

PARALLEL PLANNING: HOW DIGITAL INFORMATION SYSTEMS CAN IMPROVE THE COMBAT DECISION-MAKING PROCESS

A Monograph
By
Major Thomas D. Mayfield III
Armor



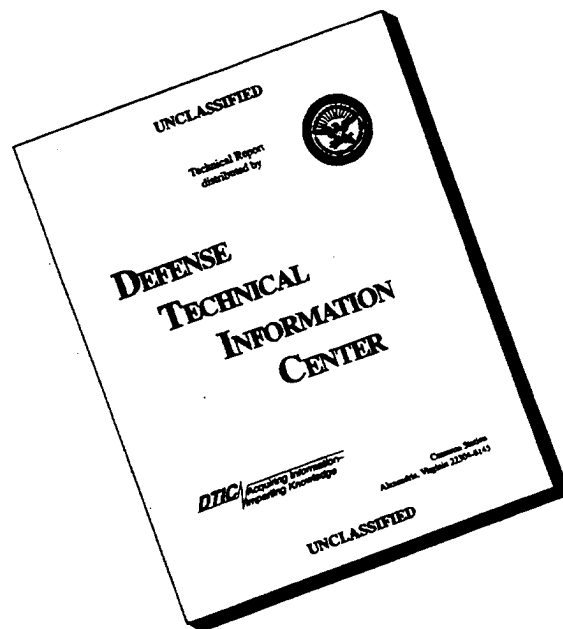
19960617 025

School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas

First Term AY 95-96

Approved for Public Release; Distribution is Unlimited

DISCLAIMER NOTICE



THIS DOCUMENT IS BEST QUALITY AVAILABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED MONOGRAPH		
4. TITLE AND SUBTITLE <i>parallel Planning; How Digital Information systems can improve the Combat Decision-Making Process</i>			5. FUNDING NUMBERS	
6. AUTHOR(S) <i>Major Thomas D. Mayfield III</i>				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) School of Advanced Military Studies Command and General Staff College Fort Leavenworth, Kansas 66027			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Command and General Staff College Fort Leavenworth, Kansas 66027			10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION / AVAILABILITY STATEMENT APPROVED FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) SEE ATTACHED				
14. SUBJECT TERMS <i>Digitization, tactical planning</i>			15. NUMBER OF PAGES <i>58</i>	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UNLIMITED	


SCHOOL OF ADVANCED MILITARY STUDIES

MONOGRAPH APPROVAL

Major Thomas D. Mayfield III

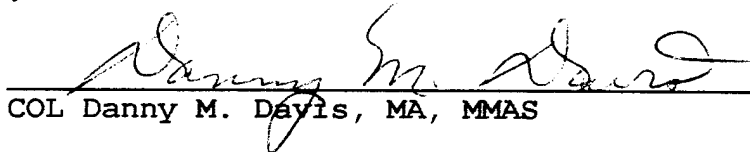
Title of Monograph: Parallel Planning: How Digital
Information Systems Can Improve the
Combat Decision-Making Process

Approved by:



LTC Gregory M. Eckert, MS, MMAS

Monograph Director



COL Danny M. Davis, MA, MMAS

Director, School
of Advanced Military
Studies



Philip J. Brookes, Ph.D.

Director, Graduate
Degree Program

Accepted this 14th Day of December 1995

Abstract

PARALLEL PLANNING: HOW DIGITAL INFORMATION SYSTEMS CAN IMPROVE THE COMBAT DECISION-MAKING PROCESS by MAJ Thomas D. Mayfield III, USA, 58 pages.

This monograph discusses the techniques and procedures units can use to make improvements in the combat decision-making process (CDMP) by using the digital systems available in the Force XXI brigade to facilitate parallel planning. The central question of this monograph is: How can the digital information systems available in the Force XXI brigade facilitate parallel planning in the CDMP? In answering this question, the monograph will present techniques and procedures maneuver brigades can employ within the combat decision-making process to allow subordinate battalions and companies to plan almost simultaneously with the brigade headquarters. These include a series of warning orders and digital information updates, as well as techniques for collaboration both inter and intra-echelon, to enhance the synchronization of the plans. The monograph will focus on parallel planning within the CDMP of the maneuver brigade and its subordinate task forces and companies. The monograph will show how using the digital systems to enhance the parallel planning process will improve both the efficiency and effectiveness of the brigade CDMP.

The monograph is organized into four chapters. Chapter one is the introduction. In chapter two, the monograph briefly describes the combat decision-making process (CDMP), with the assumption that the reader is already familiar with the military decision-making process in general. It defines the one-third/two-thirds rule and explains how it may not make the most efficient use of the time available for planning. Chapter two then defines parallel and collaborative planning, and finally, describes the capabilities of the digital systems available to the Force XXI brigade. Chapter three presents the parallel and collaborative process for planning using the digital systems. It describes in a step by step manner, from the receipt of the mission to execution, how units can use the digital systems to improve the efficiency and effectiveness of the CDMP. Chapter three also highlights possible limitations to the use of the digital systems, addresses some cautions, and recommends techniques to avoid problems. Finally, chapter four concludes the monograph with a summary of the recommendations for enhancing parallel and collaborative planning using the digital systems available to the Force XXI brigade.

Table of Contents

I. <u>Introduction</u>	1
II. <u>Definitions, Background, and Problem</u>	6
III. <u>Parallel Planning in the Digital Brigade</u>	17
IV. <u>Conclusion</u>	42
Appendices:	
A. <u>Digital Parallel Planning Model</u>	47
B. <u>Digital Brigade Staff Actions</u>	49
C. <u>List of Abbreviations</u>	50
Endnotes.....	52
Bibliography.....	56

I. Introduction

Throughout the history of warfare, commanders have sought the ability to mass the combat power of their forces at the right place and time on the battlefield. The U.S. Army's capstone doctrinal manual, FM 100-5 states the goal is to engage the enemy with overwhelming combat power. "Overwhelming combat power is achieved when all combat elements are violently brought to bear quickly, giving the enemy no opportunity to respond with coordinated or effective opposition."¹ The difficult task of the modern combat commander is to use the available tools to bring his combat power to bear quickly to accomplish his mission. The military planning process is the tool with which the staff and commanders of the maneuver units in the army collectively apply their intellectual abilities to solve this tactical problem. The digital systems available to the Force XXI tactical unit provide an opportunity to do this better, but the army must develop common-sense techniques and procedures in order to do so. TRADOC PAM 525-5 identifies the nature of the problem by noting:

We must recognize that success on past battlefields has resulted not so much from technological advances but from innovative ways of considering available and sometimes new technologies as they apply to warfighting.²

This monograph presents an innovative way of applying the available technology of digital information systems to the task of warfighting.

Following digital rotation 94-07 at the National Training Center (NTC)³, in which the maneuver units were equipped with some of the modern tactical digital information systems that are available to the Force XXI brigade⁴, the senior brigade observer/controller (OC) had the following observation of the brigade's use of the digital systems:

...[the brigade commander] had a view of his enemy no commander in history has ever possessed. At the same time, the brigade commander had the capability to know where every platoon-sized unit in his own force was located on the battlefield with six-digit accuracy, real time. This was also unprecedented in the history of warfare. But it made no difference.

The enemy attacked, quickly penetrated and destroyed the brigade, advanced into the brigade's rear, and destroyed the forward support battalion, much the same as any other brigade. Why did it happen? Why were we unable to exploit this incredible power of the information age?...

...Bottom line: conditions were never set by the brigade commander and his staff to achieve effective synchronization of the combined arms team.⁵

This observation is cited not to find fault with the brigade commander or his staff. Rather, the example makes the point that without effective procedures, the digital equipment may not provide any additional benefit to its user. The digital systems are but a tool for the commander, and alone will not produce synchronized plans.

The central question of this monograph is: How can the digital information systems available in the Force XXI brigade facilitate parallel planning in the combat decision-making process? In answering this question, the monograph will present techniques and procedures maneuver brigades can employ within the combat decision-making process to allow subordinate battalions and companies to plan almost simultaneously with the brigade headquarters. These include a series of warning orders and digital information updates, as well as techniques for collaboration both inter and intra-echelon, to enhance the synchronization of the plans. The monograph will identify critical elements of information for units to share and techniques for doing so. The monograph will focus on parallel planning within the combat decision-making process (CDMP) of the maneuver brigade and its subordinate task forces and companies. The CDMP is the process units use to plan for upcoming tactical operations when time is limited. The digital systems have applicability to

the deliberate process as well, but the focus of this monograph is on the brigade in combat or combat-like settings.

Parallel planning is the technique by which tactical units at the various echelons of command plan and prepare for upcoming operations nearly simultaneously. The concept of parallel planning with digital systems has applicability at virtually all tactical and operational levels as well, but this monograph limits its discussion to the parallel planning process at the lowest level where all combat functions come together, the maneuver brigade.

During the advanced warfighting experiment (AWE) Focused Dispatch '95, at Ft. Knox, Kentucky in August and September 1995, tactical units, using some of the techniques described in this monograph, began to realize the advantages parallel planning can provide the digitized unit⁶. In his after action review (AAR), the commander of Task Force 2-33 Armor made the following comment about the advantages of using digital systems to facilitate parallel planning:

Digital communications systems facilitate parallel planning between the battle staff and subordinate elements. During the orders process, the battle staff was able to quickly disseminate warning orders and graphics that were in line with the final plan. Subordinate elements were then able to begin troop leading procedures well ahead of normal timelines. During the AWE, subordinate commanders stated that they felt that they were already executing the plan long before the orders brief. When commanders would come to the orders brief they were better informed about the plan and were able to offer valid comments and recommendations that improved the overall plan.⁷

The unit was able to achieve the synchronization of efficient staff processes and arrive at informed command decisions with the actions and intents of subordinate commanders, to accomplish a tactical task. They did so by developing techniques to use the digital equipment as a tool for doing their jobs better. During the previous AWE, NTC

rotation 94-07, the units did not develop effective techniques and found the digital systems to be just high-tech equipment that consumed their time and energy for marginal gain.⁸

This monograph will build on the potential advantages like those realized by Task Force 2-33 Armor, to develop a common sense approach to using digital technology to improve on parallel planning in the CDMP.

The monograph will show how using the digital systems to enhance the parallel planning process will improve both the *efficiency* and *effectiveness* of the brigade CDMP. The monograph will show how the recommended techniques will improve the efficiency of the staff and commander by producing time savings in information dissemination, allowing more time for preparation and planning by the subordinate battalions and companies. The techniques will also allow more time for commanders at all levels to conduct detailed rehearsals and reconnaissance prior to execution of the mission. The ability of the various staff sections to collaborate independently between echelons via digital means, for example, between S2s at brigade and battalion level, will also improve the efficiency of the overall process by allowing the staff officers to spend less time collecting information and more time on analysis and synchronization. The monograph will also show how the process will improve the effectiveness of the units by providing the information to allow subordinate units to be better participants in the development, and synchronization of the plan. The subordinate commanders, by having more time for reconnaissance and preparation, will be able to identify issues and problems before the operations order briefing and rehearsal. Through collaboration via digital means, the brigade staff and subordinate commanders will be able to solve the problems more quickly. The resulting plans will have less ambiguity

and fewer chances for misunderstanding since the executors will have been active participants in the formulation and synchronization of the plan.

The monograph will also point out that digitization does not replace the requirement for the commander and staff to apply a logical, coherent thought process to solve problems. While digitization provides some unique capabilities to the tactical commander, it is still merely a tool to be used to help bring the combat forces to bear at the right time and place on the battlefield. As such it is a useful means, but not an end in and of itself. The commander and staff must remain focused, and not become so enamored with the digital planning tools that they lose sight of the true objective, which is the proper execution of the operation.

