

USAWC STRATEGY RESEARCH PROJECT

**ARMY TRANSFORMATION AND DIGITIZATION –TRAINING AND RESOURCE CHALLENGES**

by

Lieutenant Colonel Robert S. Ferrell  
United States Army

Colonel Richard Jones  
Project Advisor

The views expressed in this academic research paper are those of the author and do not necessarily reflect the official policy or position of the U.S. Government, the Department of Defense, or any of its agencies.

U.S. Army War College  
CARLISLE BARRACKS, PENNSYLVANIA 17013



## ABSTRACT

AUTHOR: LTC Robert S. Ferrell

TITLE: Army Transformation and Digitization – Training and Resource Challenges

FORMAT: Strategy Research Project

DATE: 09 April 2002

PAGES: 41

CLASSIFICATION: Unclassified

The Army's vision of the future is to be trained and ready, a strategic force, serving the nation at home and abroad, capable of decisive victory...into the 21 century. To maintain its posture as the most lethal force in the world, the Army is undergoing a major change; it is transforming. A changing world order, diminishing resources and rapid and continuous advances in technology are the driving forces behind the Army's transformation campaign and the redesign of the force to the Force XXI concept. This concept is organized around information technology and digitization of the battlefield. Developing and training soldiers and leaders with the skill sets needed to be effective in this environment is a challenge that must be addressed in the transformation campaign. The current training programs offered by the military are not adequate to support the digitization process of Army Transformation. This study discusses the challenges we face with digitizing our Army as part of the Army Transformation campaign. It will address the materiel development, training, and leader development challenges that are surfacing as the Army integrates digital equipment into units. It will conclude that senior leaders should integrate digitization into institutional and home station training and accelerate the bureaucratic processes in the materiel development process to gain efficiencies and effectively manage change.



## TABLE OF CONTENTS

<b>ABSTRACT</b> .....	<b>III</b>
<b>PREFACE</b> .....	<b>VII</b>
<b>LIST OF ILLUSTRATIONS</b> .....	<b>IX</b>
<b>ARMY TRANSFORMATION AND DIGITALIZATION – TRAINING AND RESOURCE CHALLENGES</b> .....	<b>1</b>
<b>OVERVIEW OF DIGITIZATION</b> .....	<b>2</b>
<b>MATERIEL DEVELOPMENT</b> .....	<b>5</b>
CENTRAL TECHNICAL SUPPORT FACILITY.....	5
MATERIEL DEVELOPMENT PROCESS .....	5
EQUIPMENT FIELDING PROCESS .....	6
SOFTWARE TURBULANCE .....	6
SOFTWARE BLOCKING POLICY .....	8
<b>TRAINING</b> .....	<b>9</b>
CENTRAL TECHNICAL SUPPORT FACILITY.....	10
INSTITUTIONAL TRAINING .....	13
HOME STATION TRAINING .....	15
<b>PERSONNEL CHALLENGES</b> .....	<b>15</b>
<b>CONCLUSIONS AND RECOMMENDATIONS:</b> .....	<b>17</b>
SOFTWARE AND HARDWARE BLOCKING .....	18
LONG LIFE TRAINING .....	18
PERSONNEL MANAGEMENT .....	19
<b>ENDNOTES</b> .....	<b>21</b>
<b>LIST OF ACRONYMS</b> .....	<b>27</b>
<b>BIBLIOGRAPHY</b> .....	<b>29</b>



## PREFACE

There are many people that I would like to thank for their assistance and support during my research. First, I would like to acknowledge and thank Colonel Richard Jones for his guidance, suggestions, and assistance in the writing and editing of this study. I would also like to personally thank Lieutenant Colonels LaWarren Patterson and Gilbert Griffin for their insights and advice. Finally, I want to thank my wife, Monique, and our two sons, Robert II and Michael, for their patience and support.



## LIST OF ILLUSTRATIONS

FIGURE 1 ARMY TRANSFORMATION CHART .....	1
FIGURE 2 ABCS SOFTWARE INTEROPERABILITY ISSUES .....	7
FIGURE 3 SOFTWARE BLOCKING CONCEPT .....	8
FIGURE 4 TRADOC DIGITAL TRAINING STRATEGY .....	10

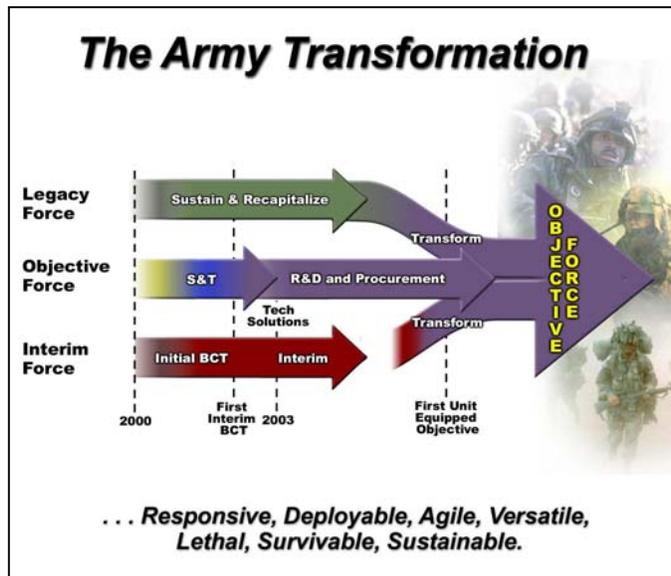


## ARMY TRANSFORMATION AND DIGITALIZATION – TRAINING AND RESOURCE CHALLENGES

The Army is on a rapid pace to transform itself to meet the new threats and challenges of the 21<sup>st</sup> Century. The Army's strategic vision, articulated in 1999 by the Chief of Staff, General Eric K. Shinseki, calls for transforming the Army toward an Objective Force that is more responsive, deployable, agile, versatile, lethal, survivable, and sustainable.<sup>1</sup>

Since the attacks on the World Trade Center in New York City and the Pentagon on September 11, 2001, Army leaders have made plans to accelerate the transformation process. Army Secretary Thomas White stated, "The Army is transitioning to a force postured to fight a global war on terrorism."<sup>2</sup>

According to the Army Transformation plan, the transformation effort will provide the National Command Authority (NCA) with a recapitalized Legacy Force to guarantee critical warfighting readiness, an Interim Force that will fill the strategic near-term capability gap that



exists today, and a future Objective Force that achieves the Army transformation objective with an increased range of options for regional engagement, crisis response, and sustained land force operations.<sup>3</sup>

Army Transformation is about total change: change in how the Army deploys and employs forces; change in its ability to adapt to a wider range of missions across the full spectrum of warfare; change in its organizational design principles; change in its leadership development process; change in its training methods and

FIGURE 1 ARMY TRANSFORMATION CHART

strategies; and change in the forces' capabilities due to the introduction of new technologies.

The purpose of this study is to examine the process for integrating technological advancements associated with digitization into the force and determine whether key elements such as force development, training and personnel management are being properly addressed to ensure readiness of Army units as they transform in accordance with the Chief of Staff's vision. The study analyzes the transformation plan, specifically associated with digitization, and identifies the issues and challenges that have surfaced during the process. It will present

recommendations on how to mitigate the challenges associated with the acquisition process, training, and personnel management in order to better realize the new operational capability.

## **OVERVIEW OF DIGITIZATION**

Digitization is the Army's process for arming its forces with advanced information technologies, allowing all friendly troops to constantly monitor the locations of friendly and enemy forces.<sup>4</sup> The Army expects that automation of the battlefield with digital technologies will produce greater fighter effectiveness through better use of resources. Digitization of the battlefield is a major effort to reshape the current Army, known as the Army of Excellence, into Force XXI—a smaller but better Army redesigned to meet the needs of the 21<sup>st</sup> century.<sup>5</sup> Thus, the digitization program is one of the Army's highest priorities. According to the Office of the Director of Information Systems for Command, Control, Communication, and Computers (ODISC4) on the Army Staff:

Digitization is the application of information technologies to acquire, exchange, and employ timely digital information throughout the battlespace, tailored to the needs of each decider (commander), shooter, and supporter—allowing each to maintain a clear and accurate vision of his battlespace necessary to support both planning and execution.<sup>6</sup>

Digitization requires inserting or retrofitting digital technologies onto the Army's substantial equipment inventory. This process should greatly modernize the Army's command, control, communications, computers, and intelligence systems and increase force effectiveness in terms of lethality, survivability, and operating tempo. The Army plans for digitization to help achieve better situational awareness to answer key questions for the soldier—Where am I? Where are my buddies? Where is the enemy?—and improve command and control at brigade-level and below.<sup>7</sup>

