJE were fielded during FY97. The schedule for fielding FEP components is shown in Table 10. 1997 dates prior to this publication have been met.

See also:

4.4.2.3 Platforms--Installation Level

5.2.2 SBIS

The SBIS program aims to provide both a standard platform and standard applications for installation management. The program has undergone several changes in scope since its initiation and finally was identified for termination in the POM 98-03. The PEO STAMIS will field SBIS servers and applications to Power Projection Platform (PPP), Power Support Platform (PSP) sites and

Table 10. Fielding schedule for ASIMS FEP

TRADOC Post	Start Date	Finish Date
BEN	1/5/98	2/5/98
BLI	10/20/97	11/20/97
CAR	8/25/97	9/5/97
EUS	4/6/98	4/30/98
GOR	11/17/97	12/17/97
HUA	2/9/98	3/31/98
JAC	6/29/98	7/30/98
KNO	7/14/97	7/30/97
LEA	8/24/98	9/30/98
LEE	3/9/98	4/9/98
LWD	5/4/98	6/4/98
McC	8/25/97	9/5/97
POM	8/11/97	8/16/97
RUC	6/11/97	6/24/97
SIL	6/1/98	7/1/98

Table 11. Fielding schedule for SBIS

Projection Platform (PPP), Power Support Platform (PSP) sites and Fort Leavenworth before the program terminates after FY 98. The fielding schedule for TRADOC sites follows.

See also:

4.4.2.2 Platforms--Mission Level

Appendix C: Mission Applications--SBIS

5.2.3 ITP

The ITP program was initiated to field target architecture platforms and applications until SBIS provided an open, distributed architecture. Although the software engineering effort was scaled back, the PM SBA did field ITP platforms and available modules during FY97. The program terminates after FY98.

See also:

4.4.2.2 Platforms--Mission Level

Appendix C: Mission Applications--Installation Transition Processing (ITP)

5.3 Projects--Support Applications

There are two projects to modernize support applications of fundamental interest to TRADOC: DMS and DVTC. Improvements to other tools for command wide coordination are likely to mature soon, but are not identifiable projects at this point.

TRADOC Post	Start Date	Finish Date
APG	8/5/97	1/19/98
BEN	6/24/97	11/3/97
BLI	5/28/97	10/3/97
EUS	7/5/96	12/5/97
GOR	7/5/96	9/12/97
HUA	7/22/97	12/5/97
JAC	5/27/97	12/5/97
KNO	7/8/97	12/5/97
LEA	7/22/97	1/6/98
LEE	7/8/97	10/31/97
LWD	7/9/97	12/5/97
MON	11/10/97	12/5/97
RUC	8/5/97	12/5/97
SIL	6/24/97	9/19/97

5.3.1 Defense Messaging System (DMS)

DMS is a DoD managed program to establish a joint messaging capability consistent with the joint concept, *C4I for the Warrior*. The DoD ASD(C3I) stated in a memo, SUBJECT: Electronic Messaging Policy - Implementation Guidance, 9 March 1995, to all services, "There will be one, seamless, end-to-end global electronic messaging service within the Department of Defense...All electronic messaging (AUTODIN and legacy electronic mail) within the Department of Defense must migrate to DMS-compliant messaging as rapidly as possible." The memo placed a moratorium on the acquisition of non-compliant messaging systems. ODISC4 reinforced this with their message (SAIS-PP, 191615Z DEC 95, Subject: Reconfiguration of The Army Defense Message System (DMS) Management Structure).

See also:

4.4.3.1 E-mail

For more information:

<http://www-tradoc.monroe.army.mil/dcsim/dms/dms.htm>

5.3.1.1 Responsibilities

DMS is a DoD managed program, but responsibilities are distributed. DoD is mostly concerned with designing the program and fielding the infrastructure components, e.g., the message transfer agents and directory service agents. Army has a Project Management Office (PMO), and is assisted by CECOM and others, to include DOIMs for DMS components that neither the DoD nor DMS-Army provide.

The DMS program assumes the availability of suitable CAN and LANs and client PCs. DISA will not fund acquisitions of, or upgrades to, CANs or LANs, which are instead identified as a Service/Agency responsibility. The DMS-Army will provide a suite of interconnected DMS server hardware and software adequate for organizational messaging, i.e., the AUTODIN replacement

architecture.

The Army PMO is the focal point for acquiring DMS components. Customers identify requirements and MIPR funds to PMO. TRADOC has a command-wide off load Waiver approving use of the DMS contract. The PMO will also provide guidance on acceptable messaging and directory components and security requirements. DOIMs will prepare any requests for DMS waivers in TRADOC and submit them in writing to DCSIM for further processing. The Army PMO DMS evaluates waivers and makes an approval recommendation to ODISC4. Waivers ultimately must be approved by DISA.

5.3.1.2 Schedule

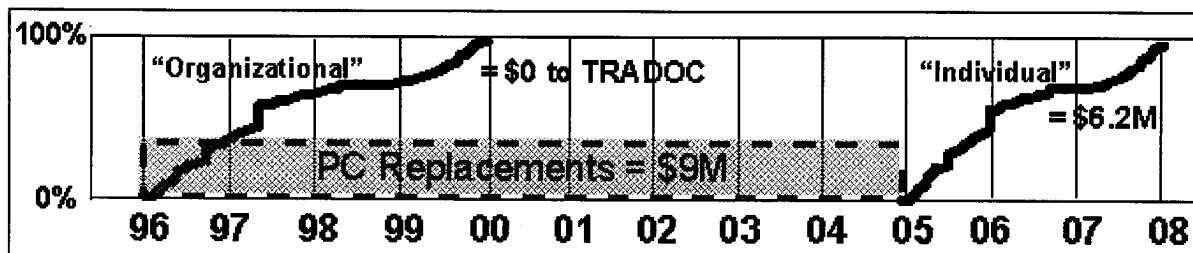


Figure 51. Phased migration to DMS for individual users

DISA will turn off AUTODIN by 2000, so the fielding schedule for organizational messaging components must be completed prior to then. However, given TRADOC's responsibilities and lack of funds for acquiring DMS components for individual users, TRADOC must delay implementing DMS across the command until beginning in 2005. Meanwhile, TRADOC will invest, through normal life cycle replacement, in personal level platforms that can support the DMS architecture.

Table 12. Fielding schedule for DMS organizational users

personal level platforms that can support the DMS architecture. This approach is illustrated in Figure 51. Table 12 provides the PM's fielding schedule for unclassified organizational DMS components.

5.3.2 Desktop VTC

HQ TRADOC directed DVTC efforts are moving out of the fielding phase and into operations. Future extensions of capabilities will be achieved through local or proponent staff investments. HQ TRADOC will upgrade the fielded DVTCs to increase switching capabilities in the multipoint control unit to include 16 users (i.e., coverage for all TRADOC installations) in one session and to increase switching capacity (M60 switch) at local level for remaining installations with a requirement, i.e., Ft. Leonard Wood and Ft. Gordon. As resources and requirements dictate, HQ TRADOC will consider other upgrades, e.g., multi-point application sharing (vice one to one application sharing that is currently available), and displays with continuous presence ("Hollywood Squares").

5.4 Projects--Mission Applications

As a general rule, functional proponents, not DCSIM, lead projects to modernize mission applications. DCSIM is the lead for TRADOC's Y2K approach, which affects all mission area applications. Consistent with the categories used throughout TPRISM, this chapter considers key projects for training applications (Army Training Information Management Program (ATIMP) and Classroom XXI), M&S applications (synthetic environment program) and installation management applications (Army STAMIS, TRADOC ISM and installation unique application migration).

5.4.1 Y2K

The change of the century affects all IS components. Since most of the effort is spent on the migration of application software, TRADOC's Y2K project is described here. The Y2K challenge is to replace code written to use two digits in fields describing the year, and to ensure that all consequences (interfaces, databases, calls to subroutines, report formats, etc.) are managed without operational failure. In some cases, the code is not application software, but operating systems, meaning entire platforms may no longer be serviceable after 2000, which in turn has consequences for the mission applications that depend on such platforms.

Although the entire DoD and Army faces the Y2K challenge, renovations are not centrally funded. TRADOC has therefore issued guidance that all TRADOC activities that produce, maintain, or operate automated systems must:

=> Eliminate or identify for Y2K retirement all automated systems that do not truly assist in mission accomplishment.

=> Spend no resources on systems that will not be in use past 1 January 2000.

=> Postpone all automated system enhancements and non-essential sustainment requirements until they have fixed, tested and certified that critical systems are Y2K complaint. All Y2K work must be accomplished with existing resources; there are no special Y2K funds programmed.

TRADOC Post	Start Date*	Finish Date*
BEN	1/17/97	3/20/98
BLI	3/31/97	10/8/97
CAR	5/1/98	12/2/98
EUS	2/24/97	12/16/97
GOR	10/9/96	8/19/97
JAC	12/1/97	8/13/98
KNO	11/3/97	9/15/98
LEA	3/2/98	10/2/98
LEE	10/2/97	7/10/98
LWD	1/5/98	11/16/98
MCC	7/5/96	7/5/96
MON	1/17/97	12/16/97
POM	10/1/98	5/3/99
SIL	10/2/97	5/22/98
RUC	2/2/98	9/16/98
* Typical tasks during this extended period include: • Site Survey • Acquisition Cycle • Contractor Delivery • System Integration • Site Training • Site Testing • Acceptance		

For more information:
<http://www-tradoc.army.mil/dcsim/y2k/>

5.4.1.1 Responsibilities

DCSIM is the overall lead on TRADOC's Y2K efforts. DCSIM operates TRADOC Project Change of Century WWW site to ensure awareness and coordinate the command's actions.

Each functional proponent (FP) and installation develops and executes a risk-based action plan to determine the scope of the change of century problem. FPs and installations assess all systems in their inventories to ensure no mission critical system failures. They must take the steps to manage the assessment and resolution processes with an acceptable level of risk. FPs and installations must maintain updated systems inventories to ensure all computer based systems are accounted for. They should conduct an impact assessment for all systems, followed by a prioritization for renovation. They must develop timelines and select pilot projects to validate approach and resource estimates. They define resource requirements for necessary resolution actions and implement solutions.

5.4.1.2 Schedule

TRADOC conducted an assessment of the problem and operational risk during 1997. That assessment is nearly completed. It produced an inventory of mission essential TRADOC systems and installation systems that pass data to DoD, DA or TRADOC systems which will be operational after 31 December 1999. The inventory was recorded in a TRADOC DCSIM Y2K database available on the WWW. Systems were assessed in terms of Y2K compliance and mission criticality and functional proponents identified systems to be replaced, redeveloped or retired.

Currently, several phases are running concurrently to ensure systems targeted for retention are operable after 1999, and that the migration path is executed for systems that will not be retained. During renovation, with a completion target of 15 Sep 98, required system fixes will be completed. During validation, with a completion target of 15 Dec 98, systems will be confirmed as Y2K compliant through testing and certification processes. During implementation, to be completed by 15 Dec 98, systems will be certified as fully integrated and operational after certification; and a contingency strategy will be implemented for mission critical systems that can not be renovated. Table 13 shows that during assessment, 55 of 109 systems were targeted for retirement. The current phase of other systems is also shown.

Table 13. Y2K phases

	# Systems	Assess	Renovate	Validate	Retire
MACOM	38	2	2	9	25
Installations	71	16	20	5	30
Total	109	18	22	14	55

5.4.2 ATIMP

The ATIMP provides Army-wide oversight to the development, integration, and operations of over 30 training IS that support institutional training, unit training, and training support. It provides a management and support infrastructure to integrate training IS, processes, and data integration and to preclude the development of unnecessary or redundant training processes and information systems. ATIMP coordinates change management to ensure all related requirements are considered prior to implementing changes in training IS. ATSC is the executive agent for overseeing ATIMP.

ATIMP has developed an objective architecture that plots the migration and integration of Army training IS through FY02. The architecture shows the migration from current training systems (see [Appendix C](#)) to the systems shown in [Figure 28](#).

See also:

4.4.4.1 Training Applications

For more information:

<http://www.atimp.army.mil/index.htm>

5.4.3 Classroom XXI

This project upgrades training facilities and equipment, to include supporting networks, to bring the training institution into line with emerging training concepts. In TRADOC, it upgrades institutional classrooms and fields DTACs.

See also:

4.4.4.1 Training Applications

For more information:

<http://www-dcst.monroe.army.mil/crxxi/toc.htm>

5.4.3.1 Responsibilities

DCST is the TRADOC lead for Classroom XXI, as well as the umbrella Army Training XXI program, and associated enabling programs such as Army Distance Learning Plan and WARNET. DCST will assist schools with requirements determination, monitoring schools' planning for command wide consistency, programming requirements, and developing an equipment procurement list to support implementation, which they will provide to Classroom XXI developers via the WWW. DCSIM assists with integrating common user network capabilities with Classroom XXI requirements, and otherwise assisting DCST with information technology issues. Installations and schools develop their own action plans in accordance with DCST guidance. ISEC is providing technical assistance.

