

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 5 June 1998	3. REPORT TYPE AND DATES COVERED Master's Thesis, 5 Aug 97 - 5 Jun 98	
4. TITLE AND SUBTITLE Did Force XXI Validate the Brigade Reconnaissance Troop?		5. FUNDING NUMBERS	
6. AUTHOR(S) MAJ Stephen E. Bruch, U.S. Army			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) US Army Command and General Staff College 1 Reynolds Avenue Fort Leavenworth, KS 66027		8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution unlimited.		12b. DISTRIBUTION CODE A	
13. ABSTRACT (Maximum 200 words) This study investigates the U.S. Army's effort to field a brigade reconnaissance troop (BRT) in the heavy maneuver brigade within the Force XXI process and integrated Advanced Warfighting Experiments (AWE) of the Joint Venture Campaign. The study reviews the evolution of the brigade reconnaissance troop concept from 1995 to 1998. The research explored the question: "Does the data available from the Force XXI process validate the organization and structure of the BRT as proposed in the Force XXI heavy division design?" This report analyzes the applicability and performance of brigade reconnaissance units employed during the Mobile Strike Force 95 Organizational and Operational Analysis, Brigade Design Analysis Studies, Task Force XXI AWE, and Division XXI AWE. Analysis determines that the aggregate Force XXI process validated the BRT in terms of contributions to situational awareness but failed to validate the BRT in terms of contributions to the brigade's tempo and survivability or with respect to the BRT accomplishing the mission with acceptable losses. Finally, this study recommends future exercises with and evaluations of the BRT to complete the validation process.			
14. SUBJECT TERMS Brigade Reconnaissance Troop, Force XXI, Division Design Analysis, Mobile Strike Force 95, Task Force XXI AWE, Division XXI AWE, Brigade Cavalry Troop, Brigade Scouts		15. NUMBER OF PAGES 183	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

19980731 070

**DID FORCE XXI VALIDATE THE BRIGADE
RECONNAISSANCE TROOP?**

A thesis presented to the Faculty of the U.S. Army
Command and General Staff College in partial
fulfillment of the requirements for the
degree

MASTER OF MILITARY ART AND SCIENCE

by

STEPHEN E. BRUCH, MAJ, USA

B.S., United States Military Academy, West Point, New York, 1985

M.S., University of Virginia, Charlottesville, Virginia, 1995

Fort Leavenworth, Kansas

1998

Approved for public release; distribution is unlimited.

DTIC QUALITY INSPECTED 1

DID FORCE XXI VALIDATE THE BRIGADE
RECONNAISSANCE TROOP?

A thesis presented to the Faculty of the U.S. Army
Command and General Staff College in partial
fulfillment of the requirements for the
degree

MASTER OF MILITARY ART AND SCIENCE

by

STEPHEN E. BRUCH, MAJ, USA
B.S., United States Military Academy, West Point, New York, 1985
M.S., University of Virginia, Charlottesville, Virginia, 1995

Fort Leavenworth, Kansas
1998

Approved for public release; distribution is unlimited.


MASTER OF MILITARY ART AND SCIENCE

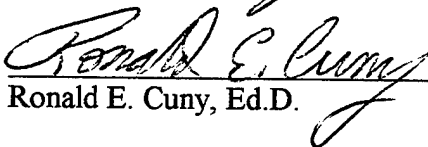
THESIS APPROVAL PAGE

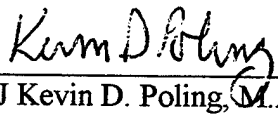
Name of Candidate: MAJ STEPHEN E. BRUCH

Thesis Title: Did Force XXI Validate the Brigade Reconnaissance Troop?

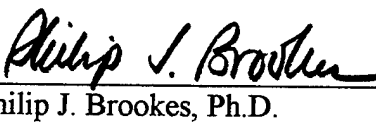
Approved by:


_____, Thesis Committee Chairman
LTC Kevin C. Dopf, M.A.


_____, Member
Ronald E. Cuny, Ed.D.


_____, Member
MAJ Kevin D. Poling, M.A.

Accepted this 5th day of June 1998 by:


_____, Director, Graduate Degree Programs
Philip J. Brookes, Ph.D.

The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

Did Force XXI Validate the Brigade Reconnaissance Troop? by MAJ Stephen E. Bruch, USA, 183 pages.

This study investigates the U.S. Army's effort to field a brigade reconnaissance troop (BRT) in the heavy maneuver brigade within the Force XXI process and integrated Advanced Warfighting Experiments (AWE) of the Joint Venture Campaign. The study reviews the evolution of the brigade reconnaissance troop concept from 1995 to 1998. The research explored the question: "Does the data available from the Force XXI process validate the organization and structure of the BRT as proposed in the Force XXI heavy division design?"

This report analyzes the applicability and performance of brigade reconnaissance units employed during the Mobile Strike Force 95 Organizational and Operational Analysis, Brigade Design Analysis Studies, Task Force XXI AWE, and Division XXI AWE. Analysis determines that the aggregate Force XXI process validated the BRT in terms of contributions to situational awareness but failed to validate the BRT in terms of contributions to the brigade's tempo and survivability or with respect to the BRT accomplishing the mission with acceptable losses. Finally, this study recommends future exercises with and evaluations of the BRT to complete the validation process.

ACKNOWLEDGMENTS

I would like to thank several individuals for their assistance and support in conducting this research: LTC Kevin C. Dopf, who helped develop this challenging topic, provided continuous support throughout the research effort, and provided insightful guidance throughout the endeavor; Dr. Ronald Cuny, who assisted in developing the methodology and often pulled me out of the details to see the unfolding issues with a larger perspective; MAJ Kevin D. Poling, who provided invaluable insights to relevant tactical issues concerning scouts and cavalrymen; Dr. Roland Groover of Training and Doctrine Command Analysis Center, who greatly assisted me in the research of the Division XXI Advanced Warfighting Experiment and generously offered his time to coach me on use of the Operational Test and Experimentation Command database; Dr. George Gernert of the Center for Army Lessons Learned, who provided invaluable guidance as well as access to computer research facilities in my effort to collect data on Task Force XXI Advanced Warfighting Experiment; Mr. Kevin Wainer of Training and Doctrine Command Analysis Center White Sands Missile Range, who provided information and insight to the Brigade Design Analysis studies; MAJ George Reynolds and CPT Patrick Kirk of Training and Doctrine Command Force Design Directorate, who were very patient and always helpful in researching the Force XXI division developments; and CPT Dean Heitkamp of Training and Doctrine Command Analysis Center, who was very helpful in researching the Division Design Analysis. Finally, I would like to thank my family for providing the moral support and inspiration to undertake and complete this research effort.

TABLE OF CONTENTS

	Page
APPROVAL PAGE	ii
ABSTRACT	iii
ACKNOWLEDGMENTS	iv
LIST OF ILLUSTRATIONS	vii
LIST OF TABLES	viii
LIST OF ABBREVIATIONS	ix
CHAPTERS	
1. INTRODUCTION	1
Purpose	1
Background	3
Statement of the Problem	8
Significance	10
Definitions	11
Assumptions	12
Limitations	13
Delimitations	13
2. REVIEW OF LITERATURE	16
Brigade's Doctrinal Responsibilities for Reconnaissance	16
Absence of Heavy Brigade Organic Reconnaissance Assets	23
Recent Evolution of Proposed Brigade Reconnaissance Units	31

Force XXI Process and the Evolution of the BRT	38
Force XXI Design for the BRT	47
Summary	50
3. RESEARCH METHODOLOGY	60
Input	60
Process	64
Output	72
4. DATA	75
Mobile Strike Force 95 Advanced Warfighting Experiment	76
Brigade Design Analysis (Phase I and Phase II)	81
Task Force XXI Advanced Warfighting Experiment	93
Division XXI Advanced Warfighting Experiment	100
Summary	105
5. ANALYSIS	112
Exercise Applicability Analysis	114
Evaluation of Exercise Data	119
Results	127
6. CONCLUSIONS	132
Recommendations	138
GLOSSARY	142
APPENDIX. DATA SUMMARY TABLE	153
BIBLIOGRAPHY	175
INITIAL DISTRIBUTION STATEMENT	182

ILLUSTRATIONS

Figure	Page
1. MAJ Boeglen's Recommended Brigade Reconnaissance Troop	26
2. MAJ Swan's Proposed Brigade Reconnaissance Company	29
3. Brigade Reconnaissance Platoon (U.S. Armor School - Cavalry / Reconnaissance Net Assessment - Master Plan, 1988)	31
4. FKSM 17-97-10(A) Brigade Reconnaissance Troop	34
5. Brigade Reconnaissance Troop for FORCE XXI Modernized Heavy (MOD HVY) Division [Approved Interim Design - Objective]	45
6. Brigade Reconnaissance Troop for FORCE XXI Conservative Heavy Division (CHD)	46
7. Brigade Reconnaissance Troop for FORCE XXI Strike Division (FY 2010 Objective as of 7 July 1997)	46
8. Near-Term Brigade Reconnaissance Troop (2000 to 2010)	48
9. Far-Term Brigade Reconnaissance Troop (2010)	48
10. Army of Excellence (AOE) Armor Division	52
11. Force XXI Moderate Heavy Division (MOD HVY) (Approved Interim FXXI Design - Objective)	53
12. Force XXI Conservative Heavy Division (CHD)	54
13. Force XXI STRIKE Heavy Division	55

TABLES

Table	Page
1. Scout Platoon Comparisons	23
2. Reconnaissance Troop Mission Profiles	33
3. Exercise Weighted, Criteria Based Evaluation Matrix	72
4. Comparison of Equipment Amounts in AOE and MOD HVY Brigades	89
5. Applicability Analysis of Force XXI Exercises	118
6. Evaluation of Data and Compilation of Results	127
7. Validation Results	131

ABBREVIATIONS

ACR	Armored Cavalry Regiment
AGS	Armored Gun System
AI	Area of Interest
AO	Area of Operations
AOE	Army of Excellence
AWE	Advanced Warfighting Experiment
BCTP	Battle Command Training Program
BDA	Brigade Design Analysis
BOS	Battlefield Operating Systems
BRT	Brigade Reconnaissance Troop
BSFV	Bradley Stinger Fighting Vehicle
CAB	Combined Arms Battalion
CALL	Center for Army Lessons Learned
CASTFOREM	Combat Arms Task Force Engagement Model
CFV	Cavalry Fighting Vehicle
CGSC	Command and General Staff College
CHD	Conservative Heavy Division
COLT	Combat Observation/Lasing Team
CS	Combat Support
CSS	Combat Service Support
CTC	Combat Training Center

DAWE	Division XXI Advanced Warfighting Experiment
DDA	Division Design Analysis
DTLOMS	Doctrine, Training, Leader Development, Organization, Materiel, Soldier Support
EPLRS	Enhanced Position Locating Reporting System
EXFOR	Experimental Force
FKSM	Fort Knox Supplemental Material
FLIR	Forward Looking Infrared
FM	Field Manual
FSCS	Future Scout and Cavalry System
FSV	Future Scout Vehicle
FY	Force Year
GSR	Ground Surveillance Radar
HLSB	Heavy-Light Small Based (Division)
HMMWV	High Mobility Multipurpose Wheeled Vehicle
HRS	High Resolution Scenario
HS3	Hunter Sensor Surrogate
JSTARS	Joint Surveillance Target Attack Radar System
LRAS3	Long Range Advanced Scout Surveillance System
METT-T	Mission, Enemy, Terrain, Troops, and Time
MG	Machinegun
MI	Military Intelligence
MOD HVY	Moderate Heavy Division

MSF	Mobile Strike Force
MSF 95 O&O	Mobile Strike Force 1995 Organizational and Operational Analysis
NAI	Named Area of Interest
NTC	National Training Center
OPTEC	Operational Test and Evaluation Command
OPFOR	Opposing Forces
PIR	Priority Intelligence Requirement
PLGR	Precision Lightweight Global Positioning System Receiver
PW	Prairie Warrior
R&S	Reconnaissance and Security
REMBASS	Remote Battlefield Sensor System
RISTA	Reconnaissance, Intelligence, Surveillance, and Target Acquisition
ROAD	Reorganization of the Army Division
SINGARS	Single Channel Ground-Airborne Radio System
TAI	Targeted Area of Interest
TEXCOM	Test and Experimentation Command
TOE	Table of Organization and Equipment
TRAC	Training and Doctrine Command Analysis Center
TRAC-WSMR	Training and Doctrine Command Analysis Center White Sands Missile Range
TRADOC	Training and Doctrine Command
TRK	Truck
TTP	Tactics, Techniques, and Procedures

UAV	Unmanned Aerial Vehicle
U.S.	United States
VIC	Vector-in-Commander
WRKR	Wrecker

CHAPTER 1
INTRODUCTION

The only thing harder than getting a new idea into the military mind is to get an old one out.¹

B.H. Liddell Hart

Purpose

Michael Howard, the military historian and theorist, stated that a “great drawback in an age of peace is that the Armed Forces function professionally in a sort of void.”² He goes on to explain that military professionals cannot verify their calculations or get the required feedback for ideas about “how wars should be fought and how weapons should be used.” In essence, with respect to changes, Howard argues that military organizations rarely “get it right” during peacetime. Howard attributes this tendency to “not get it right” to two factors: the inability to verify ideas and the exceptionally rigid bureaucratic structure of the military. Three elements in the bureaucracy influence change: operational requirement, technological feasibility, and financial constraints.³

Although Michael Howard was addressing a British audience in 1973, his argument is quite germane to the current modernization efforts in the United States Army. Can the Army get it right? Is the Army really testing and verifying its new concepts? Are the operational requirements well defined and correct? Do the results meet operational requirements or are the operational requirements knowingly compromised due to technological feasibility or financial constraints?

The purpose of this research effort is to objectively investigate one element of the current modernization effort, the concept of heavy brigade reconnaissance and security, and to predict whether the Force XXI process “got it right.” With respect to this one concept of brigade reconnaissance and security, has the U.S. Army avoided the inherent peacetime shortfalls in modernization presented in Michael Howard’s argument through the Force XXI process?

This research specifically investigates the U.S. Army’s efforts to design and field a brigade reconnaissance and security element in the heavy maneuver brigade within the Force XXI process and integrated Advanced Warfighting Experiments (AWE) of the Joint Venture Campaign. This paper addresses the evolution of the brigade reconnaissance troop concept since 1995 within a continuous iterative process of modernizing the division structure. The mission, required capabilities, organization, and effectiveness of the brigade reconnaissance and security element are defined and analyzed with respect to tests, evaluations, and observations. The demonstrated effectiveness of brigade reconnaissance and security for the heavy maneuver brigade of the Experimental Force (EXFOR) in the Task Force XXI AWE and the Division AWE is reviewed in light of results from the Brigade Design Analysis (BDA) subprogram of the Division Design Analysis Program. This research attempts to determine whether the data, available from the AWE exercises and other recent Training and Doctrine Command (TRADOC) studies, simulations, and analyses of the Force XXI process, do or do not validate the organization and structure of the final product, the Brigade Reconnaissance Troop (BRT) for the Force XXI division.

Background

Several facts and perceptions lie at the core of the issue concerning reconnaissance and security assets in the heavy brigade. (1) The heavy brigade in the U.S. Army currently has no dedicated reconnaissance and security asset. (2) Current U.S. Army doctrine mandates that brigades perform reconnaissance and security within every operation. (3) As demonstrated at the National Training Center (NTC), brigades generally do not perform reconnaissance well. (4) Senior Army leadership recognizes the deficiency and has introduced a BRT as part of the Army's Force XXI modernization effort. (5) The BRT testing and evaluation process has very low visibility amongst the more popular high-technology modernization initiatives of the Force XXI process. This last point, lack of visibility, implies this change may not receive healthy public scrutiny and debate by leaders at the execution level of Army operations. Lack of open professional review of the BRT concept could impede its successful implementation in the Army. According to Michael Howard's argument and the Starry-Wass de Czege paradigm for "How to Change an Army," effecting change within the void of large bureaucratic organizations and without the widest possible professional review increases the probability of "getting it wrong."⁴

The current U.S. Army division force structure is based on the Army of Excellence (AOE) Table of Organization and Equipment (TOE). In this TOE, the heavy maneuver brigade has no organic ground reconnaissance and security assets. Since the AOE heavy divisions were fielded in the mid-1980s, Army leadership has recognized this void of assets as an inhibitor to the effectiveness of the brigade in executing tactical tasks.

Both the need for and the lack of organic reconnaissance assets at the brigade level are acknowledged in many documents.

The brigade commander needs an organic reconnaissance and security element. The element designed will be required to operate on a scale created by the size of the brigade sector. Division 86 force structure originally identified a need for a brigade reconnaissance platoon; AOE cuts in 1984 deleted the platoon. This deficiency is consistently demonstrated at the NTC.⁵

The brigade is the only tactical level of command between the battalion and corps which does not have organic reconnaissance and security assets. The battalion has a scout platoon; the division has a cavalry squadron and a long range surveillance detachment (in several divisions); and the corps has a long range surveillance company, a military intelligence brigade, and often an armored cavalry regiment.

Current U.S. Army doctrine (Field Manual (FM) 100-5, *Army Operations*; FM 71-100, *Division Operations*; and FM 71-3, *Brigade Operations*) holds the brigade responsible for reconnaissance and security within the brigade area of operations. *Army Operations* clarifies the importance of reconnaissance by stating, "Successful reconnaissance normally precedes successful operations at all levels."⁶ *Division Operations* highlights the absence of the brigade reconnaissance and security asset by stating,

The division brigade does not have an organic reconnaissance or security organization. Army doctrine states that a brigade normally does not act independently, but serves as part of a division or corps. Brigades may task their subordinate battalions with reconnaissance and security operations, but brigades normally rely on the division G2 [Intelligence Officer], the direct support MI [military intelligence] company, the cavalry squadron, subordinate maneuver battalions, and other attached and adjacent units for reconnaissance and security.⁷

Furthermore, *Division Operations* highlights the importance of reconnaissance to all

commanders, "Ground reconnaissance near the enemy is often risky....However, all division units can and do perform some ground reconnaissance in the conduct of their operations to provide the commander with an all-weather, eye-on target capability."⁸ Concerning the importance of reconnaissance to the brigade, *Brigade Operations* states, "Reconnaissance and security are critical to the brigade's success....Reconnaissance actions yield information on the disposition and intentions of the enemy forces and direct friendly units into the fight. Security protects and conserves the combat power of the brigade."⁹ *Brigade Operations* also states, "Reconnaissance is the precursor to all operations. It focuses on locating the enemy and provides information on terrain. While conducting reconnaissance, the brigade relies on limited assets."¹⁰ Chapter 4, "Offensive Operations," of *Brigade Operations* particularly addresses in detail the reconnaissance and security requirements for various offensive operations. The importance of reconnaissance, counterreconnaissance, and security of the force in all tactical operations is fundamental in U.S. tactical doctrine at every level of command.

The importance of reconnaissance and security is constantly a lesson learned during battalion and brigade task force rotations to the NTC. Under the current organizational structure, brigades routinely task their battalions to perform reconnaissance and security missions for the brigade. This tasking results in an associated degradation of combat power available to other brigade and battalion missions. "Observations at the CTCs [Combat Training Centers] and comments by field commanders throughout the Army indicate an inability of our battalions and brigades to routinely conduct adequate reconnaissance of the battlefield; provide adequate force

security; and defeat enemy reconnaissance forces. Our battalions and brigade maneuver forces are not winning the reconnaissance/security battle.”¹¹

The bottom line, as stated by Colonel William Betson of the National Training Center, is that “Our heavy forces are not good at reconnaissance.”¹² There are many reasons for this problem beyond the resourcing issue addressed in this research. Colonel Betson in “Reconnaissance and the Maneuver Brigade” addresses reasons associated with techniques and procedures used by brigades during mission planning, preparation, and execution.¹³ He also presents recommended procedures and techniques, based on numerous NTC rotations and observations, for the heavy brigade without organic reconnaissance assets to improve brigade reconnaissance. Nevertheless, a fundamental disadvantage of the heavy brigade in conducting reconnaissance is the lack of a dedicated asset, a resourcing issue.

The U.S. Army is currently transitioning in response to the changing world political situation, the changing perceived threats to national interests, a changing role in national policy, and the information age. AirLand Battle strategy, which was associated with the Cold War era of clearly defined threats, has transitioned into a more flexible force projection strategy. The Army’s current military strategy is one of active global engagement to “Shape, Respond, and Prepare Now.” The threats to national security interests are no longer clearly defined and range from transnational threats (terrorism, drugs, and organized crime) to unstable regional powers, such as North Korea and Iraq.

In order to prepare for the challenges associated with the twenty-first century, the Army has implemented a process of development, test, and assessment to determine its

optimal organization and structure. The projected threat, evolving mission, emerging technologies, and budgetary constraints shape this process. This process is called Force XXI. TRADOC is the proponent Army agency responsible for Force XXI. TRADOC has conducted a series of Advanced Warfighting Experiments to provide facts and analysis to support the Force XXI structure and development decisions. The Division Design Analysis (DDA) conducted by the TRADOC Analysis Center (TRAC) is the focal point for testing and validating the division design.

The initial phase of the DDA analysis resulted in an interim division design, known as the Modernized Heavy (MOD HVY) Division. The AWE objective is to “analyze, make recommendations for adjustments, and validate this design, using the AWE process, to ensure the resulting final design incorporates advanced information systems, new concepts, and appropriate doctrine which will enable reduction in the size of the future division while retaining or enhancing required lethality, survivability, sustainability, and tempo.”¹⁴ The organization of this interim proposed Force XXI division included a brigade reconnaissance troop.¹⁵ However, among the many popular digitization initiatives of the Joint Venture Campaign Plan, the Division Design Analysis Program, and AWE programs, the BRT issue has lost visibility in most published media and executive level after action reports. The brigade reconnaissance and security issue, a very significant issue to most soldiers and leaders at the tactical level of warfighting, does not seem to rise above the noise level of the more futuristic and technology-based initiatives.

In 1983 General Donn A. Starry formed a model for “how to change an Army”; Colonel Huba de Wass de Czege modified this model in 1984. Military analysts today

refer to this as the Starry-Wass de Czege Paradigm.¹⁶ According to the Starry-Wass de Czege paradigm, testing a proposed change to the Army by experiment and experience is imperative to the successful implementation of the change.¹⁷ The Starry-Wass de Czege model asserts that testing is important to ensure the changes are relevant and effective improvements to the force structure. This model suggests that testing is also important in convincing the general population of army leadership, who will implement the change, that the change is necessary and actually improves the force. An implication of testing is to validate the concept (conduct a structured analysis to determine if the change produces its intended results). Finally the validation should be published to support the implementation of the change.

Statement of the Problem

The current Force XXI heavy division structure proposal is based on the Conservative Heavy Division Design (CHD) which includes a digitized brigade reconnaissance troop organic to the brigade.¹⁸ The BRT organizational change is one of a multitude of initiatives in the Force XXI division that resulted from a three- year process involving numerous analyses and experiments. However, unlike most Force XXI initiatives that have received much attention in published reports, the BRT initiative has received very little attention. The lack of attention to the BRT in the recent army media and literature is significant because it fails to encourage critical review and broad acceptance by the general population of army leadership.

The analysis and validation of the BRT initiative with respect to its stated objectives within the Division Design Analysis, the Army Warfighting Experiments, and

the Force XXI design are very important. A validation is necessary to ensure that the organization and structure of the BRT is the best possible solution to the brigade reconnaissance and security asset shortcoming. Published validation is also important to the acceptance and smooth implementation of the change by army leadership in the field. This research effort analyzes the BRT concept with respect to the DDA process and AWE exercises that have involved the brigade organization.

This thesis will answer the fundamental question: Do the data available from the DDA and AWE exercises validate the organization and structure of the Brigade Reconnaissance Troop as proposed in the Force XXI division design. The AWE tests involved with this research include Task Force XXI AWE (a force on force exercise conducted by a brigade of the 4th Infantry Division in March 1997 at the NTC), Prairie Warrior 95 Operational and Organizational Analysis (a corps level battle command training simulation conducted in 1995 at Fort Leavenworth, Kansas), and the Division XXI AWE (a battle command training exercise conducted by the 4th Infantry Division and III Corps in November 1997 at Fort Hood, Texas). The research also reviews the simulation tests and analyses conducted for the Brigade Design Analysis by TRAC at White Sands Missile Range, Arizona, as part of the Division Design Analysis of TRAC.

The question of validation involves several supporting questions. (1) What is the mission and doctrinal role for the brigade reconnaissance troop? (2) What are the organization, equipment, and personnel structures of the brigade reconnaissance troop as proposed in Force XXI? (3) What Force XXI exercises and AWE tested the BRT? (4) What brigade reconnaissance troop structure was used in AWE exercises? (5) What demonstrated enhancements to force capabilities (situation awareness, tempo, lethality,

and survivability) does the brigade reconnaissance troop provide? (6) Has the Force XXI process demonstrated that the BRT can accomplish its mission on the current battlefield and the future battlefield?

Significance

The brigade reconnaissance troop concept involves many controversial issues that excite the passion of both senior and junior combined arms leaders. The BRT issue is very important to both the infantry and armor branches and to their tactical doctrine. Performing both reconnaissance and security operations are fundamental to U.S. Army tactical doctrine at every level of command. The recognition of the need for a brigade reconnaissance asset is nearly universal in the combat arms force. However, whether the dominant role of the BRT is that of reconnaissance, security, or target acquisition inspires many debates. In any of these three roles, the BRT will significantly affect the way heavy ground maneuver brigades (and battalions) fight on the battlefields of the twenty-first century.

The BRT issue also inspires debate among cavalrymen since it involves capabilities and possibly an expanded role for cavalry in the future force structure. The BRT issue resurfaces the question concerning whether scouts should have an unarmored wheeled vehicle (High Mobility Multipurpose Wheeled Vehicle, HMMWV), which is the current case for battalion scouts, or an armored tracked vehicle, the M3 Cavalry Fighting Vehicle (CFV). Should the BRT be capable of aggressive reconnaissance or just stealthy reconnaissance as addressed in FM 17-97, *Cavalry Troop*?¹⁹ In terms of the future force (force year 2001 and beyond), the BRT brings up the issue of modernized systems, their

capabilities, and how their capabilities should affect the doctrinal mission of scouts. The Long Range Advanced Scout Surveillance System (LRAS3), an advanced HMMWV with second generation forward looking infrared radar (FLIR), will be fielded in force year 2001.²⁰ This system has enhanced long range target acquisition capabilities. The Future Scout and Cavalry System (FSCS) is in the design phase. This system will replace the M3 CFV and offer enhanced lethality, survivability, mobility, deployability, digitization, communications, and a reduced signature.²¹ The artillery branch also has an interest in the BRT because of the target acquisition or "Striker" capabilities. One issue with the artillery branch concerns whether the near-term BRT (force year 2001) will have organic Striker teams or direct support Striker teams from the division artillery brigade. The far-term BRT equipped with either the LRAS3 or the FSCS will inherently have this capability. Hence, in the far-term, the BRT design is possibly in competition with the artillery Striker concept.

With the many issues of parochial branch interests, it is imperative that the BRT receive adequate testing, thorough analysis, and impartial validation. This paper addresses these issues and postulates whether the resulting BRT is an optimized solution to the reconnaissance and security needs of the heavy maneuver brigade in the 21st century.

Definitions

For the purpose of specificity and clarity of the thesis question, the term "data" in this analysis refers to factual information, formally collected observations, quantitative results, and qualitative results used as a basis for reasoning. Qualitative results include

the professional opinions of participants, subject matter experts, and observer-controllers for exercises. The term “validate” means to verify that a concept is logically supported with evidence and sound reasoning. Specifically, this research effort involves determining if the Force XXI process has demonstrated that the BRT (in terms of organization, manning, and equipment) can accomplish its intended doctrinal role.

The Force XXI process or simply Force XXI is the Army’s comprehensive process for modernizing and preparing for warfare and operations in the twenty-first century. Force XXI is charged to develop the necessary doctrine, organizations, training, equipment, and weapons for the Army of the twenty-first century. The initial product of Force XXI will be Army XXI. Force XXI involves a series of evaluations, exercises, and experiments, on which the Army’s future organization, equipment, training, and doctrine will be based.²²

The Glossary presents definitions and explanations for many other military terms, programs, projects, agencies, and abbreviations used in this paper.

Assumptions

1. The simulated representations of the BRT used in several experiments and analysis accurately represent the BRT organization and capabilities in both near-term scenarios for force year 2001 and objective-term scenarios for force year 2010.
2. The simulations and exercises represent an accurate projected threat facing the Army in the objective term (force year 2010) and early twenty-first century.
3. The brigade will not operate autonomously but will continue to operate within the structure of a division.

Limitations

This paper will cover the development and analysis of the BRT concept from Phase I of the DDA (1995) to the present. Data is collected from Prairie Warrior 1995, simulations of the Brigade Design Analysis conducted by TRAC at White Sands Missile Range, the Task Force XXI AWE, and the Division AWE. Observations from the TRADOC Force Design Directorate, TRADOC Analysis Center, Experimental Force (4th Infantry Division), and the U.S. Armor Center and Mounted Maneuver Battle Lab are incorporated into this analysis. The evolution of the BRT organization within the DDA optimization process is reviewed, but the focus of this analysis is the final Force XXI BRT structure and organization recommended by the TRADOC Commander to the Chief of Staff of the Army Board of Directors meeting in February 1998.

Delimitations

This analysis of the BRT does not address data and observations collected prior to 1994. This research and its conclusion do not aggregate computer simulations conducted prior to 1994.

This analysis does not provide a comprehensive review of literature addressing the need for a brigade reconnaissance and security element published prior to 1990. A very comprehensive review of pertinent literature prior to 1990 is provided in a Master of Military Art and Science thesis prepared by Major Kenneth L. Boeglen in 1992 entitled, "Does the Heavy Maneuver Brigade Commander Need An Organic Reconnaissance/Security Organization?"

This analysis is restricted to tests and experiences within the U.S. Army. The Command and General Staff College, the U.S. Army War College, and the U.S. Army branch schools have conducted several comprehensive studies comparing the U.S. Army reconnaissance and security organizations with those of foreign armies.

This analysis does not present budgetary and personnel constraints to the proposed Force XXI Division design. The issue of manning the brigade reconnaissance troop within the AWE objective of reducing the size of the future division falls outside the scope of determining the validity of the brigade reconnaissance troop based on the DDA analysis and AWE exercises.²³

¹ B. H. Liddel Hart, *The Military Quotation Book*, ed. James Charlton (New York: St. Martin's Press, October 1995), 64.

² Michael Howard, "Military Science in an Age of Peace," *RUSI, Journal of the Royal United Services Institute for Defense Studies* 119 (March 1974) : 4.

³ Howard, 5.

⁴ Howard, 5; and Rodler F. Morris and others, "Initial Impressions Report: Changing the Army" (Fort Leavenworth, KS: U.S. Army Combined Arms Command Center for Lessons Learned, 1994), ES-1.

⁵ U.S. Army Armor Center, "Cavalry/Reconnaissance Net Assessment - Master Plan" (briefing by Directorate of Combat Developments, Fort Leavenworth, KS: Center For Army Lessons Learned, 31 August 1988), 31.

⁶ U.S. Army, FM 100-5, *Operations* (Washington, DC: Department of the Army, 14 June 1993), 6-15.

⁷ U.S. Army, FM 71-100, *Division Operations* (Washington, DC: Department of the Army, 28 August 1996), A-4.

⁸ FM 71-100, 2-20.

⁹ U.S. Army, FM 71-3, *The Armored and Mechanized Infantry Brigade* (Washington, DC: Department of the Army, 8 January 1996), 2-5.

¹⁰ FM 71-3, 4-4.

¹¹ U.S. Army Combined Arms Center, "Reconnaissance, Surveillance, and Counter-Reconnaissance Assessment" (briefing for General Officer Executive Committee, Fort Leavenworth, KS: 30 September 1988), 5.

¹² Colonel William Betson, "Reconnaissance and the Maneuver Brigade," *CTC Quarterly Bulletin*, 4th Qrt, FY 97, No. 97-18 (Fort Leavenworth, KS: Center for Army Lessons Learned, September 1997), 1.

¹³ Betson, 1-18.

¹⁴ U.S. Army, "Study Plan for the Division XXI Advanced Warfighting Experiment" (Fort Leavenworth, KS: Center for Army Lessons Learned, October 1996), 3.

¹⁵ U.S. Army, "Force XXI, Joint Venture, How to Fight Army XXI" (briefing by LTC Robert R. Leonhard, Fort Monroe, VA: U.S. Army Training and Doctrine Command, 28 August 1997), Slide 28.

¹⁶ Rodler F. Morris and others, "Initial Impressions Report: Changing the Army," (Fort Leavenworth, KS: Combined Arms Center History Office and Center for Army Lessons Learned, 1994), 1.

¹⁷ Morris, 2.

¹⁸ Major George Reynolds, Training and Doctrine Command - Force Design Directorate, telephone interview by author, Fort Leavenworth, KS, 26 February 1998.

¹⁹ U.S. Army, FM 17-97, *Cavalry Troop* (Washington, DC: Department of the Army, 8 June 1995), Chapter 3.

²⁰ U.S. Army Armor Center, Directorate of Force Development, "Long Range Advanced Scout Surveillance System" (slide, Fort Leavenworth, KS: Training and Doctrine Command - Force Design Directorate, 30 October 1997).

²¹ Jason Sherman, "Future Scouts," *Armed Forces Journal* (June 1997) : 50-51.

²² U.S. Army, *Posture Statement FY 98* (Washington, DC: Department of the Army, U.S. Government Printing Office, 1998), xi and 50.

²³ "Study Plan for the Division XXI Advanced Warfighting Experiment," 3.

CHAPTER 2

REVIEW OF LITERATURE

You can never have too much reconnaissance.¹

General George S. Patton, Jr., *War As I Knew It*

This chapter provides a backdrop for the analysis of the brigade reconnaissance troop proposed in the Force XXI division design. To understand the issues involved in validating the troop's organizational design, it is necessary to review current and emerging doctrine, previous research efforts, and current army studies which are relevant to brigade reconnaissance responsibilities, assets, and capabilities with respect to the Force XXI division design. The goals of this chapter are to provide an overview of the following topics by reviewing available literature.

1. Brigade's Doctrinal Responsibilities for Reconnaissance
2. Absence of Heavy Brigade Organic Reconnaissance Assets
3. Evolution of Proposed Brigade Reconnaissance Units
4. Force XXI Process and the Evolution of the BRT
5. Force XXI Design for the BRT

Brigade's Doctrinal Responsibilities for Reconnaissance

The doctrinal references relevant to reconnaissance responsibilities and assets of the brigade are numerous. As stated in chapter 1, the Army capstone "how to fight" manual, *Army Operations* (FM 100-5), clearly highlights the importance of both reconnaissance and security to the success of operations at all levels of warfare and at all

echelons of command. The tenants of U.S. Army warfighting doctrine are agility, initiative, depth, synchronization, and versatility. Commanders set favorable conditions for battle by synchronizing available assets to attack the enemy simultaneously throughout the depth of the battlefield. By setting the proper conditions, commanders can concentrate overwhelming combat power at the decisive point to defeat the enemy. In order for commanders to take the initiative and synchronize the efforts of all battlefield operating systems, they must maintain a clear picture of the battlefield conditions and the enemy. "Successful commanders do not run out of options" and are always looking for enemy weaknesses and vulnerabilities while protecting their own force.² Hence, "security of the force is crucial," and "successful reconnaissance is vital to success."³

With respect to the both offensive and defensive operations, reconnaissance is paramount to achieving surprise, a component of initiative. A clear picture of the battlefield, knowing the location of both friendly and enemy units, and knowing the terrain allow commanders to expedite decisions and overwhelm the enemy with the speed of actions, called tempo. Requisite to the ability to use surprise and tempo, the commander must know "the enemy commander's intent."⁴ This knowledge is gained through timely and accurate battlefield information and intelligence. Reconnaissance is the directed effort to obtain this information. Intelligence is the product of the analysis and evaluation of this information.

Division Operations (FM 71-100) dedicates Appendix A to reconnaissance and security operations. Reconnaissance is a mission to collect information by visual or other detection means. Reconnaissance is usually focused toward specific target areas without the requirement for continuous coverage.⁵ *Division Operations* states that

“reconnaissance is the precursor to all operations.”⁶ The forms of reconnaissance used by division assets include route, area, and zone reconnaissance and a less traditional reconnaissance in force. Doctrinally, reconnaissance is characterized as passive or active. Active techniques can include mounted, dismounted, and aerial reconnaissance or reconnaissance by fire. Passive reconnaissance involves map and photographic reconnaissance and systematic observation of a particular location, place, or thing by human or technical assets. *Division Operations* mandates that “commanders must conduct reconnaissance operations prior to all maneuver and fires.”⁷ Furthermore, “poor reconnaissance often results in unsuccessful operations and unnecessary friendly casualties.”⁸

Security is a distinct mission from reconnaissance, although the two are closely related. Security involves taking measures to protect a unit against all acts that may impair its effectiveness.⁹ Security operations are designed to provide reaction time, maneuver space, and protection to the main body. Security operations are characterized by aggressive reconnaissance (to gain and maintain contact with the enemy), counter-reconnaissance, and prevention of enemy interference with the friendly unit. Counter-reconnaissance is the act of denying the enemy knowledge of what the friendly force is doing; however, counter-reconnaissance is often interpreted as operations to defeat the enemy reconnaissance effort (often by destruction).

Security operations involve screening, guarding, and covering tasks. A screen is a task to observe, identify, and report information, and may involve fighting in self-protection.¹⁰ Screening implies surveillance to warn the main body, harassment of the enemy, and destruction of enemy reconnaissance without becoming decisively engaged.

A guard is a task to protect the main force by fighting to gain time, to collect and report information, and to prevent enemy observation and direct fires on the friendly unit.¹¹

Guarding implies aggressive reconnaissance, counter-reconnaissance, attacking, delaying, and defending. The guard force operates within the range of the main body's indirect fire weapons. A cover is a task similar to the guard but with the distinction that the covering force operates independent of support of the main body.¹² The cover is usually used to protect large organizations (division and corps) and involves organizations with autonomous combat, combat support, and combat service support assets.

Because the reconnaissance effort must be layered at every level, *Division Operations* addresses corps assets, division assets, brigade assets, and battalion assets. It also explicitly states that "all maneuver units can conduct reconnaissance missions."¹³ Specific reconnaissance actions include local combat patrols, use of air defense and artillery radars, chemical detection, military police patrols, map and photo reconnaissance, and collecting intelligence from other technical sources.

The corps has an armored cavalry regiment (ACR) and a military intelligence brigade. The ACR is the primary maneuver force for corps reconnaissance and security operations and includes both ground and aviation assets. The ACR is capable of all types of reconnaissance (route, zone, area, and reconnaissance in force) and security missions (screen, guard, cover, and area). The corps military intelligence brigade can collect information using the Guardrail Common Sensor, unmanned aerial vehicles (UAV), a long-range surveillance company, and counterintelligence and interrogator personnel.

The division reconnaissance assets parallel the corps assets and include the cavalry squadron and the military intelligence battalion. The cavalry squadron is the

heavy division's primary reconnaissance and security force; it consists of three ground troops and two air cavalry troops equipped with the OH-58D (Kiowa Warrior).¹⁴ Each ground troop consists of two tank platoons, each equipped with four M1A1 tanks, and two scout platoons, each equipped with six M3 Cavalry Fighting Vehicles. The doctrinal guide for the cavalry squadron is FM 17-95, *Cavalry Operations*. The squadron is capable of all reconnaissance missions and the screen security mission. If augmented, the cavalry squadron can conduct limited guard missions. The other division information collection assets include a long-range surveillance detachment, Quickfix, unmanned aerial vehicles, ground surveillance radar (GSR), and the ground-based common sensor.