The monograph is organized into four chapters. Chapter one is the introduction. In chapter two, the monograph briefly describes the combat decision-making process (CDMP), with the assumption that the reader is already familiar with the military decision-making process in general. It defines the one-third/two-thirds rule and explains how it may not make the most efficient use of the time available for planning. Chapter two then defines parallel and collaborative planning, and finally, describes the capabilities of the digital systems available to the Force XXI brigade. Chapter three presents the parallel and collaborative process for planning using the digital systems. It describes in a step by step manner, from the receipt of the mission to execution, how units can use the digital systems to improve the efficiency and effectiveness of the CDMP. Chapter three also highlights possible limitations to the use of the digital systems, addresses some cautions, and recommends techniques to avoid problems. Finally, chapter four concludes the monograph

with a summary of the recommendations for enhancing parallel and collaborative planning using the digital systems available to the Force XXI brigade.

The monograph cites examples from three major warfighting experiments and exercises as evidence. The monograph will cite NTC rotation 94-07, the army's first AWE as an example. Although the units participating in the exercise did not have fully developed training and integration techniques and procedures for using the digital systems, the exercise is a valuable example. NTC 94-07 is the only major exercise in which digital systems were distributed from the brigade headquarters through platoon level in a live maneuver exercise, demonstrating some of the potential benefits and limitations of digitization on a large scale. Prairie Warrior '95⁹, even though focused on division level and higher, provides some key conceptual points for the discussion. During the exercise, the Mobile Strike Force (MSF) operated with several advanced digital systems and experimented with different staff organizations and procedures. Finally, AWE Focused Dispatch '95, the third warfighting experiment represents the first time a tactical unit actively integrated digital systems and procedures into a comprehensive training program prior to the exercise. The unit, in coordination with the U. S. Army Armor School, developed some innovative techniques and procedures for the use of tactical digital information systems.

Chapter II. Definitions, Background, and Problem

This chapter provides background information on combat planning in tactical units and the potential improvements of using digital information systems to facilitate parallel and collaborative planning. Using the assumption that the reader is generally familiar with the

military decision-making process, it includes a summary of the CDMP, definitions of the one-third/two-thirds rule, parallel planning and collaborative planning. It identifies, in theory, how parallel and collaborative planning can improve the efficiency and effectiveness of planning in units, and the problems units have had attempting to use these processes. Finally, it describes the capabilities and limitations of the digital information systems available to the Force XXI brigade.

The Combat Decision-making Process (CDMP).

The CDMP is an abbreviated form of the deliberate decision-making process (DDMP) used by units in combat situations to plan quickly for upcoming operations. It is a flexible process, driven by the commander, emphasizing speed without neglecting full consideration of all influences on the battle. It is a derivative of the DDMP¹⁰. According to U.S. Army Command and General Staff College (CGSC) Student Text (ST) 101-5, it is similar to the DDMP in that “both processes represent the coherent mental activities that support sound decision-making. They both include logical identification of the mission, development of concepts for executing the mission, evaluating the concepts and communication of the decision in a clear and concise manner.”¹¹

The CDMP and DDMP differ, however in several key areas. As ST 101-5 notes, the DDMP is a sequential set of actions with discrete points in the process where the commander makes decisions. The CDMP is a parallel thought process which can lead to decisions at almost any point in the process.¹² The amount of available time is the most obvious difference between the two processes. Time is relatively unconstrained in the DDMP, whereas the CDMP operates in an environment where time is limited. In the

CDMP, the number of friendly and enemy courses of action (COAs) the commander and staff consider is limited to save time, sometimes only considering one COA for each. The most significant difference between the two processes is the level of involvement of the commander and the amount of guidance he gives the staff.¹³ As ST 101-5 suggests, although the commander provides guidance and makes the key decisions, the DDMP is primarily a staff process. The CDMP is a more commander-driven process, in which the commander conducts his personal assessment, formulates concepts, and makes his decisions using the staff to support his efforts.¹⁴

Figure 1 depicts the steps in the CDMP. The steps are not necessarily sequential, and depending on the situation, may be no more than a recap of the steps used in the DDMP prior to the start of operations. The CDMP also provides a greater opportunity to arrive at a decision before actually completing all the steps. By using the CDMP, the commander seeks to develop a complete plan to accomplish the mission, while abbreviating the process. The resulting time savings will allow more time for the subordinate units to synchronize the plan through more detailed preparations and rehearsals.

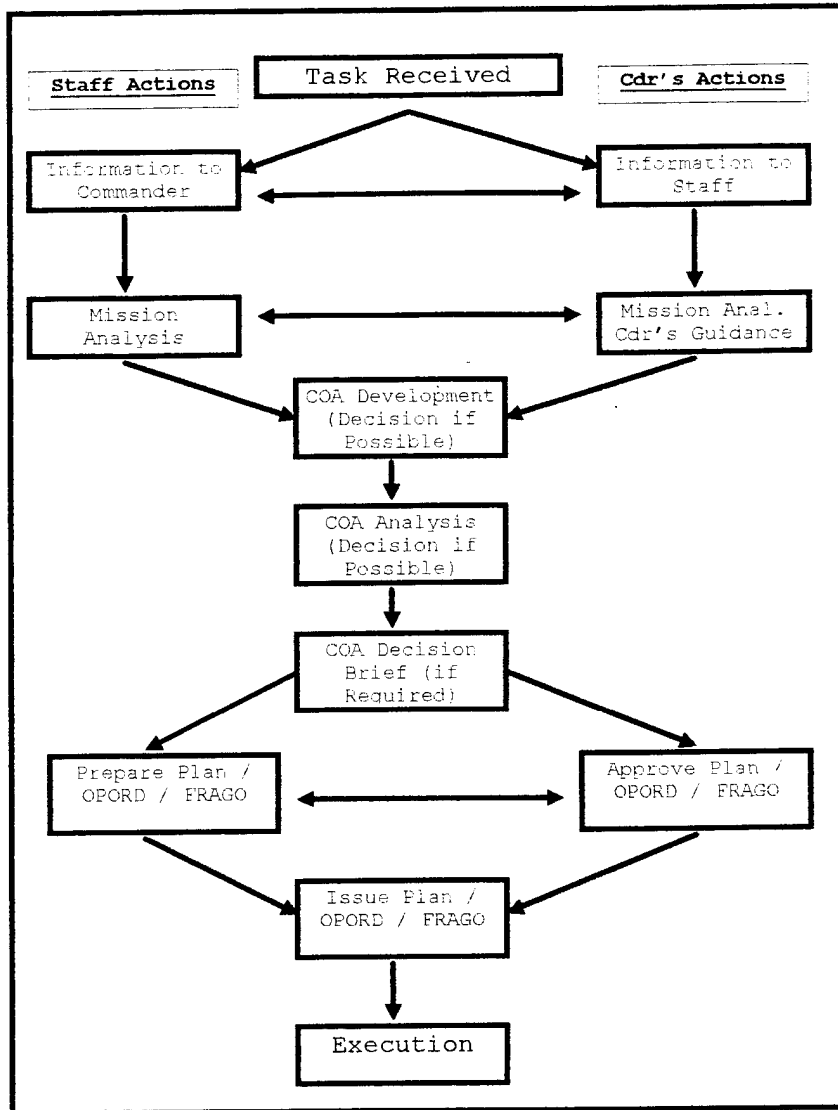


Figure 1. The Combat Decision-Making Process (CDMP)¹⁵

Commanders use abbreviated planning primarily to achieve efficiency in their use of time. Efficient time management, however, is one of the most difficult tasks for units to master in combat or during training. Friction, the fog of war, and chance will affect operations on the twenty-first century battlefield as much as they always have. Their effect is to cause everything to be more difficult and take more time than anticipated. A RAND study of battalion level command and control at the National Training Center (NTC) noted

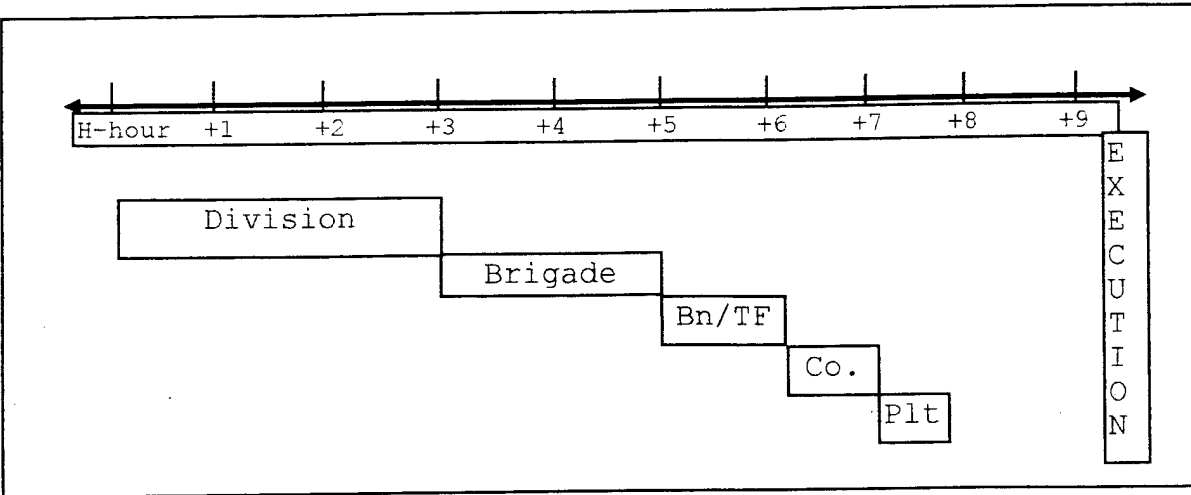
that: "in 56 out of 60 [After Action Reviews] AARs conducted in 1993-94 by the senior mechanized [infantry] task force trainer, the Blueforce units named time management as one of the key issues for improvement."¹⁶ The resulting problem is that units often do not meet the required time for issuance of OPORDs to their subordinate units, effectively depriving them of their full amount of planning time. In an attempt to manage the available time more efficiently, the army has developed techniques and guidelines for staffs to use within the planning process. One such guideline is the one-third/two-thirds rule.

The one-third/two-thirds rule.

To ensure commanders give subordinate units adequate time to plan and prepare for combat operations, maneuver units in the army have subscribed to the one-third/two-thirds rule for the planning process. FM 71-123 defines the rule as follows:

Planning time for a given headquarters should not exceed one third of the total planning time available. This one third lasts from receipt of the order from higher headquarters through briefbacks from the subordinates immediately following issuance of the order.¹⁷

As figure 2 depicts however, if units *strictly* follow the process, it does not make the most efficient use of the time available for the battalions, companies, and platoons. For example, if the division headquarters has nine hours from receipt of the mission to the start of execution, strictly following the one-third/two-thirds rule, the company commanders will have only two hours and twenty minutes from receipt of the mission to execution, or approximately twenty-six percent of the total time available to the division.



**Figure 2. The one-third/two-thirds rule.
(Strict Application)**

This suggests that the maneuver companies of a division, using the one-third/two-thirds rule, could spend the remaining seventy-four percent of the available time on tasks not directed towards the accomplishment of the upcoming mission. Most maneuver commanders, however recognize this inefficiency and take measures to give the fighting units more time to prepare. As an example, units use warning orders to give subordinates advance notice of an upcoming operation to allow them to do some limited preparation prior to actually receiving the operations order (OPORD). Units may also use standard plays or standing operating procedures (SOP) to reduce the amount of planning required. As an example, a specific battalion within a maneuver brigade may be designated as the advance guard during every movement to contact, and another battalion the reserve, thus reducing planning time and course of action development. Another potential solution to the problem is to develop procedures to allow units to plan simultaneously at various levels of command to make more efficient and effective use of the available time. This technique is called parallel planning.