5.4.3.2 Schedule

In the near term, TRADOC is modernizing its CAN segments for clusters of training buildings on TRADOC installations to increase readiness for classroom XXI operations. As ADLP funds become available for use on TRADOC installations, pilot classrooms and DTACs will be fielded as shown in Table 14. Typical site preparation tasks include: collect pre-site survey information, conduct pre-brief to installation, and conduct site survey. Typical implementation tasks include: install equipment, perform facilities work, conduct tests, and gain user acceptance.

Table 14. Fielding schedule for Classroom XXI

Task	Site	Start Date	Finish Date
CRXXI Site Preparation	APG	4/17/97	8/28/97
CRXXI Implementation	APG	2/27/98	8/21/98
CRXXI Site Preparation	BEN	4/17/97	7/31/97
CRXXI Implementation	BEN	2/27/98	8/21/98
CRXXI Site Preparation	BLI	4/17/97	7/31/97
CRXXI Implementation	BLI	2/27/98	8/21/98
CRXXI Site Preparation	CAR	7/5/96	7/5/96
CRXXI Implementation	CAR	7/5/96	7/5/96
CRXXI Site Preparation	EUS	4/17/97	7/10/97
CRXXI Implementation	EUS	12/17/97	6/24/98
CRXXI Site Preparation	GOR	4/17/97	8/7/97
CRXXI Implementation	GOR	2/27/98	8/21/98
CRXXI Site Preparation	HUA	4/17/97	8/7/97
CRXXI Implementation	HUA	2/27/98	8/21/98
CRXXI Site Preparation	JAC	4/17/97	8/14/97
CRXXI Implementation	JAC	2/27/98	8/21/98
CRXXI Site Preparation	KNO	4/17/97	7/24/97
CRXXI Implementation	KNO	2/27/98	8/21/98
CRXXI Site Preparation	LEA	4/17/97	9/4/97
CRXXI Implementation	LEA	2/27/98	8/21/98
CRXXI Site Preparation	LEE	4/17/97	7/10/97
CRXXI Implementation	LEE	9/1/97	6/9/98
CRXXI Site Preparation	LWD	4/17/97	8/28/97
CRXXI Implementation	LWD	2/27/98	8/21/98
CRXXI Site Preparation	POM	4/17/97	7/31/97
CRXXI Implementation	POM	2/27/98	8/21/98
CRXXI Site Preparation	RED	7/5/96	7/5/96
CRXXI Implementation	RED	7/5/96	7/5/96
CRXXI Site Preparation	RUC	4/17/97	8/28/97
CRXXI Implementation	RUC	12/17/97	6/24/98
CRXXI Site Preparation	SIL	4/17/97	7/24/97
CRXXI Implementation	SIL	2/27/98	8/21/98

5.4.4 M&S Modernization

The Army's effort to mature M&S applications into an integrated synthetic environment architecture includes several programs aimed at achieving the objective architecture described in paragraph 4.4.4.2. The migration to HLA, CATT, WARSIM2000, and JWARS are addressed in the

sub-paragraphs below. Another project, the Battle Lab Reconfigurable Simulator Initiative (BLRSI), was recently terminated due to funding cuts. DCSCD is currently establishing a plan to meet requirements for a Battle Lab research tool. Combat developers will prepare and coordinate the performance specifications, and in coordination with STRICOM will develop an Operational Requirements Document (ORD). STRICOM will maintain available reconfigurable simulator funding in FY 97 and FY 98 to meet this requirement.

The migration to HLA is mandated by DoD. TRADOC is committed to support it. The DoD Modeling and Simulation Master Plan required a "review [of] all ongoing DoD M&S projects and/or programs by second quarter FY 1997 for feasibility of immediately adopting the HLA. If not immediately feasible, these reviews shall establish the date by which each program shall comply. If a specific M&S project and/or program is unable to comply with the HLA, the developing Component must report the reason(s) for non-compliance to the DDR&E." The initial report was sent to DMSO 30 Jun 97. The costs for modifying simulations for HLA compliance must come from the proponent for the simulation, which, for TRADOC is estimated to be in the millions of dollars over the next five year period. Development programs that cannot show an HLA migration plan cannot be continued. After 1 Oct 2000, non-compliant systems can no longer play in M&S confederations.

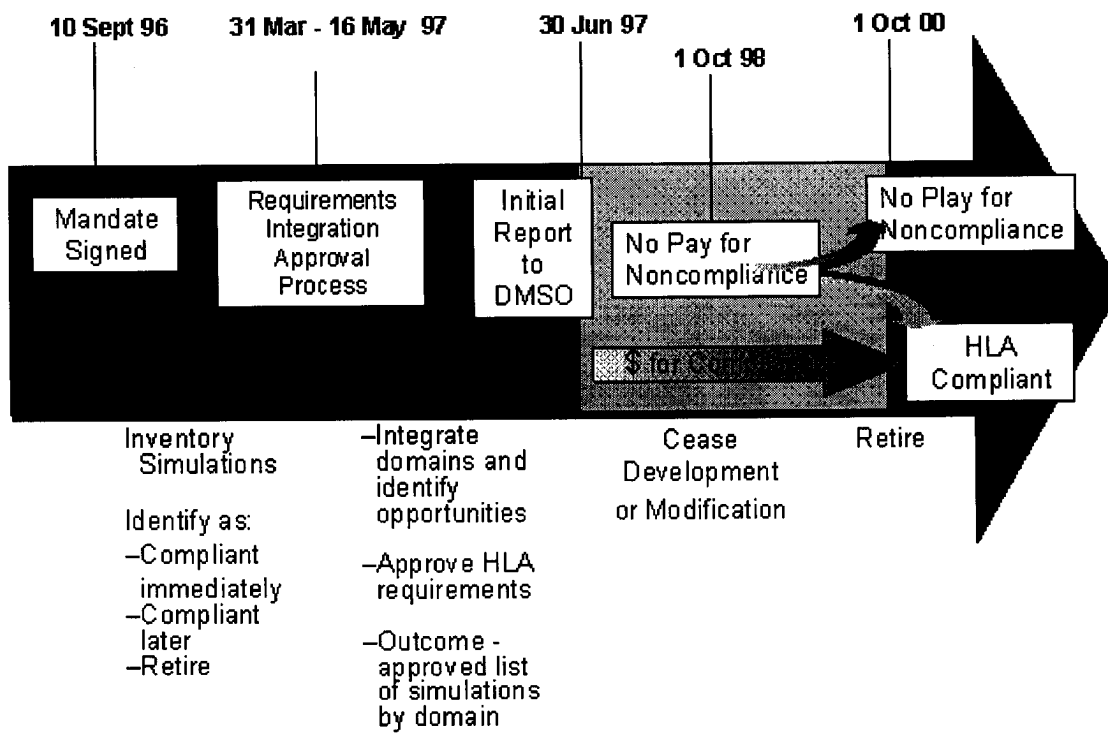


Figure 52. Schedule for Migration to HLA

The schedule for CATT, WARSIM, OneSAF and related M&S modernization projects is depicted in [Figure 53](#). WARSIM2000 initial operation capability (IOC) is in FY99. Fielding to TRADOC is scheduled to begin in FY03. IOC for CCTT is also FY99, with fielding to Forts Knox and Benning planned for that same year. The Synthetic Theater of War-Architecture (STOW-A) project shown below is a suite of equipment to support links among live, virtual, and constructive M&S. STOW-A will provide an interim training capability, and its lessons learned will be used to help develop CCTT and WARSIM applications.

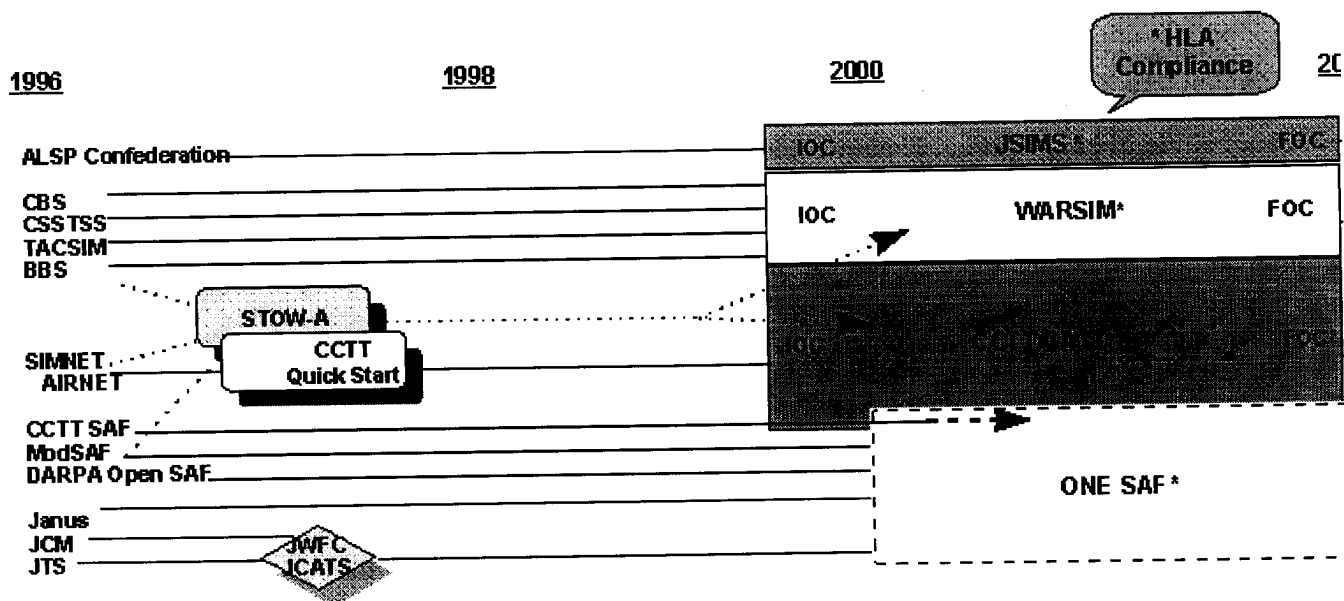


Figure 53. Modernization Schedule for TEMO M&S Applications

In November 1995, the JWARS Office was established to develop JWARS. The JWARS Office is under direction of the Director, Program Analysis and Evaluation (DPA&E) within OSD. JWARS will replace several ACR domain applications described in paragraph 4.3.4.2. The schedule is depicted in Figure 54. JWARS will be HLA compliant. It will be developed incrementally in blocks, corresponding to prioritized functional requirements. JWARS development is in the prototype stage. A proof-of-concept testbed has been designed and is being implemented.

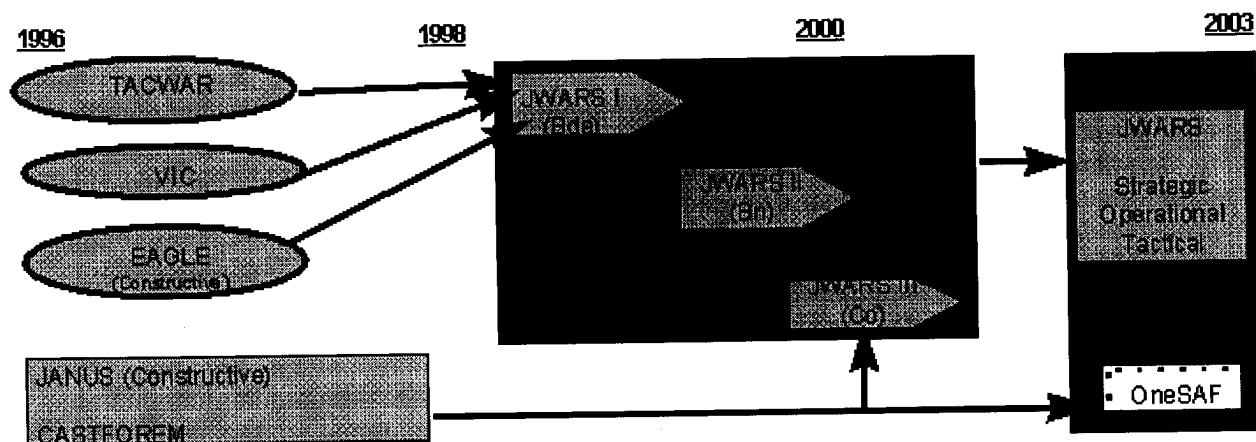


Figure 54. Modernization Schedule for ACR M&S Applications

See also:

5.1.1.1 DISN Enhanced IP Services

5.4.5 Installation Management Applications

TRADOC uses installation management applications from a variety of sources, most from programs managed external to TRADOC. TRADOC must participate during development, site surveys and fielding to ensure the applications can be inserted into a prepared infrastructure.