FM 71-100, *Division Operations*, acknowledges that the brigade has no organic reconnaissance organizations; brigades may task subordinate battalions with reconnaissance and security and request intelligence support from the division intelligence officer.¹⁵ Doctrinally, a company from the division military intelligence battalion provides direct support to the brigade. The direct support MI company is equipped with GSR, remotely monitored battlefield sensor system (REMBASS), high frequency and very high frequency collection and jamming systems, UAVs, a joint surveillance target attack radar system (JSTARS) ground station module, a commander's tactical terminal, and an analysis and control element.¹⁶

The doctrinal guideline for the heavy brigade is FM 71-3, *The Armored and Mechanized Infantry Brigade*. Unlike the *Division Operations*, the heavy brigade's doctrinal guide does not dedicate a chapter or an appendix to reconnaissance and security operations. Nevertheless, the manual is consistent with *Division Operations* in clearly

addressing the importance of reconnaissance to all brigade operations. “Reconnaissance and security are critical to brigade’s success.”¹⁷

Doctrinally, the brigade is not a set organization with organic subordinate units; the brigade has only an organic headquarters and headquarters company. The brigade is tailored to an environment or operation with a combination of two to five armored and mechanized infantry battalions, often an aviation battalion or task force and or a light infantry battalion, combat support (CS), and combat service support (CSS) units from the parent division or corps.¹⁸ Doctrinally, the brigade normally operates as a part of a division or corps. “The brigade influences an engagement mainly through synchronizing reconnaissance and security efforts, task organizing maneuver battalions, assigning subordinate missions and tasks, applying combat multipliers, assigning and shifting priorities of CS and CSS assets, and constituting and committing a reserve.”¹⁹

The brigade is a synchronizer of assets across the entire spectrum of battlefield operating systems. Though the brigade has no dedicated reconnaissance assets, FM 71-3 continues to direct the employment of reconnaissance and security assets in the description of operations and missions.²⁰ Although the active component currently has no separate brigades, *The Armored and Mechanized Infantry Brigade* does highlight that the separate brigade has an organic cavalry troop. Furthermore, when discussing requirements for reconnaissance and security, *The Armored and Mechanized Infantry Brigade* states that “in the separate brigade, this is an ideal mission for the brigade’s cavalry troop.”²¹

Each maneuver battalion has a scout platoon that can conduct route, zone, and area reconnaissance, surveillance, and screen missions. The doctrinal guide for the scout platoon operations is FM 17-98, *Scout Platoon*. The maneuver battalion scout platoon consists of an officer and twenty-nine enlisted soldiers and is equipped with ten High Mobility Multipurpose Wheeled Vehicles mounted with either a M2 .50-caliber machinegun or a MK-19 automatic grenade launcher. The platoon organizes for a particular mission according to mission, enemy, terrain, troops, and time (METT-T) considerations and can organize into two, three, or four sections. A scout "team" usually refers to a single vehicle with three soldiers (the section or squad leader, a scout driver, and a scout who is qualified on the vehicle weapon system).²²

One issue germane to the development of the BRT and still very much controversial amongst armor and cavalry officers is whether the BRT should be equipped with HMMWVs which afford greater stealth and a smaller signature or an armored vehicle affording greater lethality and protection. To a large extent the capability of the BRT will be dependent upon its equipment. The mission and doctrinal role of the BRT are certainly dependent upon the vehicle used by the scout teams. A comparison of the capabilities of the HMMWV-mounted scout team and a team equipped with the M3A2 Cavalry Fighting Vehicle (CFV) is presented in table 1.

Other sources which complement the current doctrinal picture for brigade reconnaissance include: FM 34-2-1, *Reconnaissance and Surveillance and Intelligence Support to Counterreconnaissance* (June 1991); FM 34-80, *Brigade and Battalion Intelligence and Electronic Warfare Operations* (April 1986); and FM 6-20-50, *Fire Support for Brigade Operations* (January 1990).

Table 1. Scout Platform Comparison

	M3A2 CFV		HMMWV
WEAPONS	3,750 m (TOW); 2,500 m (25-mm)	RANGE	1,500 m (CAL .50) 2,200 m (MK-19)
	Defeat tanks with TOW; Defeat light armor with cannon.	CAPABILITY	Suppression of light armor.
OPTICS	Greater than 3,750	THERMAL SIGHT CAPABILITY	3,000 to 4,000 m (system-dependent)
SURVIVABILITY	Can protect against 30-mm (direct fire) and 155-mm (near miss) indirect fire	ARMOR PROTECTION	None
MOBILITY	Excellent	OFF-ROAD	Fair
	Fair	ON-ROAD	Excellent
	Good	NIGHT	Poor
	Good	FORDING CAPABILITY	Fair
CAPACITY	Up to 9 Personnel	PERSONNEL	Up to 4 Personnel
	Good	HAUL	Poor
SIGNATURE	Poor	ACOUSTIC	Good
	Poor	THERMAL	Good
	Poor	PHYSICAL	Good

Source: U.S. Army, FM 17-98, *Scout Platoon* (Washington, DC: Headquarters, Department of the Army, 9 September 1994), 1-6.

Absence of Heavy Brigade Organic Reconnaissance Assets

The absence of heavy brigade reconnaissance assets has been a topic for numerous studies and research efforts over the past ten years. Four of the more pertinent studies include two theses from the Command and General Staff College Master of Military Art and Science program and two monographs from the School for Advanced Military Studies. These studies provide very comprehensive historical reviews, doctrinal

reviews based on manuals published prior to 1995, analysis of the consequences to brigade operations, observations from operation DESERT STORM and the combat training centers, and reviews of proposed brigade reconnaissance organizations prior to the Force XXI design.

A comprehensive analysis of the absence of brigade reconnaissance and security assets from the implementation of Army of Excellence (AOE) organization in the mid-1980s through 1990 is found in "Does the Heavy Maneuver Brigade Commander Need an Organic Reconnaissance/Security Organization" by Major Kenneth L. Boeglen.²³ This study primarily investigates whether a deficiency exists in the reconnaissance and security assets of the heavy maneuver brigade. The thesis is based on AirLand Battle doctrine as presented in the 1986 version of FM 100-5, *Operations*. This work concludes that a significant deficiency does in fact exist with the AOE heavy brigade structure. Boeglen highlights the fact that the brigade does not have a dedicated and responsive asset to complement the reconnaissance and security assets at the battalion and division levels or to complement the electronic sensors that it uses. The analysis and conclusions are based on numerous articles and observations from the U.S. Army Infantry School, the Armor School, the National Training Center, and Operation DESERT STORM. The analysis compares the brigade mission requirements as determined by the Concept Based Requirements System with the brigade mission profile, as determined by doctrinal manuals, NTC exercises, and Operation DESERT STORM. The comparison substantiates the necessity for a brigade reconnaissance and security asset.

Major Boeglen's study also addresses considerations for determining the optimal composition of the brigade reconnaissance and security element. He presents and

compares six different brigade reconnaissance troop organizations.²⁴ The first organization involved consolidating the three HMMWV-mounted battalion scout platoons at the brigade level and adding a company headquarters element. Each of next five options included both a headquarters element and a maintenance platoon or section. The options were (1) a troop structured with two M-1 tank platoons with four tanks in each and two platoons with six HMMWVs and four M3 CFVs in each; (2) a balanced troop consisting of two Armored Gun System (AGS) platoons and two platoons with ten HMMWVs and four motorcycles in each; (3) a troop of three platoons, each with a combination of six M3 CFV, four M1 tanks, and four motorcycles; (4) a troop with two platoons, each with six HMMWVs and four CFVs, and a separate platoon with ten motorcycles; and (5) a troop with three platoons, each with four M3 CFVs, four M1 tanks, and four HMMWVs. After analyzing the options and making a comparison, Major Boeglen recommended the structure depicted in figure 1.²⁵ Major Boeglen optimized this organization based on dismounted patrol capability, stealthy reconnaissance capability, and security mission capabilities to include guard and counter-reconnaissance missions. The cited disadvantage of the organization is the large number of personnel required in an era of zero growth constraints.²⁶

A second thesis, "Does the Force XXI Heavy Brigade Need An Organic Reconnaissance and Security Element" prepared in 1995 by Major William J. McKean, analyzes the need for an organic reconnaissance and security element within the structure of the Force XXI heavy brigade.²⁷ At the time of publication, Training and Doctrine Command (TRADOC), the executive agent for the Army's Force XXI efforts, had not

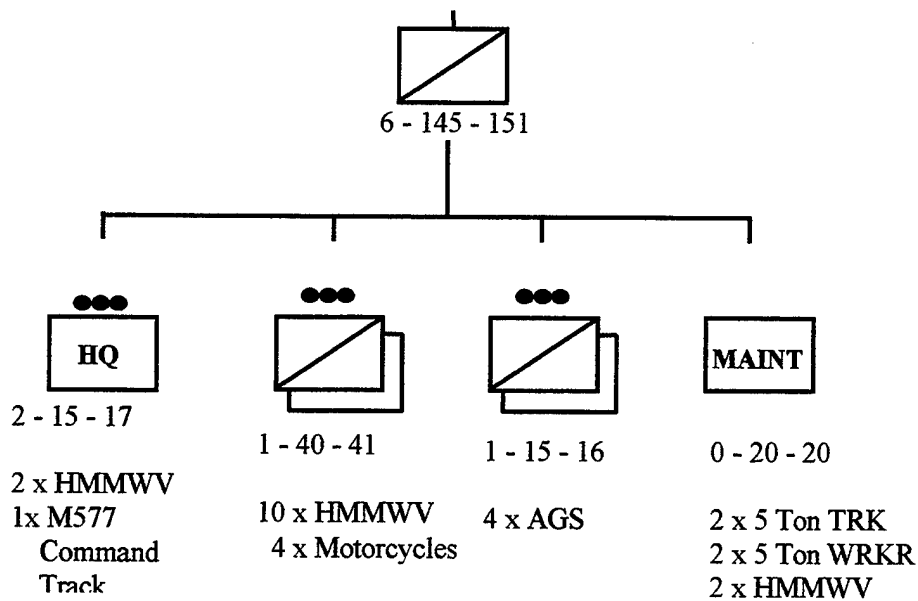


Figure 1. Major Boeglen's Recommended Brigade Reconnaissance Troop. Source: Major Kenneth L. Boeglen, "Does the Heavy Maneuver Brigade Commander Need an Organic Reconnaissance/Security Organization?" (Thesis for Master of Military Art and Science, Fort Leavenworth, Kansas: Command and General Staff College, 1992), 187.

developed the Conservative Heavy Division (CHD) design. Nevertheless, this thesis addresses the need for a reconnaissance and security asset within the context of force projection strategy and the emerging role for Force XXI on the battlefields of the twenty-first century. The thesis uses the concepts of battlespace control, battle command, protection of the force, information, and tempo to investigate a brigade reconnaissance and security element. This study is useful because it provides a review of literature through 1994 with regard to the brigade's requirement. It also cites some results from initial simulated tests conducted by the U.S. Army Armor School, Fort Knox, Kentucky. These tests were actually conducted in the late 1980's and were not directly associated with AWE and the Force XXI process.

Another interesting and comprehensive study is a monograph prepared by Major Guy Swan, III in 1988. This monograph "Tactical Reconnaissance for the Heavy Brigade Commander: How Much is not Enough?" provides a concise historical perspective for the absence of an organic tactical reconnaissance element at the brigade level.²⁸ The monograph first examines the perspectives of military theorists (Sun Tzu, Carl von Clausewitz, and Henri Jomini) concerning intelligence and reconnaissance. From a theoretical standpoint, Major Swan summarizes that the effectiveness of a brigade's reconnaissance can be measured by eight fundamental imperatives of reconnaissance. These imperatives, the principles of reconnaissance, originally proposed by Lieutenant Colonel Wayne M. Hall, state that information must be timely, accurate, and relevant; that reconnaissance must be aggressive, continuous, complementary, and focused on combat power; and that most effective reconnaissance is stealthy.

Major Swan's monograph provides a unique historical review of reconnaissance organizations within the U.S. Army brigade-size commands between World War II and 1988. The review includes the organizations of the early World War II armored regiment with a reconnaissance company (1942), the later World War II combat command which was augmented with a divisional cavalry troop (1943), the pentomic division's battle group with a reconnaissance platoon and with the normal augmentation of a divisional cavalry troop (1950s), the Reorganization of Army Division (ROAD-65) brigade with a reconnaissance section, the Division 86 J-Series Table of Organization and Equipment (TOE) brigade with a scout platoon, and subsequent Army of Excellence TOE elimination of the brigade scout platoon. Since World War II, the U.S. Army brigade level organization has had at best an organic reconnaissance platoon. Nevertheless, prior

to conversion to the AOE TOE, the division cavalry squadron was arguably robust enough to realistically provide the maneuver brigades with reconnaissance and security support. Major Swan presents the supporting facts to argue that prior to AOE, the divisional cavalry squadron could reasonably augment the brigade level commands with a ground cavalry troop. However, given the parallel AOE reductions in the size of the divisional cavalry ground assets, the augmentation of a troop to each brigade is no longer reasonable.

Major Swan's monograph also presents a comparison of U.S. and foreign army capabilities with respect to brigade level reconnaissance. In comparing the U.S. Army brigade structure to the comparable organizations in the Soviet, French, British, and Canadian forces, he illustrates that the U.S. Army does not conform to an international norm of providing brigade level commanders with organic reconnaissance assets. The monograph presents some studies and initiatives of the late 1980s aimed at improving brigade reconnaissance. The monograph concludes that the brigade commander definitively needs an organic reconnaissance element.

Major Swan further recommended a light HMMWV-mounted company organization, which emphasized infiltration, stealth, reconnaissance and surveillance, as opposed to aggressive reconnaissance and active security. His proposed Brigade Reconnaissance Company (figure 2) could operate "layered" between the division's cavalry squadron area of interest (20-70 kilometers out) and the battalion scouts' area of operations (5-10 kilometers out). Each of three reconnaissance platoons are equipped with five HMMWVs and capable of reconnaissance ten to twenty kilometers beyond the forward line of troops. The company's ability to engage armor is limited to controlling

indirect fires. The company is not equipped in terms of survivability or lethality for aggressive reconnaissance or active counter-reconnaissance, both of which require anti-armor, direct-fire capabilities and armor protection.²⁹

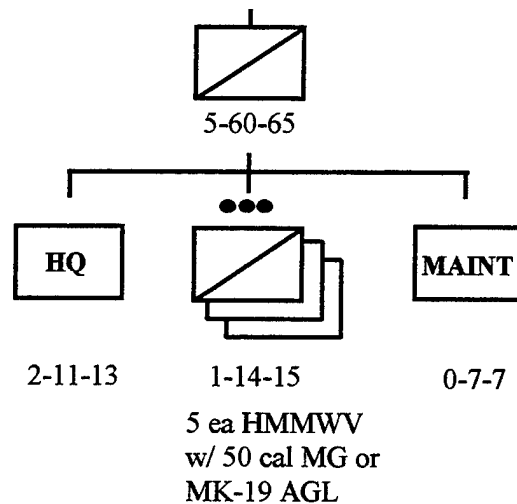


Figure 2. Major Swan's Proposed Brigade Reconnaissance Company. Source: Major Guy C. Swan, III, "Tactical Reconnaissance for the Heavy Brigade Commander: How Much is Not Enough?" (Monograph for School of Advanced Military Studies, Fort Leavenworth, Kansas: United States Army Command and General Staff College, December 1988), 42.

Another, more recent monograph germane to the topic of brigade reconnaissance was prepared in 1994 by Lieutenant Colonel Thomas C. McCarthy.³⁰ "U.S. Heavy Brigade Reconnaissance During Offensive Operations" addresses what brigades should doctrinally accomplish with respect to reconnaissance, what brigades are currently accomplishing (as of 1994), and why there is a discrepancy. Lieutenant Colonel McCarthy reviews doctrinal literature from *Army Operations* (FM 100-5) to the *Scout Platoon* (FM 17-98) to define what the brigades should accomplish. To highlight the

discrepancies between doctrinal expectations and actual performance, he uses a 1987 RAND analysis of reconnaissance at the NTC, 1988 Center for Army Lessons Learned reconnaissance studies, NTC take-home packages from October 1991 to March 1993, after action reports from operation DESERT STORM, and the Gulf War Report supervised by Lieutenant General (Retired) Thomas Tait.

Lieutenant Colonel McCarthy reports some interesting statistics correlating effective reconnaissance and successful offensive operations at the NTC. From 1987 to 1993 the percentage of operations with successful reconnaissance consistently increased, as did the strength of the correlation between effective reconnaissance and successful offensive operations. Between the period of 1991 and 1993, he cites that twenty-five percent of offensive operations at the NTC used effective reconnaissance. Furthermore, greater than ninety percent of these operations with effective reconnaissance were successful. Nevertheless, NTC performance continues to demonstrate profound weaknesses in reconnaissance operations.

Lieutenant Colonel McCarthy's monograph investigates several deficiencies in doctrine, organization, equipment, and training leading to these discrepancies. One of the deficiencies in organization is that "brigade commanders have no organic capability to see the gap between task force scouts and division cavalry." He examines several field expedient techniques that brigade commanders have used to offset this lack of dedicated reconnaissance. These techniques include directly tasking battalions, taking control of the reserve battalion scout platoon, and creating adhoc reconnaissance organizations from brigade assets. Each of these innovative techniques has drawbacks since they deprive capabilities from subordinate units; but, they can improve the brigade reconnaissance

effort. Concerning a doctrinal deficiency, he states that “task force scout platoons cannot use both aggressive and stealth reconnaissance techniques, see deep, and survive as currently organized and equipped.”

Recent Evolution of Proposed Brigade Reconnaissance Units

A review of several brigade reconnaissance organizations, which have been proposed over the past ten years, and their advantages and disadvantages provide some background for the Force XXI BRT. Figures 1 and 2 presented two organizations recommended by Major Boeglen (1992) and Major Swan (1988).

In 1988 the U.S. Army Armor School proposed a brigade reconnaissance platoon of thirty-eight men equipped with four M3 CFVs, six HMMWVs, and four motorcycles (figure 3). The Armor School originally proposed a company but tailored this down to a platoon due to fiscal and manning constraints and a simultaneous effort to save divisional cavalry squadron assets.³¹

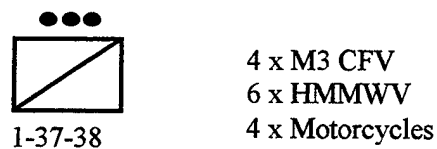


Figure 3. Brigade Reconnaissance Platoon (U.S. Armor School - Cavalry / Reconnaissance Net Assessment -- Master Plan, 1988). Source: Major Guy C. Swan, III, 32.

Several informative drafts of emerging doctrine associated with the digitized force and Force XXI provide some background to the Brigade Reconnaissance Troop design. Fort Knox Supplemental Material (FKSM) 71-3-1(A), *The Digitized Heavy Brigade*, addresses how the heavy brigade should conduct operations within the framework of the Force XXI battlefield and organizational structure.

In June 1996, the Armor School circulated a coordinating draft of proposed doctrine for the Brigade Reconnaissance Troop. This manual is FKSM 17-97-10(A), *Tactics, Techniques, and Procedures for the Applique' Brigade Reconnaissance Troop*. This draft presents the doctrinal guidelines for the digitized Brigade Reconnaissance Troop and is as comprehensive as FM 17-97, *Cavalry Troop*. The manual addresses the mission, organization, capabilities, doctrinal employment, as well as tactics, techniques, and procedures of the BRT. The 4th Infantry Division (Experimental Force) is currently updating this future manual.

The draft defines the primary mission of the Brigade Reconnaissance Troop is to provide battlefield information directly to the brigade commander.³² The BRT can also conduct limited security missions; when properly augmented, it can conduct defend and delay missions as a brigade economy-of-force effort. (See table 2, Reconnaissance Troop Mission Profiles.) The manual emphasizes the stealthy reconnaissance technique over the aggressive reconnaissance technique; "the troop accomplishes its missions by communicating, moving, and shooting in that order."³³ Furthermore, the manual emphasizes that the troop does not have to kill the enemy to be effective.

Table 2. Reconnaissance Troop Mission Profile

<u>Reconnaissance Missions</u>	
Route Recon	✓
Zone Recon	✓
Area Recon	✓
<u>Security Missions</u>	
Screen	✓
Area Security	✓
Convoy Security	•
<u>Economy-of-Force Role</u>	
Offensive Missions	
Hasty Attack	• or ✕
Movement to Contact	• or ✕
Defensive Missions	
Defend in Battle Position	✕
Defend in Sector	✕
Retrograde Missions	
Delay	• or ✕
✓ = fully capable	
✕ = capable when reinforced	
• = capable under permissive METT-T (Mission, Enemy, Terrain, Troops, and Time)	

Source: Fort Knox Supplemental Material 17-97-10(A), *Brigade Reconnaissance Troop - Coordinating Draft #2* (Fort Knox, KY: Headquarters, U.S. Army Armor School, 1 June 1996), 1-8.

The BRT organization of FKSM 17-97-10(A) is depicted in figure 4. The troop has four officers (commander, executive officer, and two platoon leaders). The troop organizes into a headquarters section, two scout platoons, and a maintenance section. A Striker team, an engineer reconnaissance squad, and a medic normally augment each platoon. The brigade's direct support chemical reconnaissance assets will often augment the troop. The headquarters is equipped with fuel, water, and cooking assets. The

maintenance section is equipped with a wrecker.³⁴ The scout platoon has nine HMMWVs, five with .50-caliber machineguns and four with the MK-19 (automatic grenade launcher). One of the platoon's HMMWVs is enhanced as a long-range advanced scout surveillance system (LRAS3) or a hunter sensor suite surrogate (HS3).³⁵ According to this manual, the BRT scout platoon will use the doctrine of the armor or mechanized infantry battalion scout platoon, addressed in FM 17-98, *Scout Platoon*.

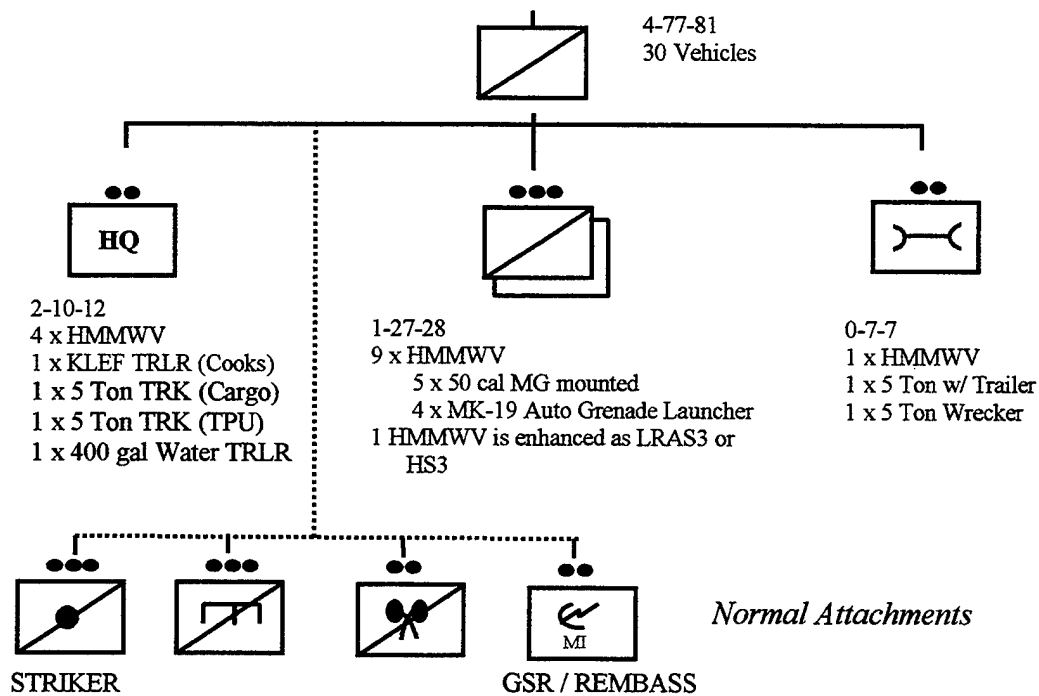


Figure 4. FKSM 17-97-10(A) Brigade Reconnaissance Troop. Source: Compiled from information in FKSM 17-97-10(A), Chapter 1 and 2.

FKSM 17-97-10(A) tailors the capabilities of the BRT to stealthy reconnaissance. The BRT is equipped to perform its missions under all visibility conditions in any terrain

that supports wheeled vehicle movement. The HMMWVs of the BRT (used for both command and control and for scout teams) can be inserted by sling load operations from UH-60 Blackhawk helicopters. The BRT is equipped with applique (computer and digital) systems that can receive combat data from brigade, process the data, and then distribute it to platoons in near real time. This data includes reports, orders, and graphical overlays. The troop is equipped with single channel ground airborne radio system (SINCGARS) and the enhanced position location reporting system (EPLRS) communication systems. The troop vehicles are also equipped with enhanced navigational system, the Position Locator Global Positioning System Receiver (PLGR). Finally the troop has long range visibility and target designation capabilities.

The limitations of the FKSM 17-97-10(A) BRT include the fact that it is restricted to terrain supporting wheeled vehicles; the SINCGARS communication system (a frequency modulated line of sight system) operating in a digital mode also limits its range of operations. The troop has limited dismounted capabilities based on the number of personnel in a scout team, although it can establish dismounted observation posts. The troop is limited in terms of survivability due to the vulnerability of the HMMWV to threat direct and indirect fires. The troop is further limited to stealth missions by its lack of direct fire anti-armor weapons. Even with a man portable anti-armor system (such as the JAVILIN), the teams cannot engage quickly or without dismounting. Finally, the troop is dependent on the brigade for combat support and combat service support assets.

According to FKSM 17-97-10(A), the BRT's reconnaissance and security plan is the basis for the brigade's overall reconnaissance, intelligence, surveillance, and target acquisition plan (RISTA) synchronization plan. As the brigade's principal ground

reconnaissance asset, all ground-based RISTA assets within the brigade reconnaissance area of operation should work for the BRT commander.³⁶ The term ground-based RISTA assets could include field artillery (Striker), engineer, and chemical reconnaissance assets, as well as GSR and REMBASS. This excludes the BRT control of UAV assets.

FKSM 17-97-10(A) presents six fundamentals of reconnaissance which are consistent with the other cavalry manuals: (1) maximize reconnaissance force forward, (2) orient of the location or movement of the reconnaissance objective, (3) report all information rapidly and accurately, (4) retain freedom of maneuver, (5) gain and maintain enemy contact, and (6) develop the situation rapidly.³⁷ The first five fundamentals also appear in FM 71-100 *Division Operations*; the sixth fundamental is distinctly cavalry. The manual develops the concepts of stealthy and aggressive reconnaissance. Stealthy reconnaissance avoids detection and engagement by the enemy and is characteristically slow; aggressive reconnaissance seeks to develop the situation once contact is made with an enemy force and uses firepower (direct or indirect) and maneuver.³⁸ Based on its configuration with limited firepower and mobility, the BRT will primarily conduct stealthy reconnaissance.

The Striker concept is very relevant to the BRT. *Tactics, Techniques, and Procedures for the STRIKE / RECON Platoon (STRIKER)* is a how-to manual on Strike/Recon (Striker) operations published by the U.S. Army Artillery School, Fort Sill Oklahoma.³⁹ This manual addresses planning and coordination by the brigade staff to execute Striker operations, and on the tactics, techniques, and procedures (TTP) used by Striker platoons to accomplish missions. The brigade commander and brigade staff determine the role of the Striker platoon; this role should primarily focus on fire support

execution and secondarily on reconnaissance. The brigade fire support coordinator and intelligence officer share responsibilities for recommending the mission of the Striker. The Striker can be an integral part of both the brigade fire support plan as a target acquisition and designation asset and also the reconnaissance and surveillance plan focused on named areas of interest and targeted areas of interest. The brigade operations officer is responsible for synchronizing the effort into the brigade RISTA plan.

The Striker platoon is organic to the fire support element that is attached to the heavy maneuver brigade. The platoon is organized into six four-man Strikers, which compose three squads. The Striker consists of a team leader (who may also be a squad leader), a driver and two forward observers. The Striker is mounted in a HMMWV and equipped with a ground/vehicular laser locator designator. The platoon has the flexibility to operate as squads or as separate teams. Teams can be integrated into other brigade units as a direct support asset. The limiting factor on the Striker operating distance is the communication equipment; like the BRT, Strikers use the SINCGARS radio.

The mission of the Striker platoon is to provide the brigade commander with observation teams that are capable of executing fires throughout the depth of the brigade area of operations. The Striker can provide observation and attack critical targets in the brigade deep fight using any laser-guided munitions. The team can laze for smart munitions delivered by artillery (COPPERHEAD rounds), Air Force, Navy, Marine Corps, and Army aircraft. The team can operate mounted or dismounted. Accordingly, the team can be inserted by helicopter and the HMMWV can be inserted by sling-load operations with a UH-60 Blackhawk.

In assigning missions for Strikers, the commander should consider the vulnerability of the team once they actively engage targets. Precision and conventional munition strikes in the enemy's rear will alert the enemy that they are under observation. This suspicion will trigger aggressive counter-reconnaissance efforts. Hence, the commander must weigh the advantage of the team in collecting information against the advantage of destroying high priority targets. During the Task Force XXI AWE, the Striker platoon was in direct support of the BRT; however, the Striker manual makes no mention of the BRT.

Force XXI Process and the Evolution of the BRT

A multitude of histories, pamphlets, directives, study plans, and reports of the Advance Warfighting Experiments and Force XXI are well documented and available through the Center for Army Lessons Learned and other TRADOC databases. These documents generally focus on the macro picture of the Army's modernization efforts. Most directives and reports focus on the major digitization initiatives of the AWE exercises. Two particular documents which address the Force XXI brigade organization and development are the Division Design Analysis Phase I and Phase II reports.

Three particularly comprehensive historical reports concerning the Army's process for change and modernization are "Prelude to Army XXI - U.S. Army Division Design Initiatives and Experiments 1917-1995" by Glen R. Hawkins and James Jay Carafano,⁴⁰ "Influences on U.S. Army Divisional Organization in the Twentieth Century" by John B. Wilson, and "Army Experimental Formations and Their Possible Influence on the Establishment of the Force XXI Experimental Force" by Lewis

Bernstein.⁴¹ The first two documents outline the history of the U.S. Army Division structure from World War I to the present Army of Excellence structure. Both articles provide a background for the methodology that the Army has used in the AWE process. The third article discusses the Army's experimental forces used in the twentieth century and how this experience impacted the development of the current Experimental Force (EXFOR) Division (4th Infantry Division).

Two pamphlets which provide the executive level guidance for the Force XXI development are TRADOC Pamphlet 525-5, *Force XXI Operations*, published 1 August 1994, and TRADOC Pamphlet 525-71, *Force XXI Division Operations Concept*, published 13 May 1996.⁴² *Force XXI Operations* addresses the foundations for the conduct of future operations in war and operations other than war by the Army in the early twenty-first century. *Force XXI Division Operations Concept* provides the required capabilities of the Force XXI division and the basis for developing doctrine, training, leader development, organizations, and material changes focused on the soldier (DTLOMS) requirements.

Study plans and exercise directives were published for both the Task Force XXI AWE conducted at the NTC in March 1997 and the Division XXI AWE (DAWE) conducted at Fort Hood Texas.⁴³ Both exercises involved the experimental force which was the 4th Infantry Division. The Task Force XXI AWE involved the 1st Brigade Combat Team of the 4th Infantry Division in a force-on-force exercise with the NTC World Class Opposing Force. The DAWE involved a battle command training exercise, a division and corps level simulation conducted by the Battle Command Training Program from Fort Leavenworth, Kansas. The study plans and exercise directive address

the experimental objectives, scope, responsibilities, methodology, required coordinations, and taskings.

The Force XXI process has responded to changing national threats, force downsizing, and the advancements in information technology. TRADOC is responsible to redesign the Army for the twenty-first century. The overarching directive for this redesign is the Joint Venture Campaign Analysis. The Division Design Analysis was a sub-component of Force XXI which was conducted by the Study and Analysis Center of the TRADOC Analysis Center. The DDA process involved iterative cycles of concept definition, requirement review, force design, equipping, training, and experimenting.⁴⁴ The analysis process was organized into two phases.

The first phase of the Division Design Analysis was summarized in a technical report, "Force XXI Division Design Analysis: Phase I Final Report," published in March 1996.⁴⁵ TRADOC conducted the DDA Phase I to examine a set of alternative division designs developed by the TRADOC Force Design Directorate. The context for the design alternatives was the TRADOC Pamphlet 525-71, *Force XXI Division Operations Concept*. The analysis provided support for the decision of the Force XXI Interim Division Design by the TRADOC commanding general, General Hertzog. The Interim Division Design recommended and approved by the commanding general was the Modernized Heavy (MOD HVY) Division. The report documents the qualitative and quantitative methods used to support this decision.⁴⁶

Phase I, which was completed in December 1995, compared and contrasted four division design alternatives by using both quantitative and qualitative methods. Initially three designs were compared: Army of Excellence (AOE) (figure 10), Heavy/Light -

Small Base (HL-SB), and Brigade Based divisions. The initial analysis generated a fourth alternative, the Modular Division (MOD DIV) which was included in the later portions of the DDA Phase I analysis. As a result of Phase I analysis, TRADOC Force Design Directorate integrated the successful characteristics of each division design into the MOD HVY Division (figure 11), which was approved as the Force XXI Interim Division Design.⁴⁷

The three alternative division designs of DDA Phase I differed in terms of what assets were organic to the brigade and the mix of brigades in the division. The current AOE Division (Heavy) (figure 10) was the first alternative and the baseline division structure used for comparisons and simulations. The AOE structure has no organic brigade ground reconnaissance assets. The HL-SB and Brigade Based divisions both incorporated a cavalry squadron of two troops into each ground maneuver brigade. Each troop was composed of two platoons mounted in Future Scout Vehicles and two platoons mounted in tanks. The squadron had no air assets.⁴⁸ The Modular Division had no brigade ground reconnaissance assets. Finally the Modernized Heavy Division (figure 11) included a ground cavalry troop with each maneuver brigade. This cavalry troop consisted of a headquarters platoon, one scout platoon mounted in six Future Scout Vehicles, and one striker platoon consisting of six teams taken from the brigade direct support artillery battalion.

Phase I incorporated analytical methods based on military judgement (qualitative) and on facts and statistics using simulations and comparison (quantitative). Force Design Directorate based the initial three alternative designs on recommendations from subject matter experts of proponent schools and the mandates of the TRADOC Pamphlet 525-71,

Force XXI Division Operations Concept. The division operations concept identified six patterns of operations that effect how the division will organize and fight. These patterns are (1) project the force, (2) protect the force, (3) gain information dominance, (4) set the battlespace conditions, (5) conduct decisive operations, and (6) sustain and transition the force.⁴⁹ Phase I analysis involved two scenario time frames. The force year 2001 (near-term) scenario emphasized organizational changes by using today's force capabilities with minimal technological enhancements. The force year 2010 (far-term) scenario incorporated futuristic technologies with the force structure changes.⁵⁰

The Phase I analysis involved seven sequential projects. (1) Front-End Differences Assessment identified major distinctions between the designs. This assessment led to realistic scenarios that amplified the differences in the designs. (2) Senior Military Review involved several retired general officers, members of Command and General Staff College, the Army War College, and Concepts Analysis Agency. This analysis was a structured qualitative exercise to determine how the divisions could be tailored (task organized) for different scenarios. The Modular Division design was an outgrowth of this effort. (3) Computer-Assisted Map Exercises evaluated and compared the designs using the results of simulations involving the Prairie Warrior 96 scenario and the criteria of the six patterns of operations. (4) Brigade Design Analysis (BDA) used higher resolution simulations to analyze specific brigade sub-issues to include the brigade reconnaissance assets. TRADOC Analysis Center at White Sands Missile Range conducted this analysis. (5) Deployability analysis assessed differences between the designs in terms of power projection and national sealift and airlift assets. Military Traffic Management Command-Transportation Engineering Agency conducted this

analysis. (6) Combat Service Support Analysis quantitatively and qualitatively assessed the logistical structure of each division design. TRADOC Analysis Center at Fort Lee conducted this analysis. (7) Validation Analysis compared the recommended MOD HVY division to the AOE division in a spectrum of warfighting scenarios with a low-resolution (corps level) constructive simulation (Vector-in-Commander).⁵¹ Of these seven projects of the Division Design Analysis Phase I, the BDA process specifically assessed the BRT issue and provides data for this research.

The second phase of the DDA was a continuation of evolutionary process to determine the optimal division structure for the army in the twenty-first century. The specific methodology and objectives of this phase are presented in the *Study Plan for the Division Design Analysis Phase II*.⁵² DDA Phase II was based on the observations and findings of DDA Phase I. DDA Phase II further studied a comparison between the MOD HVY division with the AOE heavy division. The MOD HVY division had a ground reconnaissance troop in each brigade for reconnaissance and security missions.

DDA Phase II, similar to Phase I, analyzed the near-term force (force year 2001) and the objective force (force year 2010).⁵³ DDA Phase II consisted of wargaming, constructive analysis, the Task Force XXI AWE exercise, and the Division XXI AWE exercise. During the process the BRT and division design options continued to evolve.

Prior to the DAWE exercise in November 1997, the DDA considered three divisional designs for the Force XXI division. The Phase I result, HVY MOD division, was one of the designs; the other two designs were new and distinct from the alternatives considered in DDA Phase I. The Conservative Heavy Division (figure 12) was an outgrowth of the MOD HVY division that reduced the total manning requirement from

15,820 to 15,071. The most noticeable difference between these two division structures was the organization of the maneuver battalions. In the MOD HVY division, the maneuver battalions were either armor or mechanized infantry pure, and each battalion consisted of four line companies. Under the CHD, the maneuver battalions were organized into mechanized or armor-heavy combat arms battalions with three companies each. The third division design was the Strike Division (figure 13), which consisted of two balanced maneuver brigades and a large aviation brigade with a light infantry battalion.

The brigade reconnaissance troop appeared in each division design alternative. The brigade reconnaissance troop (BRT) of the MOD HVY division further evolved during the conduct of Phase II analysis. The near-term BRT organization grew to seventy-three personnel, two HMMWV-mounted scout platoons with ten HMMWVs in each platoon, and a troop headquarters. The Striker Platoon of six Striker teams continued to directly support the BRT. The HMMWV represented the near-term structure; the future scout vehicle represented the objective term. The Task Force XXI AWE used this near-term MOD HVY structure for the BRT. The MOD HVY Division BRT is depicted in figure 5; this organization closely parallels the organization in FKSM 17-97-10(A) as presented in figure 4.