Parallel planning.

As stated in chapter one, parallel planning is the technique by which tactical units at various echelons of command, plan for upcoming operations nearly simultaneously. Units can save considerable time using the parallel planning technique. Without the proper flow of information, however, the process may not be effective, and may even be detrimental to the planning process. Parallel planning allows units to begin the time-consuming tasks of mission analysis and staff estimates prior to receiving a complete operations order from the higher headquarters. Figure 3 graphically depicts the brigade parallel planning concept, with the subordinate task forces and companies conducting portions of their planning and preparation nearly simultaneously with the brigade staff.

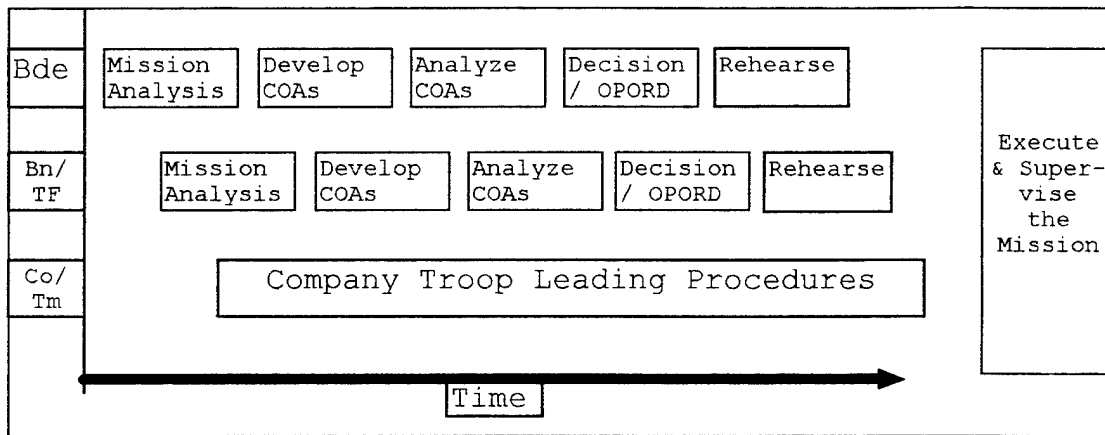


Figure 3. Parallel Planning Concept

Parallel planning, however, requires more detailed communications and coordination between echelons in order to be an effective planning technique. One of the risks of parallel planning is subordinate units misunderstanding the commander's guidance and wasting time developing a plan that is not in accordance with the higher commander's intent. As a

result, parallel planning normally requires more frequent information updates and subordinate back-briefs to the higher commander. This additional collaboration between echelons of command during the planning process is key to avoiding misunderstandings in intent, and improving not only the efficiency, but the effectiveness of the process.

Collaborative Planning.

Closely related to parallel planning is collaborative planning. It is the technique by which commanders and staff officers at various levels of command synchronize and deconflict aspects of upcoming operations during the planning process. In common terms, the process might be called *networking*. ST 71-3, Tactics, Techniques, and Procedures for the Digitized Brigade defines collaborative planning as a tool to accelerate the planning process by “capturing inputs from subordinate, higher, and adjacent planners.”¹⁸

Collaborative planning is simply the process of coordinating a plan between echelons and staff organizations during the planning process to avoid what military planners call, planning in a vacuum. It allows commanders and staffs to use the talents and resources that may be available at other echelons or in other staff agencies simultaneously. Collaboration between echelons and staff members is nothing new, it has always been desirable, but has been less effective than it potentially could be due to limitations in communications and command and control systems. Under the conventional system, the time required to travel to a common location for a face to face meeting has made collaboration infeasible in many cases. The capability to digitally transmit graphics and text, has simply made collaboration more feasible.

Three types of collaboration occur during the combat planning process; (1) inter-echelon command collaboration, such as between the brigade and battalion commanders, (2) stovepipe collaboration between staff members and their counterparts at higher, lower, or adjacent units, such as between the S3s on the brigade and battalion staffs, and finally (3) inter-staff collaboration between members of a staff, such as between the S3 and FSO on a battalion staff.¹⁹ Each of these collaborative efforts provide a unique contribution to the planning process. Collectively, they represent the mechanism to facilitate synchronization within the parallel planning process.

Capabilities of Tactical Digital Systems.

*Shared situational awareness, coupled with the ability to conduct continuous operations, will allow information age armies to observe, decide, and act faster, more correctly, and more precisely than their enemies.*²⁰ - General Gordon R. Sullivan and Colonel James M. Dubik

General Sullivan and Colonel Dubik predicted that shared situational awareness will enhance the operations of information age armies. How is that going to affect operations at the tactical level? The Army Digitization Master Plan (ADMP) states: “The objective of the Army digitization effort is to assure the superiority of our command and control systems by providing our warfighters with a horizontally and vertically integrated digital information network.”²¹ The central purpose of the digitization effort is to allow each soldier to maintain a clear and accurate vision of the common battle space necessary to support planning and execution.²² This section describes the capabilities of the digital systems available in the Force XXI brigade to facilitate planning and preparation for combat operations. Digitization can enhance not only the CDMP and DDMP, but also preparation and execution as well. However, consistent with this monograph’s focus, the emphasis in

this section is on the capabilities of the digital systems to improve the efficiency and effectiveness of the parallel planning process in the Force XXI brigade.

The Force XXI Battle Command Brigade-and-Below (FBCB2) is a collection of digital systems that, as part of the overall Army Battle Command System (ABCS), will provide digital capabilities to the tactical units of the army.²³ Some of the systems FBCB2 currently includes are digital platforms such as the M1A2 Tank with its Inter-Vehicular Information System (IVIS), the All Source Analysis System (ASAS) for intelligence information management and dissemination, Brigade and Below Command and Control (B2C2) system, and the Improved Fire Support Automated System (IFSAS). Additionally, Force XXI Battle Command Brigade-and-Below systems include an interim appliqué digital system for those units and systems that do not have imbedded digital capabilities. Together, these systems provide information to improve the situational awareness of the tactical unit and help provide a common relevant picture of the battlefield. They focus on answering four basic questions for the user²⁴:

- Where am I?
- Where are my soldiers?
- Where is the enemy?
- What is each of them doing?

With this basic information, the tactical commander can make more informed decisions about how and where to dispose his forces to accomplish his mission. In addition to providing the basic situational awareness, the digital systems will provide the commander and staff the ability to access and distribute information throughout the battlefield as

necessary. The ADMP identifies some of the specific capabilities of the FBCB2 systems as²⁵:

- Automatic position location and reporting.
- Digital map with graphics, and hasty mapping products.
- Graphical display of the location of all members of the unit and adjacent friendlies.
- Display of enemy locations in predetermined zone or sector.
- Fusing of digital terrain data and intelligence data into a graphic portrayal of battlespace and situational awareness.
- Templates for digital reports and requests, with prompts.
- Creating, sending, and receiving text and graphics.
- Automatic receiving, consolidating, and transmission of reports.
- An automated roll-up of logistical requirements.
- Access to all available databases.
- Interface and exchange of information with fire support, combat support, and combat service support automated systems.

In examining these capabilities, the question is: What is the value added to the tactical units who have these capabilities, in terms of the degree to which they enhance tactical units in general and the parallel and collaborative planning process in particular? The ADMP suggests “that a digitized capability will enhance force effectiveness, specifically in terms of improved lethality, survivability, and tempo”.²⁶ To achieve the improved effectiveness, the digital systems will provide the commander, his staff, and subordinate commanders a common understanding of the battlefield. The commander will have the ability to receive

and evaluate battlefield information, such as friendly and enemy unit locations and dispositions, combat power information, and information about combat multipliers, such as logistics. Through shared data bases, the staffs at each level will have access to common planning data, such as terrain data, weather data, and information on enemy preparedness and obstacles in zone. The digital systems will also allow the commander to disseminate decisions and orders rapidly to the staff and subordinates for execution in a digital burst transmission that the enemy will have little or no ability to jam or intercept. The commander and staff will have the ability to create and send multiple warning orders and FRAGOs with overlays and text to make sure their subordinate units have the very latest planning information available. With these capabilities, the commander and staff of the Force XXI unit will be able to improve the efficiency and effectiveness of the planning process, using parallel and collaborative planning.

Having examined the CDMP, parallel and collaborative planning processes, and the capabilities of the digital systems, the following chapter will present techniques and procedures the brigade of the future can adopt to conduct parallel planning more efficiently and effectively. The goal of these techniques and procedures is to make the digital systems become a tool to help the commander, and to avoid allowing them to become so rigid that they dictate the terms of the planning process to the units in the field.

Chapter III. Parallel Planning in the Digital Brigade

As the previous chapter established, the CDMP is the process for planning upcoming operations in a combat situation. The goal is to efficiently and effectively

produce a synchronized plan to enable the unit to mass the effects of combat forces and combat multipliers to destroy the enemy. Chapter II also described the capabilities of the digital systems available to the commander and staff of the Force XXI brigade. This chapter matches-up the enhanced capabilities provided by the digital systems with the tasks associated with planning tactical operations to produce more fully synchronized plans.

This chapter describes a process that will allow units to use the digital systems available to the Force XXI brigade to conduct parallel planning better than their conventionally-equipped counterparts. Using the digital systems to facilitate the parallel and collaborative planning process will improve the *efficiency* and *effectiveness* of the planning process. Digitization will improve the efficiency of the overall process by providing the task force and company commanders critical information they need with which to begin their planning earlier. The subordinate battalions and companies will spend less time waiting for the brigade headquarters to produce a plan, and more time actually planning and preparing for the upcoming operation. The process contains techniques for using the digital systems to produce time savings, ultimately resulting in more time to rehearse and synchronize the plans. Digitization will also improve the effectiveness of the planning process by allowing the subordinates to be more informed and active participants in the formulation of the plan, through collaborative planning. The subordinates will also have more time to conduct reconnaissance and wargaming prior to the issuance of the operations order and will come to the operations order briefing better able to provide feedback and make informed recommendations. Through collaboration enabled by the digital systems, subordinate commanders and staffs will actively participate in the formulation of the brigade plan.

When they come to the operations order briefing, they will already be familiar with the plan, and will be prepared to synchronize their actions with their counterparts.

The process is not necessarily a sequential set of steps, many of the activities are simultaneous and some are continuous. This chapter, however, describes the activities in a step by step manner from receipt of the mission to execution, to allow a better understanding of the role digitization can play in each part of the parallel and collaborative planning process. As with the previous chapter, this chapter assumes the reader has a working knowledge of the planning process. The focus is not on the process itself, but the role digitization will play in the process. Since the CDMP is a commander-driven process, the commander will be personally involved in many of the activities and can abbreviate, lengthen, or modify the steps as he sees necessary to fit the situation.

The process described uses insights from AWE Focused Dispatch as its departure point. It is not meant to be prescriptive, but merely to demonstrate the potential advantages and disadvantages of using the digital systems to facilitate parallel planning. For clarity, a graphical depiction of the parallel and collaborative process is included at appendix A. Appendix B is a matrix depicting the digital actions of the brigade battlestaff at each step in the planning process. The matrix is adapted from one used by TF 2-33 Armor during AWE Focused Dispatch. During the planning process, the commander used a matrix to keep track of what digital products had been transmitted to and from the battlestaff. The matrix allowed the commander to know what actions had been taken, what information had been provided to his subordinate commanders, and when it was done.²⁷

Receive the Mission.