The Army's Strategy will focus on three force structures: the Legacy Force, the Interim Force, and the Objective Force. The strategy to reach the goal of the Objective Force, with the capabilities described in the Army Vision, involves the development of Division XXI (4<sup>th</sup> Infantry and 1<sup>st</sup> Cavalry Divisions), the Interim Brigade Combat Team (IBCT) and the Interim Force (Fort Lewis, Washington).<sup>8</sup> The 4<sup>th</sup> Infantry Division completed its digitization process and was validated during Division Capabilities Exercise (DCX) and DCX1 in 2001. The 1<sup>st</sup> Cavalry Division and III Corps expect to be completely digitized in FY04. Fort Lewis IBCT units started their transformation and expect to be completed by 2003. The Army estimates it will take 30 years to complete the Army-wide digitization process.<sup>9</sup>

The modernization of the Legacy Force through recapitalization of selected units and systems, insertion of digital technologies, and enhancements in the lethality and survivability of the light forces will ensure that the Army remains prepared to defeat any potential adversary. Digitization enhancements and Division XXI force structure implementation will result in increased situational awareness within the heavy divisions and will dramatically improve their strategic responsiveness by reduction in overall combat platforms.<sup>10</sup>

According to the Army's Transformation Campaign Plan, the Interim Force "is a transition force that fills the strategic near-term capability gap that exists today—one that seeks the Objective Force to the maximum extent feasible, but leverages today's state of the art technology together with modernized legacy forces to bridge a gap to the future."<sup>11</sup> The Army has funded 6 IBCTs, including one Reserve Component Brigade.<sup>12</sup> The plan was for all six IBCTs to be in the United States. However, the Quadrennial Defense Review, which was released on 1 October 01, directed the Army to position one IBCT in Europe to provide quick response to a conventional or an asymmetric threat.<sup>13</sup> The Army will make the Brigade Combat Teams ready to respond to immediate operational requirements.

The critical transformation path for the Army leads to the Objective Force with unique characteristics and capabilities. The Objective Force will be capable of rapidly responding to crises, shaping the operational environment, and succeeding across the full spectrum of future operations. It will be linked internally and externally through a responsive, reliable, mobile non-line-of-sight internetted Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) capability. The Objective Force will use joint/interagency reach back capabilities for intelligence, planning support, effects, administration, and logistical supports.<sup>14</sup>

The Army's vision of future battle command is reflected in the Army Battle Command System (ABCS) concept. This system capitalizes on the power of our quality soldiers, enabled by what we now call Information-Age technology. "Future battle command starts with competent commanders, noncommissioned officers, and soldiers who have developed an intuitive sense of battle gained from study and experience."<sup>15</sup> To gain a true appreciation for the requirement to capture and utilize the experience of soldiers already trained on ABCS platforms, one must fully understand the linkage each system brings to the integrated digitized battlefield.

ABCS is the Army's integrated information architecture of fielded and developmental battlefield automated systems and communications, extending from the joint/strategic level through the operational and tactical systems to the platform/section.<sup>16</sup> ABCS is an integrated, ground mobile, and fixed deployable network of common hardware and software for echelons at

corps and below. The purpose of ABCS is to assist commanders and their staffs to obtain near real-time access to command critical information requirements through a force level database. ABCS provides strategic operational and tactical command and control for service, joint, air combined contingency operations across a spectrum of conflict. ABCS includes the Global Command and Control System-Army (GCCS-A), the Maneuver Control System (MCS), the All Source Analysis System (ASAS), the Advanced Field Artillery Target Data System (AFATDS), the Air Missile Defense Planning and Control System (AMDPCS), the Combat Service Support Control System (CSSCS), and the Force XXI Battle Command Brigade and Below (FBCB2) System.<sup>17</sup>

There is a critical need for the ABCS because the legacy “stove-pipe” communication systems used in yesterday’s networks didn’t provide commanders with the level of detailed information on friendly and enemy forces required to make critical decisions. They didn’t provide a common picture at all levels. Historically, the military has used face-to-face communication, acetate maps, and radios to transmit operation orders. Commanders were more dependent on the chain of command (commanders and battle staff interface) to make critical decisions. The future’s focus on information technology in a totally digitized force will result in a change in the way the Army does its business, however, the downside to advancement in technology is the increased opportunities for over-centralization, micromanagement, and impersonal leadership. “When commanders have a much greater supply of information and the large degree of ‘battlespace transparency’ that goes along with it, they have the ability to supervise in minute detail.”<sup>18</sup> Additionally, with an abundance of information (common picture) available at all levels, there is the ability for critical decisions to be made at lower levels of leadership. Considering these changes in technology and the changes in operations that will evolve, the Army will have to rethink its material development and integration strategy, training strategy and manpower management for digitized units.

The current systems for materiel development are inefficient and hamper or interfere with the ability to learn the new software and hardware. Furthermore, the Army hasn’t developed an effective strategy to train soldiers and leaders on the necessary skills to operate the improved technology nor the means to stabilize trained personnel long enough to share their experience and knowledge with others in the unit (cascading). These issues, if not addressed and tackled, have the potential to de-rail the transformation efforts.

## **MATERIEL DEVELOPMENT**

The Army modernization strategy is focused on transformation to ensure that essential capabilities are developed for the future. However, current systems and processes for developing and fielding of software and hardware are not effective. Software improvements aren't always validated and certified before fielding, and hardware improvements are slow in production and not always compatible with fielded software.

### **CENTRAL TECHNICAL SUPPORT FACILITY**

The Central Technical Support Facility at Fort Hood, Texas enables the Army to integrate Total Package Fielding, Unit Set Fielding, and Doctrine, Training, Leader Development, Organization, Materiel Soldier (DTLOMS) along with software and hardware systems as part of the Army's modernization strategy.<sup>19</sup> It has played a central role in the effort to digitize the Army. The facility, run by the Program Executive Office for Command, Control, and Communications Systems, has provided the Army with an atmosphere for materiel developers, contractors, researchers, testers, warfighters, and user representatives to work together without boundaries. The Central Technical Support Facility focuses on the system of systems that represent the digitization effort as opposed to any particular system. The goal is to synchronize interoperability and integration requirements and other systems critical to achieving digitization goals.<sup>20</sup>

### **MATERIEL DEVELOPMENT PROCESS**

The traditional acquisition approach to materiel development is to follow a linear, step-by-step schedule, driven by a rigorous requirements process. This approach was often slow, taking many years to move from idea to requirement to fielded capability, with the end product often being an out-of-date solution. Furthermore, there was no process in place to quickly field improvements or adaptations as threats changed or new technologies emerged. The Army's current modernization strategy recognizes the key role played by information operations on today's battlefield and that it can't determine rigid objective requirements. Therefore, it implemented a more effective methodology, the spiral approach, which applies evolving technology to develop at least interim requirements as quickly as possible and then continual upgrades as technology advances and capabilities develop.<sup>21</sup> The Army recognized that information system technology advances at a rapid pace and, if quickly exploited, would provide the Army with ever-increasing capabilities. Unlike requirements-driven development, spiral development permits new hypotheses to be constantly offered with new technologies requiring verification, validation, and insertion into the development process. Additionally, it gives the

Army the means to adjust objective requirements as systems progress through iterations of experimentation, analysis and design, integration, and evaluation. This approach can be very effective for keeping up with technology and fielding modern solutions more quickly.

## EQUIPMENT FIELDING PROCESS

There are two important processes that are integral to the execution of the Army Modernization Plan currently being used at Forts Hood and Lewis. These processes are Total Package Fielding and Unit Set Fielding.<sup>22</sup> This process, which attempts to synchronize fielding in the most effective manner, enables the units to receive hardware and software simultaneously.

Total Package Fielding (TPF) forms the foundation of successful Unit Set Fielding (USF) and is the Army's process to affect a total system fielding of new and modified equipment. It provides for the concurrent fielding of a single system and all its required support. The process aims at minimizing the logistics burden on the gaining unit.<sup>23</sup>

Unit Set Fielding is TPF by unit sets. It refers to both a strategy and process that modernizes the force through a family of systems approach to fielding. It involves the assembly and issuance of several individual, interactive systems as a set to a particular unit within a specified time period. Unit Set Fielding is focused on fielding enhanced capability instead of individual systems. The goal of USF is to produce combat-capable units with greater capabilities in the shortest period of time with minimum risk to operational availability.<sup>24</sup>

## SOFTWARE TURBULANCE

Although utilization of the spiral development approach has resulted in faster fielding of upgrades and new equipment, over the past few years it has created a new set of problems and has had some negative impact on the transformation process. To provide the users with software at critical points, developers have often had to release the software before it has been perfected, and then continuously field product upgrades. According to MAJ Carlos Walker (Brigade Signal Officer, 2<sup>nd</sup> Brigade, 4<sup>th</sup> Infantry Division, Fort Hood, Texas), spiral development is a double-edge sword. "There needs to be a balance in developing systems that leverage the latest and greatest technology with having systems that are stable and combat ready."<sup>25</sup> During the development process, contractors want to showcase the latest features for the benefit of selling the product at the expense of potential instability in the system architecture. DCX I was a great example. Software patches and upgrades that should have been identified and implemented at Fort Hood prior to deployment were issued in the Dustbowl at the National Training Center days before the start of maneuver exercises. Software drops (changes to

software) often occurred right before major training events.<sup>26</sup> The scheduling of these drops did not allow the operators the time to train on the upgrades before the next training event. The