5.4.5.1 Installation Support Modules

As described in the baseline system architecture (see paragraph 4.3.4.3), there are two sets of ISMs: one fielded by TRADOC, and another set being built and fielded by DA in their ITP and SBIS programs. TRADOC will not run overlapping applications. Therefore, effort expended on TRADOC ISMs is mostly aimed at migrating away from them and toward Army ISMs and STAMIS, not all of which are available yet.

5.4.5.1.1 Responsibilities

The DOIM at Fort Sill developed most TRADOC ISMs and continues to be responsible for their maintenance and migration. DOIMs at each installation run the ISMs in their data processing installation (DPI). HQ TRADOC staff proponents, primarily the DCSBOS, define the operational requirements and priorities.

The PM for Sustaining Base Automation is developing the Army's ISMs for ITP and SBIS, with primary software engineering support from the Software Development Center in Washington DC. DISC4 is the Army staff integrator. HQDA functional proponents define the individual modules' requirements. DA has been responsible for fielding both the hardware environment and the software applications to installations.

5.4.5.1.2 Schedule

The schedule for migrating away from TRADOC's ISMs is tied up with the Y2K challenge, the IBM mainframe replacement project, and the availability of Army replacement applications. See the Y2K and Fielding Timeline pages on the DCSIM's homepage for information on the migration planning for specific applications. The SBIS and ITP ISMs have been, or will be fielded, with few exceptions, coincident with the insertion of the platforms.

For more information:

<http://www-tradoc.army.mil/netviz/syncmatrix/index.html>

5.4.5.2 Civilian Personnel Regionalization

The reorganization of civilian personnel services requires the introduction of a new IS, referred to as the modern system. In 1995, the Deputy Assistant Secretary of Defense for Civilian Personnel Policy [DASD(CPP)] established the Reg/Mod Division within the Civilian Personnel Management Service (CPMS). The Division's charter is to oversee and integrate program activities and to provide functional guidance and direction for developing the modern system. The acquisition, development, configuration, integration, implementation, and life-cycle management of the modern system was brought under the Major Automated Information system Review Council (MAISRC) process. The Central Design Activity (CDA) at the Headquarters Air Force Personnel Center (HQ AFPC), Randolph Air Force Base (AFB), TX, was designated as the software development activity for the modern system.

During FY97 a substantial effort has been made to ensure development, testing, and training activities were put in place to meet the goal to begin fielding the modern system in FY98. DoD will begin developing training materials or identify courses associated with the development, implementation, and functional use of the modern system. System and application testing will occur. A DoD-wide implementation and transition plan will be built to ensure a smooth transition from the legacy to the modern system. Upgrade and acquisition of hardware and software will continue in support of modernization. A central network database management system will be put in place to reduce workload on the Components. The system will be fielded after system testing and operator training efforts are completed.

5.4.5.3 MWRMIS

The Community and Family Support Center (CFSC), an HQDA field operating activity manages the

development and fielding of MWRMIS. CFSC secures an MOI/MOU with gaining installations' Directors of Community Activities prior to fielding. MWRMIS applications are fielded as the are available. The next module scheduled for fielding is RECTRAC.

Table 15. RECTRAC Fielding Schedule

Site	Team arrives	Training	Live Production
Ft Leavenworth	28 Sep 97	6 Oct - 7 Nov 97	7 Nov 97
Ft Eustis/Story	6 Oct 97	13 Oct - 21 Nov	21 Nov
Ft Monroe	3 Nov 97	10 Nov - 9 Jan 98	9 Jan 98
Ft Benning	5 Jan 98	12 Jan - 13 Mar 98	13 Mar 98
Ft Lee	26 Jan 98	2 Feb - 13 Mar 98	13 Mar 98
Ft Rucker	2 Mar 98	9 Mar - 27 Mar	27 Mar 98
Presidio Monterey	29 Jun 98	6 Jul - 24 Jul 98	24 Jul 98

5.5 Modernization Resources

TRADOC IS modernization requires both OPA2 and OMA funds. Most of the funds required to implement the objective system architecture are managed outside TRADOC in DoD and Army projects such as DISN, PPC4I, DMS, SBIS, and STAMIS. TRADOC manages the funding for the Army's ADLP, which includes TRADOC's Classroom XXI project, but also includes Army-wide modernization of training equipment. TRADOC is also budgeted OPA2, earmarked for the IMA, and OMA which is often used for IMA modernization requirements short of OPA thresholds.

OPA2 supports IMA investment costs over \$100K. Planning for OPA2 requirements is done via TRADOC's submissions to the *Army RDA Plan* and associated input to the POM to cover OMA tails, i.e., operational expenditures that are consequences of the planned OPA2 investments. Beginning in 1997, DCSRM, rather than DCSIM, manages the command's OPA2. The major part of TRADOC's OPA2 account is now used for an Army project (ADLP) rather than internal TRADOC investments. HQDA prepares the *Army RDA Plan* and periodically requests input from the MACOMs. The *Army RDA Plan* primarily contains OPA requirements, but also reflects the OMA required to execute the OPA investment dollars. Depending on timelines for the submissions to HQDA, DCSIM solicits OPA2 UFRs from the installations and HQ elements. Architecture framework documents submitted by the installations will be a source of requirements and justifications for short turnaround drills. The functional staff at HQ TRADOC integrate installation submissions in their mission areas. DCSIM integrates the command's submission, staffs the action and recommends Chief of Staff approval.

OMA funding supports operations, including automation, communications, records management, printing and postage, and low cost (<\$100K) acquisitions. OMA, since it is not IMA specific, is allocated to and managed by all TRADOC organizations. Out-year planning for OMA requirements are submitted to the Army POM. Installations submit UFRs to document their OMA requirements for the IMA.

It is important to understand that the resource planning documents, e.g., *Army RDA Plan* and UFRs simply state requirements for funds and that approved requirements, e.g., Operational Requirements Documents, simply recognize the validity of an operational requirement. Neither represent available funding. That step is left to the programming and budgeting processes. TRADOC traditionally receives in its operating budget far less than is requested in its planning documentation.

5.6 Responsibilities for IS Modernization

This section provides an overview of organizational responsibilities for managing projects to modernize TRADOC's IS architecture. TRADOC will not do this alone so several non-TRADOC organizations are also listed. Project-specific responsibilities were given in the paragraphs above.

5.6.1 DoD

In an effort to increase joint interoperability and cut costs, the DoD has increasingly taken on more centralized IM planning and execution responsibilities. DoD has issued the TAFIM to provide a framework for how to plan IS architecture based on its TRM. DoD also maintains the *Defense Information Infrastructure (DII) Master Plan* to lay out their own system architecture modernization planning. According to the master plan, the DII is "a seamless web of communications networks, computers, software, databases, applications, data, and other capabilities that meets the information processing and transport needs of DoD users in peace and in all crises, conflict, humanitarian support, and wartime roles." The DoD, particularly DISA, manage programs of major importance to TRADOC. TPRISM already discussed components of the DII in sections corresponding to their architectural niche within the TRM. These included the DISN, COE and DMS. DoD defines the architecture and provides selective components (e.g., WAN backbone) for each of these programs. DoD also provides contractual vehicles for installations to procure architecturally compliant components to satisfy their own local requirements. DoD also publishes the *Joint Technical Architecture* to promulgate standards necessary for interservice IS compatibility. Lastly, DISA also operates several infrastructure components, including the DISN, and the Defense Megacenters to centralize much of the mainframe processing formerly done by the individual services.

5.6.2 Army

The Army is likewise increasing centralized planning and execution of IM programs. In planning, this includes publication of the *JTA-Army*, which complies with the DoD's *JTA*, and serves as the standards profile for all Army MACOMs. The Army manages several acquisition programs important to TRADOC, e.g., PPC4I through CECOM, and STAMIS, SBIS and ITP through PEO STAMIS.

5.6.3 TRADOC

TRADOC has IM responsibilities for both the Army's Force XXI and for the command's own mission capabilities. The first looks external to TRADOC, while the latter looks internally. Discussion below shows how TRADOC is organized for these two different missions.

5.6.3.1 Army-wide Information Management

CG TRADOC is the Army's requirements manager. In general, TRADOC executes this responsibility by producing doctrine, organizational designs and materiel requirements; and, by approving requirements for all Army warfighting systems and systems in ACAT I-III. DCSCD executes the mission to approve materiel, or systems, requirements. Also, DCSCD is the C4I operational architect for Force XXI. The procedures for requirements management are described in TRADOC Pam 71-9, *Requirements Determination*.

DCSCD has tasked CAC to develop a C4I operational architecture for Force XXI, and tasked the Signal Center to represent TRADOC on system architecture developments. All other schools' Directorates of Combat Developments participate in defining Force XXI architecture and requirements for their area of proponency.

TRADOC is the Army's approving authority for all M&S requirements. The DCSSA is the cross-domain coordinator and integrator for M&S requirements. DCSSA is also responsible for execution and functional management for DIS user requirements. This M&S requirements approval process is also described in an appendix to TRADOC Pam 71-9, *Requirements Determination*. The M&S process includes review by the Requirements Integration Working Group and Council.

The *Army M&S Master Plan* (1995) directed the formation of the three Army level domains as a framework for organizing M&S management: Training, Exercises, and Military Operations (TEMO); Advanced Concepts and Requirements (ACR); and Research, Development, and Acquisition (RDA). DCSOPS Army Modeling and Simulation Office is the single point of contact for the three domains.

Domain Managers identify, integrate and coordinate requirements within each domain; evaluate existing capabilities; establish domain priorities; develop and maintain a Domain Management Plan; and develop and maintain Domain Investment Plans. The DCST and DCSCD are the Domain Agents for TEMO and ACR respectively.

TEMO domain functions are managed by the TEMO Executive Agent (ADCST-S) through the TEMO Action Agent staff (National Simulation Center at Fort Leavenworth). The TEMO domain has established a TRADOC Program Integration Office for the Synthetic Training Environment (TPIO-SE) and four TRADOC Project Offices (TPOs): TPO Live, TPO Virtual, TPO Constructive, and TPO Synthetic Theater of War (STOW). The last manages the combat developer and training developer activities associated with STOW-A.

The materiel developers are outside TRADOC, e.g., STRICOM. DCSIM and DOIMs provide networking support for M&S connectivity within TRADOC.

5.6.3.2 Internal TRADOC Information Management

The DCSIM at HQ TRADOC is responsible for staff supervision and command-wide implementation of the IMA for TRADOC. The DCSIM provides technical expertise to the TRADOC Commanding General, staff, and 16 separate TRADOC Army installation commanders on all aspects of the IMA, and develops IMA policy, plans, programs and architecture for TRADOC's command-wide IS management. TPRISM readers are referred to the DCSIM world wide web page for current information on DCSIM staff responsibilities (<http://www-tradoc.monroe.army.mil/dcsim/imorgan.htm>).

The Deputy Chief of Staff for Intelligence (DCSINT) is the lead HQ staff for the IS security program (ISSP). DCSINT has responsibility for vulnerability assessments, TEMPEST, SCI, and overall IS security (ISS) policy. DCSIM is assigned responsibility for COMPUSEC (to include technical solutions, implementation, and network security) and COMSEC. DCSBOS is responsible for physical security and force protection aspects of the ISSP.

TRADOC installation commanders direct the command's DOIMs. The 1996 functional area analysis (FAA) of the IMA preserved this relationship. DOIMs implement the IMA for all activities on their installation. They provide technical expertise to the installation commander and all tenant activities. They manage their installations IS architecture, define objectives and plan strategy for modernizing their IS; they document installation level requirements and manage lower level requirements for their installation. DOIMs determine the high priority initiatives that can be started within a strategy that keeps its aim on the objective system and technical architecture. They operate installation level IM services, including DPIs. DOIMs chair Information Management Support Committees to review installation level projects and priorities for IS modernization.

ISS managers promulgate security policies and procedures to ensure installation level security of network services. They sit on AIS configuration management boards as a voting member to ensure all new and legacy systems meet security standards as outlined in AR 380-19. They ensure system administrators submit AIS accreditation requests. They ensure terminal area security officers (TASO) and network security officers (NSO) are appointed on orders and understand their responsibilities. They review all proposals by DOIMs to establish subscriptions for commercial services, e.g. America on Line, to establish security procedures and determine required protection equipment needs. They fund security training for System Administrators and NSO.