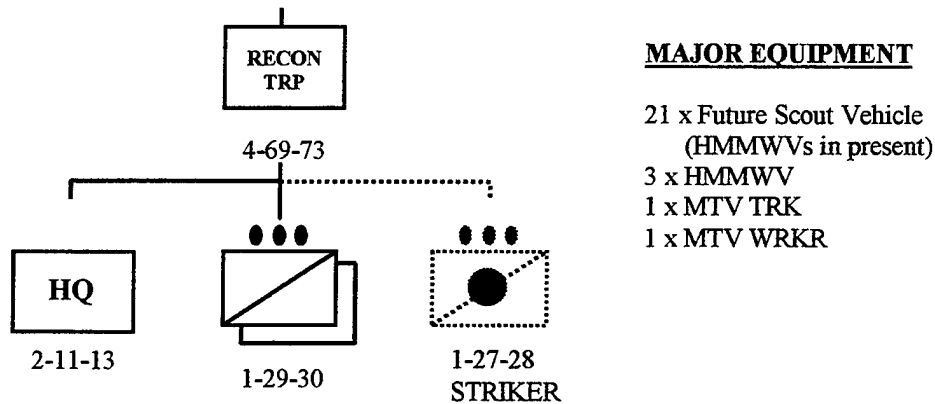
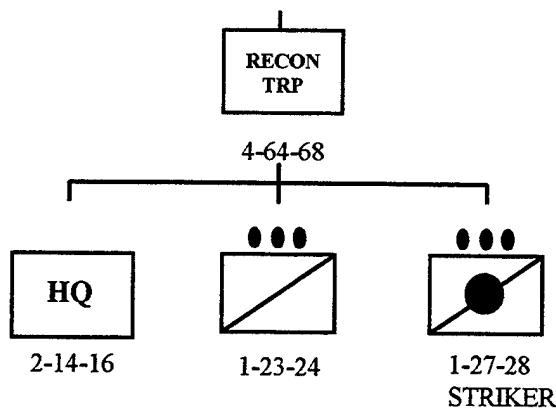


Figure 5. Brigade Reconnaissance Troop for FORCE XXI Modernized Heavy (MOD HVY) Division [Approved Interim Design - Objective]. Source: Training and Doctrine Command, Force Design Directorate, "Post DIV AWE Design Issue Packet -- Coordinating Draft" (Fort Leavenworth, KS: Force Design Directorate, 5 November 1997), Slide 4.

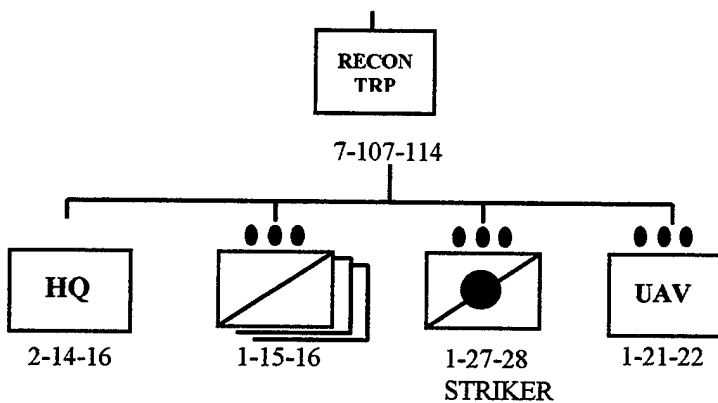
The CHD brigade reconnaissance troop had only one scout platoon and an organic Striker platoon. The scout platoon was equipped with ten HMMWVs in the near-term and four future scout and cavalry systems in the objective term. The CHD organization grew out of the Task Force XXI AWE results and the requirement for a lower personnel ceiling. The CHD BRT is depicted in figure 6. The brigade reconnaissance troop of the Strike Division consisted of three scout platoons of four vehicles each, an unmanned aerial vehicle platoon, and the Striker platoon. This organization is depicted in figure 7.



MAJOR EQUIPMENT

- 7 x Future Scout Vehicle
- 1 x HMMWV w/ Shelter
- 9 x HMMWV CGO
- 1 x H2O TRL
- 5 x JAVELIN
- 1 x ¾ Ton TRL
- 1 x LMTV TRK

Figure 6. Brigade Reconnaissance Troop for FORCE XXI Conservative Heavy Division (CHD). Source: "Post DIV AWE Design Issue Packet - Coordinating Draft," Slide #3.



MAJOR EQUIPMENT

- | | |
|---------------------------|----------------------|
| 13 x Future Scout Vehicle | 1 x LMTV TRK |
| 1 x HMMWV w/ Shelter | 2 x UAV w/CONT TUA |
| 11 x HMMWV CGO | 1 x TRK, UAV TRANSPT |
| 1 x H2O TRL | 1 x TRK UAV TANSPT |
| 1 x Air Veh Launcher UAV | |
| 10 x JAVELIN | |
| 3 x ¾ Ton TRL | |

Figure 7. Brigade Reconnaissance Troop for FORCE XXI Strike Division (FY 2010 Objective). Source: Training and Doctrine Command, Force Design Directorate, "Force XXI Heavy Division Strike Division Design (FY2010 Objective as of 07 July 1997)" (Fort Leavenworth, KS: Force Design Directorate, 5 November 1997), Slide 26.

Force XXI Design for the Brigade Reconnaissance Troop

The Counsel of Colonels (6-9 January 1998) and General Officer Steering Committee (13-15 January 1998) recommended a modified Conservative Heavy Division design to the Chief of Staff's Force XXI Board of Directors in February 1998. This Force XXI heavy division structure included a Brigade Reconnaissance Troop for the near-term as depicted in figure 8. The proposed BRT has two scout platoons of six scout vehicles each. The current scout vehicle is the armored HMMWV. This will be replaced with the LRAS3 scout vehicle as these are fielded. The 4th Infantry Division, EXFOR should have all HMMWVs replaced with the LRAS3 by 1999.⁵⁴ Habitually associated with the BRT will be the Striker Platoon of six Striker systems. The vehicles will be equipped with SINCGARS radios and the EPLRS system for communication.⁵⁵

As the Future Scout Cavalry System (FSCS) is developed and demonstrates that it has redundant "Striker" capability, a third FSCS-equipped scout platoon will possibly replace the direct support Striker platoon. This transition is projected in the force year 2010 timeframe and greatly depends on the development and fielding of the FSCS. The "modernized" version of the BRT is depicted in figure 9. In this structure, the LRAS3 (HMMWV) and the Striker vehicles are converted into FSCS.⁵⁶

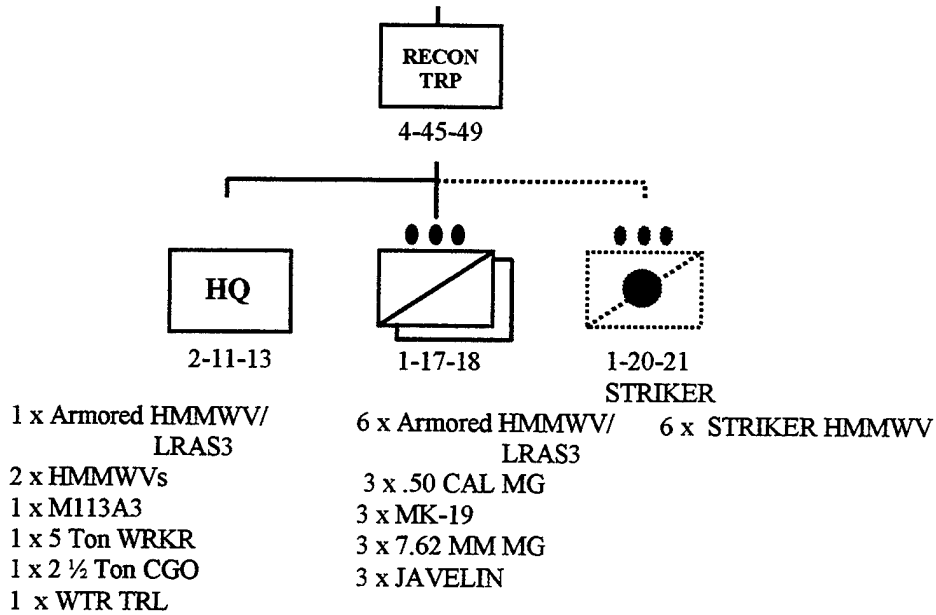


Figure 8. Near-Term Brigade Reconnaissance Troop (2000 to 2010). Source: Major George Reynolds (26 February 1998) and CPT Patrick Kirk (28 January 1998), Force Design Directorate, Training and Doctrine Command, telephonic interview by author, Fort Leavenworth, KS.

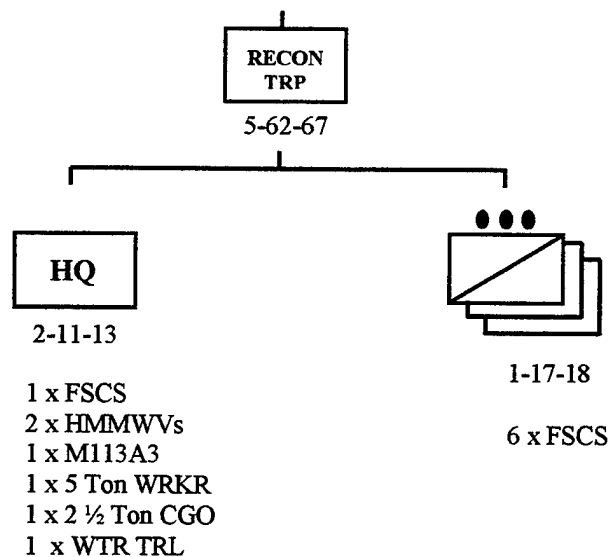


Figure 9. Far-Term Brigade Reconnaissance Troop (2010). Source: Reynolds (26 February 1998).

The doctrinal role of the BRT is consistent with the description in FKSM 17-97-10(A), *Brigade Reconnaissance Troop*. Doctrinally the BRT in both the near term and the far term can perform stealthy reconnaissance and surveillance, target acquisition, battle damage assessment, and static screening missions (primarily involving stationary observation posts). The BRT capability for aggressive reconnaissance, mobile screening missions, and guarding missions is limited and dependent on permissive METT-T conditions. The BRT is capable of performing many other tasks in support of brigade operations, but these tasks are not the primary reason for its inclusion within the brigade structure. Some of these tasks include determining battle damage assessment; assisting in command and control of RISTA assets within the brigade area of operations; facilitating movement of the brigade in convoy operations; supporting passage of line operations and coordination with other units; conducting nuclear, biological, and chemical detection; and in supporting the emplacement of remote sensors.⁵⁷

The BRT doctrinal role highlights the reconnaissance capabilities and de-emphasizes the ability of the troop to provide security for the heavy brigade. The *Task Force XXI Advance Warfighting Experiment (AWE) Live Experiment Assessment Report*, (10 September 1997) which was a final analytical report for the Task Force XXI AWE confirms this doctrinal role of reconnaissance. "The BRT is the divisional brigade's primary reconnaissance asset and will operate forward, to the flanks, or to the rear of the brigade to execute reconnaissance and enhance command and control. The BRT will complement other information sources available to the brigade commander, such as unmanned aerial vehicles, and direct feed from division and echelons above division

reconnaissance. The BRT provides a continuous, all environment collection asset that is directly responsive to the tactical needs of the Brigade Commander.”⁵⁸

Summary

This chapter provided the background for the investigation of the Brigade Reconnaissance Troop within the Force XXI heavy division structure. Current U.S. Army doctrine mandates that the brigade perform reconnaissance and security to support all operations and missions. A review of other research efforts clearly indicated that the brigade should have an organic reconnaissance element that can directly support the brigade commander’s RISTA plan. Over the past three years, the Force XXI process has addressed this requirement during the development of the Force XXI heavy division structure.

The Force XXI process has involved numerous versions of the BRT in terms of organization and structure in various simulations, experiments, and exercises. This chapter reviewed the evolution of the BRT within the Force XXI process. The Brigade Design Analysis of the Division Design Analysis conducted by Training and Doctrine Command Analysis Center specifically analyzed several permutations of the BRT using high-resolution simulations. Prairie Warrior 95 AWE analyzed a division organization that included a brigade cavalry troop. The Task Force XXI AWE exercised a brigade reconnaissance troop structure in a force-on-force rotation at the National Training Center. Finally, The Division AWE exercised the concept of the reconnaissance troop during a Battle Command and Training Program (BCTP) exercise.

Finally, this chapter presented the proposed brigade reconnaissance troop for the Force XXI heavy division. A void exists in literature to date in the area of a comprehensive analysis determining if the aggregate data from the Force XXI process (AWE and other evaluations) validates the product. The question remains. Does the data available from the Force XXI process validate the organization and structure of the BRT?

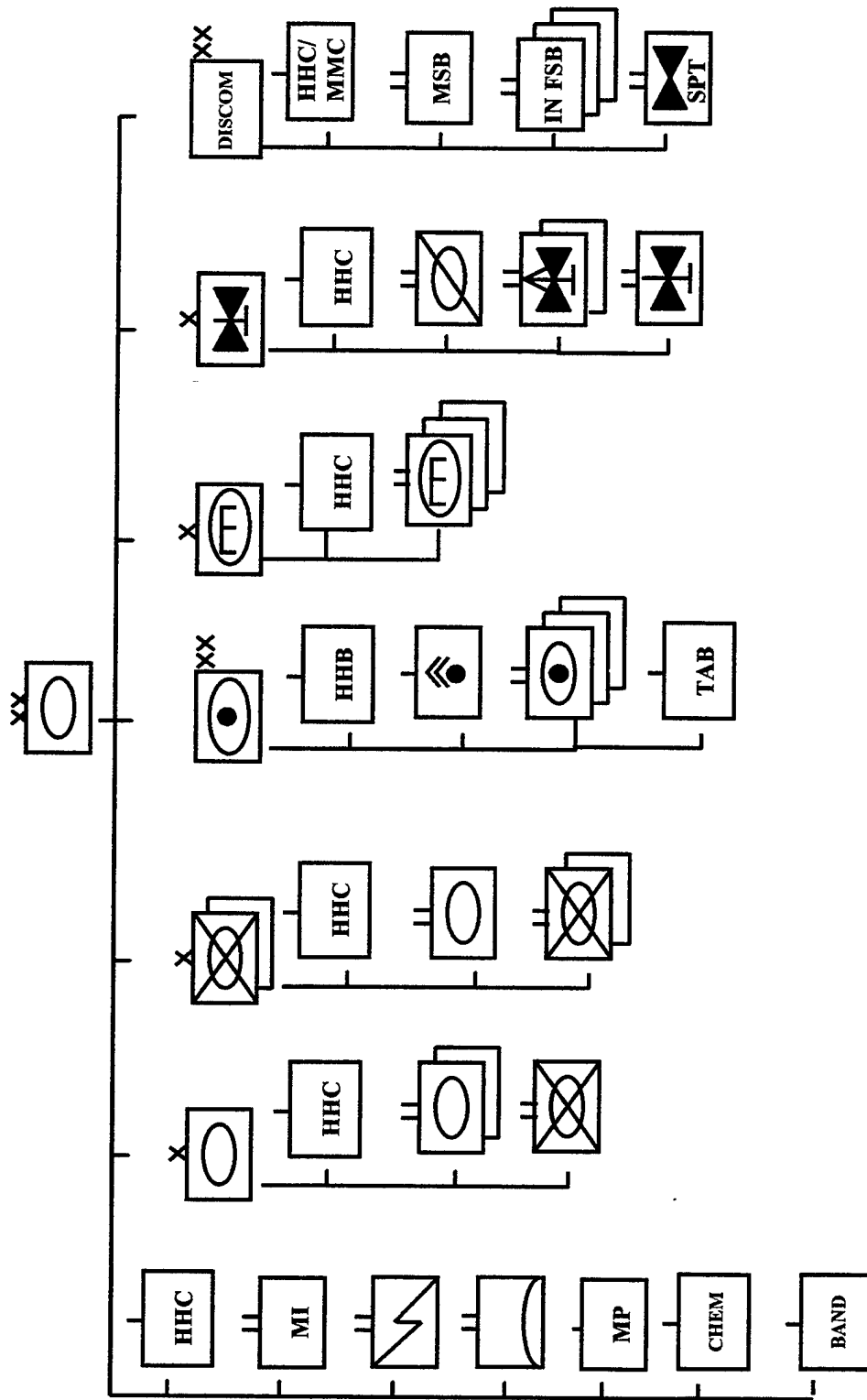


Figure 10. Army of Excellence (AOE) Armor Division Source: U.S. Army Training and Doctrine Command Analysis Center, Technical Report TRAC-TR-0396, "Force XXI Division Design Analysis: Phase I Final Report" (Fort Leavenworth, KS: Study and Analysis Center, March 1996) G-42.

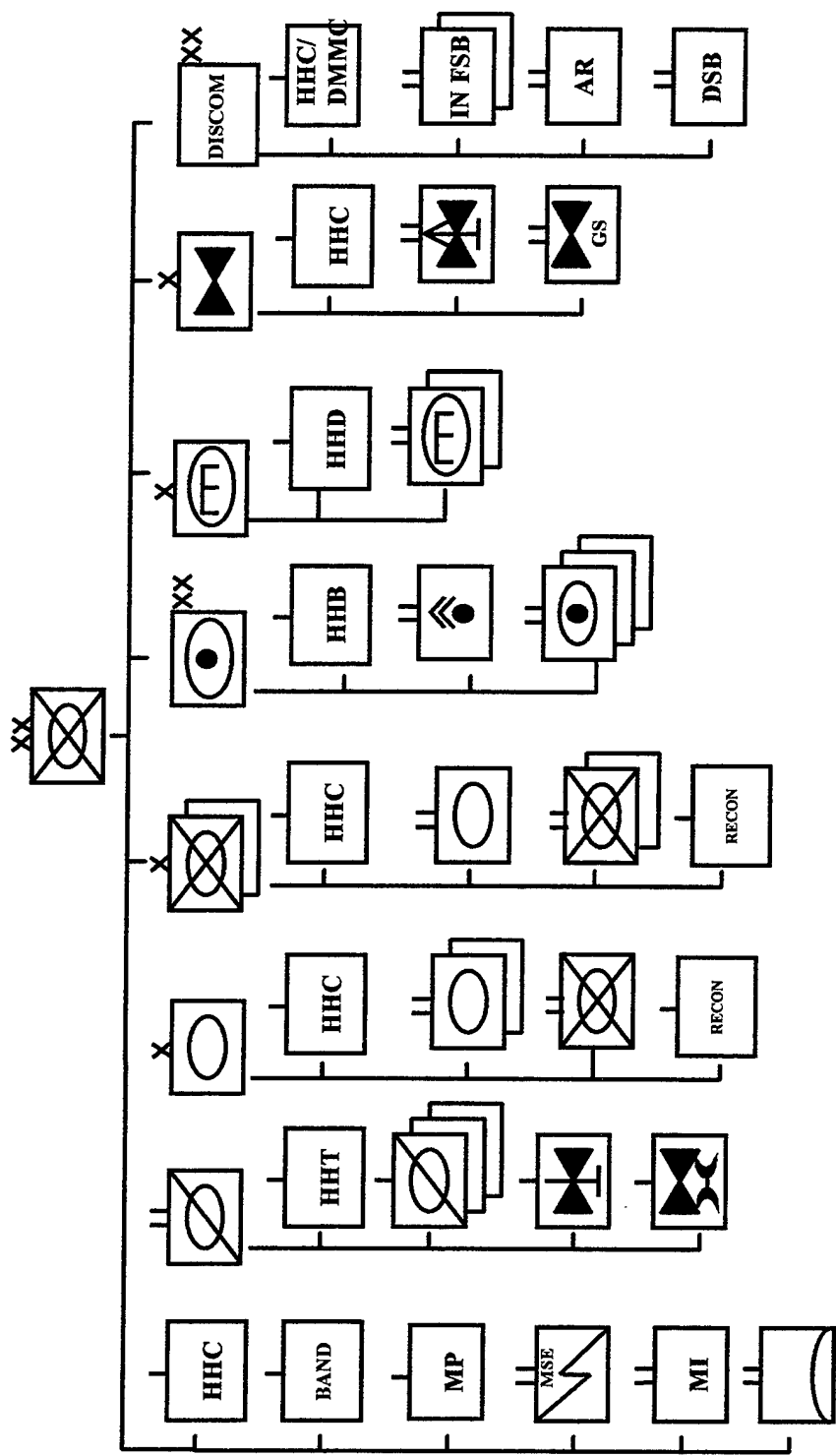


Figure 11. Force XXI Moderate Heavy Division (MOD HVY) (Approved Interim FXXI Design - Objective) Source: "Force XXI, Division Design Analysis: Phase I Final Report," 57.

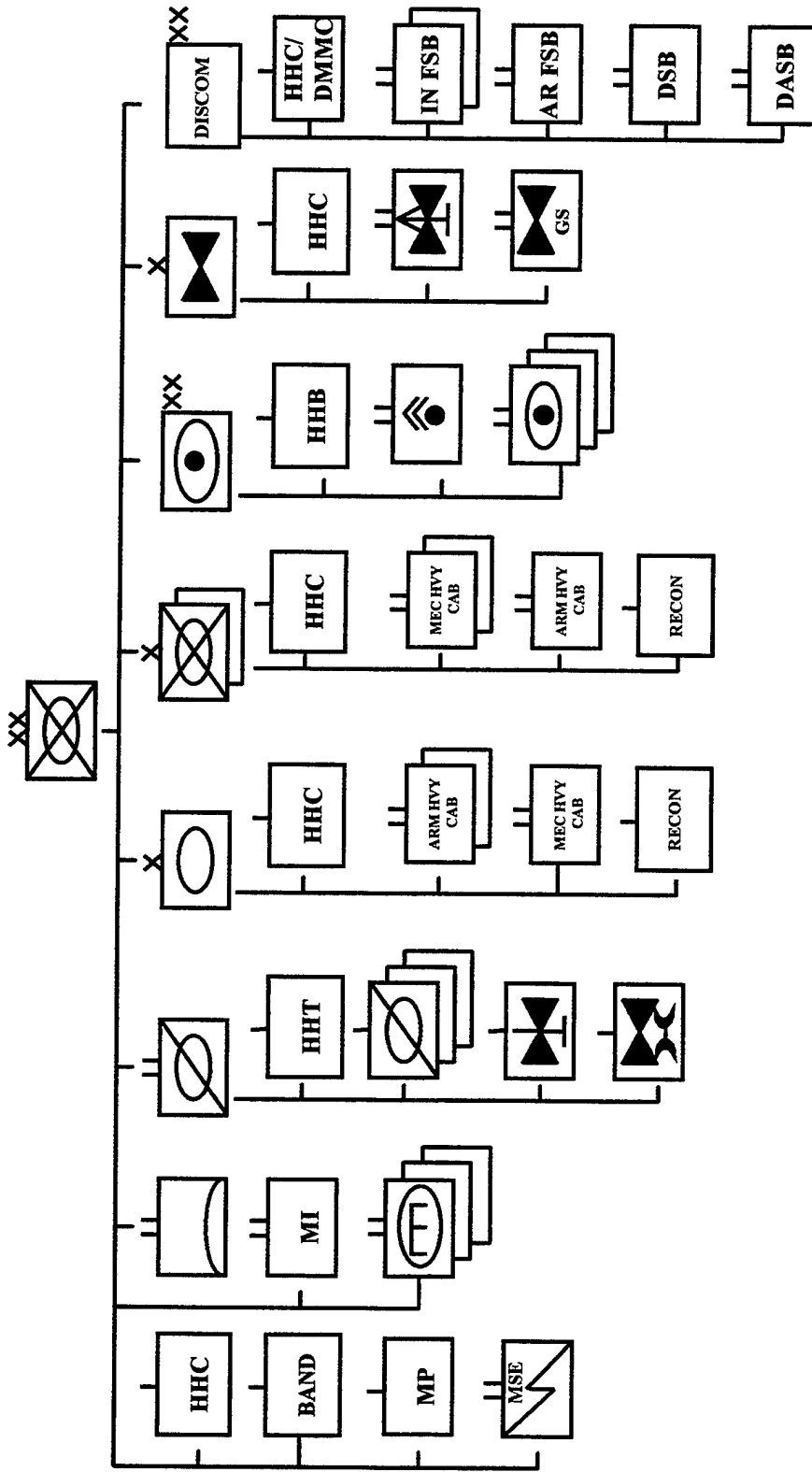


Figure 12. Force XXI Conservative Heavy Division (CHD) Source: Training and Doctrine Command Force Design Directorate, "Force XXI Heavy Division Conservative Heavy Design (FY2010 Objective as of 07 July 1997)" (Fort Leavenworth, KS: Force Design Directorate, 5 November 1997), Slide 1.

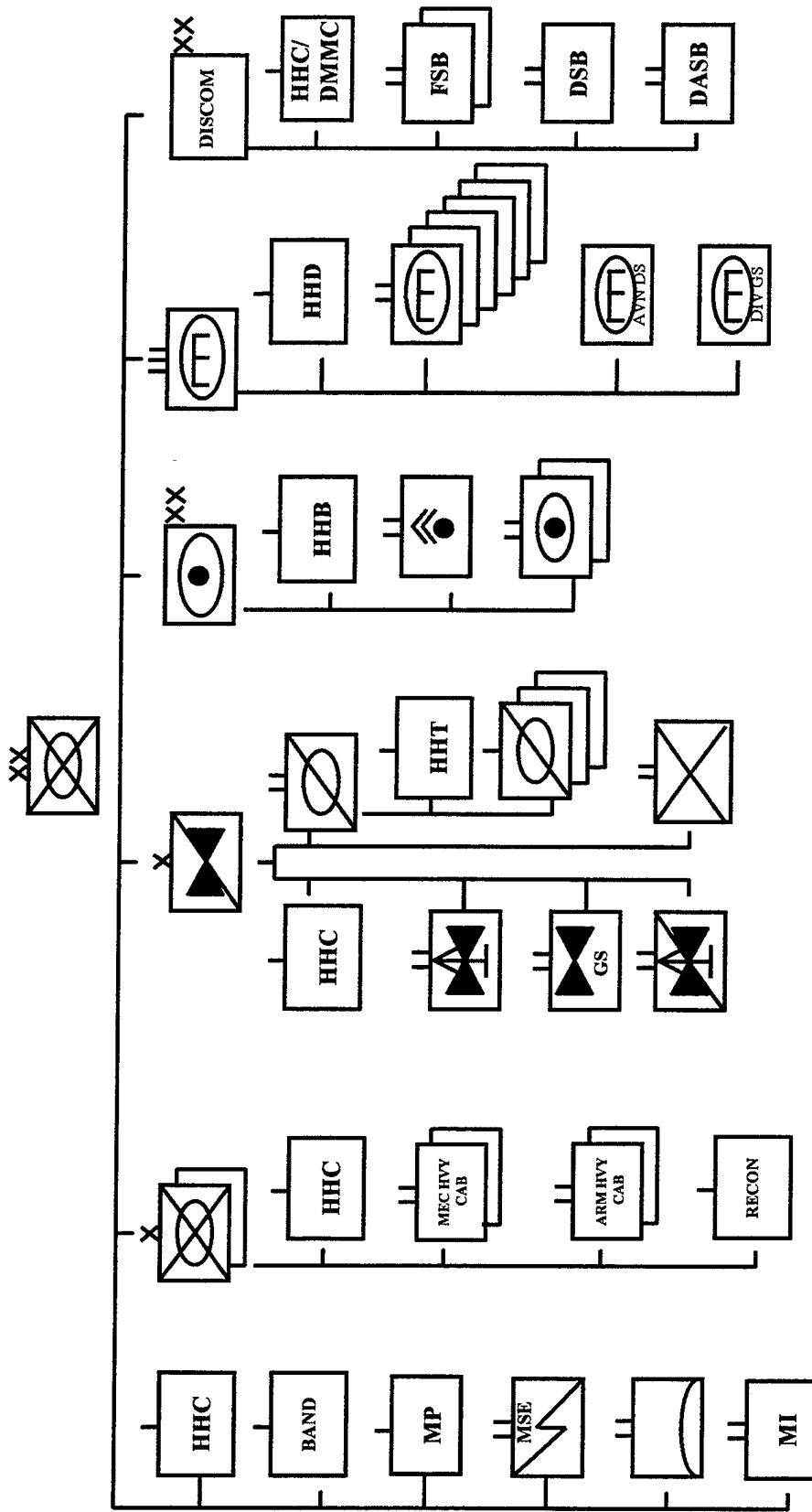


Figure 13. Force XXI STRIKE Heavy Division Source: Training and Doctrine Command, Force Design Directorate, "Force XXI Heavy Division Strike Division Design (FY2010 Objective as of 07 July 1997)" (Fort Leavenworth, KS: Force Design Directorate, 5 November 1997), Slide 1.

-
- ¹George S. Patton, Jr. *War As I Knew It* (Cambridge, MA: Riverside Press, 1947).
- ²U.S. Army, FM 100-5, *Operations* (Washington, DC: Department of the Army, June 1993), 6-15.
- ³FM 100-5, *Operations*, 6-19.
- ⁴FM 100-5, *Operations*, 7-1.
- ⁵U.S. Army, FM 101-5-1, *Operational Terms and Graphics* (Washington, DC: Department of the Army, 30 September 1997), 1-130.
- ⁶U.S. Army, FM 71-100, *Division Operations* (Washington, DC: Department of the Army, 28 August 1996), A-1.
- ⁷FM 71-100, *Division Operations* , A-2.
- ⁸FM 71-100, *Division Operations* , A-2.
- ⁹FM 101-5-1, *Operational Terms and Graphics*, 1-138.
- ¹⁰FM 71-100, *Division Operations*, A-5.
- ¹¹FM 71-100, *Division Operations*, A-5.
- ¹²FM 71-100, *Division Operations*, A-5.
- ¹³FM 71-100, *Division Operations* , A-1.
- ¹⁴U.S. Army, FM 17-95, *Cavalry Operations* (Washington, DC: Department of the Army, 3 October 1995), 1-20.
- ¹⁵FM 100-5, *Operations*, Appendix A.
- ¹⁶U.S. Army, FM 34-10-2, *Intelligence and Electronic Warfare (IEW)* (Washington, DC: Department of the Army, 13 July 1993), Chapter 1.
- ¹⁷FM 71-3, *The Armored and Mechanized Infantry Brigade* (Washington, DC: Department of the Army, 8 January 1996), 2-1.
- ¹⁸FM 71-3, *The Armored and Mechanized Infantry Brigade*, 1-2.
- ¹⁹FM 71-3, *The Armored and Mechanized Infantry Brigade*, 1-10.

²⁰ FM 71-3, *The Armored and Mechanized Infantry Brigade*, Offensive Operations: 4-4, 4-16, 4-18, 4-24, and 4-44; Defensive Operations: 5-2.

²¹ FM 71-3, *The Armored and Mechanized Infantry Brigade*, 4-16.

²² U.S. Army, FM 17-98, *Scout Platoon* (Washington, DC: Department of the Army, September 1994), Chapter 1.

²³ Major Kenneth L. Boeglen, "Does the Heavy Maneuver Brigade Commander Need an Organic Reconnaissance/Security Organization?" (Thesis for Master of Military Art and Science, Fort Leavenworth, KS: Command and General Staff College, 1992).

²⁴ Boeglen, 165- 176.

²⁵ Boeglen, 187.

²⁶ Boeglen, 189.

²⁷ Major William J. McKean, "Does the Force XXI Heavy Brigade Need an Organic Reconnaissance and Security Element?" (Thesis for Master of Military Art and Science, Fort Leavenworth, KS: Command and General Staff College, 1995).

²⁸ Major Guy C. Swan, III, "Tactical Reconnaissance for the Heavy Brigade Commander: How Much is Not Enough?" (Monograph, Fort Leavenworth, KS: School of Advanced Military Studies, Command and General Staff College, December 1988).

²⁹ Swan, 37-38.

³⁰ Lieutenant Colonel Thomas C. McCarthy, "U.S. Heavy Brigade Reconnaissance During Offensive Operations" (Monograph, Fort Leavenworth, KS: School of Advanced Military Studies, Command and General Staff College, December 1994).

³¹ U.S. Army Armor School, "Cavalry Reconnaissance Net Assessment - Master Plan" (Fort Knox, KY: 1 August 1988), 15; referenced in Swan, 32.

³² U.S. Army Armor School, Fort Knox Supplemental Material (FKSM) 17-97-10(A), *Tactics, Techniques and Procedures for the Applique' Brigade Reconnaissance Troop Coordinating Draft #2* (Fort Knox, KY: 1 June 1996), 1-7.

³³ FKSM 17-97-10(A), 1-1.

³⁴ FKSM 17-97-10(A), 1-2 to 1-6.

³⁶ FKSM 17-97-10(A), 2-20.

³⁷ FKSM 17-97-10(A), 3-2; FM 17-97, 3-2.

³⁸ FKSM 17-97-10(A), 3-17.

³⁹ U.S. Army Field Artillery School, *Tactics, Techniques, and Procedures for the STRIKE / RECON Platoon (STRIKER)* (Online: <http://sil-www.army.mil>, accessed on 10 December 1997.)

⁴⁰ Glen R. Hawkins and James Jay Carafano. *Prelude to Army XXI - U.S. Army Division Design Initiatives and Experiments 1917-1995* (Washington, DC: United States Army Center for Military History, 1997).

⁴¹ John B. Wilson, "Influences on U.S. Army Divisional Organization in the Twentieth Century" (Fort Leavenworth, KS: Center for Army Lessons Learned, 1995); Lewis Bernstein, "Army Experimental Formations and Their Possible Influence on the Establishment of The Force XXI Experimental Force" (Fort Leavenworth, KS: Combined Arms Center, History Branch, 23 October 1996).

⁴² U.S. Army, TRADOC Pamphlet 525-5, *Force XXI Operations* (Fort Monroe, VA: United States Army Training and Doctrine Command, 1 August 1994); U.S. Army, TRADOC Pamphlet 525-71, *Force XXI Division Operations Concept* (Fort Monroe, VA: United States Army Training and Doctrine Command, 13 May 1996).

⁴³ U.S. Army Experimental Force (EXFOR) Coordination Cell (ECC), "Task Force XXI Experiment Directive" (Fort Hood, TX: 1 June 1996); U.S. Army Training and Doctrine Command (TRADOC), "Division XXI Advance Warfighting Experiment Directive" (Fort Monroe, VA: February 1997); U.S. Army TRADOC, "Study Plan for the Division XXI, Advanced Warfighting Experiment (DIV XXI AWE)" (Fort Monroe, VA: October 1996).

⁴⁴ U.S. Army Training and Doctrine Command Analysis Center, Technical Report TRAC-TR-0396, "Force XXI Division Design Analysis: Phase I Final Report" (Fort Leavenworth, KS: Study and Analysis Center, March 1996), ES-3.

⁴⁵ "Force XXI Division Design Analysis: Phase I Final Report."

⁴⁶ "Force XXI Division Design Analysis: Phase I Final Report," ES-1 to ES-2.

⁴⁷ "Force XXI Division Design Analysis: Phase I Final Report," ES-2.

⁴⁸ "Force XXI Division Design Analysis: Phase I Final Report," C-20

⁴⁹ "Force XXI Division Design Analysis: Phase I Final Report," 20.

⁵⁰ "Force XXI Division Design Analysis: Phase I Final Report," ES-2.

⁵¹ "Force XXI Division Design Analysis: Phase I Final Report," 21-24.

⁵² U.S. Army Training and Doctrine Command Analysis Center, Study Plan TRAC-SP-0196, "Study Plan for the Force XXI Division Design Analysis Phase II" (Fort Leavenworth, KS: TRADOC Analysis Center (TRAC) Study and Analysis Center (SAC), November 1996).

⁵³ "Study Plan Force XXI Division Design Analysis Phase II," 4.

⁵⁴ U.S. Army Armor Center - Directorate of Force Development, "Long Range Advanced Scout Surveillance System Prototype," Briefing Slides, (Fort Leavenworth, KS: TRADOC - Force Design Directorate, 5 November 1997), Slide 2.

⁵⁵ Major George Reynolds (26 February 1998) and Captain Patrick Kirk (28 January 1998), Training and Doctrine Command - Force Design Directorate, telephone interviews by author, Fort Leavenworth, KS.

⁵⁶ Reynolds and Kirk, telephone interviews by author, Fort Leavenworth, KS, 26 February 1998.

⁵⁷ FKSM 17-90-10(A), Chapter 1; U.S. Army, "Task Force XXI Advance Warfighting Experiment (AWE) Live Experiment Assessment Report" (Alexandria, VA: Operational Test and Evaluation Command, 10 September 1997), ES-21 to ES-24, 4-66 to 4-77, D-1 to D-28; Division Advanced Warfighting Experiment (DAWE) TEXCOM Database (Fort Leavenworth, KS: TRADOC Analysis Center, as of 13 January 1998), [Online: <http://www.trac.army.mil/dawe>] Observations: 4804, 3691, 3763, 3768, and 5579.

⁵⁸ "Task Force XXI Advance Warfighting Experiment (AWE) Live Experiment Assessment Report," 4-66.

CHAPTER 3

RESEARCH METHODOLOGY

The reason the enlightened prince and wise general conquer the enemy whenever they move and their achievements surpass those of ordinary men is foreknowledge... What is called "foreknowledge" cannot be elicited from spirits, nor from gods, nor by analogy with past events, nor from calculations. It must be obtained from men who know the enemy situation.¹

Sun Tzu, *The Art of War*

This chapter addresses the method that is used to answer the primary question:

Does the data available from the Force XXI process validate the organization and structure of the Brigade Reconnaissance Troop (BRT) as proposed in the Force XXI heavy division? In addressing the question of validation, chapter 1 identified six supporting questions that help evaluate the issue of the BRT and the Force XXI process. These questions are addressed within the methodology of this research effort. The methodology involves three fundamental steps: determining required information (input), analyzing this input (logical process), and determining conclusions from this analysis (output).

Input

The input for this analysis involves two general categories of information addressed in the primary question: the BRT and data. The first category of information involves identifying the organization, structure, and doctrinal role for the proposed Force XXI Heavy Division BRT. This category of information answers the first two supporting questions of chapter 1. What is the mission and doctrinal role for the BRT? What are the

organization, equipment, and personnel structures of the BRT as proposed in Force XXI? Both of these questions were answered in the background information presented in chapter 2.

The doctrinal role of the Force XXI BRT was found in the Fort Knox Supplemental Material 17-97-10(A), *Tactics, Techniques, and Procedures for the Applique' Brigade Reconnaissance Troop*. Although this manual is a draft and continues to be updated by the 4th Infantry Division (EXFOR), it does address the mission and role of the BRT. Furthermore, it is the most comprehensive reference available that describes the primary role and tasks of the BRT. Several of the Force XXI process study plans and final reports confirm this doctrinal role for the BRT; however, these descriptions are more general and conceptual.² Table 2, Reconnaissance Troop Mission Profiles summarizes the primary missions of the BRT. The current Force XXI BRT organization and structure is presented in figure 8 (Near-Term BRT, 2000 to 2010) and figure 9 (Far-Term BRT, 2010).

The second category of input involves the data from the Force XXI process. The data collection for this research involved answering the next two supporting questions from chapter 1. What Force XXI exercises and AWE tested the BRT? What brigade reconnaissance unit structure was used in these exercises and AWE? Chapter 2 provided the background for both of these questions in the section "Force XXI Process and the Evolution of the BRT." Based on a review of the Force XXI process, four studies and AWE provide data (observations, facts, statistics, and evidence) concerning the performance of a brigade reconnaissance unit.