**MODERNIZATION**  
*ABCS Software Interoperability Issues*



		4ID	ICD	III CORPS	OP IMPACT	PLAN	
FDD ★	Dec 2000	Corps WFX	6.0	4.3	4.3	The COP is not as robust at Corps and other Divisions. Limited capability	Use limited operational message set between 6.0 and 4.3 along with
	Mar 2001	DCX Phase 1	6.1	4.3	4.3		the capability of GCCS to provide the COP
	Oct 2001	DCX Phase 2	6.2	4.3	4.3		6.0 Backward Compatibility has not been tested
	Mar 2002	Corps WFX	7.0	4.3	4.3		
	2/3 Qtr 2002	CAWE	7.0	4.3	4.3		
Dec 2003							

Legend:  
 Light Shade - Same version  
 Medium Shade - Different version & Limited Backward Compatibility  
 Dark Shade - Different version & Not Backward Compatible

SDD  
FDC



FIGURE 2 ABCS SOFTWARE INTEROPERABILITY ISSUES

operators spent a great deal of their time during the training exercises relearning procedures before they could get on with their jobs. This created a training requirement that affected the unit's ability to maintain proficiency during DCX I.

Not only have timing of software changes been problematic, but also frequency of the changes. For example, several versions of the ABCS software were fielded to the 4<sup>th</sup>

Infantry Division as part of their digital transformation. Between December 2000 and October 2001, three software upgrades (Version 6, 6.2, 6.2.1) were issued.<sup>27</sup> Training events that occurred during that window were the Corps Warfighter, Division Capstone Exercise Phase 1 and Division Capstone Exercise Phase 2.<sup>28</sup> The series of changes in the software upgrade had a significant impact on the train-up and training of soldiers in preparation for these exercises. This problem persists as III Corps anticipates yet another software upgrade—version 7.0—prior to the Corps Warfighter Exercise scheduled for March 2002.<sup>29</sup>

Also, most of the ATCCS systems were “stove piped” within their battlefield operating system (BOS). This stovepipe approach to development restricted the interoperability among the digital systems. In both DCX and DCX I, users often manually transferred data between the Army Tactical Command and Control System (ATCCS) or between Appliqué and ATCCS; a very time consuming process that often caused them to lose sight of the events going on around them.<sup>30</sup>

Furthermore, throughout DCX and DCX I there was concern over the immaturity of the digital equipment. These immaturities caused numerous equipment failures, or “crashes,” that became major distracters and caused initial mistrust of the systems. The unit experienced frustration due to inadequate memory, inefficient printers, default settings that increased time to

complete tasks, breakdowns of systems due to heat and humidity, and waiting for parts.<sup>31</sup> In DCX I, 49 percent of the units rated Appliqué as inadequate for constructing, passing, and receiving overlays.<sup>32</sup> Many stated the system crashed too easily, it was unreliable, and the process for building and sending overlays was too time consuming and not user friendly. The current spiral development process didn't provide replacement parts in time to fix these shortfalls.

Other challenges with the spiral development process have surfaced during the fielding of FBCB2. The Army has set very aggressive timelines for testing FBCB2 and is dependent on commercial vendors meeting production deadlines to provide the equipment. Insufficient funding, labor strikes by plant employees, or failure by the vendor to produce the parts adversely impacts on the fielding timeline. Furthermore, FBCB2 requires more operational testing because it is not a user-friendly system. And, as with the ABCS system, software isn't always properly synchronized with the FBCB2 device.

### SOFTWARE BLOCKING POLICY

Currently, there is not an effective system that separates requirements into blocks or increments of development such as interim (threshold), midterm, and objective (end state).<sup>33</sup>

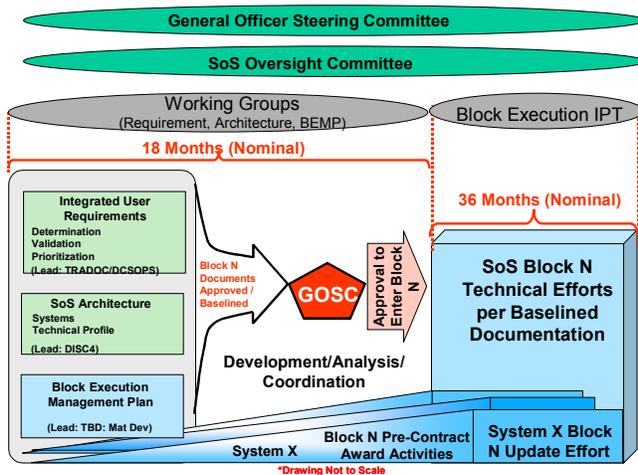


FIGURE 3 SOFTWARE BLOCKING CONCEPT

This “blocking” of requirements could better establish an understanding with the materiel developer as to expected levels of performance at key points in time.

Independent and disjointed process threads extending from requirements to fielding across individual system developers' programs interfere with achieving the goal of an integrated and interoperable warfighting capability.

The lack of cohesion is a result of individual system requirements that are not integrated; cost benefit analysis, testing and evaluation that are system-specific; system developments that are program-centric and funding limitations.<sup>34</sup> This lack of cohesion across the acquisition process has fostered stovepipe

system developments and resulted in unstable fielding of software and hardware for digital systems.

Frequent software changes have a negative impact on the Army's transformation efforts. The Army needs a process that harmonizes requirements across individual systems. Recognizing these weaknesses, the Vice Chief of Staff, General Keane, and the Acting Assistant Secretary of the Army for Acquisition, Logistics and Technology (ALT), Kenneth J. Oscar, implemented an Army Software Blocking Policy to harmonize requirements and system developments during program execution.<sup>35</sup> The intent of the policy is to minimize disconnects between requirements, designs, and implementation efforts. It will also enable the earlier fielding of new technology in support of the Warfighter. These integrated requirements would feed a cost benefit analysis that looks at impact not from an individual systems perspective, but from an operational impact on Warfighter/Unit capability. The goal is to ensure that contracts are harmonized such that they can be adjusted to consider significant technical and programmatic factors that otherwise would result in a costly delay or loss of functionality.<sup>36</sup> The Army has elected to implement System of System (SoS) software blocking as a means to manage the dependencies between individual system programs.<sup>37</sup>

Software blocking focuses on requirement determination/prioritization, development, certification, and evaluation of an integrated SoS capability increment.<sup>38</sup> The software blocking process depicted in Figure 3 complements the Unit Set Fielding process. Software blocking harmonizes DTLOMS related materiel developments based on a set of integrated requirements and recognized SoS interdependencies between programs.<sup>39</sup>

## **TRAINING**

In a digitized environment, soldiers must be knowledgeable of the systems in order to pull the applicable information that is required to make critical decisions on the battlefield. The Army has significant challenges ahead to keep pace with information technology and accommodate training for digitized equipment. Currently, most TRADOC military school systems are not producing "digitization smart" soldiers, and there is a long learning curve for soldiers and leaders to understand this new and evolving technology.<sup>40</sup> These soldiers need training to acquire the skills needed to manage the infrastructure that ties together the battlefield functional areas making up the Army Battle Command System.

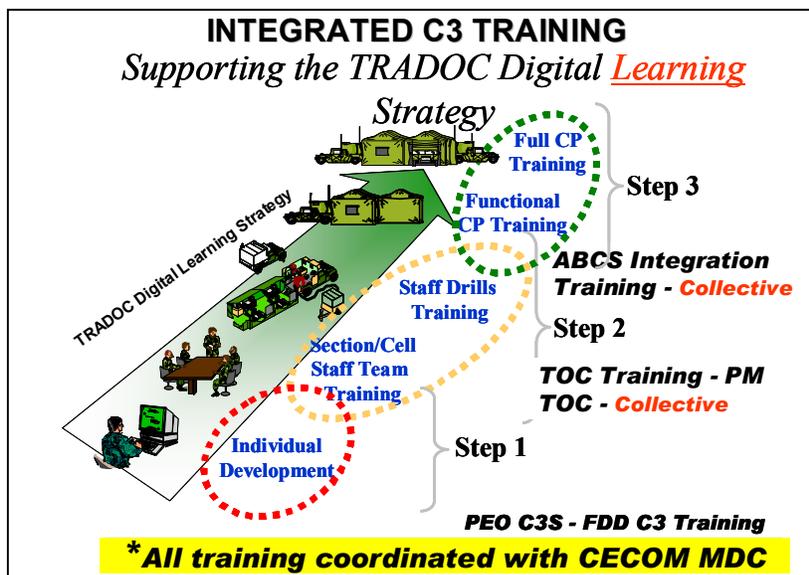
Beginning immediately, and over the next 10 to 15 years, the Army must aggressively and purposely formulate and implement a plan to develop this essential technical competency. This is no easy task as adult learning--and relearning--presents its own unique challenges.