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[Appendix A: TRADOC's Technical Architecture Standards]

[Appendix B: Network Diagrams]

[Appendix C: Mission Applications]

[Appendix D: Acronyms]

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6. APPENDIX A: TRADOC's Technical Architecture Standards

Para	Title	Para	Title
<u>6.1</u>	Networks	<u>6.2.3</u>	System Support Service
<u>6.1.1</u>	Networking Layer	<u>6.3</u>	Applications
<u>6.1.2</u>	Inter-networking Layer	<u>6.3.1</u>	Common Operating Environment
<u>6.1.3</u>	Host to Host Transport Layer	<u>6.3.2</u>	E-mail
<u>6.2</u>	Platforms	<u>6.3.3</u>	Videoteleconferencing
<u>6.2.1</u>	Hardware--Personal Level	<u>6.3.4</u>	Modeling and Simulation
<u>6.2.2</u>	Operating Systems	<u>6.3.5</u>	Electronic document Exchange Formats

TRADOC uses the standards profile established in the *JTA-Army*, last approved 11 Sep 97. Refer to the worldwide web for version 5.0 and any updates. The *JTA-Army* is based on widely accepted commercial standards. TRADOC will make permissible refinements and additions to the *JTA-Army* as required to execute our mission and maintain command-wide information flow. This appendix provides portions of the *JTA-Army* which are of primary importance within TRADOC for technical architecture compliance. An even more compressed overview is available on the DCSIM homepage.

See also:

4.2 Technical architecture

For more information:

<http://www-jta.itsi.disa.mil/>

6.1 Networks

The *JTA-Army* adopts widely accepted, commercial standards regarding networks for transporting information. Specifically, the *JTA-Army* standards and protocols are based on the same open architecture as the Internet and the DISN. The *JTA-Army* primarily covers standards for packet switched networks.

Effective information transport requires standardization by both networking and computing system components. There are several ways to architect, or partition, information transport among hardware components. The Government Open System Interconnection Profile (GOSIP) was previously the standard mandated by DoD, but that is no longer true. The *JTA-Army* adopts the architecture used for Transmission Control Protocol/Internet Protocol (TCP/IP). Figure 55 shows how that architecture is partitioned, and the particular standards *JTA-Army* cites for each.

The networking layer, as shown in Figure 55, is implemented by network system components. Networks may be relatively simple (e.g., point-to-point links) or have complex internal structures (e.g., a network of packet switches). Routers and hosts implement the higher layers shown in Figure 55. Routers interconnect two or more networks and forward packets across network boundaries. Hosts are computers that generally execute application programs on behalf of users and share information with other hosts via networks. TPRISM defers discussing the standards at the user services layer until paragraph 6.2.

The IP suite is several different protocols, defined in a series of Request for Comments (RFCs) published by the Internet Architecture Board (IAB). IAB Standards (STDs) are a subseries of notes within the RFC series. The *JTA-Army* mandates only a subset of protocols within the entire IP suite. Other protocols within the IP suite can be used if they provide services that are not offered by any of the *JTA-Army's* mandated protocols.

STANDARDS											LAYER	
FTP STD-9	TEL-NET STD-8	BGP V4 RFC-1771/ 1772	HTTP	X.400/ X.500 DMS STD-55	DNS STD-13	EDOTP RFC-851	DHCP RFC-1541	SNMP STD-15	MIL-STD 2045 - 47001	OSPF V2	USER	
TCP STD-7						UDP STD-6				RFC- 1583	HOST TO HOST	
IP STD-5												INTERNETWORKING
MIL-STD- 188-220A	PPP	CCITT X.25 (DCE)	ISO 8203 (DTE)	IEEE 802.3 Ethernet V2	LLC IEEE 802.2	AAL1 AAL5		NETWORKING & ACCESS				
			ISO 7776 (DTE)									
		RS-232, 449, 530 or ISDN (1430, 1431)				FDDI ISO 9314						ATM

Figure 55. Layered standards for information transport

6.1.1 Networking Layer

The first layer of information transport standardization covers internal networking and external network access, as shown in [Figure 55](#). The TCP/IP suite, since it is concerned with inter-networking, does not mandate standards at this layer. The *JTA-Army* permits several standardization approaches at this level, e.g., ATM, FDDI and X.25. Furthermore, this layer contains multiple standards because there are multiple capabilities that must be standardized, e.g., cabling and other physical components, data framing, protocols to establish and maintain electronic links, error detection, synchronization and flow control of signals. Multiple approaches to standardization at this layer provide options for a range of performance needs, e.g., LANs vs. CANs. Designers for information transport systems will choose specific network standards based on the requirements for a given application, such as cost and speed-of-service.

6.1.1.1 Ethernet

Ethernet is the most common LAN technology available. Data is transmitted at 10 Mbps over a cable, which is shared by multiple hosts. At the physical layer, Ethernet shall be implemented with any of four different types of cable. The implementations (and cable types) shall be as defined by the IEEE as: 10Base-5 (thick coaxial); 10Base-2 (thin coaxial); 10Base-T (unshielded twisted pair); and 10BaseF (fiber-optic cable). Hosts use a carrier sense multiple access with collision detection (CSMA/CD) scheme to control access to the cable. Ethernet's physical layer and CSMA/CD access scheme are specified in IEEE 802.3. The interface between Ethernet and IP shall be in accordance with STD- 41 and STD-37.

For higher-capacity requirements, 100-Mbps Ethernet technology can be implemented in

accordance with IEEE 802.3u. This standard supports auto-negotiation of the media speed, making it possible for dual-speed Ethernet interfaces to run at either 10 or 100 Mbps automatically.

- *STD-41 Standard for the Transmission of IP Datagrams over Ethernet Networks, C. Hornig, April 1984 (Also RFC-894)*
- *STD-37 An Ethernet Address Resolution Protocol, Nov 1982.*

6.1.1.2 FDDI

FDDI is a mature standard for high-capacity LANs and CANs. Data is transmitted at 100 Mbps over either multimode or single mode fiber-optic cable. FDDI is defined by a series of ISO standards. These standards shall apply: 9314-1 (physical layer), 9314-2 (media access control), and 9314-3 (medium dependent). In addition, the Station Management (SMT) protocol defined in ANSI X3.229 shall be used.

The Logical Link Control (LLC) layer for FDDI shall be as specified in IEEE 802.2. The interface between FDDI and IP shall be in accordance with STD-36.

- *STD-36 Transmission of IP and ARP over FDDI Networks, D. Katz, January 1993 (Also RFC-1390)*

6.1.1.3 Asynchronous Transfer Mode

ATM is a high-capacity switching technology that takes advantage of low bit- error rate transmission facilities to accommodate intelligent multiplexing of voice, data, video, imagery, and composite inputs over high-capacity trunks. The network access protocols to ATM switches are defined in the ATM Forum's User-Network Interface Specification, Version 3.1. These network access protocols can operate over fiber-optic and twisted pair cables, with data rates of 1.5, 2, 45, 51, 100, and 155 Mbps.

The *Private Network-Network Interface (PNNI) Specification, Version 1* is mandated. PNNI supports the distribution of topology information between switches and clusters of switches to allow paths to be computed through the network. PNNI also defines the signaling to establish point-to-point and point- to-multipoint connections across the ATM network.

The protocol layers consist of an ATM Adaptation Layer (AAL), the ATM layer, and a physical layer. The role of AAL is to divide the variable-length data units into 48-octet units to pass to the ATM layer. There are currently four defined AAL protocols to support different service classes. The ATA mandates two of these AAL protocols. AAL1 shall be used to support constant bit rate service, which is sensitive to cell delay, but not cell loss. AAL5 shall be used to support variable bit rate service. AAL1 and AAL5 are specified in ANSI T1.630 and T1.635, respectively. IP packets shall be transported over AAL5, in accordance with RFC-1577. Ethernet can be emulated by ATM networks using *Local Area Network (LAN) Emulation over ATM, Version 1.0*. This permits ATM networks to be deployed without disruption of host network protocols and applications.

6.1.1.4 ITU X.25

X.25 is an international standard that has been widely adopted for packet- switched networks. X.25 defines the interface between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The DTE generally refers to the router or host equipment side of the interface, and the DCE refers to the communications network side.

The standards that apply to DTEs are different from (but fully compatible with) the standards that apply to DCEs. For DCEs, ITU X.25 shall be used at the data link and packet (i.e., intra network) layers. For DTEs, ISO 7776 shall be used at the data link layer and ISO 8208 shall be used at the packet layer.

At the physical layer, the X.25 interface shall be in accordance with Recommended Standard

(RS)-232, RS-422/423/449, or RS530.

The method of working IP with X.25 interfaces shall be as specified in RFC- 1356.

6.1.1.5 Integrated Services Digital Network (ISDN)

ISDN is an international standard used to support integrated voice and data over standard twisted-pair wire. ISDN defines a Basic Rate Interface (BRI) and Primary Rate Interface (PRI) to provide digital access to ISDN networks. These interfaces support both circuit-switched and packet-switched services.

The BRI and PRI physical layers are specified by I.430 and I.431, respectively. The profiles for BRI and PRI are National ISDN 1 and 2, respectively. The BRI physical layer uses two wires to provide two B channels (64 kbps) for information transport and one D channel (16 kbps) for signaling. The PRI physical layer uses four wires to provide 23 B channels (64 kbps) for information transport and one D channel (64 kbps) for signaling. The B channels can provide clear channel services or packet based, point-to-point services.

For B channels configured for packet-switched services, the data link and network layers shall be the same as specified in X.25. IP packets shall be encapsulated and transmitted over ISDN as specified in RFC-1356. For B channels configured for clear channel services, IP packets shall be encapsulated and transmitted using PPP over ISDN as specified in RFC-1618. For D channels, the data link layer is specified in Q.921 and the network layer is specified in Q.931.

6.1.2 Inter-networking Layer

All protocols within the IP suite use IP, specified in STD-5, as the basic data transport mechanism. IP provides a basic connectionless datagram service among heterogeneous networks. Two other protocols, also specified in STD-5, are integral parts of IP: the Internet Control Message Protocol (ICMP) and the Internet Group Management Protocol (IGMP). ICMP is used to provide error reporting, flow control, and gateway redirection. IGMP provides multicast extensions for hosts to report their group membership to multicast routers.

IP, ICMP, and IGMP are mandatory protocols for all hosts and routers. The profile shall be in accordance with MIL-STD-2045-14502-1A.

- *STD-5 Internet Protocol, J. Postel, September 1981 (Also RFC-791, RFC-950, RFC-919, RFC-922, RFC-792, RFC-1112)*

6.1.3 Host to Host Transport Layer

Either STD-6 or STD-7 will be used at the transport layer. These two protocols provide fundamentally different services. STD-6 defines the User Datagram Protocol (UDP), which provides a connectionless, datagram service to applications not requiring reliable, sequenced communications. STD-7 defines the Transmission Control Protocol (TCP), which provides a reliable, connection-oriented transport service.

- *STD-6 User Datagram Protocol, J. Postel, August 1980 (Also RFC-768)*
- *STD-7 Transmission Control Protocol, J. Postel, September 1981 (Also RFC-793)*

6.2 Platforms

In the TRM, platforms encompass the computing hardware, operating system, and system support services. Each is discussed in the sections below.

6.2.1 Hardware--Personal Level

The *JTA-Army* does not say much about the hardware layer. It depends more on standardizing the platforms' operating systems and APIs to ensure interoperability.

At the personal platform level, ASD(C3I) issued the *Department of Defense Personal Computer Policy Implementation Plan FY 1995 - FY 2000*, March 31, 1995. It provides performance standards for personal computers (PCs), based on requirements for running DMS and the Defense Information Infrastructure (DII) common operating environment (COE). It exempts only those PCs used solely as file servers or for CAD/CAM. While not part of the *JTA-Army*, this guidance does contribute to the standardization of personal computers. TRADOC made permissible modifications as shown in [Table 5](#), Recommended PC configuration.

6.2.2 Operating Systems

These core services are necessary to operate a computer platform and support application software. They control applications' access to information and the underlying hardware. They include kernel operations, shell and utilities. The *JTA-Army* mandates Win32 APIs for accessing operating system services in sustaining base systems, i.e., applications of the type used to support TRADOC's internal business. For other systems, which TRADOC might train, *JTA-Army* mandates the POSIX standards.

- *Win32 APIs, Microsoft Win32 Programmers Reference Manual, Volumes 1-5, 1993, Microsoft Press.*

6.2.3 System Support Services

The TAFIM TRM defines six system support services: software engineering, user interfaces, data management, data interchange, graphics, and network services.

6.2.3.1 Software engineering

Since Ada was the mandated software engineering environment for so long, it is worth stating here that since April 1997, DOD no longer required the use of Ada. HQDA promulgated this for Army as well in a DISC4 memorandum, SUBJECT: Selection of Third Generation Programming Languages, 28 Jul 97. Instead, developers will select their programming language in the context of system and software engineering factors that influence overall life-cycle costs, risks, and interoperability.

6.2.3.2 User Interface Services

These services implement the Human Computer Interface (HCI) style and control how users interact with the system. The *JTA-Army* mandates the windowing Win32 APIs for sustaining base systems, i.e., applications of the type used to support TRADOC's internal business. For other systems, which TRADOC might train, *JTA-Army* mandates the Common Desktop Environment which is based on X Window System and Open Software Foundation (OSF) Motif. See [section 5 of the JTA-Army](#) for details on HCI style, e.g., how the screen looks and behaves. The following standards apply:

- *Win32 APIs, Window Management and Graphics Device Interface, Volume 1 Microsoft Win32 Programmers Reference Manual, 1993, Microsoft Press.*
- *FIPS Pub 158-1, X Window System, Version 11, Release 5*
- *OSF, 1992, Motif Application Environment Specification, Release 1.2*
- *OSF/Motif Inter Client Communications Convention Manual (ICCCM)*

6.2.3.3 Data Management Services

The data management services provide independent management of data shared by multiple applications. These services support the definition, storage, and retrieval of data elements from monolithic and distributed, relational DBMSs.