The Commander's Assessment. The first activity upon receipt of a new mission is the commander's personal assessment of the plan with respect to his unit's current situation. Although not a formal step in the planning process, it is critical for establishing the basis for future planning. It is important that the commander have a complete understanding of the higher commander's intent so he can visualize where his unit fits into the overall plan. According to FM 101-5, it is also important for the commander to have a clear, logical visualization of the current situation, an understanding of the enemy force disposition, and an accurate picture of his friendly forces.²⁸ The digital systems available to the Force XXI commander will provide him with a unique advantage. He will have an unprecedented view of the battlefield. Friendly unit locations and dispositions will be displayed on his automated command and control system. ASAS intelligence data will be integrated into his display to provide information on known enemy locations and activities. The commander will have automated terrain and weather information available on his display, as well as current logistical status for all his units. All these will help him formulate his thoughts more quickly for the upcoming operation. According to Major General Lon E. Maggart, Commanding General of the Armor Center, the commander of the digital unit will be able to spend more time and residual energy on creative, reflective thought and less on the mundane tasks of gathering information to maintain his situational awareness.²⁹ At the same time the commander is receiving the order from the division headquarters, the brigade staff will receive information digitally transmitted from the division staff. With this

information, the brigade staff can begin preparing their estimates for the commander much sooner than if they were relying on manual methods of gathering information.

Warning Order #1. As soon as the commander has received a new mission, he will immediately issue a warning order to his staff, subordinate commanders and supporting units. This initial warning order is the mechanism that starts the parallel planning process. In the interest of time, the initial warning order will probably be issued orally, by FM radio. The warning order will be followed-up with more detailed information, digitally transmitted to the subordinate units as it becomes available. With the information contained in the initial warning order, including among other things a planning timeline for the operation, the subordinate battalions and companies can begin making preparations. These preparations may include reconnaissance of the area of operations, dispatching of quartering parties to the new assembly areas, or coordination for passage through another unit. They can also reposition units, begin resupply operations, make necessary changes to the task organization, and most importantly, they can begin planning for the upcoming operation.

Digital Distribution. When the brigade receives the mission from the division headquarters in the digitized unit, it will normally be accompanied by some automated products. The operations order may be in the form of an annotated digital overlay or in a text file with a separate overlay. In some cases however, the situation may have developed so rapidly that the higher headquarters has not had time to create any digital products, in which case the staff may have to create the graphics themselves. There will also typically be some accompanying products such as overlays or text supporting one or more of the combat functions, such as a CSS overlay or an ADA coverage plan. It is critical that the

staff distribute these products quickly to the subordinate and supporting commanders in order to allow them to continue parallel planning.

Digitally transmitted graphics and orders provide a distinct advantage to the digitized unit over their conventionally equipped counterpart. Under the conventional system, the brigade commander would have to rely on a voice description of the upcoming operation to provide information to his subordinate battalion commanders until the subordinate units could physically obtain a copy of the graphics. Obtaining a copy of the hand-written graphics could take the battalion commanders hours, depending on the location and activity of the units. The digitally transmitted operations graphics establish immediately the location of the area of operations so the units can begin their terrain analysis and review of the area of operations. Figure 4 depicts what a typical IVIS initial operations graphic might look like. The graphics are displayed on a map screen with the basic control measures to give the commander an idea of the general location and what type of mission he can expect. This graphical display provides him a better picture of the upcoming mission than a simple voice warning order. The task force commanders can better visualize the operation and understand the brigade commander's intent with less ambiguity and less chance of misunderstanding. There is also less chance for the errors committed while manually copying graphics. The battalion commanders can transmit the picture to their subordinate company commanders to allow them to begin their troop leading procedures. Additionally, the battalion commander can add text to the digitally transmitted graphics, such as the initial commander's intent or possibly, specific tasks to the subordinate units to further add resolution for the company commanders. This gives the

battalion commander the ability to initiate actions without having to meet with his company commanders, saving considerable time over the conventional methods.

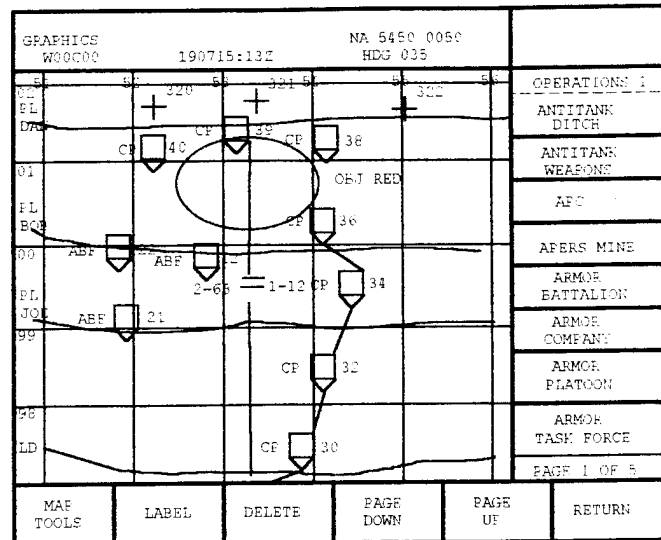


Figure 4. Typical IVIS initial operations graphics³⁰.

As a caution, however, commanders and staffs must ensure the information they send to the subordinate units is accurate, and necessary to support parallel planning. Inaccurate or inappropriate data introduced into the process at this early stage, could adversely effect the entire process. With access to a plethora of available data, there may be a tendency to view all the digital information as inherently good. The large amounts of raw data that will be available through the digital systems may not be appropriate to send to the subordinate commanders. An example of data that may not be useful to a subordinate commander is, an overlay depicting the location of all the intelligence collection assets in the division's sector. The fact that the data is available to the brigade does not mean it is of any value to a battalion commander. The commander and staff must identify which elements of information are necessary to support parallel planning and which are not, and avoid sending unnecessary information to the subordinate battalions and companies.

Commanders' Collaboration. After the brigade commander has received the order from division headquarters, issued the warning order to his subordinates, and disseminated any available graphics via digital means, he has the opportunity to conduct collaborative planning to help him formulate his vision and develop ideas for the upcoming operation. He may want to discuss the operation with his subordinate maneuver commanders to get their input and suggestions on the scheme of maneuver. He may want to collaborate with his artillery commander about the feasibility of a particular fire support option, or discuss issues of intelligence, logistics, or mobility with any number or combination of subordinate or supporting commanders. Digital white-board or John Madden-type illustrators will be available for some commanders. They will be able to draw on a map screen which anyone on the network, almost anywhere on the battlefield can see. This collaborative process is unique to the digital unit since unlike the conventional unit, all the subordinates will be working off the same picture of the battlefield. By using a graphic depiction of the operation, the commander can more easily convey his visualization of a course of action and reduce confusion among his subordinate commanders, than if he were simply trying to describe it. During Prairie Warrior '95, the Mobile Strike Force commander used this technique, with some success, to discuss maneuver options with his subordinates. The MSF commander hosted a live discussion on the voice command net while all the subordinate commanders and key staff members simultaneously viewed the graphical depiction of the proposed scheme of maneuver on their screens. Any member of the organization could draw on the screen and make comments for everyone to see and hear. Based on the input he received from this discussion, the MSF commander would issue guidance to his staff for

further development of the plan. This unique collaboration gave the MSF commander the ability to tap the resources of the subordinate commanders and staffs to improve the effectiveness of the planning process by reducing uncertainty and ambiguity among the subordinate units. Additionally, the subordinate commanders felt they were a part of the planning process at the MSF level.³¹

Inherent in the parallel planning effort is the danger that the planning process will become democratized, and turn into a sort of planning by committee. Arguably, digitization could increase the danger of this happening. As such, it becomes even more incumbent on the commander to prevent the collaboration from devolving into committee planning. By staying personally involved, the commander can moderate the discussion, take the various views into consideration and make his decision based on his best estimate of the situation.

Information to the Commander and Staff

Initial Staff Estimates. Once the unit has received the mission, the staff collects and organizes information and provides it to the commander to assist him in his analysis of the mission, enemy, troops available, terrain, and time (METT-T). The staff provides this information to the commander in the form of initial staff estimates. The requirement to provide this information is the same in the digital unit as in the conventional unit, the techniques for obtaining it and getting it in the hands of the commander, however are much improved. Much of the information the commander needs is available to him continuously through his digital systems, such as unit locations and combat strength. In the case of this information, the staff need only confirm and update the information as appropriate. The staff will provide the remaining information to the commander in the manner he specifies,

usually as outlined in the unit standing operating procedure (SOP). (See staff section actions at appendix 2.)

As with most operations, the enemy dispositions will play a large role in the brigade commander's decisions. The S2 will provide the commander with his initial intelligence preparation of the battlefield (IPB), including the most recent information of enemy forces in the potential area of operations. The S2 has access to ASAS data and can digitally provide the commander a picture of the battlefield that includes a broad range of intelligence information from national level assets through information collected by task force scouts, combined on the same display. Intelligence officers at various levels of command, using the ASAS system, as well as other digital and voice communications means can share information and collaborate about the threat situation to facilitate parallel planning. Figure 5 depicts an IVIS enemy overlay created by the S2 from ASAS data. This digitally transmitted picture provides an immediate depiction of the known and suspected enemy forces. The brigade commander and his subordinate commanders can overlay the enemy picture on their screen with the area of operations and the proposed maneuver plan to help them visualize more quickly the upcoming operation and provide guidance to their staffs and subordinates. Unlike their conventionally equipped counterparts, the commanders of the digital units can get this information wherever they are on the battlefield, negating or reducing the time consuming requirement of returning to the command post to gather the information needed to form their initial estimates. In a similar manner, the S2 will continue to update the commanders and staff throughout the planning process, all the way to execution.

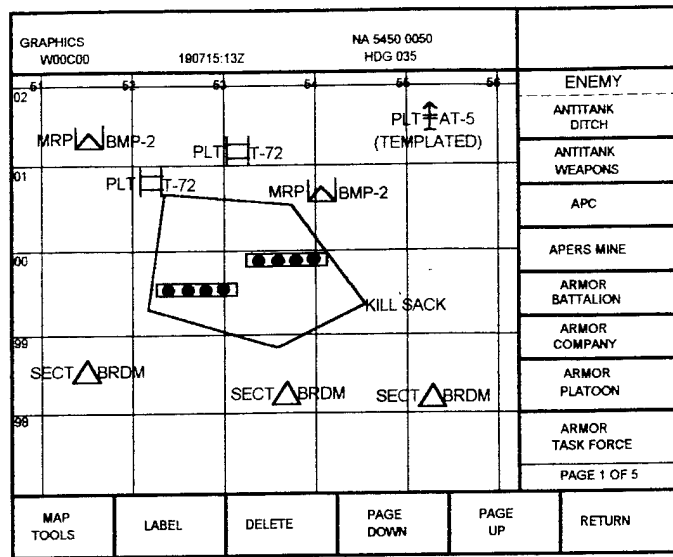


Figure 5. IVIS Enemy Overlay³²

In the same manner as the S2, the S3 will provide the brigade commander with a current friendly unit situation, including combat power status, unit locations, dispositions, and current activities. Much of this information is also available to the commander through his B2C2 or IVIS display. It is therefore, necessary for the S3 only to update information as needed, and provide an assessment of the readiness of the subordinate units. Similarly, the S1 and S4 will provide the commander with a current logistical status of the unit. The commander can get as much or as little information as he wants, but probably at a minimum will want to know the current and forecasted status of vehicles, weapons systems, class III and V of supply, and transportation. The S4 can, for example, transmit the brigade commander a digital roll-up of the subordinate units' logistical status. Other staff sections will provide information in accordance with the unit SOP. The matrix at appendix 2 depicts some of the information the commander may want to have when he conducts his initial commander's estimate. Again, in the digital unit the commander has the advantage of

being able to receive the information quickly wherever he is on the battlefield, producing time savings which will allow the brigade headquarters to use the available time more efficiently, and quickly provide information to the subordinate commanders to facilitate the parallel planning process.