(1) The Mobile Strike Force (MSF) 95 Organizational and Operational Analysis was associated with the Prairie Warrior 95 AWE. The TRADOC Analysis Center conducted this optimization study from October 1994 to January 1996 at Fort Leavenworth, Kansas. The MSF 95 study involved a repetitive low-resolution constructive computer simulation (Vector-in-Commander) to quantitatively optimize a division structure based on lethality, survivability, and tempo measures of effectiveness in a far-term (2010) scenario.³

(2) The Brigade Design Analysis (BDA) was a two-phase analysis supporting the Division Design Analysis conducted by TRADOC Analysis Center at Fort Leavenworth, KS. TRADOC Analysis Center-White Sands Missile Range in New Mexico conducted both phases. The Brigade Design Analysis involved repetitive high-resolution computer simulations of a brigade task force in order to quantitatively analyze and compare different organizations and equipment. Phase I was conducted from August through December 1995, and phase II was conducted from November 1996 through May 1997. Both phases involved both a near-term (current technologies and equipment) and a far-term (force year 2010) scenario.

(3) Task Force XXI AWE was a series of live force exercises conducted from March 1996 through March 1997. This AWE involved platoon, company, and battalion task force training for the 4th Infantry Division (Experimental Force) at Fort Hood, Texas from March through December 1996. This AWE culminated with a brigade task force rotation to the National Training Center (NTC), Fort Irwin, California from 15-29 March 1997. The final brigade-level force-on-force exercise was operation "Ivy Focus," NTC

Rotation 97-06. The AWE involved primarily qualitative analysis and modernized but on-hand equipment (near-term scenario).

(4) The Division XXI AWE (DAWE) was conducted from 5 to 13 November 1997 at Fort Hood, Texas by the 4th Infantry Division (Experimental Force); the Battle Command Training Center, Fort Leavenworth, Kansas; and the National Simulation Center from Fort Leavenworth. This exercise was a simulation-enhanced command post warfighter exercise with a digitized division and brigade tactical operations centers in the field. The primary focus of DAWE was to collect data for both quantitative and qualitative analysis. This AWE involved both a near-term (1998) scenario and a far-term (2003) scenario.

These four sources of data provide two fully computer-simulated exercises (Mobile Strike Force 95 at the corps and division level and the Brigade Design Analysis at the brigade level), one series of live training exercises culminating with the brigade task force NTC rotation (Task Force XXI AWE), and one simulation-enhanced division-level command post exercise (DAWE). These sources provide data for the analysis of both the near-term Force XXI BRT and the far-term Force XXI BRT. Although each exercise used a slight variation in organization, equipment, and personnel for the brigade reconnaissance unit, they each provide useful data for the validation process.

Chapter 4 provides a review of each of these exercises and identifies the background data for this analysis. The data includes: the type of exercise and analysis; the purpose and objectives for the exercise and analysis with respect to the brigade reconnaissance unit; the scenario, terrain, and threat for the exercise; the division and brigade missions within which the brigade reconnaissance unit operated; the specific

organization and structure of the brigade reconnaissance unit used in the exercise; the specific missions and tasks assigned to the brigade reconnaissance units; and the general performance of the reconnaissance unit during the exercise or simulated test. The last category involves observations and results based on both qualitative and quantitative analysis inherent in the exercise or test.

Process

The process of analysis for the input (proposed Force XXI BRT and data from exercises and simulations) involves the last two supporting questions of chapter 1. What demonstrated enhancements to force capabilities (battle command/situation awareness, tempo, lethality, and survivability) does the BRT provide? Has the Force XXI process demonstrated that the BRT can accomplish its mission on the current battlefield and the future battlefield? Because the available data comes from exercises with different organizations, equipment, and missions for the brigade reconnaissance unit, this analysis first determines how applicable the data from the particular exercise is to the proposed Force XXI BRT. The analysis then evaluates the performance of the "exercised" brigade reconnaissance units with respect to criteria based on force enhancements (situational awareness, tempo, lethality, survivability) and on general effectiveness accomplishing the mission. The degree of applicability of the particular test or exercise to the proposed Force XXI BRT corresponds to the significance of the exercise or simulation to this research and the reliability of the test results as evidence of the effectiveness of the proposed Force XXI BRT. If data from the Force XXI process is applicable and

demonstrates a positive contribution to the brigade's effectiveness as measured by the selected criteria, then the Force XXI process has validated the proposed BRT concept.

In order to objectively address the research question, the analytical process uses a criteria-based evaluation with each exercise (source of data) weighted. The weight is based on the applicability of the exercise or test. The criteria are associated with the effectiveness of the reconnaissance unit to accomplish its mission and the force enhancements provided by the reconnaissance unit. The analysis will independently evaluate the near-term and far-term Force XXI BRT organizations using the same process. The data is classified in the analysis as applicable to the near-term (HMMWV or LRAS3-equipped) Force XXI BRT or to the far-term (future scout vehicle equipped) Force XXI BRT.

Applicability

The analysis determines applicability by an objective comparison of the "exercised" brigade reconnaissance unit to the proposed Force XXI BRT. This comparison involves equipment, organization, and the missions assigned to or performed by the reconnaissance asset in the exercise. The weighting factor is associated with the exercise not the criteria. The weighting factor increases as the applicability of the exercise increases in terms of similarity of the brigade reconnaissance unit to the Force XXI BRT in either the near-term or far-term case. The weighting factor is the numerical sum of the following three factors: equipment (E), organization (O), and mission (M). A zero rating in any category indicates that there is no applicability to the Force XXI BRT

in that category. If the total weighting factor is zero, the data from the exercise is not applicable to the validation process.

The equipment factor (E) can range from 0 to +1.0. This factor rates the exercise for similarity with respect to the reconnaissance vehicle used by the brigade reconnaissance unit. Use of a HMMWV or a representation of a future scout vehicle (FSV) is rated as a +1.0 representing that the “exercised” reconnaissance unit used identical equipment to the Force XXI BRT. Use of an M3 Cavalry Fighting Vehicle (CFV) is rated as +0.5; use of an M1 tank is rated as 0. If the “exercised” reconnaissance unit used a combination of vehicles, then the equipment factor (E) is the average based on the numbers of each type of vehicle used.

The organization factor (O) is determined from the difference between the number of scout teams and the number of platoons in the “exercised” reconnaissance unit and the Force XXI BRT. The Force XXI BRT has eighteen scout teams organized into three platoons. In the near-term, the direct support of the Striker Platoon accounts for six teams and one platoon. An exact match with the Force XXI BRT results in a maximum organization rating of +2.0. Every additional scout team in the exercised unit reduces this rating by 0.25. A difference of one platoon in the organizational structure reduces the rating by 0.5. The organization factor is determined using the following technique.

$$(3.1) \quad O = 2 - X; \quad (\text{if } 2 - X \text{ is less than } 0, \text{ then } O = 0).$$

$$(3.2) \quad X = T + P.$$

$$(3.3) \quad T = 0.25 * (\# \text{ scout teams} - 18);$$

$$(\text{if } \# \text{ scout teams is less than } 18, \text{ then } T=0).$$

$$(3.4) \quad P = 0.5 * |3 - \# \text{ scout platoons}|.$$

“X” represents the dissimilarity of the unit organization. “T” represents the dissimilarity between number of scout teams if the exercise unit is larger than the BRT. (An induction based on a case with fewer scout teams is logical. For example, if three scout teams demonstrate an enhancement of a brigade’s lethality, it is reasonable to assume that six teams would also enhance the brigade’s lethality.) “P” represents the dissimilarity in number of platoons and hence the command and control structure between the units.

The mission factor (M) rates the missions for which the reconnaissance unit was used in the exercise. This distinguishes between stealthy and aggressive operations. The doctrinal mission and role of the Force XXI BRT emphasizes stealthy operations. “The BRT is not designed to engage enemy forces with direct fire weapons but it provides information and when possible uses combat multipliers to disrupt, canalize movement, or destroy enemy formations.”⁴ The BRT can perform aggressive reconnaissance but rarely with acceptable risk against a heavy threat (mechanized or armor forces). For this evaluation, stealthy operations include reconnaissance, screen, or target acquisition during which the unit does not seek direct contact with or active engagement of the threat with organic direct fire weapons. Aggressive operations include reconnaissance or security missions (screen, guard, or cover) with the intent or instructions to actively engage the enemy using all available fires (direct and indirect). The stealthy operation is represented with a +1.0 (most compliant with BRT doctrine); the aggressive operation is represented with a 0 (least compliant with BRT doctrine). Exercises which employ the reconnaissance unit in both stealthy and aggressive operations or for which the determination cannot be made are represented with a +0.5.

The total weighting factor for an exercise is the sum of the three factors,

$$(3.5) \quad \text{Weight} = O + E + M,$$

and represents the applicability of the test to the research question. The maximum possible weighting factor is four, which corresponds to an “exercise” brigade reconnaissance unit that is identical to the proposed Force XXI BRT in terms of equipment (+1), organization (+2), and mission (+1). The minimum weighting factor possible is 0, indicating that the exercise or test is not applicable to the Force XXI BRT and will not be used to make logical deductions about the Force XXI BRT. Each of the four comparisons (type equipment, number of scout team, number of platoons, and mission) are considered of equal value in determining the applicability of the exercise to the criteria-based evaluation.

Evaluation Criteria

The data available from each exercise is evaluated with respect to the reconnaissance unit’s demonstrated contribution to the brigade commander’s situational awareness, the brigade’s tempo of operation, lethality, and survivability; and the effectiveness of the reconnaissance unit in accomplishing the mission with acceptable losses.

The force enhancements (situation awareness, tempo, lethality, and survivability) are linked to the “Future Battle Dynamics” presented in TRADOC Pamphlet 525-5 *Force XXI Operations*, and the “Force XXI Division Patterns of Operation,” “Force XXI Division Design Principles,” and “Characteristics of Force XXI Operations” as presented in TRADOC Pamphlet 525-71 *Force XXI Division Operations Concept*.⁵ These

enhancement criteria relate to both the capabilities of the reconnaissance unit and the ability of the brigade to properly employ, integrate, and take advantage of the reconnaissance unit. The fifth criterion addresses the effectiveness of the reconnaissance unit with less emphasis on how the brigade capitalized on this effectiveness.

Situational awareness is related to the concepts of battle command and battlespace. Situational awareness is the ability of the commander to see the entire depth of the battlefield with an understanding of friendly unit locations and disposition; enemy unit locations, intent, and disposition; and the environment (terrain and weather). Situational awareness supports the commander in the art of battle decision making and in visualizing and forming concepts of operations to get from a current state to a future state (battle command).⁶ Some indicators that the reconnaissance unit contributed to the commander's situational awareness include evidence that: (1) the unit provided timely and accurate information about the enemy and friendly units or the terrain; (2) the unit answered the commander's priority information requirements (PIR); (3) the unit extended the reconnaissance, intelligence, surveillance, and target acquisition (RISTA) coverage of the brigade in space or time; (4) the brigade used information provided by the unit to modify courses of action or issue fragmentary orders; (5) the brigade and friendly units in the same area of operations knew the locations of the unit's scout teams.

Tempo is more than speed of operations; it is the control of the rate of operations based on the battlefield situation and assessment of the enemy capability to react.⁷ Controlling tempo is a fundamental design principle for the Force XXI division and is related to effective battle command and enlarging battlespace. Indicators that the reconnaissance unit contributed to the brigade's tempo of operations include evidence

that: (1) the unit disrupted the enemy tempo (forced the enemy to slow movement, impeded enemy reconnaissance efforts, impeded enemy use of indirect fire, or forced the enemy to change plans); (2) the unit increased the speed of brigade planning through reports and information; (3) the unit expedited or impeded the employment of other brigade assets (maneuver, direct fire, indirect fire, attack air, or close air support) at a decisive point; (4) the brigade focused the RISTA effort of the unit in a timely manner.

Lethality refers to the ability of the brigade to destroy the threat. Enhancing lethality refers to an increase in the effectiveness, the range, or the precision of direct and indirect fires. Indicators of the reconnaissance unit contributing to the brigade lethality include evidence that: (1) the brigade used information provided by the reconnaissance unit to concentrate effective fires in a timely manner; (2) the unit effectively controlled indirect fires and close air support to destroy the enemy; (3) the unit effected the brigade's counter-reconnaissance effort.

Survivability is the ability of the brigade forces to withstand enemy fires and prevent the enemy from effectively applying combat power. Survivability is indicated by brigade losses in personnel and equipment. Indicators that the reconnaissance unit contributed to the brigade's survivability include evidence that: (1) the unit effected the brigade's losses through force protection, security missions, reconnaissance, and general warnings; (2) the unit effected friendly fratricide; and (3) an acceptable number of scout teams survived the mission.

Effectiveness of the reconnaissance unit is indicated by the ability to accomplish the assigned mission with the organization and equipment assigned within acceptable loss parameters. Indicators that the reconnaissance unit was effective include evidence that:

(1) the unit accomplished its assigned mission within the intent of the commander; (2) the unit did not exceed acceptable loss rates as determined by the exercise, commander, or situation; (3) the observers or participants recommended to not change the exercised organization, equipment, and manning; (4) there were problems with the ability to move, communicate, shoot, or sustain within the parameters of the mission.

Evaluation

With respect to the first four criteria, if the reconnaissance unit made a net positive contribution during the exercise, the exercise is rated as +1; if the reconnaissance unit made a net negative contribution, the exercise is rated as -1. If the exercise fails to present data to support either determination (positive or negative contribution) within the criterion or if the data presents both positive and negative contributions with no clear net assessment, then the exercise is rated as 0 for the criterion. The determination of net positive (+1), negative (-1), or indeterminable (0) contribution in a specific area is a subjective judgement based on the data and evidence available from the particular exercise. The use of negative ratings allows this analysis to combine a net assessment from both successful and unsuccessful exercises with respect to a specific criterion.

The Force XXI process validated the BRT in terms of a specific criterion if the sum of weighted ratings from all exercises is equal to four. This standard is equivalent to an exact replica of the Force XXI BRT demonstrating in a single exercise a net positive contribution in the criterion. This criteria-based evaluation aggregates the results of the Force XXI process, which involved several exercises and tests, each of which used a

slightly different brigade reconnaissance unit organization, equipment, or role in support of the brigade. Table 3 depicts the evaluation matrix with weighting factors and criteria.

Table 3. Exercise Weighted, Criteria-Based Evaluation Matrix

APPLICABILITY OF TEST (Weighting Factor)	MSF 95 O & O	BDA I	BDA II	TF XXI AWE	Div XXI AWE	
Equipment: (Max = 1; Min = 0) HMMWV = +1 (Near-term) FSCS = +1 (Far-term) M3 CFV = +0.5 (Far-term) M1 Tank = 0						
Organization: (Max = 2; Min = 0) O = 2 - X If (2-X) < 0, then O = 0. X = T + P						
T = 0.25 * (# teams -18) If # teams < 18, then T = 0.						
# Scout Teams						
P = 0.5 * 3 - # platoons						
# Platoons						
Mission: (Max = +1, Min = 0) Stealthy = +1 Both or unknown = 0.5 Aggressive = 0						
TOTAL APPLICABILITY FACTOR (Exercise)						TOTAL (4 = 100%)
FORCE ENHANCEMENT CRITERIA: Positive Contribution = 1 Indeterminate Contribution = 0 Negative Contribution = -1						
Situation Awareness						
Tempo						
Lethality						
Survivability						
EFFECTIVENESS: (Mission accomplishment with acceptable losses) Yes = 1 Indeterminate = 0 No = -1.						

Output

The output from this methodology involves conclusive statements (based on the analytical process) that the data from Force XXI exercises and AWE does or does not validate the Force XXI BRT. The standard for validation is that aggregately the Force XXI has demonstrated a net contribution in a particular force enhancement category or in general effectiveness. A conclusion will be drawn for each criterion determining if the Force XXI BRT can reasonably be expected to make a positive or negative contribution to the brigade's situational awareness, the tempo of brigade operations, the lethality of the brigade, and the survivability of the brigade. This reasonable expectation is based on demonstrated performance, observations, or analyses (in the case of simulations) associated with applicable tests.

The purpose for addressing the thesis question goes beyond the conclusive statements. The process of analysis will reveal capabilities or contributions that have been demonstrated to a reasonable standard. The process will also reveal those capabilities or contributions of the Force XXI BRT which have a negative impact on brigade operations, indicating that the Force XXI BRT (as configured or employed) is not necessarily the "right" solution to the brigade reconnaissance issue and requires more testing. Finally the analysis will indicate areas in which the Force XXI BRT should be further tested and some of the parameters for the test. The analytical process will also reveal issues associated with the BRT which are not necessarily evaluated with the criteria. These issues may be related to doctrine, organization, training, leader development, materiel, or soldier support; and tactics, techniques, and procedures.

¹ Sun Tzu. *The Art of War*, trans. Samuel B. Griffith (London: Oxford University Press, 1963) 144-145.

² U.S. Army Training and Doctrine Command Analysis Center, Technical Report TRAC-TR-0396, "Force XXI Division Design Analysis: Phase I Final Report" (Fort Leavenworth, KS: Study and Analysis Center, March 1996), 52 - 53; Training and Doctrine Command Analysis Center, "Brigade Design Analysis (BDA): Phase II [Results Draft]" (White Sands Missile Range, NV: TRADOC-WSMR, September 1997), 3 and 9; U.S. Army, "Task Force XXI Advance Warfighting Experiment (AWE) Live Experiment Assessment Report" (Alexandria, VA: Operational Test and Evaluation Command, 10 September 1997), ES-21.

³ U.S. Army Training and Doctrine Command Analysis Center, "Mobile Strike Force 95 Organizational and Operational Analysis" (Fort Leavenworth, KS: TRADOC-TRAC, January 1996) [Online <http://www.trac.army.mil/msf>], 1-5.

⁴ U.S. Army Armor School, Fort Knox Supplemental Material (FKSM) 71-3-1(A), *The Digitized Heavy Brigade* (Fort Knox, KY: 15 February 1997), 3-13.

⁵ U.S. Army, TRADOC Pamphlet 525-71 *Division Operations Concept* (Fort Monroe, VA: TRADOC, 13 May 1996), 15-17; TRADOC PAM 525-5 *Force XXI Operations* (Fort Monroe, VA: TRADOC, 1 August 1994) 3-11.

⁶ Field Manual 101-5-1, *Operational Terms and Graphics*; U.S. Army, TRADOC Pamphlet 525-200-4 *Mounted Battlespace Battle Dynamic Concept* (Fort Monroe, VA: TRADOC, 1 June 1994), 6.

⁷ TRADOC Pamphlet 525-5 *Force XXI Operations*, 3-16.

CHAPTER 4

DATA

...we are on the threshold of a new age that demands institutions make bold adjustments in information processing and organizational structure to fully advantage the capability of information age technologies.¹

GEN (Ret) Frederick M. Franks, Jr., TRADOC Pamphlet 525-5

This chapter presents a summary of the data collected to provide input to the process of analysis presented in chapter 3 (Methodology). The fundamental question to be answered is "Does the data available from the Force XXI process (DDA and AWE exercises) validate the organization and structure of the Brigade Reconnaissance Troop (BRT) as proposed in the Force XXI heavy division?" The four primary sources of data from the Force XXI process are Mobile Strike Force (MSF) 95 Organizational and Operational Analysis, the Brigade Design Analysis (BDA), Task Force XXI Advanced Warfighting Experiment (AWE), and Division XXI AWE.

This review addresses general information about each exercise, the specific information concerning the brigade reconnaissance asset used in the exercise, and then pertinent results of the exercise with respect to the reconnaissance unit. The results include conclusions presented in available sources and documented analyses for each particular exercise. Conclusions from the experiments and exercises are based on both qualitative and quantitative analysis performed by various Army agencies. These conclusions from individual exercises become data for this analysis of the Force XXI process. Appendix (Data Summary Matrix) presents specific facts and observations from

each exercise in the form of a matrix, useful in comparing the different exercises and results. The purpose of this chapter is to summarize the data.

Mobile Strike Force 95 Advanced Warfighting Experiment

MSF 95 AWE General Information

The Army Training and Doctrine Command Analysis Center conducted a very quantitative division structure optimization analysis for the Mobile Strike Force division concept from October 1994 until January 1996. The Prairie Warrior exercise in May 1995 used the Mobile Strike Force concept. Prairie Warrior was a corps-level command post exercise conducted at Fort Leavenworth, Kansas by the U.S. Army Command and General Staff College and the Battle Command Training Center. The TRADOC Battle Laboratory Integration, Technology, and Concepts Directorate developed the Mobile Strike Force organizational, operational and materiel concepts according to TRADOC Pamphlet 525-5, *Force XXI Operations*, and Force XXI design principles, later published in TRADOC Pamphlet 525-71, *Force XXI Division Operations Concept*.²

The purpose of the Mobile Strike Force 95 AWE and analysis was to extend the MSF operational concept beyond the single exercise portrayed in the 1995 Prairie Warrior student exercise in order to determine how the MSF could best be tailored for lethality, survivability, and tempo. Planning for the AWE began in October 1994, Prairie Warrior 95 was conducted in May 1995, and the simulation iterations and analysis continued until September 1995. In January 1996, TRADOC Analysis Center published the final AWE report, "Mobile Strike Force 95 Organizational and Operational Analysis," which was the principle source for the information presented here.³

Unlike other events from the Force XXI process which focused on specific potential organizational structures, the MSF analysis did not focus on an actual division organization constrained by pragmatic issues (budget, personnel ceilings, equipment fielding, etc.) The MSF was not a prototype division; it was a concept vehicle to study future systems, organizations, and operational concepts.⁴ The MSF organizational and operational concept was written by Brigadier General (retired) Wass de Czege. This concept emphasized simultaneity, surprise, and maximizing the effects of precision guided munitions. The MSF division consisted of four combat brigades: armor, aviation, light infantry, and artillery. The armor brigade task force included two mechanized battalions, two armor battalions, an armored gun system battalion, a heavy engineer battalion, two Bradley Stinger Fighting Vehicle batteries (BSFV), and a future scout vehicle (FSV) cavalry troop.⁵

The test objectives for the MSF analysis supported the concept development stage of the early Force XXI process. The Mobile Strike Force AWE objectives were to assess the MSF design concepts (simultaneity, surprise, and precision) using the Force XXI design principles, to assess the MSF and Force XXI operational concepts, and to assess the proposed Force XXI battle command capabilities.⁶ Two study issues of the analysis are applicable to the brigade reconnaissance unit. "What MSF 2010 capabilities and capabilities contribute most to its effectiveness? What organizational adjustments are required to the MSF to allow it better to execute the operational concept?"⁷

The MSF 95 AWE scenario projected force capabilities to the year 2010; the terrain and enemy depicted a conflict in Korea. The MSF mission was to attack as a Joint Force Land Component Command operational reserve to destroy (reduce to 40 percent) a

mechanized corps, the operational exploitation force, in the vicinity of the Kokson/Chorwon valleys to deny the reinforcement of the threat forward army group. The intent of the MSF commander highlighted the destruction of the threat corps by incorporating the full range of MSF, air, naval, and special operations forces capabilities in executing a simultaneous, in-depth attack. The endstate included the MSF with at least 85 percent combat strength prepared for future operations.⁸

Of particular interest to this study, the armor brigade conducted a six and one half hour movement into position. The brigade's mission involved the destruction of a threat brigade in an ambush oriented on an engagement area and simultaneous to similar ambushes conducted by the other three brigades (aviation, light infantry, and artillery). The armor brigade received the support of close air support, RAH-66 Comanche helicopters, volcano minefields, and Crusader and Paladin indirect fire systems. Following the ambush the armor brigade attacked to destroy remaining threat battalion-sized units in zone.⁹

The Mobile Strike Force 95 AWE analysis included a very quantitative division optimization process based on statistics of threat systems killed (lethality), friendly systems killed (survivability), and duration of the operation (tempo). A systematic force tailoring process used iterative Vector-in-Commander constructive simulations to evaluate and optimize the MSF.¹⁰ A description of the optimization process exceeds the scope of this work; however, the process did evaluate the individual MSF assets in terms of contributions to the entire force's lethality, tempo, and survivability.

MSF 95 AWE Brigade Reconnaissance Unit

The MSF included a ground cavalry troop in the armor, light infantry, and aviation brigade. The cavalry troop was organized into three scout platoons and a troop headquarters. Each platoon consisted of ten FSVs. The exercise simulated the FSV with 2010-projected capabilities (armament, protection, optics, target acquisition and direct fire engagement capabilities). The mission of the armor brigade's cavalry troop was to conduct a mobile screen forward of the brigade during movement to the ambush positions. Once the brigade occupied ambush positions, the cavalry troop conducted a screen to provide security for the brigade's flank as well as to trigger the brigade ambush as the lead threat brigade reconnaissance companies entered the engagement area.¹¹

Because the analysis used a low-resolution simulation focused at the division level, available sources presented no specific operational details for the execution of the cavalry troop mission. However, the statistical optimization process did evaluate the contributions of the cavalry troop over multiple iterations of the operation.

MSF 95 AWE Results

The Mobile Strike Force 95 AWE evaluation determined the aggregate contribution of the ground cavalry troops in all three brigades (armor, light infantry, and aviation). The overall performance of the cavalry troop indicated strong contributions to the MSF in lethality and survivability and average contributions to the MSF in terms of tempo.

The lethality evaluation involved the contribution of a unit to threat kills subdivided into types of equipment: armor, command, control, communications, and

intelligence (C3I); artillery (cannon and rocket); and mounted anti-tank (AT) systems.

The minimum criterion for the MSF success was 40 percent destruction of the operational exploitation force. A ranking of units by overall performance in lethality found the ground cavalry troop the highest or second highest contributor in each iteration of the simulated operation. The other leading system in lethality was the attack helicopter troop.¹²

The minimum criterion for survivability was a post-operation combat strength of 85 percent or better in every unit. With respect to the organizational optimization for survivability, the ground cavalry troops within the brigades made the second highest contribution to the composite survivability of the MSF. The survival rate of the cavalry troop was approximately 95 percent.¹³

The criterion for tempo was the duration of the ambush. The analysis considered secondary factors (the percentage of units in the right place at the right time, the percentage of threat forces detected, and the percentage of MSF assets used); however these offered little distinction between the case studies. With respect to the tempo, the final results did not cite the cavalry troop as a high or low contributor.¹⁴

The Mobile Strike Force analysis determined that the brigade cavalry troop was a valuable asset (in comparison to the other units) in terms of the lethality and survivability of the brigade within the scope of the MSF mission and scenario. The analysis supports the concept of placing a cavalry-type troop in the brigade structure given the scenario projection of the future battlefield (force capabilities and battlefield environment in year 2010). The MSF employed a number of futuristic reconnaissance, intelligence, surveillance, and target acquisition (RISTA) assets to include unmanned aerial vehicles

(UAV). The evidence that the ground cavalry troop was a high contributor to the brigade's lethality and survivability in conjunction with and compared to these other RISTA assets is a significant statement.

Brigade Design Analysis (Phase I and Phase II)

BDA General Information

The Brigade Design Analysis was one of several concurrent study efforts to provide quantifiable evidence supporting the Division Design Analysis. The DDA was the lead Army program for designing the Force XXI division and was subordinate to the Joint Venture Campaign Plan. The United States Army Training and Doctrine Command Analysis Center White Sands Missile Range (TRAC-WSMR) conducted the BDA to provide insights and findings at the brigade level and echelons below brigade using quantitative analysis and a high-resolution computer simulation.

TRAC-WSMR conducted the BDA Phase I from August through December 1995 and BDA Phase II from November 1996 through May 1997. Both phases used the Combat Arms Task Force Engagement Model for the computer simulations with a European scenario, high-resolution scenario (HRS-37). The scenario depicted a mechanized infantry brigade attacking a threat tank regiment in partially forested and mountainous terrain with numerous urban areas and rivers. Both BDA phases evaluated and compared near-term and far-term models for the brigade structures. This summary of the BDA is based on three TRADOC Analysis Center documents and discussions with principle analysts from TRAC-WSMR.¹⁵ The TRAC documents were "Force XXI Division Design Analysis: Phase I Final Report" (March 1996), "Study Plan for the Force

XXI Division Design Analysis Phase II” (November 1996), and “The Brigade Design Analysis (BDA): Phase II Results - Draft” (September 1997).¹⁶

BDA Phase I

The Brigade Design Analysis Phase I (BDA I) investigated the impact of weapon equipment changes on force effectiveness and compared the brigades of the current Army of Excellence (AOE) heavy division to the brigades of two alternative divisions presented in the Division Design Analysis Phase I. These alternatives were the Heavy/Light Small Based (HL-SB) Division and the Brigade Based Division. BDA I based comparisons on threat systems killed (lethality), friendly systems killed (survivability), loss exchange ratios, system exchange ratios, losses over time and range, residual combat power, and time to complete the mission. The BDA I objective was to collect data to substantiate the hypothesis: “The selected division design alternative will product the greatest qualitative edge in controlling the tempo of operations as well as overwhelming effects-oriented combat power with respect to survivability and lethality.”¹⁷

Two BDA I study issues addressed the brigade reconnaissance unit. The first issue involved reconnaissance assets and the organizational structure: “For the division design alternatives, what assets best satisfy the functions of reconnaissance and security (cavalry and scouts), by echelon, and for the spectrum of operations (from linear to non-contiguous)?”¹⁸ The second issue was a comparison of the HMMWV scout vehicle to a future scout vehicle in terms of tempo, lethality, and survivability.

The threat for the BDA I study was a second echelon tank regiment of a first echelon tank division. The threat was equipped with year 2005+ capabilities: T-80U

tanks, BMP-3 armored personnel carriers, HOKUM Helicopters, and cannon and rocket artillery systems.¹⁹ The exercise did not simulate division level assets beyond those supporting the brigade task force. The brigade task force consisted of two mechanized battalion task forces, one armor battalion task force, one attack helicopter battalion under operational control, and two artillery battalions in support. The BDA I compared the performance of three brigade structures: an AOE brigade with no cavalry, a HL-SB brigade with a cavalry squadron and the Brigade Based structure with a cavalry squadron.²⁰

The brigade mission was to conduct an attack to destroy the two lead threat tank battalions with the intent to maneuver to the flank of the threat and destroy the threat in an engagement area. The brigade operation involved fighting through the threat divisional reconnaissance assets and employing attack helicopter companies from battle positions oriented on the engagement area. One mechanized task force blocked, one mechanized task force attacked a terrain-oriented objective to force the enemy to conduct a hasty defense inside the engagement area, and then the armor task force attacked the flank of the enemy in the engagement area.²¹

BDA I Reconnaissance Unit

The cavalry squadron in both alternative brigade structures consisted of three cavalry ground troops; each troop had six M1A1 tanks and fifteen HMMWVs in the near-term model. In the far-term model, the FSV replaced the HMMWVs. In support of the HL-SB and Brigade Based brigade operations, the cavalry squadron conducted a zone reconnaissance forward of the battalion task force formations. The cavalry squadron

engaged any threat units of platoon size or smaller with both direct and indirect fires. Larger threat units were engaged with only indirect fires. Once the task forces were on their objectives, the cavalry squadron conducted a screen for the brigade task force. The AOE brigade used a similar concept of operation without the cavalry squadron.²²

BDA I Results

With respect to the brigade ground reconnaissance assets, the Brigade Design Analysis Phase I made two pertinent comparisons. First, it compared the absence of ground reconnaissance assets (AOE baseline) to the organic ground cavalry squadron (HL-SB and Brigade Based design). In the simulations, the cavalry squadron greatly enhanced the effectiveness of indirect fire employed against the opposing forces prior to the main force engagement.²³ The cavalry squadron coupled with the increased fire support assets of the alternative brigades also contributed to an increase in the survivability of the main battle area forces (mechanized and armor battalion task forces). However, these advantages were partially offset by the high losses experienced by the cavalry squadron. The net comparison of the brigade structures determined almost negligible differences in the effectiveness of the brigades as measured by the percent of threat combat vehicles killed and the percent of friendly combat vehicles killed.²⁴ The brigade losses were higher in the covering force fight with the cavalry squadron; the losses were higher in the main battle area without the cavalry assets. The net result was an Enemy Kill to Friendly Loss ratio of 0.77 for the AOE brigade and 0.83 (average) for the HL-SB and Brigade Based brigades.²⁵

The BDA Phase I also compared the use of wheeled scout vehicles (HMMWVs) with armored scout vehicles (Cavalry Fighting Vehicle, M3). The CFV has target acquisition/optical systems with greater range, a twenty-millimeter main gun and a tube-launched, optically-tracked, wire-guided (TOW) anti-tank system affording greater lethality, and armor protection affording greater survivability. The BDA I comparison showed an approximately ten percent enhancement in the effectiveness of the CFV squadron measured in terms of a Loss Exchange Ratio (the ratio of the percentage of friendly losses to the percentage of enemy losses).²⁶ However, conclusions must be tempered with the fact that the CFV system was modeled in the simulation with higher parameters in terms of range of visibility, survivability, and lethality. The greater statistical effectiveness of the output could be a reflection of the greater numerical parameters of the input which corresponded with the compared characteristics of survivability and lethality. Furthermore, the simulation did not account for human factors distinguishing scouts mounted in armor-protected vehicles with weapon systems as opposed to vehicles without armor or weapon systems. One relevant human factor to this comparison is that scouts in hardened vehicles may be more prone to engage the enemy and compromise the reconnaissance mission (reducing their effectiveness in the reconnaissance role).

The Brigade Design Analysis Phase I made two findings related to the brigade reconnaissance unit.

4.1 Issue 15: Do the division alternatives have sufficient organic assets (numbers and types of systems) to generate overwhelming combat power in the close fight?

* Scout Assets. The additional scout resources in the HL-SB and BDE Based alternatives when combined with a sufficient level of fire support assets and

appropriate tactics and doctrine, have the potential to provide the commander with a significant advantage going into the close fight. To further maximize the scout potential, the scout vehicles must be survivable and capable of engaging and destroying enemy scout and expeditionary units.²⁷

4.1 Issue 16: For the division design alternatives, what assets best satisfy the functions of reconnaissance and security (Cavalry and scouts), by echelon, and for the spectrum of operations (from linear to non-contiguous)?

* The increase in scout assets in the HL-SB and BDE Based alternatives results in considerable increase in effects achieved by the BLUE force prior to the start of the main battle. The magnitude of this advantage is directly related to the reconnaissance and security capability inherent in the scout force. While the impact of the additional scout assets noticeably improved the force effectiveness, their capability was restricted because of their vulnerability to enemy fire, their inability to perform the security mission, and the inadequacy of their target acquisition capability. Upgrading the scout vehicle to the equivalent of a CFV, or better, would greatly enhance the BDE CAV units' reconnaissance and security capability.²⁸

The Division Design Analysis Phase I incorporated these findings into "The Force XXI Division Design Analysis: Phase I Final Report." One finding of the final report was that the brigade cavalry/reconnaissance unit should at most be a company-sized element. The report concluded that the Division Design Analysis Phase II should continue to investigate the brigade reconnaissance and cavalry issues. The report also stated that the cavalry unit was good idea for the near-term force but that it could possibly be deleted in the far-term force based on the availability and quality of the relevant common picture from other Force XXI initiatives (unmanned aerial vehicles and future technologies).²⁹

The Division Design Analysis Phase I final report highlighted that adding the cavalry to the mechanized brigade greatly increased the number of artillery kills in the covering force fight. Nevertheless, the cavalry unit also sustained high losses. The report concluded that the ground cavalry needs better sensor standoff on the future

battlefield.³⁰ The squadron-size cavalry element greatly enhanced the versatility of the brigade with respect to the Force XXI patterns of operations. However, the report concluded that given the objective to reduce the size of the division, a cavalry troop dedicated to reconnaissance was more appropriate for the Force XXI heavy brigade.³¹

BDA II

Brigade Design Analysis Phase II (BDA II) compared the brigade of the Force XXI interim approved design, the Heavy Moderate (HVY MOD) division, with the AOE heavy brigade. The comparison included both near-term (year 2001) and far-term (year 2010) friendly force capabilities. Similar to phase I, the analysis used statistical data from total friendly and threat losses over time; loss exchange ratios; system specific threat and friendly losses over time; and shots, hits, and kills by system by ammunition type. The objective of BDA II was to substantiate the hypothesis: "Interim Force design (MOD HVY) will increase the survivability, lethality, and operational tempo of the mechanized infantry brigade."³²

Several BDA II study issues supported the overarching Joint Venture study issue, "What organization structures are required to support the Force XXI division operational concept?"³³ The primary BDA II study issue related to the reconnaissance unit was to identify the RISTA force structure required by the Force XXI division in order to ensure information dominance. BDA II addressed three supporting questions.

1.2.2 Does the Force XXI Division need a BRT when the objective suite of sensors is fully fielded (REMBASS, UAVs)?

1.2.2.1 Considering the objective Force XXI division's sensor assets, what are the brigade reconnaissance missions?

1.2.2.2 What unique conditions favor the employment of the BRT over other assets?³⁴

The Brigade Design Analysis Phase II used the high resolution European scenario with a modernized version of the threat tank regiment. BDA II modeled threat capabilities for the year 2010 with the T-90 tank, the BMP-3 armored personnel carrier, the HOKUM helicopter, an unmanned aerial vehicle, and with appropriately enhanced artillery. The friendly mechanized brigade consisted of two mechanized and one armor battalion task forces with brigade operational control of an attack helicopter battalion. Two artillery battalions provided direct support with other supporting division and corps artillery. The MOD HVY brigade included a brigade reconnaissance troop. Table 4 summarizes the differences between the brigade assets.

The brigade mission and operation was very similar to the Brigade Design Analysis Phase I study. The mechanized brigade attacked to destroy a tank regiment using an engagement area. One mechanized task force blocked; the other mechanized task force seized a terrain-oriented objective forcing the threat to deploy into an engagement area; and the armor task force conducted a flank attack. The attack aviation battalion attacked by fire into the engagement area from battle positions.

Table 4. Comparison of Equipment Amounts in AOE and MOD HVY Brigades

SYSTEM/EQUIPMENT	AOE BDE Design	MOD HVY BDE Design
M1A1 Tank	58	58
M2A2 Bradley	108	108
HMMWV/FSV (Scouts) (FSV - Future Scout Veh)	10 per BN TF Total: 30	10 per BN TF 20 (BDE recon troop) Total: 30
Artillery DS - Direct Support GSR - General Support Reinforcing	18 M109 (155 mm SP) 18 M109 45 MLRS (Div and Corps)	18 M109 18 M109 45 MLRS (Div and Corps)
Helicopters OH58 Kiowa Warrior AH-64 Apache RAH-66 Comanche	9 15 0 Total: 24	0 10 6 Total: 16
Anti-air systems: Avenger MANPADS BSFV	8 10 8	12 0 8
Mortars	18	12 (No mortars in AR TF)
Anti-armor Systems M3A2	24	0
Unmanned Aerial Vehicles UAV GCS (Ground control station)	2 1	1 (DS), 4 (GSR) 2

Source: "The Brigade Design Analysis (BDA): Phase II Results - Draft," 11.

BDA II Reconnaissance Unit

The brigade reconnaissance troop consisted of two scout platoons. Each scout platoon consisted of ten HMMWVs in the near-term scenario and ten FSVs in the far-term scenario. The reconnaissance troop's mission was to conduct a zone reconnaissance forward of the battalion task force formations. The troop directly engaged any threat units of platoon size or smaller, as well as employed indirect fires on larger threat units.

Once the battalion task forces were on their objectives or in attack positions, the troop withdrew to flank screening positions to protect the brigade.

BDA II Results

The BDA II study made two independent comparisons involving the brigade reconnaissance unit. It compared the AOE brigade to the MOD HVY brigade using the friendly near-term and then friendly far-term force capabilities. The threat force with 2010 (far-term) capabilities remained the same in all simulations. The comparison of total losses, kills, and loss exchange ratios between the two brigades (AOE and MOD HVY) aggregated the effects of all differences between the brigades. (Refer to Table 4, Comparison of Equipment Amounts in AOE and MOD HVY Brigades.) These results do not isolate the contribution of the reconnaissance troop of the MOD HVY brigade.