To support the identification of information and information interchange requirements, the DoD has

selected the Integrated Definition (IDEF) modeling methodology. DoD Directive 8320.1-M requires IDEF0 (Integrated Definition for Function Modeling) in accordance with *FIPS Pub 183* and IDEF1X (Integrated Definition for Information Modeling) in accordance with *FIPS Pub 184* as the presentation standard for activity and data modeling, respectively. Data model development shall proceed in accordance with DoD 8320.1-M-X, which authorizes a single authoritative source for data definitions and documentation standards, i.e., the Defense Data Dictionary System (DDDS). The DDDS is used to collect and integrate individual data models into a DoD data model and to document content and format for data elements. It is the DoD-wide integration point for standard data element definitions.

Data management services also support platform-independent file management (e.g., the creation, access, and destruction of files and directories). The *JTA-Army* mandates the ANSI Structured Query Language (SQL) standards with Ada interfaces. The following standards are mandated for any system required to use a relational DBMS for managing information shared among multiple users or applications.

- *FIPS Pub 183 Federal Information Processing Standards Publication 183, Integration Definition for Function Modeling (IDEF0), 21 December 1993*
- *FIPS Pub 184 Federal Information Processing Standards Publication 184, Integration Definition for Data Modeling (IDEF1X), 21 December 1993*
- *FIPS Pub 127-2, Database Language - SQL*
- *ISO 12227:1994, SQL Ada Module Description Language*
- *Open Data Base Connectivity, ODBC 2.0: Provides standard APIs between database application clients and the database server.*

6.2.3.4 Data Interchange Services

The data interchange services provide specialized support for the exchange of data and information between applications and to and from the external environment. Standards for these services apply more to system developers than system users. TPRISM readers needing to understand standards that apply are referred to the *JTA-Army*. For the users' perspective, see paragraph 6.3.5 regarding formats for exchanging applications software files via e-mail or file transfer protocol.

6.2.3.5 Network Services

The technical architecture for some network services was already described in the network section above, paragraph 6.1. The reader is referred there for information to complement the description below. The protocols discussed in the following subparagraphs are mandated for all hosts that require these capabilities.

6.2.3.5.1 File Transfer

Basic file transfer shall be accomplished using File Transfer Protocol (FTP). FTP provides a reliable, file transfer service for text or binary files. While designed to be used by other programs, it includes a direct interactive user interface to enable access to remote file servers. FTP is specified in STD-9. The profile shall be in accordance with MIL-STD-2045-17504.

- *STD-9. File Transfer Protocol, J. Postel, J. Reynolds, October, 1985. (Also RFC- 959)*

6.2.3.5.2 Remote Terminal

Basic remote terminal services shall be accomplished using TELNET. TELNET provides a virtual terminal capability that allows a user to "log on" to a remote system as though the user's terminal was directly connected to the remote system. TELNET is specified in STD-8. The profile shall be in accordance with MIL-STD-2045-17506.

- *STD-8. Telnet Protocol, J. Postel, J. Reynolds, May, 1983 (Also RFC-854, RFC- 855)*

6.2.3.5.3 E-mail

The standard for electronic mail is compliance with the Defense Message System (DMS). DMS-compliant X.400 provides a full-featured, electronic mail service, as specified in Allied Communication Publication (ACP) 123. Note that X.400 is not an Internet standard, but can operate over IP networks through the use of STD-35.

6.2.3.5.4 Directory Services

International Telecommunications Union (ITU) X.500 is mandated for use with DMS. X.500 which provides directory and security services that may be used by users or DMS-compliant applications to locate other users and resources on the network. Note that X.500 is not an Internet standard, and must operate over TCP through the use of STD-35.

6.2.3.5.5 Translating Names to IP Addresses

The Domain Name System (DNS) provides the service of translating between host names and IP addresses. DNS, which uses TCP as a transport service, is specified in STD-13.

- *STD-13 Domain Name System. Also RFC 1034 and 1035.*

6.2.3.5.6 Network Management

All hosts and routers shall implement the Simple Network Management Protocol (SNMP) set of management protocols. The set consists of STD-15, STD-16, and STD- 17.

- *STD-15 Simple Network Management Protocol, J. Case, M. Fedor, M. Schoffstall, J. Davin, May 1990 (Also RFC-1157)*
- *STD-16 Structure of Management Information, M. Rose, K. McCloghrie, May 1990 (Also RFC-1155, RFC-1212)*
- *STD-17 Management Information Base, K. McCloghrie, M. Rose, March 1991. (Also RFC-1213)*

6.2.3.5.7 Dynamic Configuration

Dynamic Host Configuration Protocol (DHCP) provides an extension of BootStrap Protocol (BOOTP) to support the passing of configuration information to Internet hosts. DHCP consists of two parts: a protocol for delivering host-specific configuration parameters from a DHCP server to a host and a mechanism for automatically allocating IP addresses to hosts. DHCP is specified in RFC1541. (NOTE: BOOTP provides a mechanism for a diskless system to bootstrap itself. BOOTP is specified in RFC-951, with additional clarification provided in RFC-1542.)

6.2.3.5.8 Hypertext Transfer

HyperText Transfer Protocol (HTTP) is used for search and retrieval within the WWW. HTTP uses TCP as a transport service. The Uniform Resource Locator (URL), which specifies how objects are identified with HTTP, is defined in RFC-1738 and RFC1808.

- *RFC-1866, Hypertext Markup Language 2.0, 3 Nov 95.*

6.3 Applications

For the software application layer, the *JTA-Army* encourages domain-specific application architectures, with standardized interfaces to lower level components, and a commonality that grows from using the DII common operating environment (COE). In this way, common reusable software and products become the building blocks that are used as-is or extended, if necessary, to meet different operational requirements, e.g., for weapons systems or installation IS.

6.3.1 Common Operating Environment

The DII COE is both a collection of reusable software components and a set of architectural guidelines and standards. The guidelines and standards specify how to build new software so that integration is seamless and, to a large extent, automated. Software components in the COE are built for a "plug and play" open architecture designed around a client/server model.

The DII COE is based on work from the command and control domain with contributions from logistics. DoD plans to expand it to other domains with different requirements, e.g., transportation, base support, personnel, health affairs, and finance.

The *JTA-Army* does not mandate the use of specific COE software products, since implementation decisions belong to the Systems Architecture, but it does emphasize the principle of software re-use. Software designers will use common support applications from the COE software library to the maximum extent consistent with requirements. DISA maintains the COE software in an on-line configuration management repository called COE Software Repository System (CSRS). See world wide web site: <http://spider.osfl.disa.mil/dii/coe>.

The *JTA-Army* also emphasizes designing toward the COE architectural concept. Fundamental to that concept are segmentation and the use of public APIs. All systems that must be integrated into the DII will segment their applications in accordance with the *DII COE Integration, Runtime Specification, Version 2.0*, 23 October 1995, and use the public APIs from the *COE Baseline Specification 3.1*, 29 April, 1997.

6.3.2 E-mail

Since 1988, the ASD(C3I) has championed the Defense Message System (DMS) as the standard approach to electronic messaging and e-mail for the DoD. ASD(C3I) has mandated that DMS will be the single, seamless, end-to-end global electronic messaging service for all DoD messaging requirements, encompassing all environments: strategic, tactical, fixed, and mobile. The *JTA-Army* reinforces this for Army users.

DMS implements internationally developed standards. DMS compliance consists of at least electronic messaging in accordance with X.400 and directory services in accordance with X.500, and interoperability and compliance certification by the DISA Joint Interoperability Test Center (JITC). Implementation also requires FORTEZZA cards for user authentication and data integrity. As soon as JITC successfully tests and certifies DMS compliant products, TRADOC will approve the acquisition of only those e-mail systems that appear on the certified list. Noncompliant messaging systems can be procured only when a transition path to full DMS compliance is documented and approved by the DISA, in accordance with CJCSI 5721.01, Chairman of the Joint Chiefs of Staff Instruction, *The Defense Message System and Associated Message Processing Systems*, 28 June 1993.

Per paragraph 4.4.3.2, TRADOC recommends the acquisition of MS Exchange as an office management product, to include e-mail capabilities, to meet DMS compliance requirements and obtain support from TRADOC DOIMs.

6.3.3 Video Teleconferencing

ITU-T H.324, Terminal for Low Bit Rate Multimedia Communication, March 1996 is mandated for VTC terminals operating at low bit rates (9.6-28.8 kbps).

VTC terminals operating at data rates of 56-1,920 kilobits per second (kb/s) will comply with VTC001-Rev1, Industry Profile for Video Teleconferencing, Revision 1, dated April 25, 1995. The profile provides interoperability between VTC terminal equipment, both in point-to-point and multipoint configurations for telephony applications. The following are mandated standards for VTC terminals operating at data rates of 56-1,920 kb/s:

- VTC001-Rev1, Industry Profile for Video Teleconferencing, Revision 1, 25 April 1995.
- ITU-T H.221, Frame Structure for a 64 to 1,920 kbit/s Channel in Audiovisual teleservices, July 1995.
- ITU-T H.321, Adaptation of H.320 Visual Telephone Terminals to B-ISDN Environments, March 1996.
- ITU-T H.224, A Real Time Control Protocol for Simplex Applications using the H.221 LSD/HSD/MLP channels , November 1994.
- ITU-T H.281, A Far-End Camera Protocol for Videoconferences Using H.224, November 1994.
- ITU-T H.244, Synchronized Aggregation of Multiple 64 or 56 kb/s channels, July 1995.

Additional ITU-T ratified standards are mandated for VTC systems implementing multimedia applications. For VTC applications implementing the features of audiographic conferencing, facsimile, still image transfer, annotation, pointing, shared whiteboard, file transfer, and audio-visual control, the following standards are mandated:

- ITU-T T.120, Data Protocols for Multimedia Conferencing, July 1996.
- ITU-T T.122, Multipoint Communication Service for Audiographics and Audiovisual Conferencing Service Definition, March 1993.
- ITU-T T.123, Protocol Stacks for Audiographic and Audiovisual Teleconference Applications November 1994.
- ITU-T T.124, Generic Conference Control, August 1995.
- ITU-T T.125, Multipoint Communication Service Protocol Specification, April 1994.
- ITU-T T.126, Multipoint Still Image and Annotation Protocol, August 1995.
- ITU-T T.127, Multipoint Binary File Transfer Protocol, August 1995.

6.3.4 Modeling and Simulation

The Advanced Research Projects Agency (ARPA) Simulation Network (SIMNET) program helped develop the Distributed Interactive Simulation (DIS) standards and protocols (e.g., Institute of Electrical and Electronic Engineers (IEEE) Standard 1278). The DIS protocols and standards establish a common data exchange, using Protocol Data Units (PDU), that supports the interoperability of heterogeneous, geographically distributed live, virtual and constructive simulations.

There will not be a DIS 3.0, in the sense of a follow-on generation to the current IEEE-1278-199(7/8) 2.x standards. Future evolution of DIS is denoted DIS++. The architecture adopted for DIS++ is High Level Architecture (HLA). HLA is defined by an interface specification (with corresponding API), an object model template, and a set of underlying technical principles (rules). DIS++ is a set of standards supporting HLA. HLA is the DOD's objective technical architecture for M&S.

ARPA also developed the Aggregate Level Simulation Protocol (ALSP). ALSP is being used to interconnect existing theater-level constructive simulations, e.g., Corps Battle Simulation, that were not designed to act in a federation. ALSP confederations will remain a cornerstone of joint force level modeling and simulations for the next few years until HLA compliant M&S are fielded.

6.3.5 Electronic Document Exchange Formats

The DOD and Army have not established "standards", in the sense of mandatory products, for office automation. TRADOC has recommended a suite of office automation applications (see [Table 6](#)). While these recommendations are not open standards, as the term is used in *JTA-Army* and TPRISM, they will help ensure interoperability and technical support.

From the command's perspective, the *minimal* capability required for interoperability of office automation products is that they be able to exchange files, e.g., as e-mail attachments, with minimal loss of information. Acquisition of applications with the file exchange capabilities listed [Table 16](#) will provide that interoperability while allowing flexibility of office automation applications. Many applications besides the original vendor's can read and write these formats. They are intended to

represent the most capable formats that are widely available and supported. The *JTA* and *JTA-Army* give recommended file formats for additional file/document types.