However, as suggested earlier, it remains essential that the commander and staff establish which items of information are critical. The digital systems will make it possible to access large amounts of raw data, particularly logistical information. The staff must remember, when providing information to the commander, that more information is not necessarily better. Large amounts of raw data may quickly overload the commander's ability to synthesize the data into something useful. Staff officers must use their experience to reduce the data into useable information for the commander. Standardized reports and SOPs also present possible solutions to the potential data overload problem.

Initial Commander's Estimate. Simultaneously, the commander gathers information he will need for the mission analysis. He informally provides information and guidance to the staff to focus their information collection efforts. The commander will use the common relevant picture provided through his digital command and control systems as well as his personal observations of the battlefield to form his initial estimate and provide guidance to his staff. The commander must use caution, however, when depending solely on the common relevant picture to form his estimate. The common relevant picture provides qualitative and objective information such as unit locations and logistical status, and does not provide qualitative and subjective data such as the subordinate units' level of preparedness and morale. The common relevant picture may mislead the commander into

believing his subordinate units are better disposed to conduct operations than they really are. One of the lessons learned from NTC rotation 94-07 was that the digital systems cannot replace the commander's judgment and personal assessment of the situation.³³ The commanders and staff officers who attempted to rely solely on the digital systems to provide the situational awareness during the digital rotation, had great difficulty staying current with the ongoing battles.³⁴ Commanders and staff officers must temper the information they receive through their digital systems, with their personal observations and experience. They must apply common-sense, to ensure what the digital systems are providing is actually representative of the actual situation on the ground. Digitization can supplement this effort, but must not be allowed to replace the commanders intuition and judgment.

During this portion of the planning process and extending through the mission analysis phase, information exchange is especially critical. Units must continue to exchange information with higher and lower echelons to continue to facilitate parallel planning. The higher units must continuously update the operational graphics so the subordinate units can continue to plan with the most current information. The internetted databases such as ASAS, digital terrain data, and friendly unit locations will allow units at all echelons to get the information they need to begin their mission analysis virtually simultaneously with their higher headquarters.

Mission Analysis and Commander's Guidance.

Mission Analysis. The information the commander and staff gathered using their digital systems will help them complete quickly the mission analysis and provide information to the subordinate units so they can continue to plan for the upcoming operation. The commander of Task Force 2-33 Armor, during AWE Focused Dispatch stated that it is very important to have this initial interchange with the staff face-to-face. The commander is more likely to see that a subordinate does not understand a mission or has reservations about the task he has been given if he can dialog with him directly. Digital systems do not do a very good job of transmitting moral factors such as fear, uncertainty, and a sense of urgency. It is, therefore, better to ensure an initial understanding of the commander's intent face-to-face, and if necessary conduct subsequent actions via digital means.³⁵ Ideally, the staff will assemble at the tactical command post (TAC) or at the main command post where they will have easy access to the information they will need for the mission analysis. The commander will make the decision based on the METT-T factors and his personal preferences.

The staff and commander conduct their mission analysis as they normally would, identifying the specified and implied tasks, essential tasks, and constraints and limitations. The digital information on the area of operations assists the commander and his staff in this task by providing near-real time information on the friendly unit locations and dispositions as well as ASAS intelligence data. Based on their analysis, the commander and staff will then formulate an initial timeline, both for the planning process and for the operation. Finally, the staff will propose a restated mission for the unit, including who, what, where, when, and why, including the relevant task and purpose, which the commander approves.

Commander's Guidance. According to the Center for Army Lessons Learned newsletter 93-03, "to correctly provide planning guidance, the commander must give the staff his vision of the operation."³⁶ When conducting parallel planning, it is also important that the vision be articulated to the subordinate and supporting units. The commander's guidance is probably the most important element of information for a subordinate unit to receive when conducting parallel planning. The subordinate units will begin *focused* planning for the upcoming operation based on the information contained in the commander's guidance. If the guidance is misunderstood by the subordinates, their plans may not be synchronized with the overall mission. By the time a unit realizes a subordinate has misunderstood the commander's guidance, it may be too late to fix the resulting problems. As an example, during Prairie Warrior '95, while conducting parallel planning, one of the subordinate brigades of the Mobile Strike Force developed their plan based on misinterpreted commander's guidance. The Mobile Strike Force commander did not realize the mistake until a few hours prior to execution. The result was a frantic attempt to re-write the brigade plan and reposition forces to meet the commander's actual intent.³⁷

According to the commander of TF 2-33 Armor during AWE Focused Dispatch, to make sure the plan is synchronized during parallel planning "the guidance must be detailed and specific, but not prescriptive,...the commander must make decisions [about the scheme of maneuver] earlier and more often".³⁸ Clear and detailed guidance as suggested by the TF 2-33 commander, combined with active collaboration between the staff and subordinate units during the process, will allow units to avoid problems like those suffered by the MSF. If the MSF commander's guidance had been clearly transmitted to the subordinate brigade,

and accompanied by detailed, digitally transmitted operational graphics, and if the subordinate unit had been digitally transmitting their operational graphics to the MSF commander and staff for coordination, the misunderstanding could have been avoided.³⁹

All the elements of information included in the commander's guidance represent the brigade commander's best estimate of the plan at this early point in the planning process. They do not represent final decisions and subordinates should expect some changes through the course of the plan development. Through experience and training, however, units will become familiar with the process and develop a sense for what information they should treat as final and what they can expect to change as the plan develops. To summarize, in the commander's guidance, the commander should issue as much and as detailed information to his staff and subordinates as he can. He should identify the elements of information which are likely to change and which will not. He should ensure the information gets the widest possible dissemination to allow all subordinates to continue their parallel planning.

In concept, the mission analysis and commander's guidance are no different in the digitized unit than in the conventional unit. The difference, however is in the specific staff actions and the amount of information available. During the mission analysis and commander's guidance phase, the digital brigade staff is routinely transmitting staff products and planning data to the subordinate commanders and staffs to facilitate parallel planning. Some examples as depicted in the matrix at appendix B, are: the updated operations graphics, text files of the commander's guidance, PIRs, and sub-unit tasks, current situational templates and intelligence collection plans from the S2, and planning data relating to the other combat functions. This represents an enhanced capability in

tactical units having the same information the higher commander's staff is using available to the staffs at lower levels. This will improve the efficiency of the planning process by reducing ambiguity and uncertainty in the lower unit and increasing staff cooperation between levels of command. Members of a task force staff, for example, will be able to have their brigade counterparts' unit location and maneuver graphics as they formulate estimates and make contributions to the supporting plans.

Warning Order #2 (Action Order). As soon as the commander has developed his guidance and made some basic decisions about the upcoming operation, the staff should issue warning order #2. ST 71-3, Tactics, Techniques, and Procedures for the Digitized Brigade calls these warning orders Action Orders⁴⁰, depicting the more action-oriented nature of the information included. During AWE Focused Dispatch, the TF 2-33 Armor commander used warning order #2 to initiate some detailed preparations by the subordinate and supporting units. The task force commander said warning order #2 was usually about a "forty to fifty percent plan".⁴¹ It included updated digital graphics, and digital text files with the task organization and all the elements of the commander's guidance. The advantage to be gained by the digital unit is in the amount of detailed information the brigade staff can disseminate, and the speed with which it can be transmitted. Again, the brigade can realize time savings over its conventionally equipped counterpart, allowing the subordinate units to make more efficient use of their time. In the conventional unit, in order to issue a comparable warning order, the subordinates would have to take time to travel to the command post to receive the graphics, using valuable preparation time and risking mistakes that may be made by manually copying graphics.

With this information, subordinate units can complete their mission analysis and further refine course of action development. Using the same procedures as the brigade commander, the task force commanders can issue a second warning order to their staff and subordinate company commanders. The task force staffs can begin developing their courses of action in accordance with their commanders' intent, and initiate other actions, such as the reconnaissance and surveillance plans, unit repositioning, and resupply operations. In the case of defensive operations, the task forces may even be able to begin engagement area development and engineer obstacle planning. For example, as figure 6 depicts, the task force staff will be able to broadcast an obstacle intent overlay digitally to their subordinate companies and supporting engineer unit to begin constructing the obstacles in support of the upcoming operation.

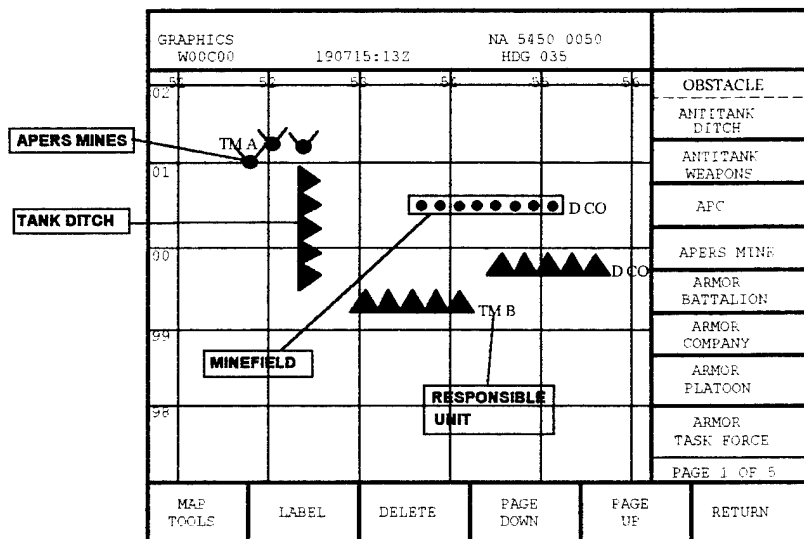


Figure 6. IVIS Obstacle Intent Overlay⁴²

Conversely, subordinate units will also continue to transmit information *up* the chain of command digitally to keep the brigade informed of their actions. During parallel planning, it is important that each echelon be aware of the actions of their higher and lower units. With

many actions occurring simultaneously, effective collaboration between levels of command is key to ensure the developing plans continue to be synchronized.

The benefits of parallel planning with digital information systems are not limited to the maneuver units. The supporting units can also begin planning and preparing for the upcoming operation with the information provided in warning order # 2. With the information describing the area of operations and the general scheme of maneuver, the forward support battalion (FSB) commander can better anticipate logistical requirements and preposition assets on the battlefield as appropriate. He can begin to tailor his support packages to help the brigade commander weight the main effort with resources. Figure 7 shows a possible CSS overlay created by the FSB based on information in warning order #2. Similarly, the combat support units of the brigade can begin preparations. For example, the supporting ADA battery can begin to reposition weapon systems to provide coverage for the projected area of operations. The supporting MP platoon leader can anticipate the routes to be used for movement for the upcoming operation and begin to develop a traffic control plan in sector and transmit that to the brigade staff for inclusion in the overall plan.

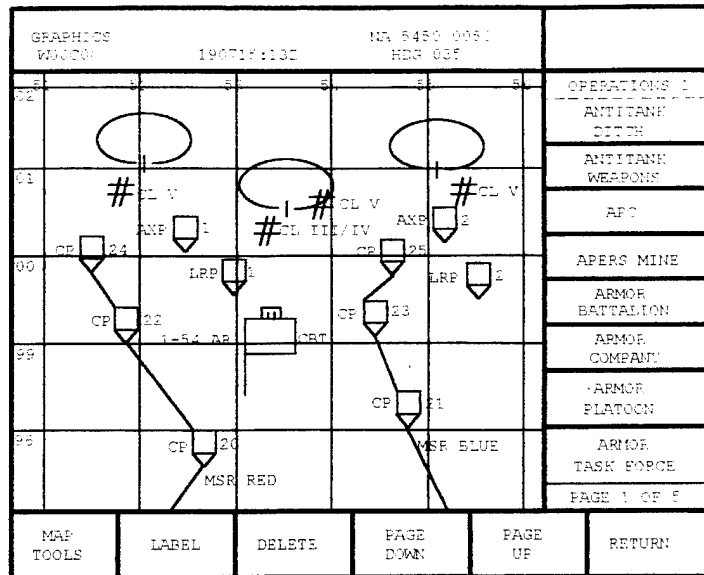


Figure 7. Digital CSS Overlay, created by the FSB after Warning Order #2⁴³

When the warning orders are digitally distributed throughout the brigade, all the players can begin to initiate actions in support of the plan well in advance of the issuance of the operations order. These actions will contribute to the commander's ability to operate at a higher tempo, increasing his chances for success. The commander and staff are now free to begin detailed development of possible courses of action for the upcoming operation.