The results of the near-term comparison of the brigades are more distinguishable than those of the far-term comparison. In terms of total kills during the engagement, the near-term AOE brigade (without the reconnaissance troop) was more lethal than the near-term MOD HVY brigade (182.4 compared to 165.5 threat losses). In the near-term case, the AOE brigade was also more survivable (145.1 compared to 157.4 friendly losses). Combining these results, the loss exchange ratio, as a general measure of effectiveness, favored the AOE structure in the near-term (1.26 compared to 1.05). In the far-term case, the AOE brigade achieved 174.4 enemy kills while the MOD HVY brigade achieved 171.1 enemy kills. With respect to survivability, the AOE brigade lost 124.3 vehicles while the MOD HVY lost 120.3 vehicles. The difference in the resulting loss exchange ratios (1.40 and 1.42) is not statistically significant.³⁵

The timing of the destruction of threat systems was one distinguishing factor between the two brigade engagements attributable to the reconnaissance unit. With the reconnaissance unit in the MOD HVY case, the friendly force destroyed significantly more threat vehicles prior to the main engagement with indirect fires. This difference increased significantly in the far-term case due to the enhanced target acquisition capabilities of the FSV and the brigade capability for precise indirect fire. One benefit associated with this fact was a reduction in the effectiveness of threat artillery systems. Essentially, the reconnaissance unit reduced the number of threat forward observers and significantly impeded the threat reconnaissance effort. (Using both the near and far-term cases, the AOE brigade destroyed an average of 2.2 threat scouts while the MOD HVY brigade destroyed an average of 17.0 threat scouts.)³⁶

The prebattle destruction of forward threat assets offers some advantages which are not captured in the final engagement statistics. First, by reducing the effectiveness of the threat reconnaissance effort, these early threat losses prevent interference with the friendly plan to shape the battlefield and position maneuver units. Human factors, not measurable in simulation, make this pre-battle success of the MOD HVY brigade even more significant. The psychology of the battlefield and the dynamics of leader perceptions of initial success and failure can greatly influence soldier morale and even the outcome of the entire battle.

Another distinguishable comparison in the Brigade Design Analysis Phase II study concerned the threat losses due to friendly scout calls for fire. Battalion scout contributions to this factor varied little in all four cases (AOE and HVY MOD brigades in the near and far-terms). In the near-term case, the brigade reconnaissance unit destroyed

approximately three times the number of threat vehicles with indirect fire than the sum of the battalion scout platoons. In the far case, the reconnaissance unit destroyed approximately seven times the number of threat vehicles with indirect fire than the sum of the battalion scouts platoons.³⁷ These facts support a net contribution to the brigade's lethality by the reconnaissance troop.

With regard to the mission of the reconnaissance troop, the BDA II study confirmed the troop is capable of performing the missions outlined in Fort Knox Supplemental Material 17-97-10(A) *Tactics, Techniques, and Procedures for the Applique' Brigade Reconnaissance Troop*. The study highlights the troop capability for the missions: reconnaissance, screen, facilitating movement, area damage control, and restoring command and control.³⁸ The report further states, "The offensive and defensive mission capability of a separate brigade cavalry troop (guard, attack, defend...) is beyond the mission capability of the BRT (unless otherwise supplemented)."³⁹

During the BDA II brigade engagement, the near-term reconnaissance troop equipped with the HMMWV suffered an average loss of 7.9 percent. In the far-term case, the reconnaissance troop equipped with the FSV averaged a loss of 9.9 percent. Both of these statistics indicate a great improvement over the losses incurred during the Phase I study with the cavalry squadron.⁴⁰ This improvement in survivability during Phase II is attributable to an increase in artillery assets supporting the brigade. These rates also support the argument that the reconnaissance troop as employed in this scenario is survivable.

The Brigade Design Analysis Phase II study makes four additional observations relevant to the brigade reconnaissance troop. The brigade reconnaissance unit decreased

the battalion task force scout mission workload. The reconnaissance unit achieved decisive pre-battle effects in terms of both threat losses and enhanced situation awareness for the friendly force commander. The reconnaissance unit increased the battlespace depth of the brigade affecting the threat decision cycle sooner and decreasing the threat maneuver time. Finally, although not simulated, the enhanced situational awareness from the reconnaissance unit could have allowed the friendly commander to maneuver forces differently and possibly achieved greater combat effectiveness.⁴¹

In addressing the study issues concerning the requirement for the reconnaissance unit given the other RISTA assets available to the brigade, the report concludes that the reconnaissance unit does make unique enhancements to the brigade's effectiveness. The study highlights limitations in the effectiveness of the unmanned aerial vehicle under adverse weather conditions, at night, and with respect to time on station for both adjusting observed fires or gathering intelligence.⁴²

Task Force XXI Advanced Warfighting Experiment

TFXXI AWE General Information

The Task Force XXI AWE was a series of live training events with the 4th Infantry Division (Experimental Force) conducted at Fort Hood, Texas, for platoon through battalion task force training and culminating at the National Training Center, Fort Irwin, California with a brigade task force training rotation (Operation IVY FOCUS, NTC Rotation 97-06). The goal of the Task Force XXI AWE was to provide insights on new organizations, information-age tactics techniques and procedures (TTP), and for investment decisions on emerging technologies. Task Force XXI AWE tested and

analyzed thirty-nine prototypes, thirteen concepts, and twenty fieldings, a total of seventy-two initiatives.⁴³ The brigade reconnaissance troop and the Striker platoon were two of the organizational concepts tested.

The purpose of Task Force XXI AWE was to introduce prototype technologies and organizational structures in heavy and light forces to provide evidence for potential improvements in force capabilities and to further refine the requirements for Force XXI.⁴⁴ The AWE test hypothesis was “If information-age battle command capabilities and connectivity exists across all battlefield operating systems functions, then increases in lethality, survivability, and tempo will be achieved.”⁴⁵ Task Force XXI proposed three study issues related to the brigade reconnaissance troop. Given the interim-approved Force XXI division structure (HVY MOD), this experiment investigated required changes in the command and control, organization, and reporting procedures of the brigade reconnaissance troop. The other two study issues addressed testing two prototype scout vehicles, the Hunter Sensor Surrogate System (HS3) and the Long-Range Advanced Scout Surveillance System (LRAS3).⁴⁶

This research used several sources for information, observations, and conclusions about the Task Force XXI AWE. Operational Test and Evaluation Command (OPTEC) was the lead Army agency for collecting, assembling, analyzing the data, and documenting the results from the AWE; OPTEC’s final report was “The Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report.”⁴⁷ The OPTEC report aggregated the observations, comments, and analysis from subject matter experts, exercise observer/controllers, and participants. The NTC take-home packets

from the rotation, an "Initial Impressions Report" and several after action report briefings also provided data for this research.⁴⁸

The brigade task force rotation to the National Training Center was a fourteen-day exercise in the Mojave Desert. The NTC opposing force, the 11th Armored Cavalry Regiment, represented a credible ex-Soviet type threat up to the size of a motorized rifle division. The NTC maneuver area is approximately 40 kilometers by 65 kilometers.⁴⁹ The Force XXI brigade task force was organized as a modified HVY MOD brigade with an armor and mechanized battalion task force, a light infantry battalion task force, a direct support artillery battalion, a heavy engineer battalion, a brigade reconnaissance troop, and a direct support Striker platoon.⁵⁰ The divisional aviation battalion and an air cavalry troop supported the brigade task force.

The friendly division (notional) mission was to attack in zone to establish contact with and then defeat a motorized rifle division to restore and international border.⁵¹ Within this scenario the brigade task force conducted three standard NTC heavy brigade missions during the first phase. The standard missions were a movement to contact, a deliberate attack, and then a defense in sector. These missions allowed comparison with other brigade rotations to the NTC. In the second phase, the brigade conducted five "TRADOC 525-5 missions."⁵² These missions differed from the standard NTC mission in terms of larger physical areas of operation, continuous operations (without preparation days), and compressed mission-planning times. The TRADOC 525-5 missions included two defenses in zone, a hasty attack, a deliberate attack and a hasty defense.⁵³

TFXXI AWE Brigade Reconnaissance Unit

The brigade reconnaissance troop consisted of two scout platoons of ten HMMWVs each. The troop headquarters consisted of thirteen personnel organized into a headquarters section and a maintenance section. The troop had two LRAS3 and one HS3 prototype systems for testing purposes.⁵⁴ The brigade task organized assets for each particular mission. During the rotation, the reconnaissance troop was often augmented with the Striker platoon or several Striker teams, engineer reconnaissance teams, and chemical reconnaissance teams.⁵⁵ The brigade reconnaissance troop missions during the fourteen-day exercise included conducting zone reconnaissance, route reconnaissance, area reconnaissance, screen, and surveillance from observation posts. The troop was further tasked to employ indirect fires to destroy threat reconnaissance, conduct air insertions to establish observation posts, and emplace remote sensors.⁵⁶

TFXXI AWE Results

In several after action briefings and in the OPTEC final report, the brigade reconnaissance troop was identified as one of twenty-eight Task Force XXI “high performers.”⁵⁷ The OPTEC report also listed the HS3 and LRAS3 scout vehicles as “high performers.”⁵⁸

The EXFOR demonstrated the ability to conduct effective Reconnaissance, Intelligence, Surveillance, and Target Acquisition (RISTA) operations during the TFXXI AWE. The reorganization coupled with many TF XXI initiatives (UAV, JSTARS, Brigade Reconnaissance Troop, Strikers, etc.) provided to the EXFOR enabled commanders to make timely tactical decisions. The EXFOR had multiple mobile reconnaissance assets which provided improved sensor ranges over those previously available. The brigade effectively employed these reconnaissance assets during the TFXXI AWE and exploited the information provided in many instances.⁵⁹

The executive summary goes on to state that more reliable extended-range frequency modulated voice communications, more capable information management systems, and improved hardware, software, and procedures were necessary before the digitized brigade could more fully exploit the information provided by the RISTA assets.⁶⁰

In terms of enhancing the brigade's situational awareness, observations indicated that the brigade reconnaissance troop addressed the reconnaissance needs of the brigade commander in a "timely and accurate manner."⁶¹ A subject matter expert comment indicated that the reconnaissance unit was in fact able to provide information that was generally not provided by other brigade assets.⁶² Another comment indicated that the reconnaissance unit addressed all assigned priority intelligence requirements during several missions. During the eight missions, the troop successfully reported approximately five hundred intelligence spot reports, an average of sixty-two per mission.⁶³ This does not include situation reports, calls for fire, or administrative reports.

The Task Force XXI AWE did demonstrate the complexity and challenge of monitoring a multitude of reconnaissance assets forward of the maneuver units within the brigade sector. During Task Force XXI, at times in excess of forty-six HMMWV-equipped scout or reconnaissance teams were forward of the maneuver units. The number of reconnaissance vehicles forward of the brigade created some problems with command and control, maintaining visibility of asset locations, clearing fires, and fratricide.⁶⁴ Nevertheless, based on a review of all available data, the reconnaissance troop uniquely enhanced and made a net positive contribution to the brigade commander's situational awareness.

With regard to the operational tempo of the brigade, observations stated the reconnaissance troop was responsive to the commander's reconnaissance needs as identified by brigade guidance.⁶⁵ The brigade faced the challenge typical to employing human intelligence during conventional tactical operations. There is a tradeoff between deploying the scout teams early enough to get into position and report (to support the planning and execution of the brigade operation) and giving the scouts enough guidance and planning time (to execute a well focused and coordinated reconnaissance operation). Observer comments indicated that on several missions, the reconnaissance troop deployed "without doing rehearsals and without specific guidance, TAI/NAI [targeted areas of interest/named areas of interest], and no priorities."⁶⁶ Observer comments also indicated that early in the exercise, the brigade relied too heavily on the unmanned aerial vehicles and overlooked some good opportunities to cover named areas of interest with unemployed scout teams from the reconnaissance troop.⁶⁷

Observer comments indicated that on some occasions the brigade staff and leadership displayed hesitancy to act on enhanced situational awareness due to the desire to verify information.⁶⁸ This delay to make decisions with real-time information (some of which was provided by the reconnaissance troop), partially offset the advantages of having this informational upper hand. "The BRT's potential to provide intelligence information more effectively will be realized when the BRT is fully integrated into a well developed R&S [reconnaissance and security] plan with established NAIs/TAIs supporting the tactical mission."⁶⁹

Based on the available sources, there was no evidence to support a conclusion that the reconnaissance troop significantly contributed to the lethality of the brigade during

the Task Force XXI AWE. The reconnaissance troop processed several calls for fire through the troop headquarters or an attached Striker team.⁷⁰ There was no specific quantitative data available to support the effectiveness of the scout-generated calls for fire. With respect to the lethality of the troop itself, one soldier in the troop responded on post-exercise questionnaire that there was “a need for direct support from an attached tank plt [platoon] or Bradley plt, and/or mortar for immediate fires and smoke.”⁷¹

Although the comment reflects the perception of a single soldier, it does highlight the limitations to lethality and self-protection of the HMMWV-equipped scout.

The Task Force XXI AWE, consistent with most NTC rotations, revealed that the survival of scout and Striker assets (regardless of the echelon of command, battalion or brigade) is dependent on not being detected by the threat. The survival of the scout assets was most vulnerable during movement to and occupation of positions. Once detected by threat reconnaissance or forward units, the scout teams were effectively destroyed using both indirect and direct fires. The HMMWV-equipped scout team is particularly vulnerable to indirect fire and must capitalize on the increased stealth capabilities of the HMMWV vice an armored vehicle for survivability. An issue associated with survivability and tempo is the ability to resupply and regenerate assets. Task Force XXI AWE revealed shortfalls in the brigade’s capability to provide combat service support to the reconnaissance troop.⁷² These shortfalls were associated with tactics, techniques, and procedures and CSS assets in the brigade.

Division XXI Advanced Warfighting Experiment

DAWE General Information

The Battle Command Training Program, the National Simulation Center, 4th Infantry Division, and elements of III Corps conducted a simulation enhanced division command post exercise from 5-13 November 1997. The 4th Infantry Division, as the Experimental Force (EXFOR), represented the Conservative Heavy Division (CHD) structure, which had evolved from the MOD HVY division structure following the Task Force XXI AWE. The purpose of the DAWE was to provide input for the Force XXI division structure decision briefing to the Chief of Staff of the Army, Force XXI Board of Directors in February 1998. DAWE addressed numerous study issues and initiatives focused on the Force XXI division structure and operation.

The DAWE sources available for this research included "The Study Plan for the Division XXI Advanced Warfighting Experiment" (October 1996), "The Division XXI Advanced Warfighting Experiment Directive" (February 1997), the "Division XXI Advanced Warfighting Experiment (DAWE) Initial Insights Report (IIR)" (15 December 1998), DAWE After Action Review Briefing (10 December 1997), and the OPTEC Test and Experimentation Command (TEXCOM) DAWE Database.⁷³ TEXCOM was the lead command in assembling and organizing the observations and comments of subject matter experts and observer/controllers for the exercise. The database contained over 6,050 records categorized in terms of doctrine, training, leader development, organization, materiel, and soldier issues.

The experimental hypothesis for DAWE was "If the Force XXI Division Operational and Organizational Concept enables information dominance and enhanced

battle command capabilities, then increases in lethality, survivability, sustainability, and tempo will be gained across the force.”⁷⁴ The DAWE focused quantitative and qualitative analysis on assessing the commander’s knowledge and the command’s effectiveness with the Force XXI division structure. The DAWE had no specific study questions directly related to the brigade reconnaissance unit; however, one study issue was to assess the impact of the Conservative Heavy Division design on Force XXI operations. The brigade reconnaissance troop was part of the CHD design.

The DAWE exercise employed both a current-technology threat and a modernized threat with capabilities projected into the year 2003. The scenario involved a fictional island, “Lantica,” with several countries of diverse economic, political, and ethnic backgrounds. The terrain of the scenario was highly urbanized with many natural and man-made obstacles (cities, towns, rivers, vegetation, and mountains). The current-technology threat was equipped with T-80 tanks, BTR-80 armored personnel carriers, AT-5 anti-tank systems, SA-13 air defense artillery systems, and Hind helicopters. The modernized threat was equipped with T-80U tanks, BTR-80A armored personnel carriers, AT-14 Kornet anti-tank guided missiles, Panzyr air defense systems and HOKUM helicopters. These modernized systems increased the range capabilities of weapons and target acquisition systems and improved the optical and fire control capabilities of systems.

The experimental force division conducted a three-phase operation as part of III Corps, which was deployed as part of a Joint Task Force. In the first phase, the division conducted a tactical movement to seize key terrain and serve as the corps covering force against the current-technology threat. During the second phase, the division attacked as a

supporting effort to seize terrain and establish a defense to defeat lead divisions of the modernized threat army. In the third phase, the division attacked as the corps main effort to maintain contact and destroy the enemy in zone (remnants of a tank army).

The Conservative Heavy Division brigade consisted of three armor or mechanized heavy combined arms battalions (CAB), a headquarters company, and a brigade reconnaissance troop. An artillery battalion with striker platoon and a heavy engineer battalion provided direct support to each maneuver brigade. Sources available provided no specific information about brigade missions or brigade operations.

DAWE Brigade Reconnaissance Unit

The brigade reconnaissance troop used in the DAWE consisted of one scout platoon of six teams, one organic Striker platoon of six teams, and a headquarters section. The troop was equipped with seven future scout vehicles, six Striker vehicles, and five Javlines (man portable anti-armor missiles). Available sources did not address the specific operational missions of the reconnaissance troops for each brigade. Nevertheless, based on observations from the subject matter experts in the TEXCOM DAWE database, the reconnaissance troops played a large role in reconnaissance, intelligence, surveillance, and target acquisition. In contrast to the Task Force XXI AWE, comments indicated that the reconnaissance troops were well integrated in the RISTA plan with joint surveillance target acquisition radar system, unmanned aerial vehicles, special operation forces, and other assets.

Observations referred to the employment of the brigade reconnaissance troops to conduct reconnaissance, for battle damage assessment, to control precision indirect fires

on high payoff targets, to cue army attack helicopter engagements, and to emplace remote sensors. Available sources did not indicate whether the reconnaissance troops conducted aggressive or stealthy reconnaissance.

DAWE Results

Although the brigade reconnaissance troop was not formally evaluated in the DAWE analysis, the after action review briefing included the brigade reconnaissance troop as a “winner.”⁷⁵ Observations in the TEXCOM database referred to the successful role of the reconnaissance troop in target acquisition, in gathering and reporting PIR, in reporting battle damage assessment from air and artillery fires, in cueing attack aviation and close air support, and in emplacing remote sensors.⁷⁶ The brigades displayed strong RISTA planning, integrating all RISTA assets, to include the brigade reconnaissance troop, into a well-focused plan with depth throughout their battlespace.⁷⁷ With respect to the other available RISTA assets, the brigade reconnaissance troops were particularly valuable in providing useful and timely information as enemy contact got closer.⁷⁸

The brigade reconnaissance troops in the DAWE exercise made significant contributions to the brigade commander’s situational awareness. Observations from the exercise address the successful reporting of accurate information, priority intelligence requirements, and high value targets by the brigade reconnaissance troops.⁷⁹ One subject matter expert commented, “With increased depth of view of the commander’s battlespace through the introduction of the BRT, JSTARS and UAV, the brigade can better determine which targets will most likely effect the commander’s mission if not attacked.”⁸⁰

Another comment stated that the brigade reconnaissance troops provided more accurate battle damage assessment than other available sources (UAV, JSTARS).

Comments and observations support two general points about the brigade reconnaissance troops' contribution to the tempo of operations. The integration of the brigade reconnaissance troop with unmanned aerial vehicles and Joint Surveillance Target Acquisition Radar System allowed high payoff targets to be detected, tracked in depth, and then engaged with precision. The tracking capability afforded by sensors in-depth introduced a "dynamic intelligence collection" capability that inherently contributed to the ability of the force to adjust the rate of operations (tempo).⁸¹ The ability to cue the "shooter" (whether artillery, attack aviation, or close air support) towards specific targets as opposed to towards engagement areas allowed more flexible and "dynamic targeting." Dynamic intelligence and targeting were composite contributions of all RISTA assets to the tempo of operations.

In terms of lethality, there were no specific observations or quantifiable data concerning the brigade reconnaissance troops' direct effects on enemy losses. However, the brigade reconnaissance troops did enhance the brigade's ability to employ effective and lethal combat power in the form of precision guided munitions and attack aviation assets.⁸²

One comment in the database referred to the survivability of "scouts" in general. The battalion scouts were also equipped with the future scout vehicles. During a defensive phase of the operation, the status of brigade scout was four out of nine platoons surviving.⁸³ The fact supported a statement about an incident when the force could not reposition scout assets to meet changing requirements for reconnaissance and

surveillance. This fact indicates that even with the FSV, when opposing a modern conventional threat, the survivability of the brigade reconnaissance troop will depend on stealth and on not being detected. Once detected, given the increase in lethality and precision on the future battlefield, the scout has a great probability of being destroyed.

Summary

This chapter reviewed the data available for analysis of the Brigade Reconnaissance Troop and the Force XXI process. This data comes from both computer-simulated testing and analysis (the Mobile Strike Force 95 AWE and the Brigade Design Analysis), from a live force-on-force exercise with a brigade task force (Task Force XXI AWE), and from a division level simulation enhanced command post exercise with the 4th Infantry Division (EXFOR). Each exercise employed a slight variation of a brigade reconnaissance unit with distinct scenarios. Three of the exercises involved a simulated-scenario based on future force capabilities (MSF, BDA, and DAWE); three of the exercises involved current-technology capabilities (BDA, Task Force XXI AWE, and DAWE).

¹ Frederick M. Franks, Jr., TRADOC Pamphlet 525-5, *Force XXI Operations* (Fort Monroe, VA: Headquarters, U.S. Army Training and Doctrine Command, 1 August 1994), 1.

² U.S. Army, "Mobile Strike Force 95 Organizational and Operational Analysis" (Fort Leavenworth, KS: Training and Doctrine Command Analysis Center, January 1996) [Online, <http://www.trac.army.mil/msf>], Slide: "Purpose."

³ "Mobile Strike Force 95 Organizational and Operational Analysis," Slide: "Purpose."

⁴ "Mobile Strike Force 95 Organizational and Operational Analysis," Slide: "MSF O&O Concept."

⁵ “Mobile Strike Force 95 Organizational and Operational Analysis,” Slide: “MSF Force Structure,” and Appendix D: “Unit Composition.”

⁶ U.S. Army, TRADOC Pamphlet 525-71 *Force XXI Division Operation Concept* (Fort Monroe, VA: Training and Doctrine Command, 13 May 1996), 15-17; TRADOC Pamphlet 525-71 *Force XXI Division Operation Concept*, 11-14.

⁷ “Mobile Strike Force 95 Organizational and Operational Analysis,” Slide: “MSF O&O Analysis Study Issues.”

⁸ “Mobile Strike Force 95 Organizational and Operational Analysis,” Slides: “MSF O&O Scenario,” “Enemy Situation,” and “Mission and Commander’s Intent.”

⁹ “Mobile Strike Force 95 Organizational and Operational Analysis,” Slides: “Phase I,” “Phase II,” “Phase III,” “Phase IV,” and “Phase V.”

¹⁰ “Mobile Strike Force 95 Organizational and Operational Analysis,” Slide: “Vector-in-Commander.”

¹¹ “Mobile Strike Force 95 Organizational and Operational Analysis,” Slides: “Phase I,” “Phase II,” “Phase III,” “Phase IV,” and “Phase V.”

¹² “Mobile Strike Force 95 Organizational and Operational Analysis,” Slides: “Base Case (Lethality),” “Adjustment 1 (Lethality),” “Adjustment 2 (Lethality),” and “Adjustment 3 (Lethality Force Package).”

¹³ “Mobile Strike Force 95 Organizational and Operational Analysis,” Slides: “Base Case (Survivability),” “Adjustment 1 (Survivability),” “Adjustment 2 (Survivability),” “Adjustment 1 (Survivability Force Package),” and “Survivability Insights.”

¹⁴ “Mobile Strike Force 95 Organizational and Operational Analysis,” Slides: “Base Case (Tempo),” “Adjustment 1 (Tempo),” “Adjustment 2 (Tempo),” “Adjustment 3 (Tempo),” “Adjustment 3 (Tempo Force Package),” and “Tempo Insights.”

¹⁵ Mr. Kevin Wainer, Analyst, Training and Doctrine Command Analysis Center White Sands Missile Range, interview by author, telephone, 5 January 1998.

¹⁶ U.S. Army Training and Doctrine Command Analysis Center, Technical Report TRAC-TR-0396, "Force XXI Division Design Analysis: Phase I Final Report" (Fort Leavenworth, KS: Study and Analysis Center, March 1996), Appendix E; U.S. Army Training and Doctrine Command Analysis Center, "The Brigade Design Analysis (BDA): Phase II Results - Draft" (White Sands Missile Range, NM: TRAC-WSMR, September 1997) 1-3; U.S. Army Training and Doctrine Command Analysis Center, Study Plan TRAC-SP-0196, "Study Plan for the Force XXI Division Design Analysis Phase II" (Fort Leavenworth, KS: TRADOC Analysis Center (TRAC) Study and Analysis Center (SAC), November 1996) Appendix B.

¹⁷ "Force XXI Division Design Analysis: Phase I Final Report," E-2.

¹⁸ "Force XXI Division Design Analysis: Phase I Final Report," E-3.

¹⁹ "Force XXI Division Design Analysis: Phase I Final Report," E-6.

²⁰ "Force XXI Division Design Analysis: Phase I Final Report," E-8.

²¹ "Force XXI Division Design Analysis: Phase I Final Report," E-6 to E-7.

²² "Force XXI Division Design Analysis: Phase I Final Report," E-6 to E-7.

²³ "Force XXI Division Design Analysis: Phase I Final Report," E-11.

²⁴ "Force XXI Division Design Analysis: Phase I Final Report," E-10.

²⁵ "Force XXI Division Design Analysis: Phase I Final Report," E-10 to E-15.

²⁶ "Force XXI Division Design Analysis: Phase I Final Report," E-10 to E-15.

²⁷ "Force XXI Division Design Analysis: Phase I Final Report," E-23.

²⁸ "Force XXI Division Design Analysis: Phase I Final Report," E-23 to E-24.

²⁹ "Force XXI Division Design Analysis: Phase I Final Report," 17.

³⁰ "Force XXI Division Design Analysis: Phase I Final Report," 53,

³¹ "Force XXI Division Design Analysis: Phase I Final Report," 53.

³² "The Brigade Design Analysis (BDA): Phase II Results - Draft," 3.

³³ "The Brigade Design Analysis (BDA): Phase II Results - Draft," 4.

³⁴ "The Brigade Design Analysis (BDA): Phase II Results - Draft," 4.

³⁵ "The Brigade Design Analysis (BDA): Phase II Results - Draft," 15.

³⁶ "The Brigade Design Analysis (BDA): Phase II Results - Draft," 23.

³⁷ "The Brigade Design Analysis (BDA): Phase II Results - Draft," 23.

³⁸ "The Brigade Design Analysis (BDA): Phase II Results - Draft," 22.

³⁹ "The Brigade Design Analysis (BDA): Phase II Results - Draft," 24.

⁴⁰ "The Brigade Design Analysis (BDA): Phase II Results - Draft," 32.

⁴¹ "The Brigade Design Analysis (BDA): Phase II Results - Draft," 25.

⁴² "The Brigade Design Analysis (BDA): Phase II Results - Draft," 26-28.

⁴³ U.S. Army Training and Doctrine Command, "Task Force XXI Outbrief to The TRADOC Staff" (Briefing, Fort Monroe, VA: October 1997), Slide 11 "Task Force XXI."

⁴⁴ "Task Force XXI Outbrief to The TRADOC Staff," Slide 7 "TF XXI Indicators of Success at NTC."

⁴⁵ "Task Force XXI Outbrief to The TRADOC Staff," Slide 7 "TF XXI Indicators of Success at NTC."

⁴⁶ U.S. Army Training and Doctrine Command Analysis Center, "Task Force XXI Advanced Warfighting Experiment Integrated Report" (White Sand Missile Range, NM: TRAC-WSMR, September 1997), 4-68 to 4-69.

⁴⁷ U.S. Army Operational Testing and Experimentation Command, "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report" (Alexandria, VA: OPTEC, 10 September 1997).

⁴⁸ U.S. Army Center for Army Lessons Learned, "Initial Impressions Report, Advanced Warfighter Experiment (Coordinating Draft) NTC Rotation 97-06, March 1997" (Fort Leavenworth, KS: April 1997); U.S. Army National Training Center, "Take Home Packet, NTC Rotation 97-06" (Fort Irwin, CA: NTC, 16 - 29 March 1997); Major General Kern, Commanding General, 4th Infantry Division, "Executive Working Group VTC 14 April 1997" (Fort Leavenworth, KS: Center for Army Lessons Learned, 16 January 1998); U.S. Army Experimental Force Control Cell, "TF XXI Experimental Directive" (Fort Hood, TX: EXFOR- ECC, 1 June 1996).

⁴⁹ "Task Force XXI Outbrief to The TRADOC Staff," Slide 14, "OPFOR Crosses International Border."

- ⁵⁰ "Take Home Packet, NTC Rotation 97-06," 1-3.
- ⁵¹ "Take Home Packet, NTC Rotation 97-06," 1-1.
- ⁵² "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," ES-3, D-1.
- ⁵³ "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," D-1 to D-3, ES-3.
- ⁵⁴ "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," 4-66, 4-67.
- ⁵⁵ "Take Home Packet, NTC Rotation 97-06," 1-3, 1-7, 1-13, 1-19, 1-22, and 1-28.
- ⁵⁶ "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," D-1 to D-28; "Take Home Packet, NTC Rotation 97-06," 1-1 to 1-30.
- ⁵⁷ "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," ES-16; MG Kern, Slides: "TF AWE Winners/Keepers."
- ⁵⁸ "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," ES-16.
- ⁵⁹ "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," ES-19.
- ⁶⁰ "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," ES-20.
- ⁶¹ "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," 4-69.
- ⁶² "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," 4-70.
- ⁶³ "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," E-7.
- ⁶⁴ "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," 3-53; "Task Force XXI Advanced Warfighting Experiment Integrated Report," 30-31.

⁶⁵ "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," ES-22.

⁶⁶ "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," D4, D7.

⁶⁷ "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," D-6.

⁶⁸ "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," D-8 to D-10.

⁶⁹ "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," 8-9.

⁷⁰ "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," 4-70.

⁷¹ "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report," 4-70.

⁷² "Take Home Packet, NTC Rotation 97-06," 1-9.

⁷³ U.S. Army Training and Doctrine Command Analysis Center, "The Study Plan for the Division XXI Advanced Warfighting Experiment" (Fort Leavenworth, KS: Study and Analysis Center, October 1996); U.S. Army Training and Doctrine Command, "The Division XXI Advanced Warfighting Experiment Directive" (Fort Monroe, VA: February 1997); U.S. Army Training and Doctrine Command Analysis Center, "Division XXI Advanced Warfighting Experiment (DAWE) Initial Insights Report (IIR)" (Fort Leavenworth, KS: Study Analysis Center, 15 December 1997); "DAWE After Action Review 10 December 1997" (Online: "Force XXI Internet" Site); U.S. Army Test and Experimentation Command, OPTEC Test and Experimentation Command (TEXCOM) DAWE Database, (Fort Leavenworth, KS: Training and Doctrine Command Analysis Center - Study Analysis Center, 13 January 1998)(Online: <http://www.trac.army.mil/dawe/>).

⁷⁴ "Division XXI Advanced Warfighting Experiment (DAWE) Initial Insights Report (IIR)," 4.

⁷⁵ "DAWE After Action Review 10 December 1997," 4th ID Slide: "AWE Winners."

⁷⁶ "TEXCOM DAWE Database," Target Acquisition: Records # 4808 and 5564, Reporting PIR: Record # 5532, Battle Damage Assessment: Record # 5550, Cueing Aviation and Close Air Support: Record # 4808, and Emplacing Remote Sensors: Records # 3691, 3763, and 3768.

⁷⁷ "TEXCOM DAWE Database," Records # 2287 and 5532.

⁷⁸ "TEXCOM DAWE Database," Record # 2287.

⁷⁹ "TEXCOM DAWE Database," Record # 5550.

⁸⁰ "TEXCOM DAWE Database," Record # 5564.

⁸¹ "TEXCOM DAWE Database," Record # 5550.

⁸² "TEXCOM DAWE Database," Record # 4808.

⁸³ "TEXCOM DAWE Database," Record # 3679.

CHAPTER 5

ANALYSIS

...by multiplying the means of obtaining information; for no matter how imperfect and contradictory they may be, the truth may be sifted from them.¹

Henri Jomini, *The Art of War*

This chapter applies the process of analysis presented in chapter 3 to the Force XXI Brigade Reconnaissance Troop as presented in chapter 2 and the Force XXI process data as presented in chapter 4. Four exercises of the Force XXI process provided data for this analysis: The Mobile Strike Force 95 Organizational and Operational Analysis (MSF 95 O&O), the Brigade Design Analysis (BDA), the Task Force XXI Advance Warfighting Experiment (AWE), and the Division XXI AWE (DAWE). The analysis uses a weighted criteria-based evaluation to determine whether the available data validates the Force XXI BRT with respect to five criteria: enhancement to the brigade commander's situational awareness; enhancement to the brigade's tempo of operations, lethality, and survivability; and effectiveness in accomplishing the reconnaissance mission with acceptable losses. Validation refers to a logical conclusion based on applicable demonstrations that the BRT enhances brigade operations and can effectively perform its mission.

This analysis involves two Force XXI BRT structures. The near-term BRT structure includes two scout platoons of six HMMWV-equipped scout teams and the direct support of a Striker platoon of six mounted forward observer teams. The scout HMMWV will be replaced with the LRAS3 with a fielding target date in 1999. (Refer to

figure 8, Near-Term Brigade Reconnaissance Troop.) The far-term BRT structure replaces the HMMWV and LRAS3 vehicles with a Future Scout and Cavalry System (FSCS). The far-term case is open to the possibility of transitioning the Striker platoon into a third scout platoon, once the FSCS-equipped scout team can demonstrate a redundant capability to the Striker team. (Refer to figure 9, Far-Term Brigade Reconnaissance Troop.)

The analysis in this chapter is presented in three sections. The first section evaluates the applicability of each Force XXI exercise based on similarities between the exercised brigade reconnaissance unit and the Force XXI BRT in terms of equipment, organization, and mission. The individual applicability of each exercise is quantified and used as a weighting factor for the final aggregate evaluation of the Force XXI process and the BRT. The second section of the chapter evaluates the data from each exercise with respect to the five criteria. This evaluation of data determines if the exercise demonstrated that the brigade reconnaissance unit made a net positive contribution in each of the four enhancement categories (situation awareness, tempo, lethality, and survivability) and that the reconnaissance unit accomplished its mission with acceptable losses (effectiveness). In the final section, the assessed demonstrations of each exercise are weighted. The composite results of the Force XXI process in each category are represented quantitatively and then compared to a quantitative standard of validation. The quantitative standard of validation in each category equates to a statement that the Force XXI process has by logical deduction demonstrated that the BRT enhances brigade operations with respect to the category (situational awareness, tempo, lethality, or survivability) or can effectively perform its mission.

Exercise Applicability Analysis

In comparing the brigade reconnaissance units exercised during the Force XXI process with the Force XXI BRT, the Task Force XXI AWE and DAWE brigade reconnaissance units were most similar to the BRT in terms of equipment, organization, and assigned missions. The Task Force XXI AWE brigade reconnaissance unit was very similar to the near-term BRT; this exercise is 75 percent applicable to the evaluation based on process described in chapter 3. The DAWE brigade reconnaissance unit was very similar to the far-term BRT; the DAWE is 75 percent applicable to this evaluation. The MSF 95 O&O Analysis and BDA II study employed reconnaissance units that were 50 percent similar to the far-term BRT. The BDA II study also applies to the near-term BRT. The BDA I study used a brigade cavalry squadron which was similar with the BRT only in terms of equipment. The BDA I study is approximately 18 percent applicable to the analysis of both the far-term and near-term BRT structures.

The evaluation and quantification of the applicability of exercises and their data to the assessment of the BRT is summarized in Table 5 (Applicability Analysis of Force XXI Exercises).

MSF 95 O&O

The MSF 95 Organizational and Operational Analysis employed a cavalry troop equipped with thirty-two future scout vehicles (FSV). The FSV is comparable to the far-term BRT Future Scout and Cavalry System currently under development. The MSF 95 O&O analysis applies to the far-term BRT evaluation in terms of type of equipment. The cavalry troop of the MFS 95 O&O was much larger than the Force XXI BRT in terms of

the number of scout teams (thirty verses eighteen) but was organized into three scout platoons, like the far-term BRT. Using the quantifying procedure outlined in chapter 3, the large discrepancy in the number of scout teams results in a rating representing no organizational similarity between the cavalry troop and the BRT.

With respect to the missions assigned to the cavalry troop in the MSF study, the exercise is applicable to the analysis of the BRT. Although the cavalry troop performed a mobile screen forward of the battalion task forces during the long movement into the ambush area, there was no significant contact or engagement during this phase of the operation. Once the brigade's task forces were in positions in the vicinity of the engagement area, the cavalry troop performed a static screen from observation posts (OP). The static screen mission is here assessed as a stealthy operation in consonance with the Force XXI BRT doctrinal role and mission. Based on the equipment similarities and the mission similarities, the MSF O&O exercise is rated as 50 percent applicable (weighted with two of four possible points).

BDA I

Because each phase of the Brigade Design Analysis involved a different brigade reconnaissance unit, the two phases are evaluated separately and treated as two separate sources of data in this analysis. The BDA I brigade reconnaissance asset was a cavalry squadron equipped with forty-five scout vehicles and fifteen M1A1 tanks; the squadron was organized into three ground troops (nine scout platoons). BDA I tested both the HMMWV for the near-term case and a FSV in the far-term case. Using the evaluation

process and the numerical average, the equipment similarity translates into a rating of 71 percent for both BRT structures.

Because the cavalry squadron was so large in terms of numbers of platoons, organizationally the squadron is not applicable to the Force XXI BRT. The missions assigned to the cavalry squadron in BDA I (described in chapter 4) involved reconnaissance and security with aggressive engagement criteria. The role of the cavalry squadron of BDA I was inconsistent with the current doctrinal role of the Force XXI BRT. The overall applicability rating for the BDA I study to the evaluation of both the near-term and far-term Force XXI BRT is approximately 18 percent (weighted with 0.71 out of 4 possible points).

BDA II

The BDA II study involved a brigade reconnaissance troop of two scout platoons and twenty scout vehicles. The study addressed both the HMMWV in the near-term case and the FSV in the far-term case. In terms of the type of equipment, this study is applicable to the evaluation of the Force XXI BRT. Organizationally, the BDA II reconnaissance troop differed slightly from the Force XXI BRT in terms of total number of scout teams (twenty verses eighteen) and in terms of numbers of platoons (three verses two). Quantifying the organizational similarity based on the procedure of chapter 3, BDA II is 50 percent similar to the Force XXI BRT. Similar to the BDA I study, BDA II employed the brigade reconnaissance troop with aggressive engagement criteria. With respect to the assigned mission, the BDA II exercise is not applicable. Nevertheless, due to the similarity in equipment and organization, the BDA II study is 50 percent applicable

to the evaluation of both the near and far-term Force XXI BRT (weighted with two of four possible points).