Table 16. Mandatory formats for file exchange

Document Type	Standard Format	File Name Extension (MIME Type)
Compound Document	MS Word 6.0	.doc
Briefing/Graphic Presentation	MS Powerpoint 4.0	.ppt
Spreadsheet	MS Excel	.xls

* Compound documents contain embedded graphics, tables and formatted text.

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7. APPENDIX B: Network Diagrams

In the published version of TPRISM, this appendix contains diagrams of the baseline architecture for WAN access and CANs on TRADOC installations. Readers of the WWW version are referred to <http://www-tradoc.army.mil/netviz/index.html> for the same displays.

These graphics, with associated data in spreadsheet format, are maintained by the DCSIM. The data in this appendix was reported by installation DOIMs during May 1997 as a result of a DCSIM data call. DCSIM solicits updates to this database on a continuous basis.

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8. APPENDIX C: Mission Applications

Para	Title	Para	Title
8.1	Training Applications	8.3	Installation Transition Processing (ITP)
8.2	Standard Army Management Information Systems	8.4	SBIS
8.2.1	ASIMS	8.5	MWRMIS Modules
8.2.2	Other STAMIS	8.6	TRADOC ISMS

This appendix gives a brief description of the mission applications referred to in TPRISM. It includes Standard Army Management Information Systems (STAMIS) and installation support modules fielded by the ITP, SBIS and TRADOC ISM programs. It also covers training MIS, mostly fielded by Army Training Support Center.

8.1 Training Applications

ATSC manages a library of training applications. More information about them can be found at <http://www.atimp.army.mil/>

Army-wide Devices Automated Management (ADAM) - ADAM provides Life Cycle Management (LCM) of training devices, distribution and redistribution, storage and supply supporting training support centers worldwide. MATS will assume functionality of ADAM or ADAM will be incorporated into MATS. Remote users (TSCs and MACOMs) cannot currently access system.

Army Training Digital Library (ATDL) - ATDL provides a globally accessible digital repository of Army doctrine, training knowledge sets, and interactive applications to support training of individuals and units. Offera information such as doctrinal literature (e.g., Field Manuals), abbreviations/acronyms, etc. identified as static documents and not made available through the library from any legacy system. Planned modernization efforts focus on multimedia; interactive training courseware; Training Support Packages (TSP) containing structured situational templates for planning, preparing for, and conducting training; information relating to Training Aids, Devices, Simulations and Simulators (TADSS) available to support training; unprocessed After Action Review (AAR) information from Combat Training Center (CTC) unit rotations, major exercises, and operational missions; lessons learned derived from processed and analyzed AAR information resident in the Army Historical Archives System (AHAS).

Automated Instructional Management System (AIMS) - AIMS is a training management system for resident student information; personnel management, student grades and records, and scheduling. It will be replaced by AIMS-R.

Automated Instructional Management System-Redesign (AIMS-R) - AIMS-R is a training management system for automating resident student information; personnel management, student grades and records, quota control, testing, and scheduling. It supports course development/design for ASAT. Undergoing pilot systems development.

Army Modernization Training Automation System (AMTAS) - AMTAS is a centralized database of all Army New Equipment Training (NET) plans. The system provides the ability to exchange information with combat, training, and materiel developers, and allows the staffing and approval of new NETPs electronically. Army Materiel Command is the proponent.

Army-wide System for Automated Training and Doctrine Development (ASATD). A tool for developing and producing training and doctrine information and products. ASATD supports both the WARRIOR and WARFIGHTER components of ATXXI through its total Army task based training and doctrine database. This database provides the foundation for both the Automated Instructional Management System-Redesign (AIMS-R) for institutional training and the Standard Army Training System (SATS) for unit training.

Audio-Visual Library System (AVLS) - AVLS tracks equipment location, usage, and duplications within Training Support Centers (TSCs). WOMS also captures TSC labor requirements. Functionality will be assumed by TRAVISS. Access is provided through the use of dumb terminals and personal computers within the TSCs. Connectivity is limited to hardware or modem connection to the installation mainframe.

CALL Collection Observation Management System (CALLCOMS) - A collection of all plans and observations from training exercises.

Combined Arms Training Strategy (CATS) - CATS is the Army's overarching concept to develop training strategies for the total force in schools, units and in self-development. It provides a means for the management and planning of Army training and training resources for Force XXI. It captures all tasks that are taught in institutions, in units, and through self-development and the resources required to train those tasks to standard. Will eventually operate in ASAT.

Force XXI Training Database - The FXXI Training Database is a prototype system consisting of three databases supporting the FXXI training process that address doctrinal training tasks for Deliberate

Attack, mounted brigade level mission organizations, and simulation resource requirements. The training-based architecture includes tracing and tracking of tasks from tactical level BOSs and major brigade level tasks down to platoon level tasks, conditions and standards for a mounted brigade including the brigade's divisional "slice." The organizational architecture includes the normal support elements provided by the division and higher units to brigades engaged in combat operations. The simulation resource requirements architecture identifies simulators and simulations with potential to support training of identified tasks from brigade down to platoon.

MILES Army-wide Tracking System (MATS) - MATS automates data collection at the user level concerning usage, maintenance, and inventory data for TADSS. Creates summary data in electronic format for data sharing capability with other automated systems using standard DOD and Army LANs, WANs, and LHNs. TRAVISS will assume its functionality.

Media Elimination and Design Intelligent Aid (MEDIA) - MEDIA assists the training developer in media, method, site, learning strategy, category of learning, selection and environmental, and safety assessment.

Manpower Staffing Standards System (MS3) - MS3 helps manage course variable data information for resourcing input to Structured Manning Decision Review (SMDR) and TRADOC Review of Manpower (TRM). Application is run on IBM CSP mainframe using VM. It will be replaced by AIMS-R.

Program of Instruction Management Module (POIMM) - POIMM provides program management and distribution of POI and course administrative data in electronic format. Partial automation of TRADOC Reg 351-1, produces course administrative data and program of instruction (POI). Will be part of AIMS-R.

Range Facility Management Support System (RFMSS) - RFMSS automates range facility management. Allows users to track events from the time of initial request. Also used to track training assets, utilization, and inventory for the Army and USMC to predict resourcing requirements. Distributes range scheduling information to installation units and to higher headquarters. Follow on versions being developed. Fielding plan not final.

Ranges, Targets, STRAC, and Ammunition (RTSA) - RTSA helps determine resource requirements for training assets and inventories available assets.

Reception Battalion Automated System (RECBASS) - provides automated in-processing for new soldiers through the reception battalion by updating soldier's personnel records and by preparing the forms contained in the individual's 201 and finance files. Data consists of new soldier personnel information.

Standard Army Training Systems (SATS) - SATS provides an automated training management system designed to enhance the planning assessment and execution of battle-focused training resources. Produces Mission essential task lists (METL), training plans, and resourcing reports for individual units. This DA directed program will ultimately roll up unit readiness from company size units to DA. SATS v4.0 was released early FY 1996.

Standard Training Army After Action Reporting System (STAARS) - provides standardized, automated storage and distribution system during a training event giving the commander a training evaluation and resource utilization tool, and the Army a doctrinal based information collection system.

SATS - Training Exercise Development System (TREDS) - SATS-TREDS provides a flexible task-based training exercise planning capability which may be used to select, edit, develop and maintain training exercise materials for any simulation environment. Products include operations orders, maps and overlays, execution matrices, simulation initialization files, and task lists in go/no go format. Special capabilities include a scenario library, training support package generation, multi-echelon, multi-task exercise planning linked to one master event, and task performance codes for various simulation

environments.

Training Ammunition Management Information System (TAMIS) - TAMIS is an automated tool for determining Army-wide training ammunition requirements.

Total Army School Courseware Distribution System (TASCDS) - TASCDS processes TASS courseware requests to make distribution of BOIP. Availability list is published and accessed via ATTAARS (Quad Zero Data Base).

TRADOC Automated Training Scheduling System (TATSS) - TATSS Establishes and tracks resource requests, shortages, conflicts, and provides empirical data on utilization. Will be replaced by AIMS-R.

Training Base Operation Decision Support System (TBODSS) - TBODSS determines the combat readiness, training load distribution and optimization, POI management, and logistical resources necessary to support training strategies for a changing training base. Will be replaced by AIMS-R. See POIMM and TATSS for details.

TRAMOD Executive Management Information System (TEXMIS) - TEXMIS, a node of the Army Training Digital Library (ATDL), is a central repository system for the gathering and dissemination of training and doctrinal information. TEXMIS acts as a bridge between proponent schools and units. Data flow is between proponent schools, from proponent schools to units, and units to proponent schools. Links to Combat Training Center feedback systems will also be developed. The system will hold relational collective, individual and doctrinal data developed within the proponent schools using the Automated Systems Approach to Training (ASAT). This data represents the latest, most current training and doctrinal information. Relational data from STRAC, Cost Factor Handbook, CATS, and MTOE will be linked with the ASAT derived data to form compatible information modules available to units using the Standard Army Training System (SATS). This relational information will also be available to other automated system's use. An output of the relational information will be hyperlinked document types to the document side of the ATDL for user review or download through the Internet. TEXMIS will be incorporated into ATDL and will provide a critical portion of the total ATDL data.

Training Feedback System (TFS) - TFS provides an observer/Controller tool to evaluate units at Combat Training Centers.

Training Mix Model (TMM) - The TMM is a mathematical programming model that selects a mix of training devices and methods that optimizes the use of training resources that meet a unit's METL (selected ARTEP/MTP/soldier tasks) and resources available to train those tasks (TADSS, field exercises). The results will incorporate constraints and restrictions placed on training, and will examine approach to maximize effectiveness or minimize costs. Currently a stand-alone system, but will be adapted to client server system for use in SATS.

Training Management Warehouse System (TMWS) - TMWS manages all receiving and shipping of Army Training Support Center products (Reserve Component Configured Courseware (RC3), Graphic Training Aids (GTA), (Production Inventory Management for CTT & OFF).

Training and Visual Information Support System (TRAVISS) - TRAVISS is envisioned to provide installation Training and Visual Information Support Center's (T/VISCs) with an automated application that will enhance T/VISC operations and productivity, and improve management capabilities through real time data availability. Funding to support software development, hardware procurement and system fielding has been withdrawn. Possibility exists to review and upgrade existing FORSCOM system (Training Support Automated Management System - TSAMS), currently in Windows format, to meet TRAVISS requirements.

TRADOC Educational Data System-Redesign (TREDs-R)- Administers the correspondence course program by enrolling and maintaining student personal and academic status, curriculum, sub-course inventory, and grading key master data. To be absorbed by AIMS-R.

Warnet XXI Information and Management Support System (WIMSS) - WIMSS provides automated support for the concept development, acquisition, fielding, and life-cycle management of TADSS, including the interrelationships with other functional areas of ATSC and the supporting systems. This project is one facet of a much larger effort within the Army to provide a mutually supportive system of local and wide area network-based relational databases that can maintain uniquely developed data elements under the control of the appropriate commands while sharing those data elements with other systems that have use of the information. This controlled sharing will assure that all Army commands have timely, consistent, and accurate information from which to formulate the management decisions necessary to support effective and efficient Army training.

Work Order Management System (WOMS) - WOMS helps ATSC personnel to track work order status, labor, materials, and overhead costs. It will be absorbed by TRAVISS.

8.2 Standard Army Management Information Systems (STAMIS)

Listed below are key STAMIS used, or scheduled for use, by TRADOC installations. Some, collectively known as ASIMS applications, are run on platforms at a DMC. Others run on local platforms that are in varying stages of migration toward JTA-Army conformance. Some STAMIS are maintained in both architectures.

8.2.1 ASIMS

Standard Installation/Division Personnel System (SIDPERS) - provides commanders and staff the necessary personnel information to make decisions and manage active duty personnel. Supports tactical and sustaining base (installation) operations. The current version, SIDPERS2.0, is an MVS application, running on an AHMDAHL 5890/600E at a DMC as an ASIMS application. SIDPERS-3 will have modules for accounting, assignments, promotions, orders and pay. Its target architecture is a Pentium MX server running SCO UNIX and the Informix DBMS.

Standard Finance System (STANFINS) - designed to support accounting at all Army installations and effective General Ledger control over all resources. STANFINS provides disclosure of the financial results of all activities; information required for all management purposes; data to serve all budgetary purposes and a means for integrating Army financial data with related data in the accounts of the Treasury Department. STANFINS is run as an ASIMS application.

Standard Army Intermediate Level Supply System (SAILS) - a supply and financial management system designed to support stock control, supply management and related financial management functions between the CONUS wholesale level and direct supply level. SAILS will be replaced by SARRS- Objective.

Standard Financial Inventory Accounting and Reporting System (STARFIARS)--an interactive system to record financial, inventory, accounting and other financial system to support CONUS Army installations and comparable overseas commands for the Defense Business Operating Fund (DBOF), formerly retail stock fund, used to finance retail-level inventory. Provides accounting support for the acquisition of wholesale-level material. Interfaces with standard supply systems as well and the general accounting system. STARFIARS-MOD has been adopted as a DOD migration system to replace STARFIARS and STANFINS.