Course of Action (COA) Development, and COA Analysis and Comparison.

During the COA development, analysis and comparison (wargaming) phases, the parallel and collaborative planning process in the digital unit is conceptually the same as in conventional units. There are numerous techniques for developing and analyzing COAs. Regardless of which technique the commander chooses, it is important to keep the subordinate units informed to continue the parallel planning process. Common sense will dictate the amount and frequency of information to be sent to the subordinate units, but

clearly some pieces of information will be critical. The staff should inform the subordinate units when a particular COA has been added or eliminated from consideration by the commander, so they can adjust their planning accordingly. Also, if the basic plan or assumptions change significantly, in a manner that will affect the subordinates' preparations, the staff should digitally transmit the changes as soon as practical. The products resulting from the wargaming process may include a synchronization matrix, a decision support template (DST) or matrix, a list of specified tasks for subordinate units or by combat function, an updated timeline for the operation, and a list of critical events. The commander may choose to send any or all of these products to the subordinate units to support their planning efforts. The commander must use discretion, however, when deciding what information to transmit to his subordinate units. Some of the staff planning tools, such as the synchronization matrix may not be useful to subordinates for their planning and will only add to the potential problem of information overload at the subordinate headquarters.

Another caution is that the advanced capabilities of the digital systems might tempt the staff and commanders to develop more detailed plans and make numerous revisions. There may be a tendency to create unnecessarily large numbers of branches and sequels to the base plan. Unless the requisite time is available to fully rehearse the branches and sequels, they only serve to dilute the planning effort. The commander must determine how much time and effort he wants the staff to dedicate to the branches and sequels, and focus the remaining effort of the staff towards the execution of the base plan.

Warning Order (Action Order) #3.

As soon as the commander selects the COA, the staff should issue warning order #3. Like the previous warning orders, it will be disseminated quickly throughout the brigade by digital means, saving time and reducing the chance for errors resulting from manually copying overlays. Warning order #3 is comprised of an oral or digital text description of the selected COA and updated operations graphics, updated fire support graphics, and an updated R&S plan overlay. (see appendix B) During AWE Focused Dispatch, warning order #3 represented “about a 70-80 percent solution” of the final plan.⁴⁴ Warning order #3 should be as complete as possible. It should include sub-unit tasks, derived from the wargaming. It should include the commander’s PIRs, named areas of interest (NAIs), targeted areas of interest (TAIs), and decision points from the DST, derived during the wargaming process. It should include the updated timeline and the commander’s concept for maneuver as well as fires (see figure 8), and other combat support functions, so units can complete their plans and wargame their COAs. Finally, warning order #3 should include information on when and where the operations order is to be issued, and time, location, and attendees for the brigade rehearsal. With this information, subordinate and supporting units can complete their plans and brief their subordinates. In some cases, the subordinate units will also be able to conduct their leaders’ reconnaissance and familiarize themselves with the terrain prior to the operations order. The subordinate battalion and company commanders, having conducted a reconnaissance of the area of operations, will have a better understanding of the tasks to be accomplished, and will be able to provide more valuable feedback at the operations order and during the rehearsal.

This feedback will allow the staff and commanders of the brigade to synchronize the actions of the upcoming operation more effectively when gathered for the operations order and rehearsal.

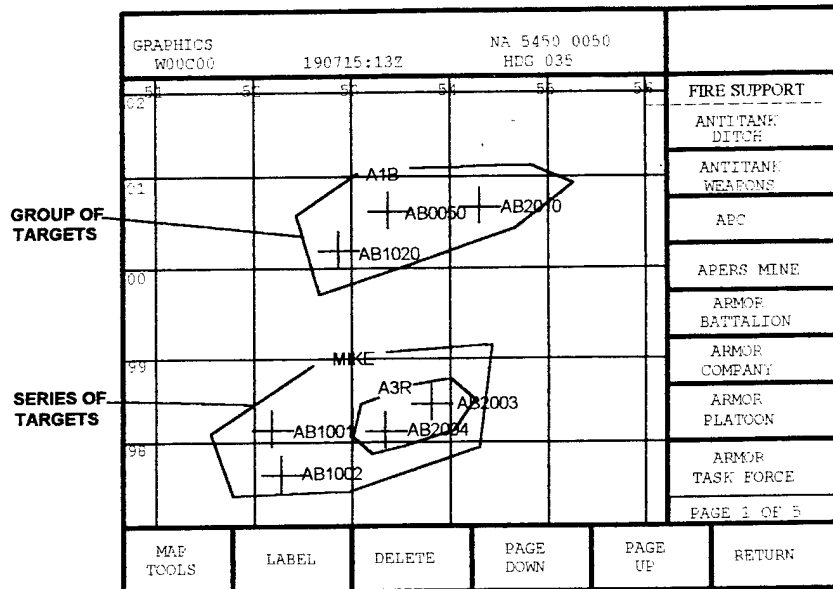


Figure 8. IVIS Fire Support Overlay issued with warning order #3⁴⁵

Issue the Operations Order.

After issuing warning order #3, the staff prepares to issue the operations order. Prior to the operations order briefing, the brigade staff transmits all updates and changes, and the latest operational and supporting graphics to the subordinate units. The Task Force 2-33 Armor S3 said during Focused Dispatch, the subordinate commanders had about 90 percent of the operations order in their hands prior to the briefing. He said this allowed the commanders to review the complete plan and formulate their issues prior to the brief. The operations order brief was really just a confirmation brief of what they already knew. The quality of the questions was better, and the subordinate commanders were ready to synchronize actions with their counterparts.⁴⁶ When using this parallel technique, the

operations order briefing is more for *synchronizing* the plan than for *informing* the subordinates about the plan. As stated in chapter one, having received at least three warning orders, and numerous digital overlays, and information updates, TF 2-33's company commanders, felt as though they were already executing the plan by the time they receive the operations order briefing.⁴⁷

Digital systems present some possible alternatives to face-to-face operations order briefings. In some cases, it may be possible to use the video-teleconference type capabilities and the video-illustrator or John Madden-type illustrators that some key leaders may have access to. During exercise Prairie Warrior '95, members of the Mobile Strike Force achieved some success issuing fragmentary orders (FRAGOs) using these capabilities imbedded in the PHOENIX command and control system.⁴⁸ Options such as this could be particularly useful when issuing short-notice FRAGOs, when time is extremely limited, but they should only be used to issue operations orders when face-to-face interaction is impossible, since commanders can more clearly convey their thoughts and gauge their subordinates' understanding when conversing face-to-face.

CALL newsletter 93-3, *The Battalion and Brigade Battlestaff*, recommends that after an operations order briefing, the commander should conduct a confirmation briefing (also known as a brief-back) with his subordinate commanders to ensure they understand their mission. Then, after the subordinate commanders have had time to formulate their supporting plans, the subordinate commanders meet again collectively with the commander to give him a backbrief of how they intend to accomplish their mission. When conducting parallel planning with digital systems, these actions will take place simultaneously,

immediately following the operations order briefing. Since the subordinate commanders have had much of the plan for some time and have already devised much of their supporting plans, there is no need for them to spend additional time to do this. This represents a significant time savings over the conventional planning using the one third/two thirds planning technique. Additionally, since the subordinate units have already completed most of their plans and have had the time and information to conduct their leaders' reconnaissance, they should be prepared to go directly from the backbrief into the brigade rehearsal.

Rehearsals.

One of the key benefits of parallel planning with digital systems is its ability to improve the effectiveness of the rehearsals. Not only will the unit have more time for rehearsals, but by reducing planning time the subordinates will have more opportunities to conduct reconnaissance and formulate their plans prior to the operations order. As a result the subordinate commanders will be better prepared to participate in the rehearsal and provide more meaningful feedback and suggestions. This will also reduce the chance of the rehearsal devolving into a wargaming session, and better create the conditions for a succinct dress rehearsal of the plan and critical branches and sequels.

The digital systems also present some interesting options for conducting rehearsals, such as mounted rehearsals using the map and reporting capabilities of the digital systems, or the video illustrator to replicate combat actions. Face to face rehearsals, however, are still better if time and the situation permit, since they are more conducive to open dialog

between the participants and the commander can personally convey his ideas to his subordinates.

Final Updates and FRAGOs Prior to Execution.

From the time of the final rehearsal to execution, the commander and staff will continue to refine and improve the plan. There will certainly be changes to the situation, both friendly and enemy. The staff must continue to send digital updates and changes to the subordinates as they occur. In order to ensure uniformity in providing information to subordinates, units should develop SOPs for last minute enemy updates. The subordinate units must continue to send information *up* the chain of command to ensure the higher headquarters remains current on the combat status of the fighting units. Staff sections must also continue to collaborate between echelons to ensure each has a current and complete understanding of the situation and any recent changes. During execution, the commander and staff will continue to use the digital systems to maintain situational awareness through the common relevant picture. Staffs will continue to ensure the information in the systems is current and accurate so when the current mission is complete and the units once again enter a planning cycle, they will be able to gather quickly the information the commander needs to plan for the next operation.

Chapter IV. Conclusion

This monograph began by asking the question: How can the digital information systems available in the Force XXI brigade facilitate parallel planning in the combat

decision-making process? The Force XXI brigade is to be equipped with a comprehensive suite of digital information systems. As Task Force 1-70 Armor found during NTC rotation 94-07, however, without effective techniques and procedures the digital systems provide little benefit to the user, and in fact, can be a hindrance to efficient operations. This monograph proposed a common sense technique for modifications to the CDMP to allow the maneuver brigade to use the digital equipment as a tool to perform the difficult task of planning combat operations, more efficiently and effectively.

To answer the central question, the monograph first described the CDMP, and defined the one-third/two-thirds rule, parallel planning, and collaborative planning. It then described the capabilities and limitations of the digital systems available to the Force XXI brigade. Chapter III then described a process for matching-up the capabilities of the digital systems with the tasks for planning tactical operations. In doing so it cited examples from recent warfighting experiments such as, NTC rotation 94-07, the Mobile Strike Force in Prairie Warrior '95, and Focused Dispatch '95.

In summary, the monograph suggested that by augmenting the CDMP with a series of detailed, digitally transmitted warning orders or action orders, coupled with digital overlays and reports, the Force XXI brigade can conduct more efficient and effective parallel planning. Periodic digitally transmitted information updates and collaboration between staff elements and commanders at various echelons allow the brigade to maintain synchronization at the various levels while planning simultaneously. The monograph also identified the need for the commander to rely not solely on the digital systems, and

therefore, identified key points in the planning process where the commander should dialog face to face with his staff and/or subordinate commanders.

When the maneuver brigade applies these techniques to the planning process the result will be a more efficient and effective process. The process is more efficient because it allows the task forces and their subordinate companies more time for preparing and rehearsing for the upcoming operation, while spending less time waiting for the brigade to complete the plan. The process is more effective in that the subordinate commanders and staff, having more time to prepare and conduct reconnaissance, will come to the brigade operations order already familiar with the details of the plan. They will be better prepared to provide feedback and informed suggestions to make the plan better. The operations order briefing will be more for *synchronizing* the plan than for *informing* the subordinates about the plan. Since the subordinates have had an opportunity to formulate their plans prior to the operations order briefing, the brigade will be able to conduct the rehearsal immediately following the operations order briefing, again providing time savings and negating the need to assemble the brigade orders group a second time.