Task Force XXI AWE

The Task Force XXI AWE exercised a brigade reconnaissance troop with two platoons of ten HMMWVs each. In terms of type of equipment, this troop was identical to the near-term Force XXI BRT. Averaging over the eight brigade missions of the exercise, two teams of the Striker Platoon were attached to or in direct support of the reconnaissance troop. The attachment of other assets (engineer and chemical reconnaissance) does not effect the comparison of the number of scout teams. Based on the comparison procedure, the Task Force XXI AWE reconnaissance troop was 50 percent organizationally similar to the Force XXI BRT. The missions assigned to the Task Force XXI AWE brigade reconnaissance troop were realistic and consistent with the doctrinal role and missions of the Force XXI BRT. The overall applicability to the Task Force XXI AWE to the evaluation of the near-term BRT is 70 percent (weighted as three out of four possible points).

DAWE

The DAWE exercise employed a two-platoon reconnaissance troop equipped with future scout vehicles. One platoon was a scout platoon, and the other was a Striker platoon; the total number of teams was twelve. In terms of type of equipment, the DAWE exercise is fully applicable to the far-term Force XXI BRT. The DAWE brigade reconnaissance unit was the only reconnaissance unit in the exercises of the Force XXI

process with fewer scout teams than the final Force XXI BRT. The smaller number of scout teams is dissimilar to the BRT but does not reduce the applicability of demonstrated contributions. Applying the procedure for comparison, the DAWE reconnaissance troop is organizationally the most similar of all the exercised reconnaissance units to the far-term Force XXI BRT. The resolution of the DAWE exercise and data precludes a classification of assigned missions to either stealthy or aggressive operations. The net applicability assessment of the DAWE to the analysis of the far-term Force XXI BRT is 75 percent (weighted as three out of four possible points).

Table 5. Applicability Analysis of Force XXI Exercises

APPLICABILITY OF TEST	MSF/ PW 95 O&O	BDA I	BDA II	TF XXI AWE	DAWE
Equipment: (Max = 1; Min = 0) HMMWV = 1 (Near-term) FSCS = 1 (Far-term) M3 CFV = 0.5 (Far-term) M1 Tank = 0	1 Far Term (FSV)	0.71 Far Term (FSV) Near Term (HMMWV)	1 Far Term (FSV) Near Term (HMMWV)	1 Near Term (HMMWV)	1 Far Term (FSV)
Organization: (Max = 2; Min = 0) O = 2 - X If (2-X) < 0, then O = 0.	0	0	1	1	1.5
X = T + P	3	13.5	1	1	0.5
T = 0.25 * (# teams - 18) If # teams < 18, then T = 0.	3	10.5	0.5	1	0
# Scout Teams	30	60	20	22	12
P = 0.5 * 3 - # platoons	0	3	0.5	0	0.5
# Platoons	3	9	2	3	2
Mission: (Max = 1, Min = 0) Stealthy = 1 Both or unknown = 0.5 Aggressive = 0	1	0	0	1	0.5
TOTAL APPLICABILITY FACTOR For Exercise Maximum = 4.0 (100% Applicable)	2 (50%) Far	0.71 (18%) Near/Far	2 (50%) Near/Far	3 (75%) Near	3 (75%) Far

Evaluation of Exercise Data

This evaluation determines whether there is evidence of successful performance of the brigade reconnaissance unit in each exercise with respect to five areas or criteria. This assessment is independent of the applicability considerations addressed in the previous section. Chapter 3 defined five assessment criteria and presented supporting indicators of successful performance in each of the five areas. Chapter 4 summarized the data available from the exercises used in this assessment.

This section will assess each exercise and its brigade reconnaissance unit in terms of the demonstrated contribution of the reconnaissance unit to the brigade commander's situational awareness, the brigade's tempo of operations, the brigade's lethality, and to the brigade's survivability. This fifth assessment determines if there is evidence that the reconnaissance unit accomplished the mission with acceptable losses in each exercise.

MSF 95 O&O

The Mobile Strike Force 95 analysis offered no specific observations or data to substantiate a contribution by the cavalry troop in each maneuver brigade to the brigade commanders' situational awareness. Assessing situational awareness was not an objective of the exercise or the analysis. Accordingly the cavalry troop contribution to situational awareness in the MSF 95 exercise is indeterminate.

The MSF 95 analysis did evaluate the contribution of the various units in the mobile strike force structure to tempo. The analysis assessed the brigade cavalry troops as average contributors to tempo relative to the other MSF units. The troop was neither a high or nor a low contributor to the tempo of operations.

The MSF 95 analysis did determine that the brigade cavalry troop was a high contributor to the lethality of the force. A distinction here is made between the direct lethality of a future scout vehicle and the contribution to lethality of the scout team equipped with a vehicle affording enhanced target acquisition and precision guidance capabilities. The contribution of the cavalry troop to lethality in MSF 95 involved directing and controlling precision artillery fire and cueing the commitment of attack aviation assets. The MSF data indicates the cavalry troop made a positive contribution to the lethality of the brigade.

The MSF 95 simulation and analysis determined the brigade cavalry troop had a positive impact on the survivability of the mobile strike force division. The results of the analysis indicated that the FSV-equipped cavalry troop was survivable (with a 95 percent survival rate at the conclusion of the battle). Perhaps more significant is the fact that the cavalry troop contributed to the survivability of the mobile strike force in terms of defeating threat systems (forward observers) which characteristically inflict heavy losses on the force.

In the commander's intent, the MSF commander established criteria for success in terms of both the destruction of the threat operational exploitation force (a mechanized corps) and a resulting combat strength of 85 percent for every unit in the MSF. The brigade cavalry troop retained an average of 95 percent combat strength after the engagement. The MSF 95 analysis data does provide evidence that the brigade cavalry troop was effective in accomplishing the mission with acceptable losses.

BDA I

The brigade ground cavalry squadron of the BDA I study demonstrated enhancement to the situational awareness of the brigade. Although assessing situational awareness was not a specific objective of the BDA I exercise or analysis, the study referred to the cavalry squadron's contribution to the extension of the brigade battlespace and to the significant effects achieved prior to the start of the main battle. These points indicate that the cavalry squadron enhanced the brigade's situational awareness during the simulated exercise.

The BDA I study provided no data indicating that the cavalry squadron enhanced or impeded the tempo of operations for the brigade. The BDA I study concluded that the cavalry squadron increased the versatility of the brigade with respect to the Force XXI patterns of operation, but it presented no substantial data to support a squadron contribution to tempo of operations.

In terms of lethality, the BDA I study highlighted the fact that adding the cavalry squadron to the brigade greatly increased the number of artillery kills in the covering force fight. The BDA I exercise demonstrated that the cavalry squadron improved the brigade's effectiveness by allowing the threat to be located, engaged, and destroyed early in the engagement. This resulted in the brigade achieving more favorable combat power ratios in the close fight. The data from BDA I does verify that the cavalry squadron enhanced the lethality of the brigade.

In the BDA I exercise the cavalry squadron sustained high losses both in the near-term case with HMMWVs and M1A1 tanks and in the far-term case with FSVs and M1A1 tanks. One comment in the analysis referred to only 60 percent of the near-term

cavalry squadron surviving the engagement. Other BDA I data indicated average scout losses of 24 to 25 percent in both the near-term and far-term cases. This second statistic summarized all scout assets (to include the battalion scouts). The BDA I study concluded that the cavalry squadron was very vulnerable to enemy fire and required an upgraded armor protection. Based on these conclusions, the BDA I exercise demonstrated that the cavalry squadron had a negative impact on the survivability of the brigade.

The brigade cavalry squadron losses in both the near and far-term cases of the BDA I simulation exceeded 25 percent. Although the cavalry squadron accomplished its reconnaissance and security mission, the high loss rate indicates that the cavalry squadron of the BDA I simulation did not accomplish the mission with acceptable losses.

BDA II

The BDA II study tested both a near-term HMMWV-equipped and a far-term FSV-equipped brigade reconnaissance troop. In the BDA II exercise the reconnaissance troop made significant contributions to the situational awareness of the brigade. In the comparison of the AOE and MOD HVY brigades, the study credited the brigade reconnaissance troop with a significant increase in the range of the brigade engagement and in the pre-battle destruction of threat scouts and forward observers. This enlargement of the brigade's battlespace in space and time is an indicator of the reconnaissance troop's positive contribution to the brigade's situational awareness.

The BDA II study offered no specific evidence that the reconnaissance troop made contributions to the brigade's tempo of operations. The reconnaissance troop did interfere with the threat's ability to employ effective indirect fires early in the

engagement by destroying threat scout teams; however, the BDA II study provided no evidence that this disrupted the enemy tempo.

The comparison of the lethality of the AOE and MOD HVY brigades, as measured by the number of threat system killed, does not indicate that the MOD HVY brigade was more lethal in either the near-term or far-term case. The BDA II data does indicate that the reconnaissance troop significantly enhanced the brigade's counter-reconnaissance fight by destroying threat scouts with indirect fire. In the far-term case this enhancement increased twofold due to the capability for precision guided artillery. The positive impact on the brigade counter-reconnaissance fight indicates a net positive contribution by the BDA II reconnaissance troop to the lethality of the brigade.

The BDA II study presented statistics concerning the survivability of the reconnaissance troop in both the near-term and far-term cases. In the near-term case, the brigade scouts had approximately a 92 percent survival rate; in the far-term case, the survival rate was closer to 90 percent. These statistics verify that the reconnaissance troop met the standards of acceptable losses and consequently had a positive impact on the brigade's survivability.

The BDA II study concluded that the reconnaissance troop was capable of performing all reconnaissance missions and the screen mission. The study presented the data to support the assessment that the reconnaissance troop accomplished the mission with acceptable losses (7.8 percent and 9.9 percent).

Task Force XXI AWE

Based on the data presented in chapter 4, the brigade reconnaissance troop employed during the Task Force XXI AWE did make a net positive contribution to the commander's situational awareness. The troop successfully reported over five hundred spot reports during the eight missions. The troop answered the commander's priority intelligence requirements and provided accurate and timely information. The Task Force XXI AWE data did indicate one negative effect on situational awareness related to the brigade reconnaissance troop. Maintaining visibility of the many friendly reconnaissance assets forward of the maneuver elements proved to be a challenge. Nevertheless, during the Task Force XXI AWE the reconnaissance troop contributed to commander's situational awareness.

The Task Force XXI AWE data indicates that the brigade experienced difficulty integrating the brigade reconnaissance troop into a coherent reconnaissance, intelligence, surveillance, and target acquisition (RISTA) plan. On more than one occasion the troop was deployed without proper focus and preparation. The reconnaissance troop also contributed to difficulties and delays in clearing fires forward of the maneuver units. These indicators lead to the conclusion that the brigade reconnaissance troop demonstrated a net negative effect on the brigade's tempo of operations.

In terms of demonstrated contributions to the lethality of the brigade, there was no strong evidence that the reconnaissance troop improved or degraded the brigade's lethality. There is evidence that the reconnaissance troop processed calls for fire, but there is no evidence that the troop achieved significant results. There were also no

indications that the troop significantly effected the brigade's counter-reconnaissance effort.

Based on the available data, there was no evidence that the reconnaissance troop enhanced or degraded the brigade's survivability during the Task Force XXI AWE. The troop was involved in two cases of friendly fratricide, and several observations referred to the success of the opposing force counter-reconnaissance effort. Nevertheless, the effect of the reconnaissance troop on the brigade's survivability is indeterminate.

General comments from Task Force XXI AWE final reports state that the brigade reconnaissance troop was a "high performer." Based on the available data, the brigade reconnaissance troop clearly demonstrated that it could enhance the commander's situational awareness; however, there was no evidence to support a conclusion that the troop accomplished its missions with acceptable losses.

DAWE

As presented in the chapter 4, the brigade reconnaissance troops exercised during the DAWE made significant contributions to the situational awareness of the commander. The troops were successful in reporting accurate and timely information, in identifying high payoff targets, and in reporting battle damage assessment. Comments indicated that the reconnaissance troops coupled with the other RISTA assets did expand the brigades' battlespace.

Based on the contribution to dynamic intelligence collection and dynamic targeting, the brigade reconnaissance troop demonstrated a net positive contribution to

the brigade's tempo of operations during DAWE. The data also indicates that the brigade successfully integrated the reconnaissance troop into a focused and coherent RISTA plan.

In terms of contributions to the lethality of the brigade, several comments from subject matter experts indicated that the reconnaissance troop helped to focus the brigade's employment of indirect fires and attack aviation assets. In the DAWE simulation, the brigade reconnaissance troops were equipped with a future scout vehicle with enhanced target acquisition capabilities. Given the enhanced target acquisition capability and the artillery's capability for precision guided munitions, the reconnaissance troop made significant contributions to lethality.

The data from the DAWE exercise does not indicate a significant contribution to the brigade's survivability by the brigade reconnaissance troop equipped with future scout vehicles. An observation from the exercise indicated that during a defensive operation, the brigade scouts were less than 50 percent combat effective. However, the data contained no other loss statistics for the reconnaissance troop. The net contribution by the reconnaissance troop to survivability is indeterminate.

The DAWE exercise indicates that the brigade reconnaissance troop was effective in performing reconnaissance, controlling indirect fires, emplacing remote sensors, and in reporting battle damage assessment. However, the data from the exercise does not support a conclusion that reconnaissance unit accomplished its mission with acceptable losses.

Results

Table 6 summarizes and quantifies the evaluations of the data from each exercise with respect to the five categories for validation. The demonstrated performance rating of the reconnaissance units in each exercise is weighted with the applicability factor of the exercise. The sum of the weighted ratings are presented in the rightmost column. The standard of validation in each category is a minimum total score of four. This standard is equivalent to a statement that the aggregated results of the Force XXI process effectively demonstrated that the BRT enhances the brigade operations with respect to the particular characteristic (situational awareness, tempo, lethality, or survivability) or effectively accomplishes the reconnaissance mission with acceptable losses.

Table 6. Evaluation of Data and Compilation of Results

	MSF/ PW 95 O & O	BDA I	BDA II	TF XXI AWE	Div AWE	
TOTAL EXERCISE APPLICABILITY FACTOR (Weighting Factor)	Far 2	Near Far .71	Near Far 2	Near 3	Far 3	
ENHANCEMENT CRITERIA: Pos = 1; Indeterminate = 0; Neg = -1						<u>TOTAL Validation</u> ≥ 4.0
	Rating/Weighted Score					
Situation Awareness	0 / 0	1 / .71	1 / 2	1 / 3	1 / 3	Near +5.71 Far +5.71
Tempo	0 / 0	0 / 0	0 / 0	-1 / -3	1 / 3	Near -3 Far +3
Lethality	1 / 2	1 / .71	1 / 2	0 / 0	1 / 3	Near +2.71 Far +7.71
Survivability	1 / 2	-1 / -.71	1 / 2	0 / 0	0 / 0	Near +1.29 Far +3.29
EFFECTIVENESS (Accomplished Mission with acceptable losses) Yes = 1; Indeterminate = 0; No = -1.	1 / 2	-1 / -.71	1 / 2	0 / 0	0 / 0	Near +1.29 Far +3.29

This analysis determines that the data from the Force XXI process validated both the near-term and far-term BRT structures with respect to enhancing the situational awareness of the brigade commander. Every individual exercise with the exception of the MSF 95 O&O confirmed this enhancement. No conclusions could be drawn from the MSF exercise in this category.

The analysis determined that the data from the Force XXI process has not validated the BRT in terms of contributions to the tempo of operations for the brigade. The MSF 95 O&O analysis addressed the issue of tempo, but it only determined that the brigade reconnaissance unit had neither a positive or negative impact on tempo compared to the other units in the MSF. Neither BDA exercise provided conclusive evidence in terms of the reconnaissance unit's contribution to tempo. The DAWE was the only exercise to demonstrate that the exercised reconnaissance unit significantly enhanced the tempo of the brigade's operation. This evidence supports the case that the far-term BRT structure, equipped with a future scout vehicle, can enhance the tempo of operations. However, it does not meet the standard of validation due to organizational differences between the exercised reconnaissance unit and the far-term BRT. Finally, Task Force XXI AWE demonstrated that in the near-term, the BRT could possibly have a detrimental effect on the brigade's tempo of operations. This effect is associated with the difficulty of the brigade in integrating the BRT into a focused, coherent RISTA plan; in maintaining visibility of friendly units forward of the maneuver battalions (to prevent fratricide); and in clearing indirect fires in a timely manner.

With respect to lethality, the Force XXI process validated the far-term (FSV-equipped) BRT. The far-term BRT will enhance the brigade's lethality primarily due to

its target acquisition capability and the artillery's precision indirect fire capability. Every simulated exercise for the far-term case supported this conclusion, with the preponderance of support from the DAWE exercise. This analysis shows that the Force XXI process failed to validate the near-term BRT in terms of enhancing the brigade's lethality. Both BDA studies (which relied completely on computer simulations) determined that a near-term reconnaissance troop could enhance the lethality of the brigade; however, the reconnaissance troops of the BDA exercises were not entirely applicable to the Force XXI BRT in terms of mission and organization.

The data from the Force XXI process failed to validate either the near-term and far-term BRT in terms of contributions to the survivability of the brigade. The two most relevant exercises, the Task Force XXI AWE and DAWE, did not provide data to support or refute the survivability of the BRT on either the near-term or far-term battlefields. The MSF 95 O&O analysis and the BDA II study both supported the statement that an FSV-equipped brigade reconnaissance unit could enhance the survivability of the brigade. However, BDA-I study demonstrated possible negative effect from a brigade reconnaissance unit to the brigade's survivability. Combining the demonstrations of these three simulated exercises, the far-term BRT slightly falls short of the validation standard. Quantifying the term slightly, the far-term BRT was only 82 percent validated.

The data from the BDA II study supports the argument that the near-term (HMMWV and LRAS3-equipped) BRT is survivable. However given the 50 percent applicability of the BDA II study in terms of equipment, organization, and mission; and given the BDA I data which indicates the near-term reconnaissance unit does not meet acceptable survivability criteria; the Force XXI process clearly did not validate the near-

term BRT in terms of survivability. The conspicuous absence of data from the Task Force XXI AWE concerning the survivability of the brigade reconnaissance unit prevented validation of the near-term BRT.

The data from the Force XXI process fails to validate the near-term and far-term BRT structures in terms of demonstrating that the troop can accomplish the mission with acceptable losses. The data from the two most relevant exercises, the Task Force XXI AWE and DAWE, strongly supports a conclusion that the reconnaissance troop could accomplish the reconnaissance mission. However, neither of these exercises provided evidence that the troop could do this with acceptable losses.

Based entirely on the three simulated exercises (MSF, BDA I, and BDA II) there is evidence that a far-term reconnaissance unit equipped with a future scout vehicle can accomplish the mission with acceptable losses. Nevertheless, this combined evidence failed to show that the far-term BRT could accomplish the mission with acceptable losses because the exercises were not completely applicable in terms of the organization of and missions assigned to the reconnaissance unit. The data from the BDA I exercise also refutes this assertion. The BDA I exercise demonstrated unacceptable losses in the far-term reconnaissance unit.

The Force XXI process failed to validate the near-term BRT in terms of mission accomplishment with acceptable losses. The most significant shortfall in this validation was the Task Force XXI AWE. Although this exercise provided data supporting a conclusion that the reconnaissance troop could accomplish its assigned mission, the data from the Task Force XXI AWE failed to provide evidence that the near-term BRT was

survivable on the battlefield. A summary of the validation results are presented in table 7.

Table 7. Validation Results

	NEAR-TERM BRT	FAR-TERM BRT
FORCE ENHANCEMENTS		
Situational Awareness	VALIDATED	VALIDATED
Tempo	NEGATIVE IMPACT	-----
Lethality	-----	VALIDATED
Survivability	-----	-----
EFFECTIVENESS	-----	-----
Mission Accomplishment With Acceptable Losses	YES NO	YES NO

¹ Henri Jomini, *The Art of War*, tran.G.H. Mendell and W.P. Craighill (West Port, CT: Greenwood Press, 1977), 273

CHAPTER 6

CONCLUSIONS

Altogether, cavalry operations are exceedingly difficult, knowledge of the country is absolutely necessary, and ability to comprehend the situation at a glance, and an audacious spirit, are everything.¹

Maurice de Saxe, *Mes Reveries*

The U.S. Army has designed and will soon integrate a brigade reconnaissance troop (BRT) in the heavy maneuver brigade of the Force XXI division. This BRT evolved from a series of tests, analyses, exercises, and advanced warfighting experiments integrated into the Force XXI process. This study reviewed the evolution of the BRT from 1995 to 1998 in order to explore the question: Does the data available from the Force XXI process validate the organization and structure of the BRT as proposed in the Force XXI heavy division design? The components of the Force XXI process most relevant to this study and which provided the data for this study included the Mobile Strike Force 95 Organizational and Operational Analysis, the Brigade Design Analysis studies as supporting analyses for the Division Design Analysis, the Task Force XXI AWE, and the Division XXI AWE.

The Force XXI heavy division will field a BRT consisting of two scout platoons with six HMMWV-mounted scout teams in each. An artillery Striker Platoon of six Striker teams will augment the BRT as an artillery asset in direct support to the brigade. The Long Range Advanced Scout Surveillance System, a lightweight, extended range line of sight reconnaissance and surveillance system mounted on the HMMWV, will replace the scout HMMWV in the near term (force year 1999). A future scout vehicle,

potentially the Future Scout and Cavalry System, should replace the LRAS3 by force year 2010. Due to expected redundant capabilities between the FSCS-equipped scout team and the current Striker team, the future Division XXI structure may convert the Striker Platoon into a third BRT scout platoon.

The doctrinal role of the BRT is well presented in a draft manual, Fort Knox Supplemental Material 17-97-10(A), *Tactics, Techniques, and Procedures for the Applique' Brigade Reconnaissance Troop*. The 4th Infantry Division (the Experimental Force for the Force XXI process) continues to refine this manual. The primary missions of the BRT are to provide battlefield information directly to the brigade commander through reconnaissance and to conduct limited security missions. The BRT is best suited for stealthy reconnaissance and should accomplish its mission by “communicating, moving, and shooting in that order.”²

Given the final structure, organization, and role of the BRT within the Force XXI heavy brigade, this research investigated whether the Force XXI studies, analyses, and AWE have demonstrated that the product works. Because each study, analysis, and AWE employed a slightly different brigade reconnaissance unit structure, this study first evaluated the applicability of the exercise to the Force XXI BRT in terms of equipment, organization, and assigned missions. The study then evaluated the data available from each exercise to determine if the exercise successfully demonstrated capabilities of the reconnaissance unit. Finally, this research assessed if the Force XXI process demonstrated that the BRT does enhance the brigade commander's situational awareness, the tempo of operations of the brigade, the lethality of the brigade, and the survivability

of the brigade. Furthermore, this research analyzed if the Force XXI process has demonstrated that the BRT can accomplish its mission with acceptable losses.

The research concludes that the available data from the Force XXI process in fact validates the BRT concept in terms of its positive contribution to the situational awareness of the brigade commander. In three of the four most applicable Force XXI studies, analyses, and AWE the brigade reconnaissance units clearly demonstrated a positive enhancement to situational awareness by providing timely and accurate information about enemy forces and terrain, by answering the commander's priority information requirements, and by increasing (temporally and spatially) the battlespace of the brigade. The BRT concept can help fulfill the requirement for dedicated brigade reconnaissance, intelligence, surveillance, and target acquisition assets.

However, this research also concludes that the data available from the Force XXI process fails to demonstrate that the BRT can enhance the brigade's tempo of operations. During Task Force XXI, the only major force-on-force AWE involving the heavy brigade, the brigade reconnaissance unit may have contributed to the degradation of the brigade's tempo of operations. During this exercise, the brigade did not effectively maintain the tempo of RISTA planning and execution with the tempo of operations. On several missions the reconnaissance troop was deployed without specific focus (named areas of interest) or adequate preparation time for rehearsals. The brigade was challenged to integrate the available RISTA assets (unmanned aerial vehicles, reconnaissance troop, and the joint surveillance target attack radar system) into a coherent, focused collection plan within a timely manner. This statement must be tempered with the fact that the brigade reconnaissance troop was one of over seventy initiatives tested during the Task

Force XXI AWE. The interruption of the brigade tempo of operations in terms of RISTA planning involved a multitude of digitization issues and tactics, techniques, and procedures. Nevertheless, the Task Force XXI failed to demonstrate that the BRT enhances the brigade's tempo of operations.

The Division AWE, a simulation-enhanced command post exercise conducted eight months later, did demonstrate great improvements in the brigades' integration of available RISTA assets into a coherent, focused plan. However, this exercise did not involve real scout teams crossing the line of departure; it was a computer simulation in which real-time troop leading procedures at the company level were not exercised. The implication here is that the BRT concept has yet to be validated in terms of enhancing the brigade's tempo of operations. In order to validate the BRT with respect to tempo, a heavy brigade with an organic BRT should execute a full force exercise specifically targeted for the assessment of the tempo of RISTA planning and execution. The brigade should continue to train, execute, and be assessed until it demonstrates the necessary tactics, techniques, and procedures (TTP) and capability to conduct timely RISTA operations within a high tempo exercise. The lessons learned from this assessment can then be captured, documented, and disseminated throughout the force. In the area of brigade reconnaissance, the combat training centers provide too many examples of what doesn't work. Exercises specifically targeting the validation of the BRT provide a great opportunity for the Army to focus and figure out what does work and then to disseminate these lessons learned throughout the force.

This research concludes that the Force XXI process failed to validate the HMMWV or LRAS3-equipped BRT in terms of the lethality and survivability of the

brigade. During all computer simulations of heavy brigade engagements, the far-term, FSV-equipped BRT did demonstrate enhancements to lethality based on the use of future target acquisition capabilities and precision artillery munitions. However, during Task Force XXI AWE the HMMWV-equipped reconnaissance troop did not demonstrate a significant contribution to threat kills or to the brigade's counterreconnaissance effort.

Perhaps the most significant aspect of validation for the BRT is the ability to accomplish the reconnaissance mission and survive against a credible threat. This is a challenging standard which many HMMWV-equipped battalion scout platoons have not met during recent Combat Training Center rotations. COL William Betson of the National Training Center, stated in the *CTC Quarterly Bulletin* (September 1997),

For years the Army has understood the direct correlation between reconnaissance success and battlefield success at the NTC--and in real combat for that matter. Yet in the great majority of instances, reconnaissance and surveillance (R&S) operations fail to provide commanders with adequate information about the enemy. Not only that, they also incur losses that are prohibitive. Indeed, if we fight the next war as we train, we will not have any scouts left after the first several days of combat.³

His article goes on to identify problems associated with planning, preparation, and execution of brigade reconnaissance and then recommends several tactics, techniques, and procedures for correcting these problems. Nevertheless, although mission accomplishment with acceptable losses is a challenging standard of validation, it is absolutely critical. Brigade leaders must have confidence in the survivability of the reconnaissance troop before they will actually use them forward of a heavy brigade in combat against a credible threat.

This research indicates that the Force XXI process and particularly the most two recent and applicable advanced warfighting experiments (Task Force XXI and Division

XXI) did not demonstrate that the BRT can accomplish its mission with acceptable losses. This shortcoming in the validation process is significant and must be addressed by the Army if tactical leaders at the brigade level are to be convinced that the Force XXI BRT is part of the solution to the acknowledged problems of brigade reconnaissance. Some leaders may claim that high risk is the cost of doing business or that low survival is an inherent characteristic of scout and reconnaissance operations. However, as an institution, the Army has a responsibility to demonstrate that the mission and survivability of the brigade reconnaissance troop are feasible and acceptable. The American soldiers serving and who will serve as scouts around the world today and tomorrow deserve nothing less.

Based on the Force XXI process, three brigade reconnaissance troop issues surfaced which were not directly related to the criteria for this analysis. Nevertheless, these issues require some refinements to the BRT concept. First, the troop requires a reliable long-range (fifteen to twenty-five kilometer) communication system. The current reliance on frequency modulated SINCGARS radios for either voice or digital communication at these ranges requires the troop have some organic relay or retransmission capability. One alternative is to use of single channel, ultra high frequency, tactical satellite communications for the troop headquarters to communicate with brigade. Two other possibilities involve high frequency radios and cellular phones. Nevertheless, reliable long-range communications remains a critical issue in the successful accomplishment of the brigade reconnaissance mission.

Another issue involves logistics. Difficult to exercise in simulations, the brigade reconnaissance troop logistic support presents some unique challenges in performing the

basic tactical logistic functions (manning, arming, fixing, fueling, moving, and sustaining). Given the ranges of the troop's area of operations forward of the brigade's lead maneuver elements, resupply and medical evacuation become critical areas which require innovative solutions. Based on this research, logistic support for the brigade reconnaissance troop is still an area requiring development and validation.

The final issue worthy of future investigation involves control measures employed to prevent fratricide between the forward maneuver task forces, friendly indirect fire, and the brigade scout teams. This issue involves refining different tactics, techniques, and procedures. The brigade can employ several restrictive control measures (no fire areas, boundaries, restricted fire lines, restricted fire areas, etc.) to protect its scouts from the maneuver task forces. Nevertheless, techniques to protect the scouts should be refined using current on-hand technologies.

Recommendations

The shortcomings in validation of the BRT presented in this research can be addressed in further exercises at reasonable costs. Brigade exercises and rotations to the combat training centers provide excellent opportunities for assessments that can validate the brigade reconnaissance troop's contribution to tempo, lethality, survivability, and mission accomplishment with acceptable losses. These exercises do not have to involve the digitized force but could involve any heavy brigade. Although the Force XXI brigade reconnaissance troop within the 4th Infantry Division is equipped with applique' or digitized equipment, several core issues of validation for the brigade reconnaissance troop can be separated from the digitization. The survival of the troop and the ability to

accomplish the mission with acceptable losses are not tied to the digital links to the brigade. These factors are related to tactics, techniques, and procedures used in accomplishing the mission. A test of these factors could be incorporated into any heavy brigade rotation to a combat training center, given a test brigade reconnaissance troop and some preliminary training for the brigade staff related to employing, controlling, and supporting the troop.

Based on this research, a successful validation effort with the brigade reconnaissance troop should have three specific characteristics. The validation of the BRT is not an ancillary issue; it requires a dedicated and focused effort. First, a single agency should be responsible for the validation effort from start to finish. The Force XXI process involved several different agencies, each with its own emphasis, techniques, and agenda. One lead agency will help ensure continuity between tests and ensure that lessons learned are carried over into the next exercise. Both the 4th Infantry Division and the Armor Center are good candidates for the lead agency.

Second, the tests should isolate the test variable (the brigade reconnaissance troop) so that clear cause and effect relationships can be determined. Throughout the Force XXI process, most exercises involved a multitude of variables or initiatives with very complex interrelationships. With respect to the mission accomplishment and survival on the battlefield, the variable (the BRT organization with current on-hand technologies) should first be isolated in testing.

Third, the test effort should focus on solving the problem. The validation will require a series of training exercises with a built in flexibility to train to standard and not to limited resources (specifically time). The validation must be open to refining the BRT

infrastructure in terms of communication systems (materiel, personnel, and procedures) and logistics systems (resupply and medical evacuation). The history of warfare since World War II and experiences from the combat training centers with reconnaissance and scouts at both the brigade and battalion levels show that this is not an easy problem to solve. It will not be solved with a single exercise; but it can be solved with an institutional commitment to solve the problem manifested in resources and attention.

One recommendation is for the test BRT to be temporarily stationed at the National Training Center. Similar to many other brigade assets, the troop could be placed organic to training brigades for the rotation. This testing arrangement presents many challenges due the absence of habitual relationships and familiarity with a brigade's leadership climate and standard operating procedures. However, if the reconnaissance troop can accomplish its mission with acceptable survival under these conditions, then it can certainly do the same operating in its assigned brigade. This arrangement would require strong coordination and some training for both the training brigade and the reconnaissance troop prior to the rotation. Nevertheless, it would provide an opportunity for one reconnaissance troop and one assessment agency to work through the issues, solve the problems, and then capture the solutions in doctrine.

This recommended validation involves a series of exercises and training. Every exercise will produce new lessons that bring the concept one step closer to achieving the standard. As are currently being refined by the 4th Infantry Division; tactics, techniques and procedures will continue to evolve until an acceptable level of tempo for brigade RISTA operations and of scout survivability is realized. Finally, the well-defined endstate to the assessment must be that the brigade reconnaissance troop can be

effectively employed by a brigade headquarters in a timely manner, accomplish the mission and survive.

¹ U.S. Army, FM 17-90, *Cavalry Operations* (Washington, DC: Department of the Army, 24 December 1996), 1-1.

² U.S. Army Armor School, Fort Knox Supplemental Material 17-97-10(A), *Tactics, Techniques, and Procedures for the Applique' Brigade Reconnaissance Troop* (Coordinating Draft #2) (Fort Knox, KY: U.S. Army Armor School, 1 June 1996), 1-1.

³ Colonel William Betson, "Reconnaissance and the Maneuver Brigade," *CTC Quarterly Bulletin*, 4th Qrt, FY 97, No. 97-18 (Fort Leavenworth, KS: Center for Army Lessons Learned, September 1997), 1.

GLOSSARY

Advanced Warfighting Experiments (AWE) are a series of experiments conducted to provide information for analysis concerning the digitization of Force XXI and other army initiatives effecting doctrine, training, tactics, techniques, organizational design, personnel, logistics, materiel, and soldier systems.¹

Area of Operations (AO) is the area assigned by higher headquarters to a subordinate commander for the purpose of conducting operations. The area should accommodate the employment of all organic, assigned, and supporting assets of the command. Within the AO the commander assigns responsibilities, coordinates fire and maneuver, and controls activities.²

Area of Interest (AI) is the area that encompasses threat forces and other factors that can influence or effect the operation of a tactical unit. The area of interest is generally larger than and includes the assigned area of interest. The brigade area of interest generally includes factors that can influence the brigade operations up to 24 hours out or which are within 30 kilometers of the area of operations.³

Army After Next is the concept for a radically different army to follow Army XXI. The Army After Next does not refer to an improvement of the existing force but to an entirely different force. The force parameters are to be a logistically unencumbered force with greater lethality, versatility, and strategic and operational mobility.⁴

Army of Excellence (AOE) is the current force structure of the army. The AOE organization has five division structures (armored, mechanized infantry, light infantry, air assault infantry, and airborne infantry). The division has an endstrength of approximately 18,000 troops and is tailored to meet specific mission, enemy, troops, terrain and weather, and time available (METT-T) conditions.⁵ AOE often refers to the current army Table of Organization and Equipment (TOE) which establishes authorizations for personnel and equipment within army units. This TOE was completed in 1984 and implemented in the mid-1980s, replacing the J-Series TOE.

Army Vision 2010 is the Army's plan for contributing to the operational concepts contained in Joint Vision 2010. The Chief of Staff of the Army published this plan in November 1996. The goal of Army Vision 2010 is to equip a capabilities-based army capable of conducting prompt and sustained joint operations while protecting the essential elements of the science, technology, and industrial bases. This involves investment strategies for the near-term (1998-2003), mid-term (2004-2009), and far-term (2010-2020).⁶

Battle Damage Assessment (BDA) is timely and accurate estimate of damage resulting from the application of combat power against a target or objective.⁷

Battle Labs are integral research facilities to the Force XXI process. There are six battle labs: Early Entry (Fort Monroe, VA), Mounted (Fort Knox, KY) and Dismounted (Fort Benning, GA) Battlespace, Command and Control (Fort Leavenworth, KS; Fort Gordon, GA; Fort Huachca, AZ), Depth and Simultaneous Attack (Fort Monroe, VA), and Combat Service Support (Fort Lee, VA). These facilities determine operational requirements through warfighting experiments and match them with available technologies in industry and academia.⁸

Battlefield operating systems (BOS) are vital tactical activities. The BOS provide a categorization for subsets of considerations for tactical planning and execution. Synchronization and coordination within the BOS and between various BOS are paramount to any operation. The BOS include intelligence, maneuver, fire support, mobility and survivability, air defense, combat service support, and command and control.⁹

Battlespace is the concept of physical region determined by the maximum capabilities of friendly and enemy forces to acquire and dominate each other by fire and maneuver and in the electromagnetic spectrum.¹⁰

Combat Arms Task Force Engagement Model (CASTFOREM) is a simulation model for weapon system and tactics evaluation for brigade and lower level combined arms operations. CASTFOREM uses digitized terrain data and is event sequenced. Decisions are made based on initial input of decision rules.¹¹

Combat Observation/Lasing Team (COLT) is a precursor to the STRIKER concept. The COLT team is a high-technology observer team designed to maximize the use of smart munitions. The COLT team is capable of directing any laser directed munitions. The team consists of three soldiers (team leader, G/VLLD operator, and driver). The team uses a G/VLLD (ground/vehicular laser locator designator) to designate targets out to 5 km.¹²

Digitization is the application of information technologies to acquire, exchange, and employ timely battlefield information. Digitization will enhance situation awareness and promote information dominance by allowing forces at all echelons to share a common relevant picture of the battlefield in real or near-real time.¹³

Division XXI Advanced Warfighting Experiment (DAWE) is a multi-echelon experiment emphasizing division level battle command in a competitive simulation. The 4th Infantry Division, the Army's Experimental Force (EXFOR) and III Corps, operating at Fort Hood, Texas fought against the World Class Opposing Force using the Battle Command Training Program (BCTP) Warfighter Exercise (WFX) tools in a European scenario. The purpose of the experiment was to validate the Force XXI division design, the combat service support (CSS) concept, the Force XXI Battle Command and Information Operations requirement, and the operational concept for Division XXI operations. The exercise was conducted from 5 - 13 November 1997.¹⁴

Experimental Force (EXFOR) is a specific army force used to test and evaluate new organizational designs, technology and digitization initiatives, doctrine, and tactics. The EXFOR is the 4th Infantry Division (Mechanized) from Fort Hood, Texas.¹⁵

Force Protection is any collection or combination of measures to prevent or mitigate damage or disruption to an aggregation of military personnel, weapon systems, vehicles, installations, or necessary support.¹⁶

Force XXI is the Army's comprehensive process for modernizing and preparing for warfare and operations in the twenty-first century. Force XXI will develop the necessary doctrine, organizations, training, equipment, and weapons for the army of the 21st century. The initial product of Force XXI will be Army XXI. The Force XXI process involves a series of evaluations, exercises, and experiments, on which the Army's future organization, equipment, training, and doctrine will be based.¹⁷

Force XXI Characteristics¹⁸

1. Doctrinal Flexibility
2. Strategic Mobility
3. Tailorability and Modularity
4. Joint and Multinational
5. Versatile in War and Stability and Support Operations

Force XXI Characteristics of Future Land-Based Warfare¹⁹

1. Mission analysis tailoring of forces.
2. Reconnaissance of Area of Operations
3. Decisive Action and Simultaneous Attack
4. Sustain Operations

Force XXI Characteristics of Operations²⁰

- (1) Multidimensional (battlespace includes width, depth, height, electromagnetic spectrum, human dimension, and time),
- (2) Precise (precision strike, precision force packaging, precision deployment, precision obstacles, precision sustainment),
- (3) Non-Linear. (no rigid organization of battlespace into close, deep, and rear; units are spaced throughout battlefield)
- (4) Distributed Operations (operations are executed throughout depth, width, and height of battlespace in decentralized manner),
- (5) Simultaneity (synergistic operations throughout battlespace).