Retired Army Personnel System (RAPS) - provides data on retired Army personnel residing within an installation's area of responsibility.

8.2.2 Other STAMIS

Army Food Management Information System (AFMIS) - an automated system supporting the management of the Army Food Service Operation, worldwide. Includes modules for Automated Headcount (AHC), the Dining Facility Operations (DFO), the Installation Food Adviser (IFA), and the

Troop Issue Subsistence Activity (TISA). The TISA, IFA, and DFO modules were developed and are fielded on the AT&T 3B2600GR Reduced Instruction Set Computer (RISC) minicomputer. A client/server version is expected in 1998. AFMIS presently serves 54 Army installation users worldwide.

Integrated Facilities System-Mini/Micro (IFS-M) - provides functional information on all aspects of facilities engineering activities as well as a single source database of facilities related and budget supportive data to assist managers at all levels of command. The system is operated and maintained on locally controlled minicomputer networks each composed of a UNISYS 5000/95 or UNISYS 6000 minicomputer at each DPW site with a network of EVEREX 486 microcomputers. The network uses TCP/IP protocols. Approximately 120 sites use IFS-M. There is also an ASIMS version of IFS.

Standard Army Automated Contracting System (SAACONS) - automates the operation of installation contracting offices throughout the Army, many sites within the Defense Logistics Agency, the Defense Commissary Agency, and the Special Operations Command. Supports the entire spectrum of contracting functions, contract document processing, preparation of purchase orders, tracking all contractual actions and preparing management reports. SAACONS serves approximately 210 sites. SAACONS will be replaced by SPS. TRADOC is using a semi-centralized architecture, with three SAACON host sites (Gordon, Eustis and Sill) supporting twelve client sites. Two stand alone sites remain at Knox and Huachuca. SAACONS can run on a variety of hosts, including the UNISYS 5000 or 6000 series and HP 9000/750.

Unit Level Logistics System (ULLS) - designed to operate at the Company and Battalion level to perform logistics related functions. The ULLS platform is a Zenith 486 Dx4/100 using the MS-DOS 6.22 or higher operating system.

Standard Army Maintenance System-Installation/TDA (SAMS-I/TDA) - provides information required for the day-to-day management of maintenance, supply, and related requirements. Provides automated operational control of maintenance work requests, maintenance management, and supply functions. The system will support maintenance management information flow to the wholesale level. SAMS-I/TDA runs on a HP 9000- 750 minicomputer with PC terminals.

Standard Army Retail Supply System-Objective (SARRS-O) - a multi-level system which provides stock record accounting and supply management for supply classes II, III(P), IV, VII, and IX. It will operate at all levels of supply from the Direct Support Unit through the TAACOM level, and at the installation level.

Standard Property Book System (SPBS-R) - provides a means of centralizing property book accounting and providing asset visibility. Designed initially for TO&E units, the application functionality has been expanded to accommodate installations and TDA units. It operates in both centralized and decentralized mode. It operates in two environments, MS-DOS and VirtuOS. SPBS-R does not run correctly under Windows 3.1, Windows for Workgroups or Windows NT.

Housing Operations Management System (HOMES) - supports the day-to-day functions of the installation/community and MACOM Housing Management Offices, to include the transient billet and guest house operations. The system has evolved from a centralized mainframe based system to a distributed mini-computer based system with computers located at each installation's housing office. HOMES operates on a variety of platforms, running UNIX, XENIX or HP-UX. The system is composed of five separate modules: Family Housing, Furnishings Management, Billeting, System Administration and Headquarters Homes.

Standard Procurement System (SPS) - supports information processing and decision making needs for procurements for all DoD service components. It will replace SAACONS.

Inspector General Network (IGNET) - assists Inspectors General in tracking and reporting inspections, investigations and requests for action. Runs on Intel based PCs at about 260 worldwide sites.

Military Police Management Information System (MPMIS) - includes several software modules used by military police running on Intel based PCs. Modules include the Registration and Access Control System (RACS) and Security Management System (SMS).

Army Medical Department Property Accounting System (AMEDDPAS)

Installation Materiel Condition Status Reporting System (IMCSRS) - produces various status reports from installations and units for reportable equipment.

8.3 Installation Transition Processing (ITP)

ITP modules were originally fielded to run on Sun 690 platforms at the DMCs. They are being converted to run on the SBIS platform architecture, distributed to installations.

Inprocessing Management Information System (INPROC) -- Supports records management for inprocessing personnel and preparation of SIDPERS transactions.

Outprocessing Management Information System (OUTPROC) -- Supports records management for outprocessing personnel and preparation of SIDPERS transactions.

Transition Processing Management Information System (TRANSPROC II) -- Supports the separation of soldiers from active to inactive status.

Personnel Locator (PERSLOC) -- Tracks military and civilian personnel, telephone numbers and addresses.

Drug And Alcohol Management Information System (DAMIS) -- Supports testing process for identification and disposition of soldiers abusing drugs.

Education Management Information System (EDMIS) -- Supports record keeping and administration of on and off duty education and financial aid.

Master Schedule Of Activities (MASSCHACT) -- Schedules events, facilities and people. Supports protocol and suspense management. No longer fielded to new sites due to lack of use at installations that received it.

Dental Readiness System (DENTRAD) -- Supports administration of dental clinics.

Central Issue Facility (CIF) -- Manages issues, maintenance, storage and accounting of Organizational Clothing and Individual Equipment (OCIE) at installation issue facilities.

Record Update Utility (RUU) -- Utility used by all DA ISMs.

Installation level Integrated Data Base (ILIDB) - provides a common relational database (INFORMIX) for the other modules to access.

8.4 SBIS

The following applications are grouped under the SBIS management framework:

Budget Preparation And Execution System-Installation (BPSI/BESI) - provides automated means to identify and analyze requirements, receive budget guidance from higher headquarters and formulate specific budget guidance for assigned organizations. It also is used to track the execution of these budgets.

Budget Preparation And Execution System-MACOM (BPSM/BESM) - MACOM level version of BPSI/BESI

Safety Management (SAFETY) -- Supports accident reporting and safety analysis of human behavior, program quality, facilities, mishaps, training, equipment, supplies, personnel and hazard data.

Security Clearance Management System (SECCLEAR) -- Supports security clearance reporting and analysis. Standardizes personnel security processing of Active and Reserve Component military members, civilian employees and affiliated personnel.

Automated Instructional Management System Redesign (AIMS-R)- AIMS was developed by DCST and fielded to TRADOC schools from 1984 to 1987. The SBIS program sustains it and plans to redesign it, although due to resource constraints, not all of the functionality originally planned for AIMS-Redesign will be built. AIMS provides administrative support to all aspects of training at TRADOC schools and Army Training Centers. It helps manage data about students, trainees and instructors; audit trails for enrollment, recycles, attrition and graduation; test validation and administration; course effectiveness; resource scheduling; and historical personnel and academic trends. Each school operates AIMS independently on a dedicated VAX platform. In the baseline, the typical platform is a VAX11/750, although Forts Leonard Wood and Sill use an additional VAX 11/785. Interfaces with SIDPERS, RECBASS, ATRRS, EIDS. User access AIMS by terminals, or PCs emulating terminals, and all processing is done by the host.

Real Property Management Tool (RMAT) -- Support for managing real property (airspace, land, buildings, housing, utilities, and other infrastructure). PM SBIS identified COTS/GOTS solution to meet functionality. Tested at Fort Knox. PM SBA will not field.

Integrated Requirements & Purchase Request System (IRPRS) -- Generates requisitions, purchase requests and other transaction information. PM SBIS will identify COTS / GOTS solution to meet functionality; PM SBA will not field.

DOIM Management Information System (DOIMMIS) -- Provides integrated system for IMA management. PM SBIS will identify COTS / GOTS solution to meet functionality; PM SBA will not field.

8.5 MWRMIS Modules

Time Labor Management System - currently fielded at all TRADOC installations and allows for electronic transfer of time cards for NAF employees from DCA to DFAS Red River NAF Financial Services. Application currently resides on PCs at each activity and at the central Novell file server at each installation DCA. Application will be upgraded to Windows version in FY98/99.

Financial Management Budget System is for all MWR/NAF activities and has also been fielded at each TRADOC installation. Also resides on PCs and Novell file server. Will eventually be on WAN. Data is currently sent via modem to MACOM to our CFAD Novell file server. DOS based application and will be converted to Windows in FY98 with fielding for FY 98/99.

Child Development Services Automated Management System - a UNIX and DOS system located at CDS activities throughout TRADOC. Undergoing conversion to Windows and Windows version being tested at Ft Knox KY. Upgrade fielding will begin in FY 98 and continue through FY 99. Will require hardware upgrade at each installation which will be funded by DA (CFSC). Communication between installation buildings will be funded by installation DCA and could utilize PAIRGAIN solution or any other on-line communication solution available at installation.

RECTRAC and GOLFTRAC are applications developed by Vermont Systems and track recreation, usage, rental, and point of sales data for MWR activities. Currently being fielded and will continue to be fielded through FY 98. Bliss, Gordon, Knox, Huachuca, Jackson, Sill, McClellan, Leonard Wood have been fielded RECTRAC and all TRADOC installations with Golf courses have been fielded Golftrac.

FOODTRAK and CATERMATE are currently being fielded. Both applications can run on

stand-alone PCs or on file server. Foodtrak will interface with RECTRAC at specific activities.

Standard NAF Contracting Services is under software testing and acceptance and has not been fielded. Being tested at Leonard Wood and Gordon.

8.6 TRADOC ISMs

Following are the applications, collectively known as ISMs, that TRADOC developed and fielded. TRADOC expects a combination of Army systems to replace the TRADOC ISMs before 2000. See Table 7, in TPRISM's discussion of the objective architecture, for a crosswalk of TRADOC ISMs to their replacements.

AUDIOVISUAL LIBRARY SYSTEM (AVLS)/ WORKORDER MANAGEMENT SYSTEM (WOMS) - Although a training application, AVLS/WOMS has been considered a TRADOC ISM. AVLS is designed to track and account for films, tapes, equipment, aids, and devices issued or loaned by the Training Services Center (TSC). Each day requests for films, tapes, aids, devices, and equipment are made to the TSC. This information is stored in the AVLS database. AVLS provides the capability to track a request during its entire active life cycle, to provide a complete listing of any and all outstanding requests for audiovisual support, and to provide, on demand, a complete list of all items on loan to any unit or organization. In addition, AVLS provides the capability to post usage information against and update present information at the user's convenience.

WOMS is designed to track a workorder during its' entire active life cycle by the Training Services Center (TSC) and other organizational users. A complete itemized account of the work order may include materials, labor, and overhead data. WOMS provides the capability to post, add, or update information. WOMS also provides a system for warehouse management including an automated inventory of supplies. The materials control section allows for automatic stock adjustment in response to First In/First Out policy, automatic notification of low stock, warehouse indexing, classification coding, request for issue of shop stock from central supply to a work area, and necessary receipts to accompany such issues.

BATCH UPDATE MODULE FOR MILITARY PERSONNEL - This batch module establishes and maintains tables in the military personnel database. Files are downloaded from SIDPERS and used to establish/update records while on-line SIDPERS transactions are passed in batch mode to the DMC for processing into SIDPERS.

CENTRAL ISSUE FACILITY SYSTEM - This system provides the installation's Central Issue Facility (CIF) with automated line item accountability for organizational clothing and individual equipment items, by size. Clothing forms (DA Form 3645), management reports and temporary issue hand receipts are printed on-line. Stocking requests are automatically computed based on demands. The system "prompts" the user when reorder is required. This system interfaces with the military personnel database; an individual's SSN is entered to make an issue, and CIF clearance is determined by Transition Point or Central Clearance Agency during outprocessing.

CIVILIAN PERSONNEL BATCH UPDATE MODULE - This system establishes and maintains the civilian personnel database and updates civilian personnel information in Post Locator and Vehicle Registration Systems. Information is loaded weekly from a ACPERS system tape in the Civilian Personnel Office.

CIVILIAN PERSONNEL INQUIRY SYSTEM - This system is used by the installation Civilian Personnel Office and other directorates. It provides the Civilian Personnel Office the capability to inquire on the records of all civilians assigned to the installation and provides authorized users in other directorates and organizations with the capability to inquire on specific record portion(s) of individual civilians assigned to their organization.

DD-1556 TRAINING - This system is designed to reduce the collective effort required to arrange, conduct, and evaluate civilian training. It virtually eliminates the manual 1556 paperwork generated

within local organizations and increases quality control for data submitted. The system reduces lag time between DD- 1556 form preparation and Civilian Personnel Office (CPO) approval or Organization approval, depending on the delegation of authority method that is adopted by the installation. DD-1556 enables users to create, review, and update forms, evaluate training, and prepare/update individual development plans.