“Adults can be ordered into a classroom and prodded into seats, but they can’t be forced to learn.”<sup>41</sup> However, the “key to using adults ‘natural’ motivation to learn is by tapping into their most teachable moments: those points in their lives when they believe they need to learn something new or different.”<sup>42</sup> With the introduction of the systems needed for digitization, there is a natural curiosity and desire to learn the latest and greatest.

## CENTRAL TECHNICAL SUPPORT FACILITY

TRADOC has charged the Central Technical Support Facility (CTSF) with executing its digital training strategy to ensure mission success in digitizing Fort Hood units.<sup>43</sup> The facility, run by the Program Executive Office for Command, Control, and Communications Systems, has provided the Army with an atmosphere for materiel developers, contractors, researchers, testers, warfighters, and user representatives to work together without boundaries. It’s a place where soldiers can come in and say what does and doesn’t work-before new hardware and software versions are taken to the field. The CTSF is the hub for implementation of the TRADOC digital training strategy (Figure 4).

The TRADOC digital training strategy uses a gate system that takes soldiers from learning the basics of soldiering, through understanding digital systems, to task-based and free play simulations.<sup>44</sup> A complete integrated training program requires coordination of New Equipment



Training (NET), collective training, and sustainment training. Step one of the training begins during system development and fielding with NET. It progresses to step two where there is collective training at the CTSF and in brigade-level tactical operation exercises. Once all brigade-level TOCs are certified, training progresses to level three, which consists of division-level Capstone

FIGURE 4 TRADOC DIGITAL TRAINING STRATEGY

Exercises to certify all levels from Division staff down to the company level at the National Training Center.<sup>45</sup>

Step 1: Individual and Staff training. CTSF provides a training environment for New Equipment Training (NET), Delta Training, and Refresher Training for individuals and staffs. NET begins when a unit receives new or modified equipment.<sup>46</sup> This includes ATCCS common tasks where applicable. Units are responsible for scheduling soldier attendance at NET based on distribution of systems and their digital battle roster. Delta Training is the training required by modifications to equipment and changes in software that call for operator skills that were not trained in NET.<sup>47</sup> Program Managers are responsible for delta training on their individual systems.<sup>48</sup> It may also be provided in conjunction with updates to, and distribution of, software user's manuals or tech manuals. Refresher Training is primarily a unit responsibility. It serves to reinforce previous training or sustain/regain previously acquired skills and is needed to maintain soldier proficiency.

Step 2: Tactical Operation Center (TOC) Training and Staff Drills. CTSF provides an environment in which units train six "overarching" tasks—Establish Command Post Operations, Manage Tactical Information, Assess Tactical Situation & Information, Plan Tactical Operations, Prepare for Tactical Operations, and Execute Tactical Operations.<sup>49</sup> During step 2, the staff (Warfighter Exercise or NTC/JRTC Rotation) masters the application of information technologies to acquire, exchange, and employ digital information throughout the battlespace. They should capitalize on these major training events to capture, train, and refine digital tactics, techniques and procedures (TTPs), and incorporate these into viable digital TACSOPS.

Step 3: Command Post Training and Full Command Post Training. To meet a wide diversity of unit training needs, CTSF provides a broad spectrum of collective training including Basic ABCS Executive Overview, Staff Interoperability, and Digital Battle Skills/STAFFEX.<sup>50</sup> Step 3 focuses on the collective involvement of key leaders, operators, and battle staff in the planning and execution of Brigade/Battalion Tactical Command Post training events.

Although TRADOC has designed this digital training strategy, and uses the CTSF to implement it, it has many challenges because:

- Digital skills are highly perishable.
- Communications infrastructure requires soldiers with skills beyond those currently trained in the Army.
- Leaders need training across all ATCCS, and equipment and software maturity impacts training.
- There is no structured sustainment-training program for digitized units once DCX I certification is achieved.

Digital skills are highly perishable. As the saying goes: “If you don’t use them, you lose them.”<sup>51</sup> According to Major Walker, during training events and field training exercises, more than 50 percent of digital equipment (Appliqué and ATCCS) operators participating in the DCX I indicated that they received little or no sustainment training, and many indicated that they needed more hands-on training to become proficient.<sup>52</sup> Maintaining operator skills can significantly impact the tempo of operations and information dominance. For example, during DCX I, based on extensive and repetitive hands-on training provided by CTSF, a trained Maneuver Control System (MCS) operator was able to complete an NBC file transfer in five minutes, a task that had previously required over 25 minutes for a less trained operator.<sup>53</sup>

Additionally, communication infrastructures in command posts have become more complex. In experiments, the Army relied on civilian technicians to set up and troubleshoot the digital equipment. During DCX I and DCX II it became evident that the Army needs highly trained signal personnel that can manipulate the connection between digital equipment and conventional communications systems.<sup>54</sup>

Also, leaders and battle staffs need extensive constructive and virtual staff training on all ATCCS systems to understand and exploit their capabilities.<sup>55</sup> During step 2 (TOC Training and Staff Drills), the CTSF facility provides the battle staff insights into how the ABCS equipment ties into the overall system and how to leverage system capabilities, however, they lack an understanding of how the systems interact in order to obtain the critical information they need to make decisions. During a full command post exercise sponsored by CTSF, the staff displayed a lack of understanding of synchronizing the ABCS systems. After action reports and a personal interview with Major Walker showed leaders and staffs lacked the technical expertise to integrate the systems and work as a combined arms team.<sup>56</sup> The use of simulations and simulators provided numerous opportunities for training at the brigade and battalion planning levels. The units exercised their staff elements in a stressful environment without having to actually deploy to a field site. This increased their proficiency tremendously. However, this contractor-provided training ends when the unit has been validated at the Division Capstone Exercise during Step 3.

The TRADOC schoolhouse system must provide advanced training for leaders to remain current and to gain insights from lessons learned in different environments, against different threats. The Army and Signal Branch leadership needs a transformation in its training strategy to address the need for more advanced technical skills (technical competencies), challenges associated with retraining adults, training methodologies, and the need to stabilize the trained force to initiate a cascading of the learned skills. “Competencies are the knowledge, skills,

attributes, and capacities that enable a leader to perform his required tasks. A competency may be based on natural ability or may be derived from education, training, or experience.<sup>57</sup> For these complex, digitized communication systems to be effective, there must be a high level of technical competency in soldiers from the ground level all the way to theatre commanders.<sup>58</sup>

However, the TRADOC guidance and current training strategy doesn't adequately address the complete cycle of training needed—contractor-provided training during fielding, institutional (schoolhouse) training, and sustainment (home station) training. Furthermore, current digital training is not developing soldiers who fully understand and can exploit the capabilities of digital systems.

### INSTITUTIONAL TRAINING

Institutional training for digitized units does not exist.<sup>59</sup> Through its subordinate schools, TRADOC is responsible for developing, training and producing the trained soldiers and leaders needed by all U.S. Army forces. It must provide a steady supply of trained soldiers to field units to replace losses caused by normal attrition and rotation. To accomplish this, TRADOC must integrate training through the appropriate training courses and programs to ensure trained soldiers and leaders are available when needed and with the necessary skills. However, each TRADOC Center and school is pursuing an independent strategy to developing a digitization-training program because varying perceptions exist regarding the training population, the categories of training required, and where the training should be conducted.<sup>60</sup> This approach will become increasingly more inefficient.

Furthermore, TRADOC hasn't developed a common scenario for digital training because proponents don't have a clear mandate or system to develop common use digital sustainment training support packages.<sup>61</sup> TRADOC Centers and Schools should focus on operator, staff, and leader processes to develop a common digital scenario for training, rather than branch-specific scenarios. A common scenario has the advantages of reduced developmental costs; efficient sharing of a broader range of digital products, including synchronized terrain and weather products; potential for interactivity and digital product exchanges among participants in multiple schools; and ease of maintenance and upgrade.<sup>62</sup>

Currently, the predominance of training on each of the ABCS platforms is conducted at Ft Hood, Texas and Ft Lewis, Washington. However, there is limited institutional ABCS training conducted at the different TRADOC schools. The United States Army Intelligence Center and School at Ft Huachuca Arizona, and the United States Army Signal Center, at Fort Gordon, Georgia conduct various levels of digitized training. Additionally, ABCS training has been

included in the curriculum at the United States Army Command and General Staff College at Ft Leavenworth, Kansas, and is being considered for inclusion in the Battle Staff Course program of instruction (POI) at the United States Army Sergeant Major Academy at Ft Bliss, Texas.<sup>63</sup> However, there still remains a considerable void in officer and NCO training throughout the Army. The units, installations, and TRADOC have become overly dependent on the contractor for training support because they haven't developed a System Training Plan (STRAP). The STRAP is the master training plan for materiel systems.<sup>64</sup> It provides combat, materiel, and training developers with a systematic approach for managing the system development, and for managing orderly integration of training for a new materiel system. The STRAP documents who require training, what tasks are to be trained, where and how the Army will conduct training. It starts the planning process for necessary courses and course revisions, training products, and training support required for the system. TRADOC and PEO C3S personnel should identify how digital training should be integrated, what training should be centralized, where it should be conducted, and document the process in an approved STRAP.