Force XXI Division Design Principles²¹

1. Optimize Information-Based Operations
2. Dominate Battlespace (Speed, Space, Information, and Time)
3. Control Tempo with Overwhelming Lethality and Superior Survivability.
4. Mount, Sustain and Recover from Operations Simultaneously.
5. Capable of Quick, Decisive Victory while Maximizing Force Protection.
6. Rapidly Deployable, Easily Tailorable, Sustainable, and Operationally Agile

7. Enhance Tailorability through Modularity.
8. Divert Tasks, Focus on Primary Mission.
9. Effective in War and MOOTW (Joint and Multinational)

Force XXI Division Patterns of Operations²²

1. Protect the Force
2. Project the Force
3. Gain Information Dominance
4. Shape the Battlefield
5. Decisive Operations
6. Sustain and Transition the Force.

Force XXI Future Battle Dynamics²³

1. Battle Command
2. Battlespace
3. Depth and Simultaneous Attack
4. Early Entry
5. Combat Service Support

Ground based common sensor is an integrated package of communications, IEW, and situation and target development equipment.²⁴

Guardrail common sensor is a combined airborne and ground integrated communications intelligence system with direction finding, target acquisition, analysis and control, and dissemination capabilities.²⁵

Hunter Sensor Surrogate (HS3) "consists of a M1025 HMMWV with a sensor package consisting of a second generation FLIR, two day cameras, and a MELIOS laser range finder, all mounted on a hydraulically operated ten-foot mast. This vehicle provides the troop with long range target acquisition and the ability to transmit target range, position, and still imagery to the tactical operations center (TOC) or other designated station....The sensor package cannot be dismounted from the vehicle."²⁶

Information is data collected from the environment and processed into a usable form.²⁷

Intelligence is the product resulting from the collection, processing, integration, analysis, evaluation, and interpretation of available information about forces or areas.²⁸

Intelligence is also information knowledge about an adversary obtained through observation, investigation, analysis, or understanding.²⁹

Janus is a high resolution, man-in-the-loop constructive computer simulation. Janus allows players in each force (friendly and threat) to plan, and execute tactical operations making system and unit employment decisions during the battle execution. The players make decisions based on terminal displays of map graphics, terrain, and unit/system icons. Janus simulates three dimensional space and variable terrain resolution tailored to the exercise.³⁰

Joint Venture is a TRADOC campaign plan and concept for redesigning the warfighting army for the 21st century using an iterative cycle of concept definition, requirements review, force design, equipping, training, and experimenting. The Division Design Analysis is a subcomponent of Joint Venture.

Joint Vision 2010 is the overarching plan for preparing the U.S. Armed Services for the 21st century. The Chairman of the Joint Chiefs of Staff published this plan in Spring 1996. The goal of Joint Vision 2010 is to build a force which can dominate adversaries across the full spectrum of conflict through dominant maneuver, precision engagement, full dimensional protection, and focused logistics.³¹

Long Range Advanced Scout Surveillance System (LRAS3) is "a lightweight, extended range line of sight reconnaissance and surveillance system. LRAS3 will provide near all-weather, day/night real time target acquisition, target detection, recognition, identification, and far target location information to the scout platoon. The LRAS3 is employed on a HMMWV and consists of a second generation FLIR (*forward looking infrared radar*), MELIOS (*mini eye-safe laser infrared observation set*) laser range finder with compass/vertical angle measurement, GPS (*global positioning system*) interface, and a low light level television camera. The LRAS3 system can remain in the ready to operate configuration during cross-country movement."³²

Mobile Strike Force (MSF) was a term given to a division structure used in Prairie Warrior 95. The division is designed to "strike" deep with significant combined arms and joint assets to destroy the enemy prior to him entering the traditional main battle area. The MSF was task organized with an armor brigade, a light infantry brigade, an aviation brigade, and division artillery (DIVARTY). The MSF was equipped with some futuristic information-age technologies.³³

Moderate Heavy Division (MOD HVY) was the interim approved Force XXI Division structure following the Division Design Analysis Phase I.

Named Area of Interest (NAI) is a point or geographical area in which enemy activity is expected. Confirmation of enemy activity at an NAI helps confirm or deny enemy courses of action.³⁴

Prairie Warrior (PW) is an annual capstone event for the Command and General Staff College which involves a corps operation. Several AWEs have been incorporated into this event to test conceptual organizational and modern technological initiatives for Force XXI.

Priority Intelligence Requirement (PIR) are intelligence requirements for which the commander has stated a priority in planning and decisionmaking. PIR should support a commander's decisions at decision points during execution.³⁵

QUICKFIX is a modified UH-60A helicopter equipped with special avionics and electronic warfare (EW) mission equipment. For a general description, see Field Manual 34-10-2, *Intelligence and Electronic Warfare*, 1-5.

Reconnaissance is a mission undertaken to collect information by visual or other detection means. It is characterized by its direction toward one or more specific target areas without the requirement for continuous coverage. The reconnaissance mission may be developed from cues indicating that an area possesses intelligence value or because current or planned operations require detailed coverage of a specific area.³⁶

Reconnaissance and Surveillance (R/S) Plan is a plan that assigns tasks to subordinate, supporting, or other assets to develop information that meets the intelligence requirements of the commander. The R/S plan focuses on Targeted Areas of Interest (TAI) and Named Areas of Interest (NAI) to collect the commander's priority information requirements (PIR) and then information requirements (IR). The R/S plan is usually developed by the S2/G2, coordinated through the S3/G3, and approved by the commander. (FM 101-5-1, 1-130.)

Reconnaissance, Intelligence, Surveillance, and Target Acquisition (RISTA) is a process for collecting information about the enemy, terrain, and weather that will affect friendly combat operations. The plan synchronizes and integrates all intelligence assets and sensors.³⁷

Reconnaissance Operations Reconnaissance operations primarily involve route, area, or zone reconnaissance.

Zone Reconnaissance is the directed effort to obtain detailed information concerning all routes, obstacles, terrain, and enemy forces within a zone defined by boundaries. The zone reconnaissance is a deliberate, time consuming process which can include reconnoitering all terrain; inspecting and classifying bridges; locating fords or crossing sites; inspecting and classifying overpasses, underpasses, and culverts; locating mines, obstacles, and barriers; finding and reporting enemy forces; and reporting reconnaissance information within the zone.³⁸

Area Reconnaissance is a specialized form of zone reconnaissance conducted to gain detailed information about terrain features and threat forces within a specified area or point that other forces intend to occupy, pass through, or avoid.³⁹

Route Reconnaissance is a specialized form of reconnaissance conducted to gain detailed information about a route.

Relevant Common Picture of the Battlefield is the aggregate of data that is shared among all friendly forces on the disposition of friendly and enemy forces. This data is used to build a tailored relevant graphic display for the warfighter that increases in detail shown as the echelon is closer to the soldier, commonly called situational awareness.⁴⁰

Security Operations are operations designed to obtain information about the enemy and provide reaction time, maneuver space and protection to the main body. Characterized by aggressive reconnaissance to reduce unknowns, gaining and maintaining contact with the enemy and providing early and accurate reports to the protected force. Security operations include screen, guard, covering force and area security operations.⁴¹

Screen is a form of security operations which provides the least protection. The screen provides early warning of enemy approach and real time information, reaction time, and maneuver space to the protected force. The screening force will destroy enemy reconnaissance elements within their capability (counterreconnaissance) and impede or harrass the enemy.⁴²

Striker team is a modern derivative of the combat observation and lazing team (COLT) concept. The Striker team is a three or four man forward observer team mounted in a HMMWV and equipped with communication, night vision, and laser locator designator equipment. This team is often employed with scout teams.⁴³

Surveillance is the systematic observation of areas by visual or other detection means for intelligence purposes. A surveillance mission is characterized by the greater size of its target area and by repetition. Optimally, surveillance is carried out continuously over the entire area of interest. It is conducted without regard to specific targets although major areas of interest may be emphasized.⁴⁴

Targeted Area of Interest (TAI) is the geographical area or point where friendly forces plan to potentially engage threat forces.⁴⁵

Task Force XXI (TFXXI) AWE was a force on force exercise conducted in March 1997 at the National Training Center in Fort Irwin, California with a brigade of the 4th Infantry Division (Experimental Force - EXFOR) supported by III Corps. This experiment tested a brigade sized modernized force to demonstrate the enhanced effectiveness of a "digitized" force. This experiment was structured to evaluate new information-age systems, new concepts, organizational designs, and employment concepts from the soldier level to the brigade level. The intent was to inform the Force XXI Board of Directors on operational and organizational concepts, material acquisition opportunities based on information-age technologies, and develop doctrine, training, leadership, organization, material, and soldier solutions for Force XXI.⁴⁶

Vector-in-Commander (VIC) is an automated combined arms force on force simulation representing land and air forces at the US Army corps and division level. The simulation is deterministic and event driven. VIC allows resolution down to the troop level for the cavalry troop. The model runs based on tactical decision rules (TDR) input from the start. These rules establish criteria for decisions based on dynamic parameters such as local force ratios, unit strength, loss rates, etc.⁴⁷

¹ U.S. Army, *Posture Statement FY98* (Washington, DC: Government Printing Office, February 1997), 54.

² U.S. Army, FM 71-3, *The Armored and Mechanized Infantry Brigade* (Washington, DC: Department of the Army, 8 January 1996), 2-4.

³ U.S. Army, FM 34-2-1, *Reconnaissance and Security and Intelligence Support to Counterreconnaissance* (Washington, DC: Department of the Army, 19 June 1991), 2-9.

⁴ *Posture Statement FY98*, 55.

⁵ U.S. Army Training and Doctrine Command Analysis Center, Study Plan TRAC-SP-0196, "Study Plan for the Force XXI Division Design Analysis Phase II" (Fort Leavenworth, KS: TRADOC Analysis Center (TRAC) Study and Analysis Center (SAC), November 1996), 2.

⁶ *Posture Statement FY98*, 35 and 50.

⁷ U.S. Army, FM 101-5-1, *Operational Terms and Graphics* (Washington, DC: Department of the Army, 30 September 1997), 1-16.

⁸ *Posture Statement FY98*, 53.

⁹ FM 101-5-1, 1-18.

¹⁰ U.S. Army Training and Doctrine Command, TRADOC Pamphlet 525-5, *Force XXI Operations* (Fort Monroe, VA: 1 August 1994), G-1.

¹¹ "Study Plan Force XXI Division Design Analysis Phase II," 14.

¹² U.S. Army, FM 6-20-50, *Fire Support for Brigade Operations (Light)* (Washington, DC: Department of the Army, 5 January 1990), Appendix J.

¹³ *Posture Statement FY98*, 52.

¹⁴ U.S. Army Training and Doctrine Command, "The Division XXI Advanced Warfighting Experiment Directive" (Fort Monroe, VA: February 1997), 1.

¹⁵ *Posture Statement FY98*, 54.

¹⁶ "Study Plan Force XXI Division Design Analysis Phase II," E-37.

¹⁷ *Posture Statement FY98*, 52.

¹⁸ U.S. Army Training and Doctrine Command, TRADOC Pamphlet 525-71, *Division Operations Concept* (Fort Monroe, VA: 13 May 1996) 7.

¹⁹ TRADOC Pamphlet 525-5, 3-12.

²⁰ TRADOC Pamphlet 525-71, 11-14.

²¹ TRADOC Pamphlet 525-71, 15-17.

²² TRADOC Pamphlet 525-71, 17-25.

²³ TRADOC Pamphlet 525-5, 3-3 to 3-11.

²⁴ U.S. Army, FM 34-10-2, *Intelligence and Electronic Warfare (IEW)* (Washington, DC: Department of the Army, 13 July 1993), 2-15.

²⁵ FM 34-10-2, 1-48.

²⁶ U.S. Army Armor School, Fort Knox Supplemental Material (FKSM) 17-97-10(A), *Tactics, Techniques and Procedures for the Applique' Brigade Reconnaissance Troop Coordinating Draft #2* (Fort Knox, KY: 1 June 1996), 1-6.

²⁷ "Study Plan Force XXI Division Design Analysis Phase II," E-37.

²⁸ "Study Plan Force XXI Division Design Analysis Phase II," E-39.

- ²⁹ Joint Pub 1-02.
- ³⁰ "Study Plan Force XXI Division Design Analysis Phase II," 14.
- ³¹ *Posture Statement FY98*, xi - xii and 50.
- ³² FKSM 17-97-10(A), 1-6.
- ³³ U.S. Army Training and Doctrine Command Analysis Center, Technical Report TRAC-TR-0396, "Force XXI Division Design Analysis: Phase I Final Report" (Fort Leavenworth, KS: Study and Analysis Center, March 1996), 9.
- ³⁴ FM 101-5-1, 1-107.
- ³⁵ FM 101-5-1, 1-124.
- ³⁶ "Study Plan Force XXI Division Design Analysis Phase II," E-40.
- ³⁷ U.S. Army Armor Center, Fort Knox Supplemental Material (FKSM) 71-3-1(A), *The Digitized Heavy Brigade* (Fort Knox, KY: February 1997) I-1.
- ³⁸ U.S. Army, FM 17-97, *Cavalry Troop* (Washington DC: Department of the Army, 8 June 1995), Chapter 3.
- ³⁹ FM 17-97, Chapter 3.
- ⁴⁰ "Study Plan Force XXI Division Design Analysis Phase II," E-41.
- ⁴¹ "Study Plan Force XXI Division Design Analysis Phase II," E-41.
- ⁴² FM 17-97, Chapter 4.
- ⁴³ U.S. Army Field Artillery School, *Tactics, Techniques, and Procedures for the STRIKE / RECON Platoon (STRIKER)* (Online: <http://sil-www.army.mil>, accessed on 10 December 1997.)
- ⁴⁴ "Study Plan Force XXI Division Design Analysis Phase II," E-41.
- ⁴⁵ FM 101-5-1, 1-152.
- ⁴⁶ U.S. Army Experimental Force Control Cell, "TF XXI Experimental Directive" (Fort Hood, TX: EXFOR- ECC, 1 June 1996), 2.

⁴⁷ U.S. Army, "Mobile Strike Force 95 Organizational and Operational Analysis"
(Fort Leavenworth, KS: Training and Doctrine Command Analysis Center, January 1996)
[Online, <http://www.trac.army.mil/msf>], Slide: "Vector-in-Commander."

APPENDIX. DATA SUMMARY TABLE

WHEN	PW/MSF 95 AWE (Oct 94 - Jan 96)	DDA - BDA I Aug - Dec 95	DDA - BDA II Nov 96 - May 97
WHERE and WHO	FT Leavenworth, KS; TRADOC - TRAC	White Sands Missile Range, NM; TRADOC-TRAC	White Sands Missile Range, NM; TRADOC-TRAC
REFERENCES	<u>Mobile Strike Force 95 Organizational and Operational Analysis</u> . Fort Leavenworth, KS: TRADOC-TRAC, January 1996.	<u>Force XXI Division Design Analysis: Phase I Final Report</u> . Fort Leavenworth, KS: TRADOC Analysis Center Study Directorate, March 1996.	<u>Brigade Design Analysis (BDA): Phase II Results Draft</u> , White Sands Missile Range, NM: TRAC-WSMR, Sep 1997.
TYPE EXERCISE	Low Resolution Computer Simulation (Vector-in-Commander)	High Resolution Computer Simulation (CASTFOREM)	High Resolution Computer Simulation (CASTFOREM)
TYPE OF ANALYSIS	Quantitative <u>division optimization</u> process based on statistics of threat systems killed (lethality), friendly systems killed (survivability), and duration of operation (tempo). Analysis compiled statistics by unit by specific weapon systems.	Quantitative analysis and comparisons based on threat systems killed (lethality), friendly systems killed (survivability), loss exchange ratios, system exchange ratios, losses over time and range, residual combat power analysis, and time to accomplish missions (tempo).	Quantitative analysis and comparison of Force XXI Brigade interim design (HVY MOD DIV) with AOE HVY BDE with near-term (2001) and far-term (2010) friendly force capability. Analysis based on total friendly and threat losses over time; loss exchange ratios (threat loss/friendly loss); system specific threat and friendly losses over time; and shots, hits, and kills by system by ammunition type.
PURPOSE:	<ol style="list-style-type: none"> 1. Conduct analysis for TRADOC Battle Lab Integration Technology and Concepts Directorate (BLITCD) in support of PW/MSF 95 AWE 2. Extend MSF organizational and operational concept and technologies beyond single instance portrayed in 1995 PW. 3. Determine how the MSF can be best tailored for lethality, survivability and tempo. 	<p>Investigate the impact of the weapon equipment changes on force effectiveness between the current AOE structure and two alternative design structures at brigade level (Heavy/Light Small Based Division and BDE Based Division).</p>	<ol style="list-style-type: none"> 1. Support Division Design Analysis Study to validate the interim division design decision made in December 1996 (Force XXI Interim Approved Design, MOD HVY DIV). 2. Provide in-depth study on relative effectiveness differences between AOE heavy brigade and MOD HVY DIV brigade.

DATA SUMMARY TABLE (Continued)

TEST OBJECTIVES	PW/MSF 95 AWE	DDA - BDA I	DDA - BDA II
	<p>1. Assess MSF force design concepts using Force XXI design principles.</p> <p>2. Assess MSF and Force XXI operational concepts.</p> <p>3. Assess proposed Force XXI battle command capabilities.</p>	<p>Collect data to substantiate hypothesis: The selected Division Design alternative will produce the greatest qualitative edge in controlling the tempo of operations as well as overwhelming effects-oriented combat power with respect to survivability and lethality.</p>	<p>Collect data to substantiate hypothesis: Interim Force design (MOD HVY) will increase survivability, lethality, and operational tempo of the mechanized infantry brigade.</p>
APPLICABLE STUDY ISSUES	<p>1e. What MSF 2010 technologies and capabilities contribute most to its effectiveness?</p> <p>2a. Does the MSF have the assets necessary to dominate its battlespace?</p> <p>2b. What organizational adjustments are required to the MSF to allow it better to execute the operational concept?</p>	<p>(16) For the division design alternatives, what assets best satisfy the functions of reconnaissance and security (cavalry and scouts), by echelon, and for the spectrum of operations (from linear to non-contiguous)? [Subordinate issue to the Conduct Decisive Operations Pattern of Operations for Force XXI.]</p> <p>2. Compare effects of HMMWV Scout vehicles to Future Scout Vehicles (FSV) on scout operations in terms of tempo, lethality, and survivability.</p>	<p>JV 1. What organization structures are required to support the FXXI Division operational concept?</p> <p>1.2 What RISTA force structure does the FXXI Division require for information dominance?</p> <p>1.2.2 Does the FXXI Division need BRT when the objective suite of sensors is fully fielded (REMBASS, UAVs)?</p> <p>1.2.2.1 Considering the objective FXXI Division's sensor assets, what are the brigade reconnaissance missions?</p> <p>1.2.2.2 What unique conditions favor the employment of the BRT over other assets?</p>
SCENARIO	<p>Korean Scenario - MSF Division ATKs Operational Exploitation Force (Corps).</p>	<p>European Scenario - Mechanized Infantry BDE attacking threat tank regiment (HRS 37)</p>	<p>European Scenario - Mechanized Infantry BDE attacking threat tank regiment (HRS 37)</p>
TERRAIN	<p>Mountainous, Open valleys with immature road network. (KOKSON and CHORWON Valleys)</p>	<p>Forested w/ Urban Obstacles and Rivers</p>	<p>Forested, w/ Urban Obstacles and Rivers</p>

DATA SUMMARY TABLE (Continued)

THREAT	PW/MSF 95 AWE	DDA - BDA I	DDA - BDA II
<p>2010 Threat <u>MSF Threat:</u> 12th Mechanized Corps (OEF of 9 Brigades) <u>AR/BDE Threat:</u> 1 Armor BDE followed by 1 MECH BDE.</p>	<p><u>Equipment:</u> T62-M M1983 (BMP Variant) 240 mm MRL 152mm Artillery 122 mm Artillery</p>	<p>2005+ Threat Two lead tank battalions of second echelon regiment of a first echelon tank division.</p> <p><u>Equipment:</u> 56 T-80U 22 BMP-3 4 BMP RECON 5 BMP ADA 4 BRM/BRDM 5 HOKUM Helicopters 15 122 mm SP HOW 46 152 mm SP HOW 5 220 mm MRL 15 122 mm MRL</p>	<p>2010 Threat Two lead tank battalions of second echelon regiment of a first echelon tank division.</p> <p><u>Equipment:</u> 56 T-90 51 BMP-3 1 BMP-3 RECON 8 2S6 (ADA) 3 BRDM 1 UAV 5 HOKUM Helicopters 15 122 mm SP HOW 46 152 mm SP HOW 15 122 mm MRL 5 220 mm MRL</p>
<p>DIVISION ORG</p>	<p>Mobile Strike Force division model consisting of 4 maneuver brigades (armor, light infantry, aviation, and artillery)</p>	<p><u>AOE Division (Current TOE)</u> <u>HL-SB Division</u> <u>BDE Based Division</u></p>	<p><u>AOE Division (Current Equipment)</u> <u>AOE Division (Modernized Equipment)</u> <u>MOD HVY (Near Term)</u> <u>MOD HVY (Far Term)</u></p>
<p>DIVISION MISSION(S)</p>	<p>O/O, MSF attacks as the JFLCC operational reserve to destroy (reduce to 40% strength) 12th Mechanized Corps (OEF) in the vicinity of the Kokson/Chorwon valleys to deny the 2AG reinforcement.</p> <p>End State: OEF destroyed, MSF at 85% strength ready for follow-on missions.</p> <p>Concept: Destroy OEF by simultaneous in-depth attacks by each maneuver brigade (ARTY, LT IN, AVN, and AR).</p>	<p>N/A</p>	<p>N/A</p>

DATA SUMMARY TABLE (Continued)

	PW/MSF 95 AWE	DDA - BDA I	DDA - BDA II
DIVISION MISSION(S) (Continued)	<p>5 Phases:</p> <ul style="list-style-type: none"> I. Reconnaissance, II. Positioning Attack Assets, III. Simultaneous Ambush, IV. Exploitation, V. Reconstitution and Repositioning. <p>Result: In final optimal configuration, the MSF destroyed nine OEF brigades in simultaneous ambushes lasting slightly over 3 hours while losing only 5% of its combat power. MSF won decisively and very much dominated its battlespace.</p>		
BRIGADE ORG	<p><u>Armor Brigade (MSF)</u></p> <ul style="list-style-type: none"> 2 each Mech BNs (78 Bradleys each) 2 each Armor BNs (46 M1A2/M1A3s each) 1 each Armored Gun System BN 1 each HVY ENG BN 2 each ADA Batteries (Bradley Stinger Fighting Vehicles) 	<p><u>Mechanized Brigade</u></p> <ul style="list-style-type: none"> 2 each Mechanized TF 1 each Armor TF 1 each ATK Helicopter BN (OPCON) 15 each AH-64. 48 each 155 mm SP HOW (M109A6) <p><u>AOE</u> - 36 MLRS No Cavalry.</p> <p><u>HL-SM</u> - 45 MLRS CAV SQDN</p> <p><u>BDE Based</u> - 27 MLRS CAV SQDN</p>	<p><u>Mechanized Brigade</u></p> <ul style="list-style-type: none"> 2 each Mechanized TF 1 each Armor TF 1 each ATK Helicopter BN (OPCON) <p><u>AOE</u> - 9 OH-58 15 AH-64 6 RAH-66 10 AH-64</p> <p>2 each ARTY BN 45 each 155 mm SP HOW (M109A6)</p> <p>1 each Div MLRS BN 1 each Corps MLRS BTRY</p> <p><u>AOE</u> - No BRT <u>MOD HVY</u> - BRT</p>

DATA SUMMARY TABLE (Continued)

BRIGADE MISSIONS(S)	PW/MSF 95 AWE	DDA - BDA I	DDA - BDA II
<p>BRIGADE OPERATION (Aspects relevant to BRT & RISTA)</p>	<p>Destroy the 3rd OEF brigade in EA Fox.</p>	<p>Conduct an attack to destroy enemy forces.</p> <p>Intent: Inflict maximum damage to threat in the engagement area by maneuvering into the flank of the threat force.</p>	<p>Conduct an attack to destroy enemy forces.</p> <p>Intent: Inflict maximum damage to threat in the engagement area by maneuvering into the flank of the threat force.</p> <p>Same as BDA I with the use of the UAV assets forward during movement to objectives.</p>
<p>Moved along Axis Cheetah 6 ½ hours prior to attack to position Advance FA System (AFAS), Paladin, ATCAS, and MLRS battalions vicinity EA Fox.</p> <p>Ambush included CAS, JATT, RAH-66 Comanches, Volcano minefields, direct fire systems, indirect fire engagements from Crusader and Paladin.</p> <p>Destroy remnants of MRB, battalion sized or larger, with attack aviation, CAS, and air interdiction. Be prepared to fight OEF's lead southern mechanized brigade.</p> <p>Armor Brigade returns to TAA Badger to prepare for follow-on operations.</p>	<p>Conduct an attack to destroy enemy forces.</p> <p>Intent: Inflict maximum damage to threat in the flank of the threat force.</p> <p>BDE fights through threat divisional recon assets enroute to objectives.</p> <p>Given designated engagement area, one ATK Helicopter Co attacks flank of threat armor battalions from battle position in east; second ATK Helicopter Co provides screen to north of BP. One mechanized TF with one ATK Helicopter Co blocks south of EA from battle position to prevent enemy from maneuvering south. Second mechanized TF attacks to seize objective southeast of EA causing the threat tank battalions to be fixed and occupy hasty defensive positions in the engagement area. The armor TF conducts flank attack of the threat tank battalions in EA from the northeast.</p>	<p>AOE - No brigade scouts. Only BN TF Scout PLTS</p> <p>HL-SB Div and BDE Based Division - Cavalry Squadron of three ground troops.</p> <p>18 each M1A1 45 each HMMWV/FSV</p>	<p>AOE - No brigade scouts. Only BN TF Scout PLTS</p> <p>HVY MOD - BRT of two platoons. 20 each HMMWV/FSV (near/far term)</p>
<p>BRIGADE RECON & SECURITY ASSETS (Organization, Structure, and Equipment)</p>	<p>Ground Cavalry Troop (w/ 3 Scout Platoons)</p> <p>32 Future Scout Vehicles (FSV)</p>		

DATA SUMMARY TABLE (Continued)

<p>BRIGADE RECON & SECURITY ASSET MISSION(S)</p>	<p>PW/MSF 95 AWE Cavalry Troop: Conduct a mobile screen forward of the brigade during movement to ambush positions. Once brigade is closed in ambush positions, screen the western flank of the brigade in order to provide security for the brigade's flank as well as to ALERT the brigade as the OEF's lead brigade reconnaissance companies entered the engagement area.</p>	<p>DDA - BDA I Cavalry Squadron: Conduct zone reconnaissance forward of TF formations. Engage any threat units of platoon size or smaller and call for fire support on other larger threat units detected. Once on BN TF objectives, withdraw to flank screening positions to protect BDE.</p>	<p>DDA - BDA II BRT: Conduct zone reconnaissance forward of TF formations. Engage any threat units of platoon size or smaller, as well as call for fire support on other larger threat units detected. Once on TF objectives, withdraw to flank screening positions to protect BDE. UAV: Orbit area in front of brigade scout element to increase situational awareness. BRT performance showed it has multifunctional capabilities and achieves decisive pre-battle effects. UAV has inherent limitations in comparison to BRT. UAV can only observe one NAI at a time and is adversely affected by weather.</p>
<p>PERFORMANCE OF BRIGADE RECON ASSET</p>	<p>Observations or analysis below represents the contribution of the Cavalry Troops for the Armor, Light Infantry, and Aviation Brigades. All cavalry troops were identical in organization. Overall performance based on criteria below indicated that the cavalry troop made very strong contributions to the MSF in lethality and survivability and average contributions in tempo.</p>	<p>CFV-equipped CAV SQDN was much more effective than the HMMWV-equipped CAV SQDN in terms of target acquisition, lethality, and survivability. Analysis clearly showed that brigade scout assets improved force effectiveness by permitting enemy to be located, engaged, and killed earlier in the engagement, thus enhancing the forces chances of overwhelming combat power in the close fight.</p>	<p>Without BRT, threat forward observers were not destroyed in the pre-battle phase. This had a detrimental impact on Blue counter-battery fires resulting in larger amounts of Red maneuver units intact for the main battle phase.</p>
<p>SITUATION AWARENESS</p>	<p>No observations found in the analysis.</p>	<p>The increase in scout assets resulted in a considerable increase in effects (knowledge and effective engagement) achieved prior to the start of the main battle. The advantage is directly related to the reconnaissance and security capability inherent in the scout force.</p>	<p>No observations found in the analysis.</p>
<p>TEMPO</p>	<p>Cavalry neither stood out as a high contributor nor a low contributor compared to other MSF units. This criteria involved the duration of the MSF ambush.</p>	<p>No observations found in the analysis.</p>	<p>No observations found in the analysis.</p>

DATA SUMMARY TABLE (Continued)

	PW/MSF 95 AWE	DDA - BDA I	DDA - BDA II
Lethality	Among the top two contributors for lethality criteria of the MSF structure. (Based on contribution to orange kills weighted by combat power of type of system killed.) Units were rank ordered based on lethality weighted three times greater than tempo and survivability.	HMMWV Mounted Scouts - Zero kills.	AOE Bde killed an average of 2.2 threat scouts; HVY MOD Bde killed an average of 17.0 threat scouts) Difference is attributable to BRT. (Average includes near and far term cases.) Lethality of BRT was extremely limited in near term scenario (HMMWVs and no precision guided M109s). In far term, BRT lethality was significant with FSV and precision guided M109 fires against point targets.
Survivability	Cavalry Troop was the second ranking contributor with a survival rate of approximately 95%.	HMMWV Scouts - HL-SB 26% losses. BDE Based 24% losses CFV Scout HL-SB 26% losses BDE Based 26% losses Impact of CAV SQDN improved force effectiveness; however, capability was restricted due to vulnerability to enemy fire, inability to perform security mission, and inadequacy of target acquisition and stand-off capability with respect to T-80U. Only 60% of cavalry assets survived the engagement with the M1A1 and HMMWV organization.	HMMWV BDE Scouts AOE - N/A MOD HVY - Loss Averaged 7.9 %. FSV BDE Scouts AOE - N/A MOD HVY - Loss Averaged 9.9% Survivability of BDE scouts was much improved over CAV SQDN of BDA I scenario. This is attributable to increased artillery assets.
Other	Cavalry troop was not recommended for deletion from the optimal MSF structure.	The cavalry squadron significantly increased the brigade's battlespace.	BRT achieves a greater number of Red losses in the early phase of the battle. The non-quantitative effects of these early

DATA SUMMARY TABLE (Continued)

<p>Other (Continued)</p>	<p>PW/MSF 95 AWE</p>	<p>DDA - BDA I Results state, "To further maximize the scout potential, the scout vehicles must be survivable and capable of engaging and destroying enemy scout and expeditionary units. Artillery assets must be available and in position to support the brigade scout effort.</p>	<p>DDA - BDA II losses are not captured quantitatively in the analysis. BRT played significant role in destroying threat forward observers enhancing the survivability of the friendly forces early in the engagement. In the near term, the AOE brigade design out-performed the MOD HVY design in terms of loss exchange ratio, enemy kills, and friendly survival. In the far term, the MOD HVY design only marginally out-performed the AOE far term in terms of loss exchange ratio (1.42 to 1.40). In far term, AOE marginally out-performed MOD HVY in enemy kills (174 to 171).</p>
------------------------------	----------------------	---	---

DATA SUMMARY TABLE (Continued)

TF XXI AWE		Division XXI AWE (DAWE)
WHEN	WHERE and WHO	5-13 Nov 1997
	<p>March 1996 - March 1997</p> <p>Fort Hood, TX and Yakima, WA: Platoon/Company/BN TF Training (4th ID - EXFOR) from March - December 1996. National Training Center, Fort Irwin, CA: BDE TF (4th ID) rotation to NTC, 15-29 March 1997.</p>	<p>Fort Hood TX, 4th ID - EXFOR, Battle Command Training Program (BCTP) and National Simulation Center (NSC).</p>
REFERENCES	<p>Task Force XXI Outbrief to the TRADOC Staff, Force XXI Joint Venture Office, TRADOC, Ft Monroe, VA, June 1997.</p> <p>NTC Take-Home Packets from 1st Bde, 4th ID, Rotation 97-06, CALL, Ft Leavenworth, KS, 16-29 March, 1997.</p> <p>Initial Impressions Report, AWE, NTC Rotation 97-06, March 1997, CALL, Ft Leavenworth, KS, April 1997.</p> <p>Executive Working Group VTC, 14 April 97, CG, 4th ID, MG Kern</p> <p>Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report, 2997-AW-ACTI-1817A, OPTEC, 10 September 1997.</p>	<p>Division XXI Advanced Warfighting Experiment (DAWE) Initial Insights Report (IIR), TRADOC-TRAC, Ft Leavenworth, Dec 1997.</p> <p>TEXCOM Data Base (Recorded observations by SME, Analysis, BCT, Unit AARs), TRADOC-TRAC, Ft Leavenworth, Nov 1997.</p> <p>DAWE After Action Review Briefing Slides, (All Agencies), 10 Dec 1997.</p>
TYPE EXERCISE	<p>Live exercises (series of training events) with EXFOR culminating in 14-day force-on-force experiment; BDE of EXFOR (1st BDE, 4th ID) opposed by NTC OPFOR.</p> <p>NTC Rotation 97-06, "Ivy Focus."</p>	<p>BCTP-like command post warfighter exercise with a digitized division and brigade tactical operations centers (TOC) in the field. BCTP and NSC established the simulated warfighting environment. The 4th Infantry Division (EXFOR) configured as interim division design (Conservative Heavy Division Design) participated.</p>
TYPE OF ANALYSIS	<p>Primarily qualitative analysis. Heavily based on observations and comments by Subject Matter Experts (SME) and representatives of the participating units in PLT Lanes, CO/TM Lanes, BN/TF Lanes, and the AWE NTC Brigade TFXXI Rotation.</p> <p>Training and Doctrine Command Analysis Center (TRAC),</p>	<p>Both qualitative and quantitative analysis.</p> <p>The primary data collection effort for the DAWE was conducted by TEXCOM using over a hundred subject matter experts (SMEs) and by BCTP using 60 observer controllers (OC). The collected data included over 6000 SME/OC observations, interviews, surveys, etc.</p>

DATA SUMMARY TABLE (Continued)

TYPE OF ANALYSIS (Continued)	TF XXI AWE	Division XXI AWE (DAWE)
<p>PURPOSE:</p>	<p>Operational Test and Evaluation Command (OPTEC), and Army Research Laboratory (ARL) evaluated the data with assistance from proponents and the NTC Command.</p> <p>Tested brigade interim design (HIVY MOD DIV) with near-term state of the art digitization technologies. General purpose was to provide insights on new organizations, information-age TTP, and for investment decisions. Introduced prototype technologies and organizational changes to provide evidence for potential improvements in force capabilities and to refine Force XXI requirements.</p> <p>Tested and Analyzed: 39 Prototypes 13 Concepts 20 Fieldings 72 Initiatives</p> <p>Evaluated BDE RECON TROOP and STRIKER PLT as organizational concepts.</p>	<p>Training and Doctrine Command Analysis Center (TRAC), Operational Test and Evaluation Command (OPTEC), and Army Research Laboratory (ARL) evaluated the data with assistance from proponents.</p> <p>Provide input to a decision briefing by the TRADOC Commander for the CSA Board of Directors (BOD) meeting in February 1998.</p> <p>Addressed numerous study issues and initiatives focused on the Force XXI division organizational structures, battle command and information operations requirements, operational concept, and CSS concept.</p>
<p>TEST OBJECTIVES</p>	<p>Provide live experimental data to support the hypothesis: "If information-age battle command capabilities/ connectivity exists across all BOS functions within and to a brigade task force, then enhancements in lethality, survivability, and tempo will be achieved."</p> <ol style="list-style-type: none"> 1. Develop easily tailorable, modular force designed around information. 2. Develop the TTP for an information age (digitized) brigade combat team. 3. Determine the implications of TTP, organization, and technological enhancements on soldiers/leaders. 4. Simultaneously experiment and integrate materiel training and organizational changes. 5. Experiment that enhance battle command capabilities. 	<p>Provide experimental data to support the hypothesis: "If the Force XXI Division Operational and Organizational Concept enables information dominance and enhanced battle command capabilities, then increases in lethality, survivability, sustainability, and tempo will be gained across the force." (IRR, 4) DAWE and analysis was focused two primary questions:</p> <ol style="list-style-type: none"> 1. What degree of accurate, timely knowledge did the commander have about self, other friendly units, enemy, terrain, and other environmental factors? (Commander's knowledge) 2. To execute the command function, was the commander able to disseminate timely, accurate orders; conduct effective

DATA SUMMARY TABLE (Continued)

<p>TEST OBJECTIVES (Continued)</p>	<p>TF XXI AWE 6. Analyze Force XXI battle command-brigade and below (FBCB2) applique and software.</p>	<p>Division XXI AWE (DAWE) force control; conduct timely, accurate planning functions; and act more adroitly than enemy forces? (Command's effectiveness) (IIR, 4)</p>
<p>APPLICABLE STUDY ISSUES</p>	<p>Organization: What is the impact of the new organizational changes? TTP: What are the new and evolving TTPs? Digitization: What impact does digitization have on control of forces? CSS: What is the impact of the new CSS structure on combat effectiveness? Effectiveness: What new weapons/technologies contribute to force effectiveness? Initiative (4.2.2.2): Brigade Reconnaissance Troop Initiative Issues (4.2.2.3): 1. What changes are required in command and control (C2), organizations, and process of reporting in the Brigade Reconnaissance Troop? 2. What is the impact of equipping a scout organization with the HS3 capabilities? 3. What is the impact of equipping a scout organization with LRAS3 capabilities? 4.4.2.3 Initiative: HMMVV Observer Team - STRIKER 4.4.2.3.3 Initiative Issue: What is the impact of the Strikers on FS operations within a digitized force?</p>	<p>What is the impact of the CHD design on FXXI operations? (CHD has the BDE RECON TROOP; the BRT participated but was not specifically evaluated.)</p>
<p>SCENARIO</p>	<p>Middle-East Regional Conflict , Ex-soviet type threat.</p>	<p>"Lantica Scenario" (Lantica is a fictional island of several countries of different economic, political, and ethnic backgrounds.) Division within Corps as the major land component of JTF within coalition in force year (2003). Highly Urbanized, Many Natural Obstacles (Rivers, Vegetation).</p>
<p>TERRAIN</p>	<p>Mojave Desert (NTC, Ft Irwin, CA)</p>	

DATA SUMMARY TABLE (Continued)