DD-1556 TRAINING HISTORY SYSTEM - This system provides a sub-module of the CPO 1556 system that allows users to query completed, closed, or canceled training request. This database provides a repository for previous training requests.

DENTAL MANAGEMENT SYSTEM/DENTAL QUERY SYSTEM - This is an interactive system to assist dental health care managers. A record showing care provided and status of dental health is maintained for each active duty soldier. Readiness reports and summaries are available for the installation commander, the unit commanders, the dental activity commander and the dental clinic manager. The Dental Query system provides unit commanders with the capability to query specific dental health information for command members.

ENLISTED STUDENTS ENTNAC STATUS SYSTEM - This system is used by the Installation AG to monitor the status of the ENTNAC'S. The module composes a message of selected individuals for electronic transmission to CCF (Central Clearance Facility).

INPROCESSING SYSTEM - This system provides status of personnel processing through the Welcome Center and information on individuals who are pending gains to the installation. On-line rosters designed to track individuals in the Welcome Center, and personnel, finance, medical, and dental records, can be produced.

INSTALLATION CLEARANCE SYSTEM (ICS) - The Installation Clearance System (ICS) allows the user to clear soldiers from an installation. A batch program executed by the DOIM loads the ICS database with information on soldiers due to clear within the next 30 days. The unit PAC logs on to the system daily to view soldiers scheduled to clear the installation within the next 30 days. The unit clerk "initializes" records for individuals due to begin clearance within 20 days. A clearance form can be printed detailing each facility the soldier is required to clear. A counter is started for each initialized soldier tracking the number of days the soldier has been in the clearance system, to provide accurate and prompt processing.

Participating facilities (for example, cablevision, bank, credit union, Finance and Accounting Office, post library, etc.) log on daily to view individuals scheduled for clearance. A 15 day window is available for facilities to electronically "sign off" on the electronic clearance for each record. The AG user signs on daily and "initials" those records meeting clearance requirements. Five days prior to the final clearance date, the PAC prints a clearance form for each soldier who must physically visit uncleared facilities.

After the AG and Unit PAC determines the soldier has met all clearance requirements they are responsible for, the AG user enters the AG Clear Date and the Unit PAC enters the Unit PAC Clear Date in the system.

OFFICER'S RECORD BRIEF (ORB) SYSTEM - This system allows access to the seven sections of the ORB either by name or SSN. Changes to the ORB can be created via SIDPERS.

ORDERS SYSTEM - This system is designed to generate reassignment, promotion, MOS, enlistment, retirement and award/pay type orders. Orders are generated by selecting order formats, headings, distribution blocks, signature blocks and additional instructions. Orders' formats, additional instructions and heading/distribution blocks/signature blocks are accessed by number and version number, which allows installations to "customize" orders according to local policy. Additions, changes or deletions can be made to the orders' formats, additional instructions and heading/distribution blocks/signature blocks tables. The completed order can be viewed, changed or canceled. The order number is automatically generated and incremented using the current Julian date plus the individual order number for each order.

Capability to print an order on-line is provided.

OUTPROCESSING SYSTEM - This system allows the user to outprocess an individual through Transition Point or Central Clearance Agency. The system checks the clothing issue status of an individual to determine if the individual has cleared the Central Issue Facility. Arrival and separation transactions are prepared for SIDPERS and the departed table is updated with departure date and forwarding address. DD Form 214 can be created and printed on-line.

POST LOCATOR SYSTEM - This system contains information on all military and civilian personnel assigned to the installation. Search for personnel can be done by name or by SSN. Information available includes name, SSN, grade, organization and telephone number. The system includes forwarding address for departed military personnel. Mailing labels for forwarding mail can be created on-line.

PROPERTY BOOK SYSTEM - This system provides property accountability for items accounted for on installation and organization property books. Users can query and update their property books, print hand receipts and print management reports. The system provides for accountability/responsibility of nonexpendable items, durable items and components. Property records are automatically updated each month with unit price changes from the command data master file (CMDf). Transactions for the Continuing Balance System-Expanded (CBS-X) are automatically created each month and written to tape for transmission to Depot Systems Command (DESCOM). An audit trail of transactions associated with property accountability, to include movement of items from one hand receipt to another, serial number changes and NSN changes, is maintained.

REMOTE AUTOMATED ISSUE DOCUMENT ENTRY/REGISTER SYSTEM (RAIDERS) - This system simplifies the day-to-day work of the supply/PLL clerk, provides an automated document register and provides same day availability of stocks on hand in the Supply Support Activity (SSA). Requests for issue (DA Form 2765) are input interactively and edited against SAILS code table files. The SAILS asset balance file (ABF) is downloaded each day from the DMC. If the item requested is on hand, the ABF is decremented, and the item can be issued the same day as requested. If the item requested is not on hand, a requisition for SAILS is created. Latest status from SAILS is automatically posted each day. The system also provides users with the capability to add, change or delete PLL items. This system eliminates pre-edit rejects from SAILS, virtually eliminates the need to hand carry requisitions and reduces about 30 percent of the workload in the Data Conversion Section.

REASSIGNMENT SYSTEM - This system provides capability to update military personnel records for individuals being reassigned. Reassignment data is captured by batch processing from the SIDPERS assignment instruction file (AIF) for enlisted permanent party personnel, and from SEES tapes for enlisted student personnel and for officer permanent party/student personnel. Travel and port call information is provided; port call orders and amendments can be updated. Users can view the reassignment cycle history. SIDPERS transactions are created.

RECEPTION BATTALION AUTOMATED SUPPORT SYSTEM (RECBASS) - Although a training application, RECBASS has historically been categorized as a TRADOC ISM as well. This system is designed to in-process new soldiers through the Reception Battalion. Each day the MEPS electronically transmits information on expected new soldiers. This information is stored in the Reception Battalion database, TGJAMEP6. RECBASS provides the capability to in-process new soldiers with a minimum of additional input. Reception Battalion personnel can add new soldiers not included in the MEPS data and IRR personnel. After the daily processing roster is complete, required reports are prepared (daily roster, listing for updating blood type, initial pay, etc.) RECBASS inter-operates with the Military Personnel System. SIDPERS transactions are created when necessary. Necessary input for the Automated Clothing Initial Issue Point System (ACIIPS) is created by daily batch program TGJAB01. The system contains an interface to AIMS which automatically enrolls new soldiers. The system provides the capability to create transactions for JSS.

With the use of microcomputers on Day 2, the Personnel Affairs Branch (PAB) updates the new soldier's record and prepares the forms contained in the individual's 201 file. Data is downloaded from the installation host computer, and after processing by PAB, verified data from the microcomputers is

uploaded back to the host. After the assignment of the soldier to a training unit on Day 3, transactions are created for JSS, AIMS, SIDPERS and ATRRS. Additional rosters and reports are prepared and forwarded to the training batteries as required.

RECORDS INQUIRY SYSTEM - The purpose of this system is two fold -- it allows users to view data from individuals' DA Forms 2A, B and provides the SIDPERS Interface Branch (SIB) with on-line capability to monitor input from MILPO sections. Transaction files list all transactions prepared as input for SIDPERS cycle. Transactions are pulled off by date for input into SIDPERS at close of business each day.

RECORDS MANAGEMENT SYSTEM - This system allows various sections to query and/or update military personnel records. The in-processing section can add records. The military personnel management section can make personnel assignments. The enlisted records section can update EER data, AEA code BARSLOCAL/DA data, and Good Conduct Medal data. The records section can update records location data to change location of a service member's 201 file. DA Form 2 can be printed on-line, and SIDPERS transactions are created.

SECURITY MANAGEMENT SYSTEM - This system provides installation security managers with current information on personnel security clearances. The system provides managers with the capability to update security information for each individual on the installation database, without affecting SIDPERS data. It also provides designated DSEC personnel with the capability to transmit DD Form 173 directly to Central Clearance Facility and with the capability to input and print DA Form 873. The system provides a weekly data update from the Central Clearance Facility (CCF) regarding requests for clearance actions initiated by the manager.

STANDARD INSTALLATION BUDGET SYSTEM (SIBS)- This system is fielded and maintained by Fort Leavenworth. Used to assist DRM and program directors with analyzing and executing the operating budget.

SPECIAL DUTY SYSTEM - This system provides the capability to screen special duty positions by name of individual in the position or by position number. Special duty position information can be added, changed or deleted. Special duty memorandums/orders can be created.

STATION UNIQUE SYSTEM - This support system contains installation unique data necessary for the operation of the ISM's. Information utilized by this module includes: user "log on" ID's, user access levels, printer ID's, and literals for printing orders and forms. The file is maintained by OSID personnel in coordination with the users.

UIC/DODAAC ORGANIZATION SYSTEM - This system contains UIC/DODAAC information for all units on the installation. It allows several ISMs to interface with one common file that contains unique unit identification data for an installation.

UNIT PROCESSING CODE (UPC) SYSTEM - This module contains the master list of units/activities serviced by the installation. It is a system support module that interfaces with several ISMs. Contains command information for medical and dental tracking support.

VEHICLE REGISTRATION SYSTEM/POST DISBARMENT SYSTEM - The Vehicle Registration System provides the Military Police access to registration records maintained on all non-military vehicles and non-military weapons registered on the installation. It provides vital information regarding vehicles and drivers. It provides a management tool to control access to the installation, complete traffic and criminal investigations, and suspension and revocation actions.

The Post Disbarment system provides the Provost Marshal with limited data (name, SSN, date of bar, etc.) on all personnel who have been barred from the installation.

APPENDIX D: ACRONYMS

ADLP	Army Distance Learning Plan
ACR	advanced concepts and requirements
ADN	Area Distribution Node
ADRP	Army DISN Router Program
ALSP	Aggregate Level Simulation Protocol
API	application program interface
ARPA	Advanced Research Projects Agency
ASIMS	Army Standard Information Management System
ATM	asynchronous transfer mode
ATSC	Army Training Support Center
AUTODIN	Automatic Digital Network
BBS	Brigade and Below Simulation
BLRSI	Battle Lab Reconfigurable Simulator Initiative
CALL	Center for Army Lessons Learned
CAN	campus area network
CATT	Combat Arms Tactical Trainer
CBI	Circuit Bundling Initiative
CBS	Corps and Below Simulation
COE	common operating environment
COTS	commercial-off-the-shelf
CR XXI	Classroom 21st Century
CUITN	Common User Installation Transport Network
DCSIM	Deputy Chief of Staff for Information Management
DII	Defense Information Infrastructure
DIS	distributed interactive simulation
DISA	Defense Information Systems Agency
DISN	Defense Information System Network
DMC	Defense Megacenter
DMS	Defense Messaging System
DOIM	Director of Information Management
DSI	Defense Simulation Internet
DTAC	digital training access center
DVTC	desktop videoteleconferencing
FAMSIM	Family of Simulations
FDDI	fiber distributed data interface
FEP	front end processor
FSSD	Field Service Support Directorate
HLA	High Level Architecture

ICT	integrated concept team
IEEE	Institute of Electrical and Electronic Engineers
IM	information management
IP	Internet Protocol
IPT	integrated product team
IS	information system
ISL	installation sequence list
ISDN	integrated services digital network
ISM	installation support module
ITP	Installation Transition Processing
JSIMS	Joint Simulation System
JTA	Joint Technical Architecture
JWARS	Joint Warfare System
JWICS	Joint Worldwide Intelligence Communication System
KEI	key enabling investment
LAN	local area network
M&S	Models and Simulations
MIS	management information system
MMFO	multi-mode fiber optic
MTMP	MACOM Telephone Modernization Program
MVS	Multiple Virtual Storage (IBM)
MWRMIS	Morale, Welfare, Recreation MIS
NAP	New York Access Point
NDI	non-developmental item
NIPRNET	not classified but sensitive IP router network
OSCAR	outside cable plant rehabilitation
OSE	open system environment
PC	personal computer
PDSS	post deployment software support
PPP	power projection platform
PPC4I	Power Projection C4 Infrastructure
PROFS	Professional Office System
PSP	power support platform
RDA	research, development and acquisition
RFC	request for comment
RISC	reduced instruction set computer
RJE	remote job entry
SAF	semi-automated forces
SBIS	Sustaining Base Information Services
SID	Systems Integration Directorate
SIPRNET	secure IP router network

SMFO	single mode fiber optic
SNA	System Network Architecture (IBM)
STAMIS	Standard Army Management Information System
TAD	Technology and Analysis Directorate
TAFIM	Technical Architecture Framework for IM
TCC	telecommunications closet <i>or</i> Telecommunications Center
TCP/IP	Transmission control protocol/IP
TEMO	training, exercises and military operations
TPRISM	TRADOC Plan for Reengineering Information System Modernization
TRADOC	Training and Doctrine Command
TRM	technical reference model
VIC	Vector in Commander
VTC	videoteleconferencing
WAN	wide area network
WARSIM	Warfighters' Simulation
WWW	World Wide Web

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