Fort Hood recently opened a Soldier Training Center to provide some digital training, however, it is focused at the individual skill level. TRADOC must develop and establish a set of Army standards that serves as the baseline requirement for all digital training. They need to include digital training at the collective level and also key leader training. Digital skills are perishable and need to be integrated in the battalion quarterly training plan and allow the company commanders an opportunity to train and evaluate on a routine basis.<sup>65</sup> According to DAWE Training Concept, Insights, and Implications report, the automation skills needed by unit personnel in a digitized division deteriorate much more rapidly than those needed by personnel in a non-digitized division.<sup>66</sup> For example, one observer noted that the Advanced Field Artillery Tactical Data System (AFATDS) has so many features that maintaining even basic proficiency requires an inordinate amount of training time. Since soldiers use other software for their garrison duties, digital skills are not being reinforced in garrison. Maintaining such skills can significantly impact the tempo of operations and information dominance.

Additionally, TRADOC should develop a training center to provide digital sustainment training at installations where the units are digitized. The training center should incorporate individual, unit and collective digital training aimed at maintaining unit readiness—both equipment and personnel. The installations should incorporate validation of the digital equipment during annual division/corps level exercises.

## HOME STATION TRAINING

Home Station training for digitized units does not exist.<sup>67</sup> Proponents have no clear mandate or system to develop common use digital home station training support packages. Because of the digitized unit's increased reliance on technology, non-training factors have a larger impact on the amount of training required by units. The amount of digital technology, the need to maintain and troubleshoot this digital equipment, the difficulty of using computer screens and functions (e.g., MCS), and a lack of TTP and SOPs for using this equipment in combat are non-training factors that increase a digitized unit's training burden. Leaders and staff need frequent practice in obtaining information from all ABCS systems to fully exploit the capabilities of these systems. They need to understand the overall system architecture and the capabilities and limitations of available digital assets. Basically, they need to understand how systems interact, and where and how to obtain the critical information they need to make decisions. In order to train and sustain a digitized staff's team work and its ability to understand the capabilities and limitation of its digital equipment, virtual and constructive staff training techniques (such as CATT, JANUS, CBS and WARSIM) incorporating the ABCS systems should be further developed and implemented in units. Hands-on training in garrison is the only way to continuously sustain a digitized division's proficiency in operating and maintaining state-of-the-art technical systems.<sup>68</sup> Training should also be developed to facilitate the rapid integration of cross-attached units into well-trained combined arms teams tailored to particular contingencies. Digitized forces must also train to deploy with the non-digitized active, National Guard, and Reserve units.<sup>69</sup>

## PERSONNEL CHALLENGES

Manning Army digitized units presents difficult challenges as the Army is forced to compete even more intensely with the private sector, higher education and other military services for morally, mentally and physically qualified young men and women as it invests enhanced capability in fewer personnel.

The Armed Forces need "leaders who have a deep understanding of warfare in the context of the information age."<sup>70</sup> The art and skill of making quick and accurate decisions while having to process enormous amounts of information will be essential for the battle commander of the 21<sup>st</sup> century. "Such information knowledgeable leaders must have had the opportunity to internalize the significant capabilities and vulnerabilities associated with the current and future role of information (from both the technological and human perspectives)."<sup>71</sup> It is essential that once soldiers are trained to make quick and accurate decisions using information provided

through ABCS, that this unique expertise is captured and passed on to future generations of leaders. Today, a rudimentary process is in place, but at best, it serves as a piece-meal approach to utilizing the talent pool of soldiers trained on digitized systems.

Current assignment policies and patterns result in personnel turbulence and affect unit readiness. From a strategic perspective, the CSA's implementation of several personnel manning initiatives simultaneously with transformation caused confusion, turbulence, and conflicting priorities.<sup>72</sup> When the CSA directed 100 percent manning of Divisions and Army Cavalry Regiments (ACRs) by drawing personnel resources away from organizations such as TRADOC, Army agencies and installation staffs, it caused conflicts of priorities.<sup>73</sup> The CSA's 100 percent manning decision had serious implications on the personnel management system as it caused short fused assignments for both officers and enlisted soldiers.<sup>74</sup> As III Armored Corps transitions to digitized units in FY '02, this policy will have a significant impact because a large percentage of soldiers have been moved down to the Divisions to meet the 100 percent fill requirement. For example, according to COL Dennis Via, Commander, 3<sup>rd</sup> Signal Brigade, his unit is at 69 percent fill across all MOSs. The brigade currently can only man 50 percent of communication switching shelters due to the personnel shortages. These shelters are an integral part of the digitized network.<sup>75</sup>

Additionally, the leader development matrix outlined in DA PAM 600-3 (Officer Professional Development Guide), is universally used Army-wide as a guideline for professional development. However, the timelines in the matrix don't provide junior leaders enough time to learn the digital capabilities of equipment in the unit, and to apply the skills learned to coach, teach and mentor other junior leaders before they move into higher staff positions. For example, a Lieutenant normally serves as a platoon leader for 12-15 months, barely enough time to transition from the basic course to a tactical environment. Twelve months is not enough time to learn the unit, the details of a new job, to include managing a platoon and company requirements, and the soldiers. Adding digital training requirements to these responsibilities during a one-year initial tour can be overwhelming for a new Lieutenant. For enlisted soldiers, a Team Chief spends an average of 12 months in the position. Similar to the Lieutenant, there is insufficient time to develop the required skills necessary to manage his team, plan, train, and maintain digital equipment. Assignment guidelines should be revised to allow junior leaders to remain in the position for 24 months. This would benefit the leader as well as the organization by enabling them to learn and understand the functioning of the unit, its equipment and soldiers during the first year. During year 2, they would be able to apply the learned skills with some level of experience.

Army proponents are closely studying this issue. According to results of a study commissioned by the Army Chief of Staff, "Officers are routinely shifted from one assignment to another before they have a chance to develop a relationship with the soldiers under their command because the Army assignments system is driven by requirements to fill spaces rather than leader development."<sup>76</sup> Commanders should be given the power to keep junior officers in the same jobs long enough for them to gain experience.

Implementation of a stabilization policy would tremendously benefit the Army's transformation efforts by providing opportunities to cascade training within units. The newly trained junior leadership should pass on the training to others in the organization, thereby helping to engrain the new systems and changes. The ultimate measure of success of the transformation efforts is when these new systems are woven seamlessly into the organization and soldiers and leaders alike become comfortable with an environment of constant change that leads to continuous progress. As junior officers become more experienced, they will become the eyes and ears for the Regiment and can identify needed refinements in the technology.

The U.S. Army is not effectively tracking digitally trained personnel.<sup>77</sup> Until the units at Forts Hood and Lewis complete their digitization process, soldiers should be tracked in order to maintain unit readiness. The process to train an individual soldier can take up to four to six months, depending on the systems. The training must include not only the systems' capabilities but also their limitations, to determine how to best to employ the ABCS systems. According to LTC Ayers, commander of the 124<sup>th</sup> Signal Battalion at Fort Hood, by the time a unit completes the Tactical Operation Cell certification (Step 2), soldiers were in receipt of orders to move to another duty station.<sup>78</sup> Between the DCX I and DCX II (which was four months apart), the 4<sup>th</sup> Infantry Division changed out over 60 percent of their digital trained key personnel. Only 20 percent of the personnel that rotated into the Division received some sort of formal digital training. This training shortfall of qualified personnel created a tremendous train-up requirement for the unit and CTSF. This could be alleviated if the Army had visibility on digitally trained soldiers. U.S. Personnel Command (PERSCOM) should be the lead agency to track digital certified trained soldiers and move those soldiers into jobs requiring digital skills.

## **CONCLUSIONS AND RECOMMENDATIONS:**

The Army is on a rapid pace to transform itself to meet the new threats and challenges of the 21<sup>st</sup> century. It will use information technology to enable its transformation effort. The operational demands on signal and information technology are increasing with the introduction of new systems designed to operate over an expanded battlespace that includes the use of

military forces that range from operations other than war to strategic warfare. There are three sets of recommendations that the Army should consider as it digitizes its units. The recommendations are in the following areas: Software and Hardware Blocking, Long Life Learning, and Personnel Management.