As noted in the introduction, TRADOC Pam 525-5 suggests that the problem is to find innovative ways to consider new technologies and apply them to warfighting. The techniques in this monograph do not represent a radical departure from the techniques and procedures the tactical units in the army have used for planning in the past. They do, however, represent a common sense way to apply the information-age technology available to the Force XXI brigade to solve some of the problems of warfighting.

While digitization presents some very promising possibilities to enable tactical units to be more efficient and effective in planning tactical operations, there are several cautions that digital units must observe. Digital systems will not replace the requirement for commanders and staff officers to apply logical and coherent thought to the problems of warfighting. A commander's intuition, experience and judgment are still the key ingredients in the formulation of a good plan. Digitization does not add value to data. Commanders and staffs must still distill raw data into useable form. More data is not necessarily better. Digitization will make available a plethora of data. Commanders must decide what information supports the parallel planning effort and what does not, and cull the data accordingly. Collaboration runs the risk of causing the planning process to devolve into planning by committee. Commanders must remain firmly in control of the process and stay personally involved, in order to focus the efforts of the staff and subordinate commanders. Finally, the advantages of digitization may tempt the staffs to create numerous branches and sequels to the base plan, diluting the planning effort. The commander, again must decide which branches and sequels are to be planned and keep the staff focused on the primary task which is to bring to bear the most combat power at the right place and time on the battlefield.

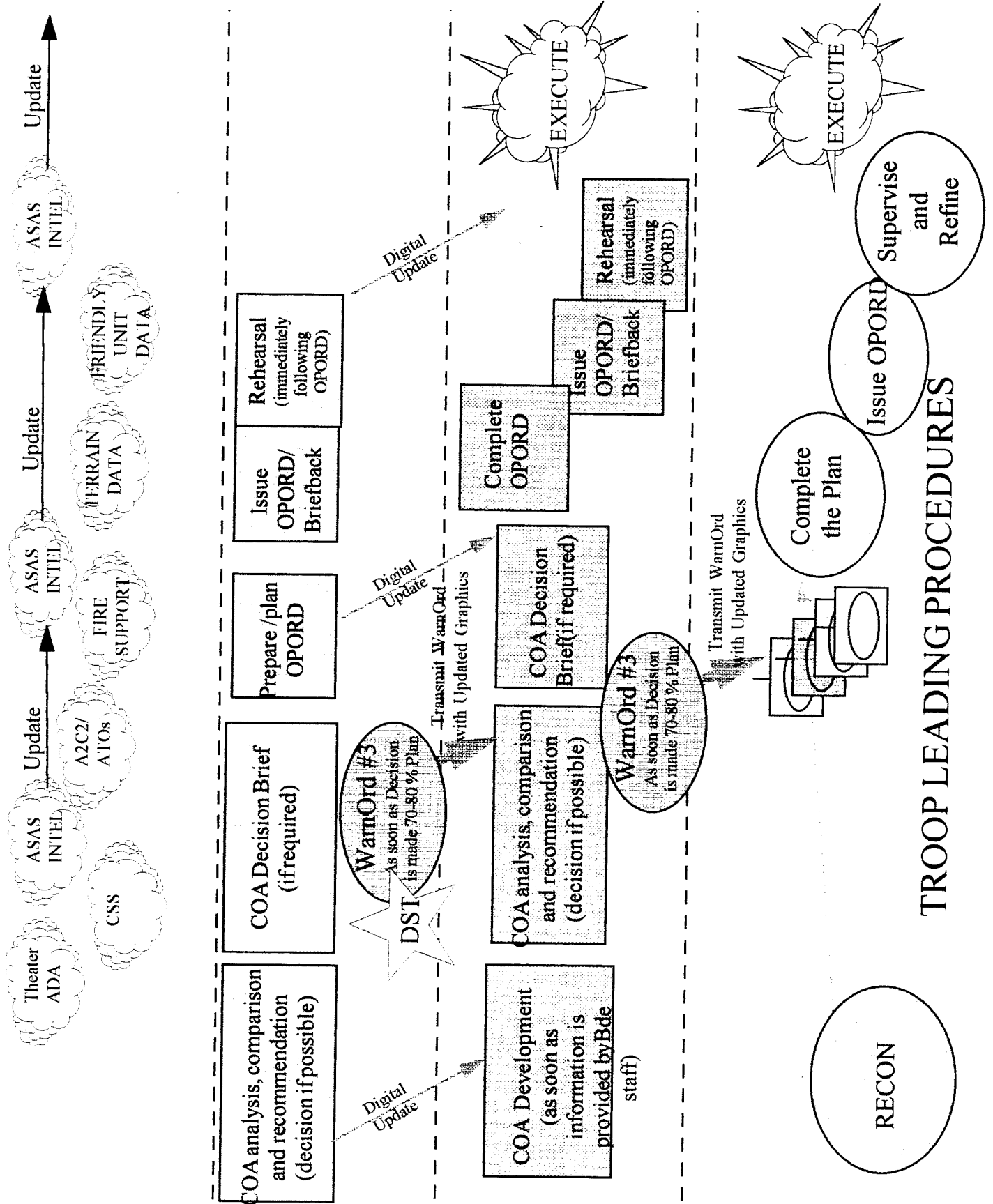
In his book, The Pentomic Era, A.J. Bacevich notes the following as one of the major lessons learned for the army in dealing with new technologies, during the period between the Korean and Vietnam wars:

A...lesson learned is the value of treating Utopian technologies with a modicum of skepticism. Without becoming Luddites, soldiers must recognize that technology alone cannot guarantee fighting power; indeed in some respects the pell-mell pursuit of technology actually can upset the sensitive balance of human factors that invests a force with genuine qualitative superiority in combat. As Martin Van

Creveld has pointed out, modern wars repeatedly affirm the critical importance of fighting power, not technology, in providing the margin of victory.⁴⁹

This lesson, learned by the army in the 1950s, is analogous to the army's situation in the 1990s with digitization. The army must keep sight of the fact that digitization is not going to replace the need to have sound decision-making processes. The digital systems in the Force XXI brigade are simply tools that present the opportunity to be more efficient and effective in the combat decision-making process. The degree to which the tactical units in the army improve as a result digital systems is dependent on the proper application of the technology to address the needs of the units in the field.

Appendix A: Digital Parallel Planning Model (continued)



Appendix B: Digital Staff Actions Matrix

Digital Brigade Staff Actions

Steps	Staff Action	Commander	Time/Status	S3	S2 / MI	FSCOOD/FSO	ENG	ADA	SI/4 FSB	Other
1. Receive the Mission	* Voice WARNORD#1 * Rec. & Xmit initial Ops. Overlay	* Voice WARNORD #1 * Conference w/ TF Cdr's (Optional)		* Xmit initial Ops overlay to sub-units	* Receive ASAS feed * initial R&S plan to sub-units	* Rec.& Xmit Div FS plan as appropriate	* Rec.& Xmit Div Obst plan	* Rec.& Xmit Div ADA plan	* Rec. Div CSS & Movement plan	
2. Information to Cdr & Staff	* Staff Estimates to Cdr * Initial time analysis	* Commander's Estimate * Initial time analysis		* Cbt power rpt to commander	* IPB & SITTEMP to commander		* Obstacle /MCOO to commander		* Init LOG Status to commander	
3. Mission Analysis / Commander's Guidance	* Identify tasks * Restated Mission Constraints & Limits * WARNORD#2	* Approve Mission * Issue Cdr's Guidance * Develop CCIR * Initial Cdr's Intent		* Update Ops Graphics * Xmit guidance * Xmit WARNORD#2 * Digital updates as needed	* Update SITTEMP * Init. PIR * R&S plan update * Intel update * ASAS update	* Exchange digital targeting info	* Xmit obst intent overlay	* Xmit ADA coverage plan to TFs	* collect digital reports, dev spt plan	
4. COA Development	* develop COAs IAW cdr's guidance						consolidate TF obst plans, post to Ops		* Xmit log spt plan to TFs	* MPs Xmit road mvmt
5. COA Analysis	* Wargame COAs * Compare results * Prep. recommendation	* Risk Assessment			* Task Sensors					
6. COA Decision	* Brief COAs * Xmit WARNORD#3 * Correct & update all graphics & text * Xmit to sub units	* Choose COA * issue final guidance * Xmit WARNORD#3		* Xmit WO#3 * update Ops graphics * sub-unit tasks	* Update PIRs * DST to units * update R&S plan * receive ASAS update * Xmit final R&S plan	* Xmit FS plan	* update obst. plan to sub units & division	* update ADA plan	* update CSS overlay	
7. Prepare OPORD/FRAGO	* Issue OPORD	* Issue OPORD * receive backbriefs * confirmation briefings		* Xmit final Ops overlay * Xmit text OPORD		* Xmit final FS plan	* Xmit final obstacle plan	* Xmit final ADA plan	* Xmit final mvmt & CSS plans	
8. Issue OPORD/FRAGO	* Conduct Rehearsals			* rehearse digital actions		* FS rehearsal	* Breadh rehearsal		* CSS rehearsal	
10. Situation Update				* Xmit changes & FRAGOs as needed * final cht power	* final intel update		* Xmit breach sites locations		* update Cdr's LOG stat report	

Appendix C: List of Abbreviations

AAR	After Action Review
ABCS	Army Battle Command System
ASAS	All Source Analysis System
AWE	Advanced Warfighting Experiment
B2C2	Brigade and Below Command and Control System
CALL	Center for Army Lessons Learned
CCIR	Commander's Critical Information Requirements
CDMP	Combat Decision-Making Process
COA	Course of Action
CSS	Combat Service Support
DDMP	Deliberate Decision-Making Process
DST	Decision Support Template
EEFI	Essential Elements of Friendly Information
FBCB2	Force XXI Battle Command Brigade-and-Below System
FFIR	Friendly Forces Information Requirements
FRAGO	Fragmentary Order
FSB	Forward Support Battalion
IFSAS	Improved Fire Support Automated System
IVIS	Inter-Vehicular Information System (imbedded in the M1A2 Tank)
MSF	Mobile Strike Force

OPORD	Operations Order
METT-T	Mission, Enemy, Terrain, Time, Troops available
NAI	Named Area of Interest
NTC	National Training Center, Ft. Irwin California
PIR	Priority Intelligence Requirements
R&S	Reconnaissance and Security
SOP	Standing Operating Procedure
TAI	Targeted Area of Interest
TRADOC	U.S. Army Training and Doctrine Command

Notes

¹ U.S. Army, FM 100-5, Operations, (Washington D.C. : Department of the Army, 1993), p2-9

² U.S. Army. TRADOC Pam 525-5, Force XXI Operations, Army Training and Doctrine Command, Ft. Monroe VA, 1994.

³ NTC 94-07 was the Army's first digital Advanced Warfighting Experiment (AWE) conducted at Ft. Irwin in April 1994. Task Force 1-70 Armor and Hq 3rd Bde 24 ID(M) as the primary participants were equipped with the most current tactical information systems available. The training for the units prior to the rotation was limited and much of the technical connectivity was ad hoc, the results were therefore inconclusive, but the units demonstrated a potential for improvement in the command and control of tactical forces using digital systems.

⁴ The term Force XXI brigade refers to the combat brigade that will be equipped with an entire suite of digital systems and advanced warfighting equipment. Some of the systems are: M1A2 tank, M2A3 BFV, B2C2 command and control system, IFSAS fire support system working in conjunction with advanced field artillery delivery systems such as Paladin, ASAS intelligence capabilities, UAVs, and many other systems. The 2nd Armored Division's EXFOR will test various concepts and equipment to determine which is most feasible, in the design for the Force XXI brigade.