<p>THREAT</p>	<p>TF XXI AWE</p> <p>Nondigitized but Augmented and Credible NTC OPFOR Brigade (11th ACR). Generally the ACR can represent a MRD with each squadron representing a Motorized Rifle Brigade or Tank Brigade. The OPFOR organization and equipment varied with each mission. Approximate numbers represent the typical force opposing the EXFOR Brigade Task Force.¹</p> <p><u>Equipment:</u> 54 T-80 125 BMP1 18 AT-5 6 HIND Helicopters Up to 6 Batteries (120mm Mortar) 1 BN 2S1 (122mm Mortar) Up to 5 BN 2S19 (152mm Mortar) Up to 2 BN 2S5 (152mm Artillery) 1 BN BM-21 (122mm MRL)</p>
<p>Division XXI AWE (DAWE)</p>	<p>DAWE used two organization and modernization levels of OPFOR armies against the 4th ID. The first force was a "less modern" Donaulian force (1998); the second force was a "more modern" Biscaynian force (2003). Each force had approximately 3000 armored combat vehicles, 1000 artillery/missile systems, 150 helicopters, 1000 air defense artillery (ADA) systems, and 300 anti-tank (AT) systems.</p> <p>Each combined arms army consisted of:</p> <ul style="list-style-type: none"> 2 Mechanized Infantry Divisions 2 Armored Divisions 1 Independent Mechanized Brigade 2 Combat Aviation Regiments 1 Anti-Tank Regiment 1 Artillery Brigade 1 Rocket Regiment 2 Surface-to-Surface Missile Brigades. <p>The less modernized OPFOR was equipped with T-80 tanks, BTR-80 Armored Personnel Carriers, AT-5 Anti-Tank systems, SA-13 ADA systems, and HIND helicopters.</p> <p>The modernized OPFOR was equipped with T-80U Tanks (increasing range by 1 km, improved fire control and night capability), BTR-80A APCs (doubled range and caliber of main gun), AT-14 Kornet anti-tank guided missile with increased range and lethality over the AT-5, Panzr air defense system (cannon and missile system with improved ranges over the SA-13), and the Hokum helicopter with increased ranges for missiles and sensor/optics systems.</p>
<p>BATTLESPACE</p>	<p>NTC "Sand box" - BDE up to 40 km Front, 60 km Depth (2600 km²)</p>
	<p>DIV = 120 km Front, 150 km Depth (18,000 km²) (DAWE IRR, 16a)</p>

DATA SUMMARY TABLE (Continued)

<p>DIVISION ORG</p>	<p>TF XXI AWE Notional Force XXI Interim Design Division (MOD HVY)</p>	<p>Division XXI AWE (DAWE) Conservative Heavy Division (CHD) post-TFXXI AWE interim division design. (Modified MOD HVY organization.)</p>
<p>DIVISION MISSION(S)</p>	<p>Attack in zone to establish contact with, then defeat 231st MRD in zone; continues the attack to secure then defend the International Border.</p> <p><u>BDE Missions:</u></p> <ol style="list-style-type: none"> 1. Movement to Contact 2. Deliberate Attack 3. Defense In Sector 4. Mobile Defense in Sector 5. Hasty Attack 6. Deliberate Attack 	<p>Phase I. As the lead division of the JTF deployed, 4th ID conducted a tactical movement to seize key terrain and establish the covering force against the less modern OPFOR. Throughout this phase of the battle, 4th ID was the main effort.</p> <p>Phase II. Once the Corps was deployed and postured, Corps attacked to defeat the modernized OPFOR and secure key terrain. 4th ID attacked as a supporting effort to establish a defense to defeat the lead divisions of the modernized OPFOR Army. 4th ID then defended as a supporting effort to the corps main attack. 4th ID seized river-crossing sites and conducted a mobile defense.</p> <p>Phase III. 4th ID attacked as corps main effort to maintain contact and destroy enemy in zone (Tank Army).</p>
<p>BRIGADE ORG</p>	<p><u>MOD HVY BDE</u> Light Infantry TF Mechanized Infantry TF Armor TF DS Artillery BN BRT HVY EN BN DS STRIKER PLT Supported by Divisional Air Cav Troop and Aviation BN.</p>	<p><u>CHD BDE</u> 2 x Armor or Mech Heavy Combined Arms Battalions (CAB) 1 x Mech or Armor Heavy CAB HHC BRT DS Artillery BN DS STRIKER PLT DS HVY ENG BN</p>
<p>BRIGADE MISSION(S)</p>	<ol style="list-style-type: none"> 1. BDE conducts MTC to defeat the 168th MRR. On order, continues the movement to contact to secure the International Border. (16 March) 2. Conduct deliberate attack in zone to defeat enemy security 	<p>No specific information about BDE missions. Missions supported the DIV covering force missions, attack missions, and defend missions.</p>

DATA SUMMARY TABLE (Continued)

BRIGADE MISSION(S) (Continued)	TF XXI AWE	Division XXI AWE (DAWE)
	<p>defense. On order, continue the attack to clear the zone to PL and restore Buffer Zone Boundary. (18 March)</p> <p>3. BDE defense in sector to defeat up to a MRR(+) in order to protect uranium mines and prevent enemy from placing direct and indirect fires on CJTF staging areas. (20 March)</p> <p>4. BDE defense in sector to defeat attacks of two MRRs and to prevent them from gaining control of uranium mines or interfering with CJTF staging areas. (23 and 24 March)</p> <p>5. BDE hasty attack in zone to destroy forces or force withdraw in order to restore territorial integrity of Mojavia. (25 March)</p> <p>6. BDE deliberate attack to defeat the 152nd TR in order to restore the territorial integrity of Mojave. (27-28 March)</p>	
<p>BRIGADE OPERATION (Aspects relevant to BRT & RISTA)</p>	<p>1. MTC: BDE CDR intended to use RISTA capability to identify, track and kill elements of lead MRB while conducting deliberate movement on a wide front maintaining TF mutual support against CRP, FSE, AGMB, and if required enveloping detachment.</p> <p>2) Deliberate Attack: BDE CDR intended to use constant recon to harasses enemy defensive preparations, destroy ambush/initial defensive position vehicles, and provide 80% confirmed intelligence on remnants of 168th MRR(-) in zone. CAS and massed fires would be used to prepare forward position objectives before assault by heavy TFs.</p> <p>3. Defense in Sector: BDE CDR intended to establish a robust, belted security zone to identify and kill enemy recon; to provide accurate tracking of enemy attacking elements, and to call fire to slow and attrit enemy forces. Main effort was AR TF in center of defensive sector.</p>	<p>No specific information about each brigade's operations.</p>

DATA SUMMARY TABLE (Continued)

	TF XXI AWE	Division XXI AWE (DAWE)
<p>BRIGADE OPERATION (Aspects relevant to BRT & RISTA) (Continued)</p>	<p>4. Mobile Defense: BDE CDR intended to use robust RISTA assets to provide early warning of enemy positions; to destroy enemy recon early, to essentially defend in depth.</p> <p>5. Hasty Attack: CDR intended to focus intel collection on identifying fighting positions, hide positions, obstacles, strong points, and flank AT positions. Fires were to be used to destroy enemy as acquired.</p> <p>6. Deliberate Attack: BDE CDR intended to destroy the enemy in zone before the enemy had time to mass the 2nd Echelon. To accomplish this the brigade RISTA assets would have to determine the enemy defensive course of action. RISTA assets were focused on identifying fighting positions, hide positions, ADA locations, obstacles, infantry strongpoints, and flank AT positions.</p>	
<p>BRIGADE RECON & SECURITY ASSETS (Organization, Structure, and Equipment)</p>	<p>BRT - 2 Platoons of 10 HMMWVs each with HQ section. Each platoon had one officer and 29 cavalry scouts. The troop headquarters had 13 personnel and was organized into a headquarters section and a maintenance section. The BRT had two LRAS3 system and one HS3 system prototypes for TF XXI AWE. (TFXXI, OPTEC Report, 4-67)</p> <p>BRT augmented for some missions with STRIKER PLT in direct support (6 COLT Teams), engineer scout squads, and Chemical FOX squad.</p> <p>Other Collection Systems: UAV, OH58-D (Kiowa Warrior), Apache Longbow, GBGS, JSTARS, QUICKFIX, GBS (FAAD), Q36 Radar, Direct TENCAP access.</p>	<p>BRT - One 6-vehicle scout platoon (FSV), one organic striker platoon (6 COLTs), and one HQ Section.</p> <p>Equipment: 7 each FSV 6 Striker Teams/vehicles 5 Javlines</p>

DATA SUMMARY TABLE (Continued)

BRIGADE RECON & SECURITY ASSET MISSION(S)	TF XXI AWE	Division XXI AWE (DAWE)
<p>BRIGADE RECON & SECURITY ASSET MISSION(S)</p>	<p>TF XXI AWE</p> <p>1. MTC: BRT conducted force-oriented zone recon with emphasis on moving through the passes and objectives in order to establish OPs forward of BDE. The CDRs intent was to locate and destroy enemy recon forces, forcing the enemy to attack blind. Later the BRT mission was to destroy CRP, identify potential enveloping detachments, track and report direction and speed of FSE and AGMB, and destroy with PGM and/or massed fires.</p> <p><u>BRT Attachments:</u> Chemical (FOX) team 6 each STRIKER Teams Recon Section/ ENG</p> <p>2) Deliberate ATK: BRT occupies OPs in vicinity of OBJs to identify enemy locations and facilitate fixing the enemy. BRT also moved along axis to identify routes, obstacles, and positions along axis.</p> <p><u>BRT Attachments:</u> 2 each STRIKER Teams Recon Section/ENG IREMBASS Team</p> <p>3. Defense in Sector: BRT inserts in sector to screen in depth. TFs push out counterrecon forces (Co/TM size) to destroy enemy recon moving through sector forward of FEBBA. Counterrecon and recon assets focus on locating, tracking, and destroying RGT RECON.</p> <p><u>BRT Attachments:</u> 2 each STRIKER Teams Recon Section/ENG IREMBASS Team</p> <p>4. Mobile Defense: The BRT and scout platoons conducted</p>	<p>Based on observations by SME/OCs and participants in the TEXCOM database, the BRTs of the CHD maneuver brigades played a large role in Reconnaissance, Intelligence, Surveillance, and Target Acquisition (RISTA). Based on comments from this database, the BRTs were well integrated in the RISTA plan with JSTARS, UAV, SOF and other assets.</p> <p>Observation reports referred to the BRT's successful role in target acquisition for high payoff/high value targets for both indirect fires and the aviation attack battalion; in reporting and helping track enemy ground and air movements as integrated with other RISTA assets; in emplacing the RAPTOR Intelligence Combat Outpost (a remote sensor developed by engineer proponent); in gathering and reporting PIR and other information; and in reporting battle damage assessment (BDA) from air and artillery fires.</p> <p>BRT reporting, compared to other RISTA assets (JSTARS, UAV), was more critical as the enemy entered the brigade close fight. JSTARS and UAV were very effective in confirming or denying enemy activity deep but less effective as the enemy closed with the brigade maneuver elements.</p>

DATA SUMMARY TABLE (Continued)

BRIGADE RECON & SECURITY ASSET MISSION(S) (Continued)	TF XXI AWE	Division XXI AWE (DAWE)
PERFORMANCE OF BRIGADE RECON ASSET	<p><u>BRT Attachments:</u> 3 ENG Recon Squads</p> <p><u>OVERALL:</u> (4-77) The BRT, HS3 and LRAS3 were identified as "high-performing" initiatives during the conduct of TF XXI AWE. "The BRT is the divisional brigade's primary reconnaissance asset and will operate forward, to the flanks, or to the rear of the brigade to execute reconnaissance and enhance command and control. The BRT will complement other information sources available to the brigade commander, such as unmanned aerial vehicles, and direct feed from division and echelons above</p>	<p>Comments from Observer Data:</p> <p>The BRT was successful in collecting and reporting information, in target acquisition, in controlling indirect fires and cueing attack aviation and airforce fires, in determining battle damage assessment, and in emplacing remote sensors.</p> <p>The RISTA planning for the brigades was very strong during this exercise in integrating all assets available to provide</p>
	<p>zone reconnaissance forward to locate, track and destroy the enemy regimental and divisional recon assets. As the enemy deployed, BDE RISTA assets were to track and destroy through indirect fire followed by ground maneuver of TFs. On the second day the BRT at one point exfiltrated scouts from one area and established Ops in another area. The BRT had no attachments.</p> <p>5. Hasty Attack: Two BRT teams inserted by air and established OPs in the vicinity of LT IN infiltration attack objectives. The remaining BRT occupied OP positions in five locations to support the heavy BN TF attacks.</p> <p><u>BRT Attachments:</u> 3 ENG Recon Squads.</p> <p>6. Deliberate Attack: Three BRT and two STRIKER teams were airlifted into the area of operations and established OPs. One BRT platoon screened along a forward phase line to provide early warning of an enemy attack. Later in the battle, the BRT and TF Scouts continued to move deeper into the zone to observe enemy defensive preparations while OH-58D located and destroyed enemy vehicles. The screening platoon conducted a force oriented zone reconnaissance between two phase lines.</p> <p><u>BRT Attachments:</u> 3 ENG Recon Squads</p>	

DATA SUMMARY TABLE (Continued)

PERFORMANCE OF BRIGADE RECON ASSET (Continued)	TF XXI AWE	Division XXI AWE (DAWE)
	<p>division reconnaissance. The BRT provides continuous, all environment collection asset that is directly responsive to tactical needs of the brigade commander." (ES-21)</p> <p>An SME comment from the AWE NTC rotation: "The BRT provide(s) eyes on intel far forward of the FLOT; more detailed and earlier info; scout are always out in front reporting; helps find enemy units earlier." (ES-21)</p> <p>1. Movement to Contact : => UAV achieved significant success in detecting OPFOR vehicles crossing the international border. No comments on BRT actions/reports.</p> <p>2. Deliberate Attack: => "BRT pushed out from AA without doing rehearsals and without specific guidance..." => "BRT was not able to give clear intelligence picture throughout the night." (D-4, OPTEC Report) => "BDE S2 fixated on UAV feed, with no priority on human intelligence. Brigade recon team with HS3 available, but not being employed. (HS3 looking due north...instead of to the west.)" (D-6, OPTEC Report.) => "BDE struggled to clearly focus and regenerate their recon resources to support actions at their forced decisive point." (1-9, NTC Take-Home Packet, BDE)</p> <p>3. Defense In Sector: =>Enemy Division Recon was successful, so the counterrecon effort was not effective. => Later in the battle, the BDE failed to react to the developing situation with necessary flexibility. The BDE had very strong ground situation awareness. => "Throughout the night, BRT and TF Scouts were pushed forward without any specific guidance, TAI/NAI, and no priorities. Additionally, COLT teams had no specific targets or areas defined for them." (D-7, OPTEC Report)</p>	<p>dynamic intelligence collection in depth which focused on PIR and well developed NAI and TAI.</p> <p>The brigades reliance on the BRT compared to other assets increased as the enemy got closer to the brigade ground maneuver elements.</p>

DATA SUMMARY TABLE (Continued)

PERFORMANCE OF BRIGADE RECON ASSET (Continued)	TF XXI AWE	Division XXI AWE (DAWE)
	<p>=> "Generally good reporting on HINDS, BMPs, and other OPFOR in Central Corridor... OPFOR breached obstacle in Hidden Valley, and there were no eyes on it at this time." (D-8, D-9, OPTEC Report.)</p> <p>4. Mobile Defense in Sector: => BRT destroyed 1 BRDM and 1 BMP.</p> <p>5. Hasty Attack => OC commented that the BDE had no eyes deep other than UAV assets.</p> <p>6. Deliberate Attack: => Enemy counterrecon was very successful destroying all but one STRIKER team.</p> <p>BRT with Striker/Colt cited as an organizational concept "Winner" in enhancing situational awareness. Comment: "But leaner"</p> <p>UAV improves survivability of BRT by pulling (or drawing away) BRT elements from enemy positions.</p>	
Situational Awareness	<p>(4-76) "The BRT can provide the brigade commander and staff with intelligence and information, in a timely and accurate manner, that is not provided by other brigade assets. "Overall, the soldiers indicated that the BRT addressed the Brigade's reconnaissance needs in a timely and accurate manner by supplying the brigade commander with information that generally is not provided by other brigade means." (4-69) => The BRT was able to "provide eyes on intel far forward of the FLOT; more detailed and earlier info." (4-70) => The BRT addressed all assigned PIRs (enemy locations, disposition, equipment, orientation of obstacles, avenues of approach, direction of enemy movements, trafficability of routes.</p>	<p>The BRT was very successful in terms of reporting to the brigades. => The BDEs were effective in developing a coordinated collection plan integrating all assets: MI, engineer, scouts, etc., into an effective reconnaissance and surveillance (R & S) plan to support the brigade fight. (5532) => The brigades successfully tasked all assets (JSTARS, UAV, GBCS, RAPTOR, STRIKER, and BRT) to gather information to develop the brigade consolidated picture of the battlefield. (OBS 5532 -BDE R/S Plan) The entire R&S plan focused on filling the commander's intent - filling his Priority Intelligence Requirements, finding the High Value, High Payoff Targets, then sending an appropriate force to defeat</p>

DATA SUMMARY TABLE (Continued)

<p>Situational Awareness (Continued)</p>	<p>TF XXI AWE</p>	<p>Division XXI AWE (DAWE) that enemy (OBS 5550 - Doctrine). => With increased depth of view of the commander's battlespace through the introduction of the BRT, JSTARS, and UAV, the brigade can better determine which targets will most likely effect the commander's mission if not attacked. (5564) => The BRT reported both ground and air enemy activities. => Throughout the exercise the BRT provided the more accurate BDA than other available sources (UAV, JSTARS).</p>
<p>Tempo</p>	<p>The BRT was found to be responsive to the CDRs reconnaissance needs as identified. The brigade faced the typical challenge in employing all HUMINT intelligence during conventional tactical operations: directing a focused reconnaissance effort which will support the plan in a timely manner. In order to get the reconnaissance element in position to report in time to effect the BDE plan, the BDE usually has to send them out prior to the completion of the synchronized plan.</p> <p>The TF XXI AWE showed that the BDE staff and leadership was hesitant to act on the enhanced situational awareness due to the desire to verify information. This delay or hesitation to make decisions based on the real time information (some of which was provided by the BRT), partially offset the advantages of having this informational upper hand. "The BRT's potential to provide intelligence information more effectively will be realized when the BRT is fully integrated into a well developed R&S plan with established NAIs/TAIs supporting the tactical mission." (8-9)</p>	<p>Observations referred to the comprehensive brigade collection plans involving JSTARS, UAV, BRT, and scouts. These observations indicated that assets were well integrated and allowed enemy high payoff/high value targets to be detected and tracked. The integrated RISTA assets greatly contributed to a dynamic targeting and intelligence approach. Once one sensor detected activity, this cued a response or refocusing of another sensor (dynamic intelligence). One a target was acquired by a RISTA asset, if the determination was made to engage, the "shooter" (whether artillery, aviation, or airforce) was more flexible to respond to this target (dynamic targeting). This dynamic targeting and intelligence collection implies an increased tempo for the force. The BRT was perhaps the least responsive in terms of repositioning but the most flexible and reliable in terms of focussing on a specific indicator already in the area of observation.</p>
<p>Lethality</p>	<p>In response to the question, "What additional capabilities and/or systems are needed for the troop/platoon to perform its mission?", several soldiers responded that there was a need for an attached tank and/or Bradley platoon and/or mortar platoon for immediate fires and smoke. (4-70)</p>	<p>=> There were no specific observations concerning the BRTs destroying enemy vehicles directly. Several reports indicate that the BRT was used to control indirect fires. In the 2003, scenario, the BRT could direct precision guided munitions, affording it effective lethality. => The BRT contribution to the brigade's ability to detect</p>

DATA SUMMARY TABLE (Continued)

<p>Lethality (Continued)</p>	<p>TF XXI AWE The BRT was effective in using indirect fire using primarily FM voice through the BRT Co headquarters or through STRIKER teams, when they were attached. (4-70)</p>	<p>Division XXI AWE (DAWE) high payoff/high value targets allowed attack aviation to move to the target and not necessarily to an engagement area. Hence, the BRT enhanced the brigade's ability to employ effective and lethal combat power. (4808)</p>
<p>Survivability</p>	<p>As is typical of most NTC rotations, the survival of "scouts" is most threatened while getting them into position. The survival of the BRT and STRIKER vehicles depends entirely on stealth. Once detected, these vehicles are destroyed by direct or indirect fires of the threat counterreconnaissance effort.</p>	<p>=> Only one observation refers to the survivability of the BRTs or scouts during the exercise. During the defensive phase of the operation, the status of Brigade scout platoons during the enemy's counterrecon fight was 4 out of 9 platoons surviving. This indicates that even with the Future Scout Vehicle capability, when opposing a modern conventional threat, the survivability of the BRT vehicles will depend on stealth and not being detected or compromised. Once compromised, the vehicle has little survivability.</p>
<p>Other</p>	<p>ORG: "The (OPTEC) assessment found no identified change to the BRT organization was needed based on user comments." (4-69)</p> <p>RISTA: "The EXFOR demonstrated the ability to conduct effective Reconnaissance, Intelligence, Surveillance, and Target Acquisition (RISTA) operations during the TFXXI AWE. The reorganization coupled with many TFXXI initiatives (UAV, JSTARS, BRT, STRIKERS, etc) provided to the EXFOR enabled commanders to make timely tactical decisions.... The brigade effectively employed these reconnaissance assets during the TFXXI AWE and exploited the information provided in many instances."</p> <p>C2: "The assessment of the BRT determined that no required changes were needed for the BRT C2 or the BRT reporting process.... Spot reports, Situation Reports, and calls for indirect fire were sent by digital means and FM voice through normal C2 reporting channels." (4-69)</p> <p>"The EXFOR could have more fully exploited the information provided by these resources (RISTA) if the following</p>	<p>An interesting issue emerged early in the exercise. The BRT reported enemy air while the ADA systems (particularly the digital connectivity) failed to function properly. The BRT report was discounted since the ADA systems did not confirm the report. (Key players did not realize the ADA systems were not functioning properly.) This example exposes the scenario of conflicts between information from "eyes on the ground" and digital systems. It is possible for HUMINT reports to be incorrect due to faulty reporting, misinterpretation of information, inappropriate analysis by the scout, or due to the "heat of battle" excitement of the reporter. Nevertheless, digital systems can also malfunction. The dilemma raised is: at what point does a commander rely more on his human inputs instead of digital systems. [One answer to this question is when two sources of information are contradictory, the commander can either go with the more dangerous information (the conservative approach). However, HUMINT should still be considered the most reliable information source. Additionally, this example exposes the false sense of security digital (automatic and technical) systems can illicit.</p>

DATA SUMMARY TABLE (Continued)

<p>Other (Continued)</p>	<p>TF XXI AWE capabilities had been available during the AWE: * Reliable FM voice communications over extended ranges. * Improved information management capability of the data provided by the multiple media. * Improved and effective hardware, software, TTP for integration of intelligence information (intelligence fusion).” (ES-20)</p>	<p>Division XXI AWE (DAWE)</p>
-------------------------------------	---	---------------------------------------

¹ NTC OPFOR Combat Battle Instructions (CBI) from Rotation 97-06 (TFXXI AWE), from MAJ Richard Richardson, NTC Observer Controller.

BIBLIOGRAPHY

Books

Clancy, Tom. *Armored Cav*. New York, NY: Berkley Books, 1994.

_____. *Into the Storm: A Study in Command*. New York, NY: G. P. Putnam's Sons, 1997.

Fuller, J. F. C. *Armored Warfare*. Harrisburg, PA: The Military Service Publishing Company, 1943.

Marshall, George C., ed. *Infantry In Battle*. 2d ed. Washington, DC: Infantry Journal Incorporated, 1939.

Simkin, Richard E. *Mechanized Infantry*. New York: Brasseys Publishers, 1985.

Sun Tzu. *The Art of War*. London: Oxford University Press, 1963.

Articles

Betson, William. "Reconnaissance and the Maneuver Brigade." *CTC Quarterly Bulletin*, 4th Qtr, FY 97, No. 97-18, Center for Army Lessons Learned, U.S. Army Training and Doctrine Command, Fort Leavenworth, KS. September 1997.

Burns, Bob. "Reconnaissance." *Combat Training Centers (CTCs) Bulletin No. 93-4*. Center for Army Lessons Learned (CALL), U.S. Army Combined Arms Command (CAC), Fort Leavenworth, KS. July 1993.

Chervenak, Jan, and Eric J. Lynam. "Professional Forum: Infantry Issues and Lessons." *Infantry* 78, 4 (July-Aug 1988): 11-12.

Foss, John W. "AirLand Battle-Future." *Army Magazine*, March 1991, 20-24 and 33-37.

Foss, John W., Donald S. Pihl, and Thomas E. Fitzgerald. "The Division Restructuring Study: The Heavy Division." *Military Review*, March 1977, 11-21.

Galitsan, A. "Combat Reconnaissance." *Soviet Military Review*, December 1980, 26-27.

- Gourley, Scott R. "Army's Force XXI Armored Maneuver Team." *Army* 46, 7 (July 1996): 40-44.
- Hallman, Beaufort C., Jr. "Lessons Learned at the National Training Center: An Observer-Controller's Perspective." *Armor* 95, 5 (September-October 1986): 30-34.
- Heritage, Gregory M. "NTC: Lessons Learned." *Infantry* 76, 1 (January - February 1986): 39-41.
- Humphrey, Vernon W. "Winning at the NTC: Reconnaissance." *Infantry* 74, 1 (January-February 1984): 35-37.
- Kalb, John F. "Reports from Fort Knox - Directorate of Force Development." *Armor* 106, 6 (November-December 1997) 15-17.
- Korotchenko, I. "Reconnaissance." *Soviet Military Review*, June 1983, 44-45.
- Leonhard, R. R. "Counter-reconnaissance Company." *Infantry* 78,1 (January-February 1988): 23-26.
- Leur, Kenneth C. "Commandant's Note: Reconnaissance and Security." *Infantry* 78, 4 (July - August 1988): 1.
- Stouder, Richard L. "AirLand Operations: Are Unit Changes Needed?" *Military Review*, October 1991, 72-77.
- Tulak, Arthur N. "Advanced Warfighting Experiment (AWE)." *CALL Newsletter*, Center for Army Lessons Learned, Fort Leavenworth, KS, May-June 1997.

U.S. Army Documents

- Kern, Major General, Commanding General 4th Infantry Division. "Executive Working Group VTC - 4th Infantry Division, 14th April 1997." Fort Leavenworth, KS: Center for Army Lessons Learned, accessed 16 January 1998.
- U.S. Army. FM 17-95, *Cavalry Operations*. Washington, DC: Headquarters, Department of the Army, December 1996.
- _____. FM 71-3, *Armored and Mechanized Infantry Brigade*. Washington, DC: Headquarters, Department of the Army, January 1996.

- _____. FM 71-100, *Division Operations*. Washington, DC: Headquarters, Department of the Army, August 1996.
- _____. FM 71-100-5, *EXFOR Division Operations Tactics, Techniques, and Procedures*. Version 3, Washington, DC: Headquarters, Department of the Army, June 1997.
- _____. FM 100-5, *Operations*. Washington, DC: Headquarters, Department of the Army, June 1993.
- _____. FM 100-5 (DRAFT), *Operations*. Washington, DC: Headquarters, Department of the Army, 1997.
- _____. *Posture Statement FY98 - America's Army - The Force of Decision for Today, Tomorrow, and the 21st Century*. Washington, DC: Department of the Army, February 1997.
- _____. *Weapon Systems United States Army 1996*. Washington, DC: Department of the Army, 1996.
- U.S. Army Armor Center. Fort Knox Supplemental Manual 71-3-1(A), *The Digitized Heavy Brigade*. Fort Knox, KY: Headquarters, U.S. Army Armor Center, February 1997.
- _____. "Brigade Operations in AirLand Battle-Future Support Analysis for TRADOC Warfighter GOWS II. Final Report 1." Fort Knox, KY: Army Armor School, June 1990.
- U.S. Army Armor School. "Brigade Scouts." White Paper, Fort Knox, KY: Directorate of Combat Developments, U.S. Army Armor Center, 1988.
- _____. "Cavalry/Reconnaissance Net Assessment - Master Plan." Fort Knox, KY: U.S. Army Armor School, 1988.
- U.S. Army Field Artillery Center. *Tactics, Techniques, and Procedures for the Strike/Recon Platoon (STRIKER)*. On-line. Fort Sill, OK: U.S. Army Field Artillery School, accessed in December 1997. Available from <http://sill-www.army.mil>; Internet.
- _____. "NTC Rotation 97-06 Brigade Take Home Packet." Fort Irwin, CA: NTC, 16-29 March 1997. Available from Center for Army Lessons Learned, Fort Leavenworth, KS.

U.S. Army Operational Test and Evaluation Command. 1997-AW-ACTI-1817A, "Task Force XXI Advanced Warfighting Experiment (AWE) Live Experiment Assessment Report." Alexandria, VA: United States Army OPTEC, 10 September 1997.

U.S. Army Operational Test and Evaluation Command, and Training and Doctrine Command Analysis Center. "Task Force XXI Advanced Warfighting Experiment (AWE) Integrated Report." Alexandria, VA: U. S. Army OPTEC, 24 December 1997.

U.S. Army Training and Doctrine Command. TRADOC Pamphlet 525-5, *Force XXI Operations*. Fort Monroe, VA: Training and Doctrine Command, 1994.

_____. TRADOC Pamphlet 525-71, *Force XXI Division Operations Concept*. Fort Monroe, VA: Training and Doctrine Command, 13 May 1996.

_____. TRADOC Pamphlet 525-200-4, *Mounted Battlespace Battle Dynamic Concept*. Fort Monroe, VA: Training and Doctrine Command, 1 June 1994.

_____. TRADOC Pamphlet, *Land Combat in the 21st Century*. Fort Monroe, VA: Training and Doctrine Command, 1995.

_____. "After Action Report, Division Advanced Warfighting Experiment." Slides, Fort Hood, TX: 4th Infantry Division (EXFOR), 10 December 1997.

_____. "After Action Report, Division Advanced Warfighting Experiment." Slides, Fort Hood, TX: RDD, USAFMSA, 10 December 1997.

_____. "Commander Reveals Some Results of Force XXI AWE." TRADOC News Service, Release No.: 94-04-03. Fort Monroe, VA: TRADOC, 22 April 1997.

_____. "Division XXI Advanced Warfighting Experiment Directive." Fort Monroe, VA: Headquarters, TRADOC, February 1997.

_____. "Study Plan for the Division XXI Advance Warfighting Experiment (DIV XXI AWE)." Fort Monroe, VA: Headquarters, TRADOC, October 1996.

_____. "Task Force XXI Outbrief to the TRADOC Staff." [On-line] Fort Monroe, VA: TRADOC, accessed in November; available from <http://199.221.105.20/digitize> (Force XXI Intranet); Internet.

U.S. Army Training and Doctrine Command Analysis Center. "Division XXI Advanced Warfighting Experiment (DAWE) Initial Insights Report (IIR)." Fort Leavenworth, KS: TRAC, 15 December 1997.

- _____. Technical Report TRAC-TR-0396, "Force XXI Division Design Analysis: Phase I Final Report." Fort Leavenworth, KS: TRADOC Analysis Center Study and Analysis Center, March 1996.
- _____. "Force XXI - Joint Venture." Summary Briefing for TRADOC Staff, Fort Monroe, VA: TRAC, 28 August 1997.
- _____. "Initial Impressions Report - Advanced Warfighter Experiment (Coordinating Draft)." Fort Leavenworth, KS: Center for Army Lessons Learned, April 1997.
- _____. "Mobile Strike Force 95 Organization and Operational Analysis." [On-line] Fort Leavenworth, KS: TRAC, accessed 10 February 1996. Available from <http://www.trac.army.mil/msf>; Internet.
- _____. Study Plan TRAC-SP-0196, "Study Plan for the Force XXI Division Design Analysis Phase II." Fort Monroe, VA.; Headquarters, TRADOC, November 1996.
- _____. "Test and Experimentation Command - Division XXI Advanced Warfighting Experiment Subject Matter Expert Observation Data Files." [On-line] Fort Leavenworth, KS: TRAC, accessed in December 1997; available from <http://www.trac.army.mil/dawe>; Internet.
- _____. "The Brigade Design Analysis (BDA): Phase II Results (Draft)." White Sands Missile Range, AZ: TRAC-WSMR, September 1997.

Monographs/Theses

- Barret, Raymond D., Jr. "Coherence Between AirLand Battle and Contemporary Force Structure at Corps, Division, and Brigade Level." Master of Military Art and Science Thesis, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 1985.
- Bishop, Captain Carl A. "The J-Series Divisional Cavalry Squadron: Asset or Liability?" Master of Military Art and Science Thesis, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 1993.
- Boeglen, Kenneth L. "Does the Heavy Maneuver Brigade Commander Need an Organic Reconnaissance/Security Organization?" Master of Military Art and Science Thesis, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 1992.

- Burkhardt, Robert W., "Brigade Organization and the AirLand Battle." Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth, KS, December 1985.
- Chappell, John S., "Security Operations: Current Net Value of NTC Lessons Learned for the Divisional Ground Maneuver Brigade." Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 1988.
- Diehl, J. G. "Who is Out There: Tactical Reconnaissance Formations for the Heavy Division." Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth, KS, December 1988.
- Jacoby, C. H. "Light Infantry in AirLand Battle Future: Organizing for Success." Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth, KS, December 1990.
- McCarthy, T. C. "U.S. Army Heavy Brigade Reconnaissance During Offensive Operations." Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth, KS, December 1994.
- McKean, William J. "Does the Force XXI Heavy Brigade Need An Organic Reconnaissance and Security Element?" Master of Military Art and Science Thesis, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 1995.
- Swan, Guy C. "Tactical Reconnaissance for the Heavy Brigade Commander: How Much is Not Enough?" Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 1988.

Unpublished Materials

- Hawkins, Glen R., and James Jay Carafano. "Prelude to Army XXI." U.S. Army Center for Military History, Washington, DC, 1997.
- Morris, Rodler F., Scott W. Lackey, George J. Mordica II, and J. Patrick Hughes. "Initial Impressions Report: Changing the Army." CAC History Office, Fort Leavenworth, KS, 1994.
- Rosenberger, John D. "An Assessment of Reconnaissance and Counter-reconnaissance Operations at the National Training Center." U.S. Army Armor School: Fort Knox, KY, 1987.

Terpeluk, W. "Lessons from the Past and a Vision of the Future: Tactical Headquarters Requirements in Force XXI." Study Project, Army War College, Carlisle Barracks, PA, 18 April 1995.

Wilson, John B. "Influences on U.S. Army Divisional Organization in the Twentieth Century." Center for Army Lessons Learned, Fort Leavenworth, KS: 1997.

INITIAL DISTRIBUTION LIST

1. Combined Arms Research Library
U.S. Army Command and General Staff College
250 Gibbon Ave.
Fort Leavenworth, KS 66027-2314
2. Defense Technical Information Center/OCA
8725 John J. Kingman Rd., Suite 944
Fort Belvoir, VA 22060-6218
3. LTC Kevin C. Dopf
Combined Tactics (CTAC)
USACGSC
1 Reynolds Ave.
Fort Leavenworth, KS 66027-1352
4. Dr. Ronal Cuny
Center for Army Leadership
USACGSC
1 Reynolds Ave.
Fort Leavenworth, KS 66027-1352
5. MAJ Kevin D. Poling
Combined Tactics (CTAC)
USACGSC
1 Reynolds Ave.
Fort Leavenworth, KS 66027-1352
6. Training and Doctrine Command
Force Design Development
Attention: MAJ Reynolds
Fort Leavenworth, KS 66027
7. Training and Doctrine Command Analysis Center
Study and Analysis Center
Attention: Dr. Roland Groover
Fort Leavenworth, KS 66027-2345
8. Training and Doctrine Command Analysis Center
White Sands Missile Range
Attention: Mr Kevin Wainer
White Sands Missile Range, NM 88002-5502

9. Center for Army Lessons Learned
Attention: Dr. George Gernert
Bldg 50W, 10 Meade Avenue
Fort Leavenworth, KS 66027-1350
10. Commander, US Army Infantry School
Attention: Combined Arms and Tactics Directorate, Force XXI Office
Fort Benning, GA 31095-5400
11. Commander, US Army Armor School
Attention: Director of Combat Developments
Fort Knox, KY 40121-5000
12. Commander, US Army Field Artillery School
Attention: ATSF-CBL
Fort Sill, OK 73503-5600

CERTIFICATION FOR MMAS DISTRIBUTION STATEMENT

1. Certification Date: 5 June 1998
2. Thesis Author: Major Stephen E. Bruch, U.S. Army
3. Thesis Title: Did Force XXI Validate the Brigade Reconnaissance Troop?
4. Thesis Committee Members
Signatures:

	<i>[Signature]</i>
	<i>Kern D. Poling</i>
	<i>[Signature]</i>

5. Distribution Statement: See distribution statements A-X on reverse, then circle appropriate distribution statement letter code below:

(A) B C D E F X

SEE EXPLANATION OF CODES ON REVERSE

If your thesis does not fit into any of the above categories or is classified, you must coordinate with the classified section at CARL.

6. Justification: Justification is required for any distribution other than described in Distribution Statement A. All or part of a thesis may justify distribution limitation. See limitation justification statements 1-10 on reverse, then list, below, the statement(s) that applies (apply) to your thesis and corresponding chapters/sections and pages. Follow sample format shown below:

EXAMPLE

<u>Limitation Justification Statement</u>	/	<u>Chapter/Section</u>	/	<u>Page(s)</u>
Direct Military Support (10)	/	Chapter 3	/	12
Critical Technology (3)	/	Section 4	/	31
Administrative Operational Use (7)	/	Chapter 2	/	13-32

Fill in limitation justification for your thesis below:

<u>Limitation Justification Statement</u>	/	<u>Chapter/Section</u>	/	<u>Page(s)</u>
	/		/	
	/		/	
	/		/	
	/		/	

7. MMAS Thesis Author's Signature: *Stephen E. Bruch*

STATEMENT A: Approved for public release; distribution is unlimited. (Documents with this statement may be made available or sold to the general public and foreign nationals).

STATEMENT B: Distribution authorized to U.S. Government agencies only (insert reason and date ON REVERSE OF THIS FORM). Currently used reasons for imposing this statement include the following:

1. Foreign Government Information. Protection of foreign information.
2. Proprietary Information. Protection of proprietary information not owned by the U.S. Government.
3. Critical Technology. Protection and control of critical technology including technical data with potential military application.
4. Test and Evaluation. Protection of test and evaluation of commercial production or military hardware.
5. Contractor Performance Evaluation. Protection of information involving contractor performance evaluation.
6. Premature Dissemination. Protection of information involving systems or hardware from premature dissemination.
7. Administrative/Operational Use. Protection of information restricted to official use or for administrative or operational purposes.
8. Software Documentation. Protection of software documentation - release only in accordance with the provisions of DoD Instruction 7930.2.
9. Specific Authority. Protection of information required by a specific authority.
10. Direct Military Support. To protect export-controlled technical data of such military significance that release for purposes other than direct support of DoD-approved activities may jeopardize a U.S. military advantage.

STATEMENT C: Distribution authorized to U.S. Government agencies and their contractors: (REASON AND DATE). Currently most used reasons are 1, 3, 7, 8, and 9 above.

STATEMENT D: Distribution authorized to DoD and U.S. DoD contractors only; (REASON AND DATE). Currently most reasons are 1, 3, 7, 8, and 9 above.

STATEMENT E: Distribution authorized to DoD only; (REASON AND DATE). Currently most used reasons are 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10.

STATEMENT F: Further dissemination only as directed by (controlling DoD office and date), or higher DoD authority. Used when the DoD originator determines that information is subject to special dissemination limitation specified by paragraph 4-505, DoD 5200.1-R.

STATEMENT X: Distribution authorized to U.S. Government agencies and private individuals of enterprises eligible to obtain export-controlled technical data in accordance with DoD Directive 5230.25; (date). Controlling DoD office is (insert).