#### SOFTWARE AND HARDWARE BLOCKING

Achieving the goal of an integrated and interoperable warfighting capability is the key for software and hardware programs. Implementation of Army Software Blocking Policy was a step in the right direction. It provided the harmonization of contracts and synchronized the acquisition process that adequately supports Transformation efforts. Currently, the software blocking policy is in place. However, software releases are not synchronized with the appropriate hardware systems. To improve this process the Army should implement a similar blocking policy for hardware systems. This will decrease competition among contractors by identifying and certifying the right system to field with the right match of software.

#### LONG LIFE TRAINING

The new equipment training method is one of the most expensive ways to train personnel or new applications. The Army should seek alternative approaches to digital equipment training and implement a long life training process to include institutional training at service schools, home station training and “train the trainer” strategies for major software and hardware changes. Home station training techniques will provide the means to enable on-going practice in garrison with the digital equipment employed in combat.

TRADOC’s Combined Arms Center (CAC), Schools, and the Program Integration Office for Army Battle Command Systems (TPIO-ABCS), in coordination with the central technical support facility (CTSF) at Fort Hood and battle labs, should develop a long life digital training strategy and integrate it throughout the TRADOC institutional and home station training system. This training strategy should encourage lifelong learning and provide 24/7 reach back for signal and information technology soldiers and leaders. This training concept should include a mixture of traditional schoolhouse resident instruction; instruction presented at home stations, and continuous access to self-learn training techniques through on-line courses to keep pace with the changes in technology as they occur.

The US Army Signal Center and Fort Gordon is developing a state-of-the-art information technology-training program called University of Information Technology (UIT).<sup>79</sup> This program should be adopted and integrated in all TRADOC Training centers. The Signal Center plan

meets the current and future training challenges. It represents a major change in the way we will train the force, now and in the future.

The University of Technology learning model is a mixture of traditional schoolhouse resident instruction as well as instruction presented in other locations by using the most cost effective mix of locations, materials and methods. It is a combination of hardware, software, facilities, connectivity, and people providing lifelong learning materials, information, and support that include 24/7 reachback for the Signal and UIT community.<sup>80</sup> The model requires an open and effective relationship between the schoolhouse, the student and the unit. Fort Gordon will accept and assume the responsibility for students at all locations. Students must also accept a higher level of personal responsibility for their education. Units must play a critical role by allowing the time required to bring required training to the soldier at the most teachable moments.

The Department of the Army has not funded the UIT plan. This plan includes the appropriate solutions not only for the Signal Corps, but the entire Army. Recommend the UIT be expanded to include all specialty branches and be prioritized as a must fund for the FY 03 POM cycle.

## PERSONNEL MANAGEMENT

The role of leaders, operators, maintainers, and network administrators of communications based systems and networks are becoming increasingly critical to battlefield success as the force continues its transition to increased reliance on information age technologies.<sup>81</sup> Soldiers that manage these systems should be identified as “Key Personnel” and awarded with an Additional Skill Identifier. It is widely recognized that digital skills required are perishable and must be continuously refreshed to maintain the proficiency levels of personnel operating signal and information technology systems and networks, including leaders who use the information produced by these systems for battle decisions.

The U.S. Total Army Personnel Command (PERSCOM) should track soldiers who received digitization/on-the-job training for future assignments in digitized units. PERSCOM should make every attempt to track these soldiers (enlisted and officer) by assigning an Additional Skill Identifier (ASI) to those personnel qualified on the ABCS. The ABCS systems requiring ASI are:

1. Combat Service Support Control System (CSSCS).
2. All Source Analysis System (ASAS)
3. Maneuver Control System (MCS)

4. Advanced Field Artillery Tactical Direction system (AFATDS).
5. Forward Area Air Defense Command and Control (FAADC2I).
6. Army Tactical Command and control System Appliqué (ATCCS appliqué)

PERSCOM should identify and track qualified individuals through Army G1, FORSCOM AG Transformation Branch, and DCSOPS-PERSCOM. Assignment Officers/NCOs should balance the needs of the Army by managing and assigning qualified individuals to digital units.

While the Army Digitization offers many challenges, effectively managing their valuable resources—digitally trained officers, NCOs, and soldiers—will benefit units that are transitioning to digital equipment and will contribute to unit readiness. “The Army will have to make wise use of all its resources to meet the challenges of the future. It must recognize where bold change is necessary and where little or no change is needed. Meeting these challenges will take a long-term sustained commitment to excellence—to develop leaders, soldiers, equipment, and organizations capable of performing the diverse missions of the future.”<sup>82</sup>

WORD COUNT = 7,496

## ENDNOTES

<sup>1</sup> Eric K. Shinseki, The Army Vision, (Washington, D.C.: U.S. Department of the Army, 1999), 3.

<sup>2</sup> Sean D. Naylor, "Army leaders consider speeding up plans for Transformation," Army Times, 29 October 2001, p.18.

<sup>3</sup> Louis Caldera and Eric K. Shinseki, United States Army Transformation Campaign Plan (Washington, D.C.: Headquarters, Department of the Army, 27 October 2000), 6-7.

<sup>4</sup> United States Army Audit Agency, Commentary on Network Managers for the Digitized Battlefield (Alexandria, Virginia: U.S. Army Audit Agency, 19 August 1999), 6.

<sup>5</sup> Ibid.

<sup>6</sup> William H. Campbell, "Force XXI...What You Can Expect to See", briefing slides, Director of Information Systems for Command, Control, Communications, and Computers, Department of the Army, June 2000.

<sup>7</sup> United States Army Audit Agency, Commentary on Network Managers for the Digitized Battlefield (Alexandria, Virginia: U.S. Army Audit Agency, 19 August 1999), 6.

<sup>8</sup> Louis Caldera and Eric K. Shinseki, United States Army Transformation Campaign Plan (Washington, D.C.: Headquarters, Department of the Army, 27 October 2000), 6-7.

<sup>9</sup> U.S. Army, Digitization Office, Report on the Plan for Fielding the First Digitized Division and First Digitized Corps, Presented to The Committee On Armed Services, United States Senate, Second Session, 106<sup>th</sup> Congress, (Washington, D.C.: Department of the Army, April 2000), 13.

<sup>10</sup> Edward J. Filiberti, James R. Oman, and James H. Thomas, The Army Transformation: A Case Study, (U.S. Army War College, Carlisle, PA, 12 October 2001), 5.

<sup>11</sup> Department of the Army, Office of the Deputy Chief of Staff Operations and Plans, The United States Army Modernization Plan 2001, (Washington, D.C.: U.S. Department of the Army, 13 September 2001), 19

<sup>12</sup> Sean D. Naylor, "Army leaders consider speeding up plans for Transformation," Army Times, 29 October 2001, p.18

<sup>13</sup> Ibid.

<sup>14</sup> Edward J. Filiberti, James R. Oman, and James H. Thomas, The Army Transformation: A Case Study, (U.S. Army War College, Carlisle, PA, 12 October 2001), 5.

<sup>15</sup> U.S. Department of the Army, FORCE XXI OPERATIONS, TRADOC Pamphlet 525-5 (Washington: U.S. Department of the Army, 1 August 1994), 3-4.

<sup>16</sup> U.S. Army, Combined Arms Center, “Army Battle Command System Capstone Requirements Document Revision 1c”, (Fort Leavenworth, KS: TRADOC Program Integration Office Army Battle Command System, 3 October 2000), 7.

<sup>17</sup> General Accounting Office, Battlefield Automation: Performance Uncertainties Are Likely When Army Fields Its First Digitized Division (Washington, D.C.: U.S. General Accounting Office, July 1999), 12..

<sup>18</sup> Robert K. Ackerman, “Army transformation changes force targets for digitization,” Signal, (July 2000), 31.

<sup>19</sup> United States Army Audit Agency, Digitization of the Battlefield: Tactical Internet (Alexandria, Virginia: U.S. Army Audit Agency, 15 March 1999), 19.

<sup>20</sup> Ibid.

<sup>21</sup> United States Army Audit Agency, Commentary on Network Managers for the Digitized Battlefield (Alexandria, Virginia: U.S. Army Audit Agency, 19 August 1999), 17.

<sup>22</sup> Department of the Army, Office of the Deputy Chief of Staff Operations and Plans, The United States Army Modernization Plan 2001, (Washington, D.C.: U.S. Department of the Army, 13 September 2001), 25

<sup>23</sup> Ibid. 25.

<sup>24</sup> Ibid.

<sup>25</sup> Major Carlos Walker, Signal Officer, 2<sup>nd</sup> Brigade, 4<sup>th</sup> Infantry Division, Fort Hood, Texas, telephone interview by author, 6 December 2001.

<sup>26</sup> Ibid.