⁵ LTC John D. Rosenberger, "The Burden our Soldiers Bear, Observations of a Senior Trainer (OC)", USAWC, 1 March 1995, pp. 18-19

⁶ Focused Dispatch was a task force level exercise conducted at Ft. Knox in August and September of 1995 as a follow-on AWE to NTC rotation 94-07. Task Force 2-33 Armor, was the primary unit. Unlike NTC 94-07, the unit conducted considerable training prior to the exercise, and the scope of the exercise was limited to a manageable level.

⁷ Orr, Joseph E. Commander, Task Force 2-33 Armor, Memorandum for Record, SUBJECT: Final After Action Report (AAR) to Advanced Warfighting Experiment (AWE) Focused Dispatch. 29 September 1995, Task Force 2-33 Armor, Ft. Knox KY.

⁸ Author's personal observation as an M1A2 SME accompanying the O/Cs during NTC rotation 94-07.

⁹ Prairie Warrior is the annual Command and General Staff College simulation exercise. In the 1995 exercise an experimental division-sized unit, the Mobile Strike Force (MSF) was

equipped with digital information systems, and participated experimenting with digital systems and used unconventional tactics, techniques, and procedures.

¹⁰U.S. Army. CGSC Student Text 101-5, Command and Staff Decision Process. U.S. Army Command and General Staff College, Ft. Leavenworth KS, 1994, p. I-2-28.

¹¹ Ibid. p. I-2-28

¹² Ibid. p. I-2-29

¹³ U.S. Army. Tactical Decision Making: Abbreviated Planning, (CALL Newsletter 95-12), Center for Army Lessons Learned, Ft. Leavenworth KS, p. 18.

¹⁴ ST 101-5, p. I-2-29

¹⁵ CALL Newsletter 95-12, p. 17

¹⁶Jon Grossman, Battalion Level Command and Control at the National Training Center. Santa Monica, CA: RAND Arroyo Center, 1994, p. 12.

¹⁷ U.S. Army. Field Manual 71-123, Tactics and Techniques for Combined Arms Heavy Forces: Armored Brigade, Battalion /Task Force, and Company/Team. Washington D.C., 1992, p. 1-11.

¹⁸U.S. Army. Supplemental Text 71-3, Tactics, Techniques, and Procedures for the Digitized Brigade. U.S. Army Armor Center, Ft. Knox KY, 1995, p. 5-4

¹⁹ LTC Joseph E. Orr, Commander Task Force 2-33 Armor, Interview by Author, 5 October 1995, Ft. Knox KY.

²⁰ General Gordon R. Sullivan and Colonel James M. Dubik, as quoted in the U.S. Army. Army Digitization Master Plan. Army Digitization Office, Washington D.C., 1995, p. 1.

²¹ Army Digitization Master Plan, p.2

²² Ibid., p.1-2

²³ Ibid., p.2

²⁴ Ibid., p.2-12

²⁵ Ibid., p.2-13

²⁶ Ibid., p.2-3

²⁷ MAJ Andy Drebe and CPT Tom Deakins, S3 and assistant S3 Task Force 2-33 Armor, Interviewed by Author, 6 October 1995, Ft. Knox KY.

²⁸ ST 101-5, p. I-2-32

²⁹ MG Lon E. Maggart, Commanding General, U.S. Army Armor Center, Interviewed by Author, 6 October 1995, Ft. Knox KY.

³⁰ U.S. Army. Supplemental Text 71-2-2, Tactics and Techniques for the Digitized Battalion Task Force. U.S. Army Armor Center, Ft. Knox KY, 1994, p. 4-15.

³¹ Author's personal observations as a member of the Mobile Strike Force during Exercise Prairie Warrior '95

³² ST 71-2-2, p.2-8

³³ Briefing, "Emerging Insights from NTC Rotation 94-07", Mounted Warfighting Battlespace Laboratory, 22 April 1994, Ft. Irwin CA.

³⁴ Author's personal observations as an M1A2 SME, augmenting the O/Cs during NTC rotation 94-07

³⁵ Interview with LTC Joe Orr, Cdr, 2-33 Armor, 5 October 1995

³⁶ U.S. Army. The Battalion and Brigade Battle Staff. (CALL Newsletter 93-3), Center for Army Lessons Learned, Ft. Leavenworth KS, 1993, p. 7.

³⁷ Author's personal observations as a member of the Mobile Strike Force during Exercise Prairie Warrior '95

³⁸ Interview with LTC Joe Orr, Cdr, 2-33 Armor, 5 October 1995

³⁹ Author's personal observations as a member of the Mobile Strike Force during Exercise Prairie Warrior '95

⁴⁰ ST 71-3, p.5-6

⁴¹ Interview with LTC Joe Orr, Cdr, 2-33 Armor, 5 October 1995

⁴² ST 71-2-2, p.7-6

⁴³ Ibid., p.8-4

⁴⁴ Interview with Major Andy Drebe, S3, 2-33 Armor, and CPT Tom Deakins, S3 Air, 2-33 Armor, 6 October 1995.

⁴⁵ ST 71-2-2, p. 8-4

⁴⁶ Interview with Major Andy Drebe, S3, 2-33 Armor, and CPT Tom Deakins, S3 Air, 2-33 Armor, 6 October 1995.

⁴⁷ Interview with LTC Joe Orr, Cdr, 2-33 Armor, 5 October 1995

⁴⁸ Author's personal observations as a member of the Mobile Strike Force during Exercise Prairie Warrior '95

⁴⁹ A.J. Bacevich, The Pentomic Era: The U.S. Army between Korea and Vietnam, (Washington D.C.: National Defense University Press, 1986), 156., During the 1950s, in the early days of the Cold War, the army became enamored, for several reasons, with the technology of nuclear weapons. The nuclear technology, some believed, was going to negate the need for old tactical methods and units. The army temporarily lost sight of the basic need for the nation's land force to use maneuver and firepower to defeat the enemy.

Bibliography

Books:

Negroponte, Nicholas, Being Digital. New York: Alfred A. Knopf Inc., 1995.

Bacevich, A.J., The Pentomic Era: The U.S. Army between Korea and Vietnam, Washington D.C.: National Defense University Press, 1986.

Military Publications:

U.S. Army. Army Digitization Master Plan. Army Digitization Office, Washington D.C., 1995

U.S. Army. The Battalion and Brigade Battle Staff. (CALL Newsletter 93-3), Center for Army Lessons Learned, Ft. Leavenworth KS, 1993.

U.S. Army. Battle Command Techniques and Procedures; A Commander's Guide for the Coordination and Execution of Battlefield Operating Systems, (first coordinating draft). Battle Command Battle Laboratory, Ft. Leavenworth KS, 1995.

U.S. Army. Battle Command. (Draft 2.1), Battle Command Battle Laboratory, Ft. Leavenworth KS, 1994.

U.S. Army. Field Manual 101-5, Command and Control for Commanders and Staff (Final Draft), U.S. Army Command and General Staff College, Ft. Leavenworth, KS, 1993.

U.S. Army. CGSC Student Text 101-5, Command and Staff Decision Process. U.S. Army Command and General Staff College, Ft. Leavenworth KS, 1994.

U.S. Army. CTC Quarterly Bulletin (No. 95-4). Center for Army Lessons Learned, Ft. Leavenworth KS, 1995.

U.S. Army. Field Manual 100-5, Operations. Washington D.C. 1993

U.S. Army. Tactical Decision Making: Abbreviated Planning, (CALL Newsletter 95-12), Center for Army Lessons Learned, Ft. Leavenworth KS, 1995.

U.S. Army. CGSC Student Text 100-9, The Tactical Decision Making Process. July 1993

U.S. Army. Field Manual 71-123, Tactics and Techniques for Combined Arms Heavy Forces: Armored Brigade, Battalion / Task Force, and Company / Team. Washington D.C., 1992

U.S. Army. Supplemental Text 71-2-2, Tactics and Techniques for the Digitized Battalion Task Force. U.S. Army Armor Center, Ft. Knox KY, 1994.

U.S. Army. Supplemental Text 71-3, Tactics, Techniques, and Procedures for the Digitized Brigade. U.S. Army Armor Center, Ft. Knox KY, 1995.

U.S. Army. Tactical Operations Center, (CALL Newsletter 95-7), Center for Army Lessons Learned, Ft. Leavenworth KS, 1995.

U.S. Army. TRADOC Pam 525-5, Force XXI Operations, Army Training and Doctrine Command, Ft. Monroe VA, 1994.

Studies/ Reports:

Bornman, Louis G. Staff Organization and Processes for the Digitized Division FY 95 Mobile Strike Force Battle Command Experiment(Draft). Ft. Leavenworth KS: TRADOC Analysis Center, 1995.

Bozek, Gregory J. Battalion Level Tactical Decision Making: can Automation Make a Difference? Ft. Leavenworth KS: School of Advanced Military Studies, 1992.

Cardine Christopher, V. Digitization of the Battlefield. USAWC Strategic Research Report, Carlisle Barracks, PA: U.S. Army War College, 1994.

Fallesen, Jon J. Overview of Army Tactical Planning Performance Research. ARI Technical Report 984 Alexandria VA: U.S. Army Research Institute for the Behavioral and Social Sciences, 1993.

Grossman, Jon Battalion Level Command and Control at the National Training Center. Santa Monica, CA: RAND Arroyo Center, 1994.

Halpin, Stanley M., S. Keene, S. Delane Desert Storm Challenges: An Overview of Desert Storm Survey Responses. Research Report 1633, Alexandria VA: U.S. Army Research Institute for the Behavioral and Social Sciences, 1993.

Kahan, J.P., D.R. Worley, C. Stasz Understanding Commanders' Information Needs. Santa Monica CA: RAND Arroyo Center, 1989.

Lussier, James W. Early Decisions and Concurrent Option Comparison in Problem Solving Groups. ARI Research Report 1618, Alexandria VA: U.S. Army Research Institute for the Behavioral and Social Sciences, 1992.

Lussier, James W. and Douglas J. Litavec Battalion Commanders' Survey: Tactical Commanders Development Course Feedback. Research Report 1628, Alexandria VA: U.S. Army Research Institute for the Behavioral and Social Sciences, 1992.

Michel, Rex R. Historical Development of the Estimate of the Situation. Research Report 1577, Alexandria VA: U.S. Army Research Institute for the Behavioral and Social Sciences, 1990.

Rosenberger, John D., "The Burden our Soldiers Bear, Observations of a Senior Trainer (OC)", U.S. Army War College, Carlisle PA, 1995

Thordsen, M., J. Galushka, G.A. Klein, S. Young, C. Brezovik, A Knowledge Elicitation Study of Military Planning. ARI Technical Report 876, Alexandria VA: U.S. Army Research Institute for the Behavioral and Social Sciences, 1990.

Interviews:

Drebe, Andy MAJ, and CPT Tom Deakins, S3 and assistant S3 Task Force 2-33 Armor, Interview by Author, 6 October 1995, Ft. Knox KY.

Maggart, Lon E. MG, Commanding General, U.S. Army Armor Center, Interview by Author, 6 October 1995, Ft. Knox KY.

Orr, Joseph E. LTC, Commander Task Force 2-33 Armor, Interview by Author, 5 October 1995, Ft. Knox KY.

Other Materials:

Briefing, "Emerging Insights from NTC Rotation 94-07", Mounted Warfighting Battlespace Laboratory, 22 April 1994, Ft. Irwin CA.

Orr, Joseph E. Commander, Task Force 2-33 Armor, Memorandum for Record, SUBJECT: Final After Action Report (AAR) to Advanced Warfighting Experiment(AWE) Focused Dispatch. 29 September 1995, Task Force 2-33 Armor, Ft. Knox KY.