<sup>27</sup> Major Mark Elliott, G6, 1<sup>st</sup> Cavalry Division, “Modernization – ABCS Software Interoperability Issues,” Briefing slides with scripted commentary, Fort Hood, Texas, 10 November 2001.

<sup>28</sup> Ibid.

<sup>29</sup> Ibid.

<sup>30</sup> Brooke B. Schaab and Franklin L. Moses, Six Myths about Digital Skills Training, U.S. Army Research Institute for the Behavioral and Social Sciences, July 2001.

<sup>31</sup> TRADOC Program Integration Office for Army Battle Command Systems, Institutional Digital Education Plan (Version 4.0), (Headquarters, United States Army Training and Doctrine Command, Fort Monroe, Virginia, 9 February 2000), 70.

<sup>32</sup> Richard R. Laferriere <[laferri@pc002.trac.wsmr.army.mil](mailto:laferri@pc002.trac.wsmr.army.mil)>, “Joint Venture – Training Analysis and Experimental Lessons Learned,” electronic mail message to Robert Ferrell <[robert.Ferrell@carlisle.army.mil](mailto:robert.Ferrell@carlisle.army.mil)>, 20 November 2001, 8.

<sup>33</sup> Chuck Pizzutelli, Chief, Force Integration Office <[cpizzutelli@c3smail.monmouth.army.mil](mailto:cpizzutelli@c3smail.monmouth.army.mil)> electronic mail message to Robert Ferrell <[robert.Ferrell@carlisle.army.mil](mailto:robert.Ferrell@carlisle.army.mil)>, 20 November 2001, 5.

<sup>34</sup> Ibid.

<sup>35</sup> General John M. Keane, Vice Chief of Staff of the Army, “Army Software Blocking Policy,” memorandum for Secretary of the Army, Chief of Staff of the Army, and the Director of Integration, Deputy Chief of Staff for Programs, 18 Sep 01.

<sup>36</sup> Department of the Army, Army Software Blocking Policy, Army Acquisition Policy, (Washington, D.C.: U.S. Department of the Army, August 2001). 1.

<sup>37</sup> Ibid.

<sup>38</sup> Department of the Army, Force Development Requirements Determination, TRADOC Pamphlet 71-9 (Headquarters, United States Army Training and Doctrine Command, Fort Monroe, Virginia, 5 November 1999), 119.

<sup>39</sup> General John M. Keane, Vice Chief of Staff of the Army, “Army Software Blocking Policy,” memorandum for Secretary of the Army, Chief of Staff of the Army, and the Director of Integration, Deputy Chief of Staff for Programs, 18 Sep 01.

<sup>40</sup> Brooke B. Schaab and Franklin L. Moses, Six Myths about Digital Skills Training, U.S. Army Research Institute for the Behavioral and Social Sciences, July 2001, 1.

<sup>41</sup> Ron Zemke and Susan Zemke, “Adult Learning What Do We Know For Sure?” Training, (June 1995), 32.

<sup>42</sup> Ibid, 2.

<sup>43</sup> United States Army Audit Agency, Digitization of the Battlefield: Tactical Internet (Alexandria, Virginia: U.S. Army Audit Agency, 15 March 1999), 19.

<sup>44</sup> Jim Hodgin, “ABCS Digital Integration Training.” Briefing slides with scripted commentary. Fort Hood, Texas: PEO C3S-REO, Central Technical Support Facility, August 2000.

<sup>45</sup> John Saucedo, Program Manager for Tactical Operations Cell, “Digitizing the 1<sup>st</sup> Cavalry Division,” briefing slides with scripted commentary, Program Executive Office, Command, Control and Communications Systems, Fort Hood, Texas, 18 July 2001.

<sup>46</sup> Jim Hodgin, “ABCS Digital Integration Training.” Briefing slides with scripted commentary. Fort Hood, Texas: PEO C3S-REO, Central Technical Support Facility, August 2000.

<sup>47</sup> Ibid.

<sup>48</sup> Ibid.

<sup>49</sup> Ibid

<sup>50</sup> Ibid.

<sup>51</sup> Brooke B. Schaab and Franklin L. Moses, Six Myths about Digital Skills Training, U.S. Army Research Institute for the Behavioral and Social Sciences, July 2001.2.

<sup>52</sup> Major Carlos Walker, Signal Officer, 2<sup>nd</sup> Brigade, 4<sup>th</sup> Infantry Division, Fort Hood, Texas, telephone interview by author, 15 October 2001.

<sup>53</sup> Ibid.

<sup>54</sup> Richard R. Laferriere <[laferrir@pc002.trac.wsmr.army.mil](mailto:laferrir@pc002.trac.wsmr.army.mil)>, "Division Capstone Exercise Report – Issue Trip Report 02," electronic mail message to Robert Ferrell <[robert.Ferrell@carlisle.army.mil](mailto:robert.Ferrell@carlisle.army.mil)>, 20 November 2001, 5.

<sup>55</sup> Charlotte H. Campbell and Kathleen A. Quinkert and Billy L. Burnside, Training For Performance: The Structured Training Approach, U.S. Army Research Institute, Alexandria, Virginia, August 2000.

<sup>56</sup> Major Carlos Walker, Signal Officer, 2<sup>nd</sup> Brigade, 4<sup>th</sup> Infantry Division, Fort Hood, Texas, telephone interview by author, 15 October 2001.

<sup>57</sup> Research Triangle Institute, U.S. Army Signal Center and Fort Gordon Information Technology and Digital Training Masterplan, (Fort Gordon, GA, U.S. Army Signal Center and Fort Gordon, 20 July 2001), ii.

<sup>58</sup> William M. Steele, "Training and Developing Army Leaders," Military Review (July-August 2001): 3.

<sup>59</sup> TRADOC Program Integration Office for Army Battle Command Systems, Institutional Digital Education Plan (Version 4.0), (Headquarters, United States Army Training and Doctrine Command, Fort Monroe, Virginia, 9 February 2000), 70.

<sup>60</sup> Research Triangle Institute, U.S. Army Signal Center and Fort Gordon Information Technology and Digital Training Masterplan, (Fort Gordon, GA, U.S. Army Signal Center and Fort Gordon, 20 July 2001), ii.

<sup>61</sup> TRADOC Program Integration Office for Army Battle Command Systems, Institutional Digital Education Plan (Version 4.0), (Headquarters, United States Army Training and Doctrine Command, Fort Monroe, Virginia, 9 February 2000), 70.

<sup>62</sup> Ibid.

<sup>63</sup> Philip B. North, Force XXI: The Need for a Trained and Available Force, Strategy Research Project (Carlisle Barracks: U.S. Army War College, 30 April 1998), 16.

<sup>64</sup> TRADOC Program Integration Office for Army Battle Command Systems, Institutional Digital Education Plan (Version 4.0), (Headquarters, United States Army Training and Doctrine Command, Fort Monroe, Virginia, 9 February 2000), 70.

<sup>65</sup> Ibid.

<sup>66</sup> Ibid

<sup>67</sup> Ibid.

<sup>68</sup> Richard R. Laferriere <[laferri@pc002.trac.wsmr.army.mil](mailto:laferri@pc002.trac.wsmr.army.mil)>, "Division Capstone Exercise Report – Issue Trip Report 02," electronic mail message to Robert Ferrell <[robert.Ferrell@carlisle.army.mil](mailto:robert.Ferrell@carlisle.army.mil)>, 20 November 2001, 9.

<sup>69</sup> Ibid.

<sup>70</sup> Philip A. La Perla, Creating Information Knowledgeable Leaders Through Information Operations Education (Carlisle Barracks, PA: U.S. Army War College, July 1997), 1.

<sup>71</sup> Ibid.

<sup>72</sup> Edward J. Filiberti, James R. Oman, and James H. Thomas, The Army Transformation: A Case Study, (U.S. Army War College, Carlisle, PA, 12 October 2001), 19.

<sup>73</sup> Ibid.18.

<sup>74</sup> Ibid.

<sup>75</sup> Colonel Dennis Via, Commander, 3<sup>rd</sup> Signal Brigade, III Corps, Fort Hood, Texas, Telephone Interview, October 2001.

<sup>76</sup> Roberto Suro, "Army Finds Itself Much at Fault; Marching Orders Issued for Changes in Training, Promotions," The Washington Post, 26 May 2001, A.6.

<sup>77</sup> TRADOC Program Integration Office for Army Battle Command Systems, Institutional Digital Education Plan (Version 4.0), (Headquarters, United States Army Training and Doctrine Command, Fort Monroe, Virginia, 9 February 2000), 70.

<sup>78</sup> Lieutenant Colonel Victor Ayers, Battalion Commander, 124<sup>th</sup> Signal Battalion, Fort Hood, Texas, telephone interview by author, 10 September 2001.

<sup>79</sup> Research Triangle Institute, U.S. Army Signal Center and Fort Gordon Information Technology and Digital Training Masterplan, (Fort Gordon, GA, U.S. Army Signal Center and Fort Gordon, 20 July 2001), ii.

<sup>80</sup> Ibid. 7.

<sup>81</sup> Research Triangle Institute, U.S. Army Signal Center and Fort Gordon Information Technology and Digital Training Masterplan, (Fort Gordon, GA, U.S. Army Signal Center and Fort Gordon, 20 July 2001), 1.

<sup>82</sup> U.S. Department of the Army, FORCE XXI OPERATIONS, TRADOC Pamphlet 525-5 (Washington: U.S. Department of the Army, 1 August 1994), 1-5.

## LIST OF ACRONYMS

ABCS	Army Battle Command System
ACR	Army Cavalry Regiment
AFATDS	Advanced Field Artillery Tactical Data System
AMDPCS	Air Missile Defense Planning and Control System
ASAS	All Source Analysis System
ASI	Additional Skill Identifier
ATCCS	Army Tactical Command and Control System
BDE	Brigade
BEMP	Block Execution Management Plan
BN	Battalion
BOS	Battlefield Operating System
C4SIR	Command Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance
CAC	Combined Arms Center
CATT	Combined Arms Tactical Trainer
CBS	Corps Battle Simulation
CSA	Chief of Staff of the Army
CSSCS	Combat Service Support Control System
CTSF	Central Technical Support Facility
DAWE	Division Army Warfighter Exercise
DCX	Division Capstone Exercise
DTLS	Doctrine, Training, Leader, Development, Organization, Materiel, and Soldier
EPLRS	Enhanced Position Location Reporting System
FBCB2	Force XXI Battle Command Brigade and Below
FORSCOM	Forces Command
GBS	Global Broadcast System
GCCS-A	Global Command and Control System – Army
GOSC	General Officer Steering Committee
IBCT	Interim Brigade Combat Team
IMO	Information Management Operations
IPT	Integrated Product Team
IT	Information Technology

JANUS	Joint Analog Numeric Understanding System
JRTC	Joint Readiness Training Center
MCS	Maneuver Control System
MOS	Military Occupation Skill
MTOE	Modified Table of Equipment
NCA	National Command Authority
NCO	Non-Commissioned Officer
NET	New Equipment Training
NTC	National Training Center
ODISC4	Office of the Director of Information Systems for Command, Control, Communications, and Computers
PDSI	Project Development Skill Identifier
PEO C3S	Program Executive Officer, Command, Control, Communications
PERSCOM	Personnel Command
PM	Program Manager
POI	Program of Instruction
SOC	Sos Oversight Council
SOP	Standing Operating procedures
SoS	System of System
STAFFEX	Staff Exercise
STRAP	System Training Plan
TACSOPS	Tactical Standard operating procedure.
TOC	Tactical Operation Center
TPIO-ABCS	The Program Integration Officer for Army Battle Command Systems
TPF	Total Package Fielding
TRADOC	Training Doctrine Command
TTP	Tactic, Techniques, and Procedures
USF	Unit Set Fielding
UIT	Unit Impulse Train
WARSIM	Warfighters' Simulation

## BIBLIOGRAPHY

- Ackerman, Robert K., "Army transformation changes force targets for digitization," Signal, July 2000, 31.
- Ayers, Victor, Lieutenant Colonel, Battalion Commander, 124<sup>th</sup> Signal Battalion, Fort Hood, Texas, telephone interview by author, 10 September 2001
- Caldera, Louis and Eric K. Shinseki, United States Army Transformation Campaign Plan Washington, D.C.: Headquarters, Department of the Army, 27 October 2000.
- Campbell, Charlotte H. and Kathleen A. Quinkert and Billy L. Burnside, Training For Performance: The Structured Training Approach, U.S. Army Research Institute, Alexandria, Virginia, August 2000.
- Campbell, William H., "Force XXI...What You Can Expect to See", briefing slides, Director of Information Systems for Command, Control, Communications, and Computers, Department of the Army, June 2000.
- Department of the Army, Force Development Requirements Determination, TRADOC Pamphlet 71-9, Headquarters, United States Army Training and Doctrine Command, Fort Monroe, Virginia, 5 November 1999.
- Department of the Army, Office of the Deputy Chief of Staff Operations and Plans, The United States Army Modernization Plan 2001, Washington, D.C.: U.S. Department of the Army, 13 September 2001.
- Filiberti, Edward J., Colonel, James R. Oman, Colonel, James H. Thomas, Colonel, The Army Transformation: A Case Study, 12 October 2001.
- General Accounting Office, Battlefield Automation: Performance Uncertainties Are Likely When Army Fields Its First Digitized Division, Washington, D.C.: U.S. General Accounting Office, July 1999.
- Hodgin, Jim, "ABCS Digital Integration Training." Briefing slides with scripted commentary. Fort Hood, Texas: PEO C3S-REO, Central Technical Support Facility, August 2000.
- Keane, John M., General, Vice Chief of Staff of the Army, "Army Software Blocking Policy," memorandum for Secretary of the Army, Chief of Staff of the Army, and the Director of Integration, Deputy Chief of Staff for Programs, 18 September 2001.
- Laferriere, Richard R. <[laferrir@pc002.trac.wsmr.army.mil](mailto:laferrir@pc002.trac.wsmr.army.mil)>, "Joint Venture – Training Analysis and Experimental Lessons Learned," electronic mail message to Robert Ferrell <[robert.Ferrell@carlisle.army.mil](mailto:robert.Ferrell@carlisle.army.mil)>, 20 November 2001
- La Perla, Philip A., Creating Information Knowledgeable Leaders Through Information Operations Education, Carlisle Barracks, PA: U.S. Army War College, July 1997.
- Naylor, Sean D., "Army leaders consider speeding up plans for Transformation," Army Times, 29 October 2001, p.18

North, Philip B., Force XXI: The Need for a Trained and Available Force, Strategy Research Project (Carlisle Barracks: U.S. Army War College, 30 April 1998).

Pizzutelli, Chuck, Chief, Force Integration Office <[cpizzutelli@c3smail.monmouth.army.mil](mailto:cpizzutelli@c3smail.monmouth.army.mil)> electronic mail message to Robert Ferrell <[robert.Ferrell@carlisle.army.mil](mailto:robert.Ferrell@carlisle.army.mil)>, 20 November 2001, 5.

Sauceda, John, Program Manager for Tactical Operations Cell, "Digitizing the 1<sup>st</sup> Cavalry Division," briefing slides with scripted commentary, Program Executive Office, Command, Control and Communications Systems, Fort Hood, Texas, 18 July 2001.

Schaab, Brooke B. and Franklin L. Moses, Six Myths about Digital Skills Training, U.S. Army Research Institute for the Behavioral and Social Sciences, July 2001.

Shinseki, Eric K., The Army Vision, Washington, D.C.: U.S. Department of the Army, 1999.

Steele, William M., "Training and Developing Army Leaders," Military Review (July-August 2001): 3.

Suro, Roberto, "Army Finds Itself Much at Fault; Marching Orders Issued for Changes in Training, Promotions," The Washington Post, 26 May 2001, A.6.

TRADOC Program Integration Office for Army Battle Command Systems, Institutional Digital Education Plan (Version 4.0), Headquarters, United States Army Training and Doctrine Command, Fort Monroe, Virginia, 9 February 2000.

U.S. Army, Combined Arms Center, "Army Battle Command System Capstone Requirements Document Revision 1c", (Fort Leavenworth, KS: TRADOC Program Integration Office Army Battle Command System, 3 October 2000.

U.S. Army, Digitization Office, Report on the Plan for Fielding the First Digitized Division and First Digitized Corps, Presented to The Committee On Armed Services, United States Senate, Second Session, 106<sup>th</sup> Congress, Washington, D.C.: Department of the Army, April 2000)

U.S. Army Signal Center and Fort Gordon Information Technology and Digital Training Masterplan, Research Triangle Institute, Fort Gordon, GA, 20 July 2001.

U.S. Department of the Army, FORCE XXI OPERATIONS, TRADOC Pamphlet 525-5 Washington: U.S. Department of the Army, 1 August 1994.

United States Army Audit Agency, Digitization of the Battlefield: Tactical Internet, Alexandria, Virginia: U.S. Army Audit Agency, 15 March 1999.

United States Army Audit Agency, Commentary on Network Managers for the Digitized Battlefield, Alexandria, Virginia: U.S. Army Audit Agency, 19 August 1999.

Via, Dennis, Colonel, Commander, 3<sup>rd</sup> Signal Brigade, III Corps, Fort Hood, Texas, Telephone Interview, 16 October 2001.

Walker, Carlos, Major, Signal Officer, 2<sup>nd</sup> Brigade, 4<sup>th</sup> Infantry Division, telephone interview by author, 15 October 2001.

Zemke, Ron and Susan Zemke, “Adult Learning What Do We Know For Sure?” Training, June 1995, 32.