**U.S. Army Research Institute
for the Behavioral and Social Sciences**

Research Report 1816

MINDPRINT:
Developing the Soldiers and Leaders
of Objective Force and Beyond

Holly C. Baxter, Jennifer Phillips, Jennifer Shafer, and Gary Klein
Klein Associates Inc.

Kathleen Mosier
San Francisco State University

JANUARY 2004

U.S. ARMY RESEARCH INSTITUTE
FOR THE BEHAVIORAL AND SOCIAL SCIENCES

A DIRECTORATE OF THE U.S. ARMY HUMAN RESOURCES COMMAND

ZITA M. SIMUTIS
Director

NOTICES

REPORT DOCUMENTATION PAGE

1. REPORT DATE (dd-mm-yy) January 2004	2. REPORT TYPE Final	3. DATES COVERED (from. . . to) January – September 2003

4. TITLE AND SUBTITLE MINDPRINT: Developing the Soldiers and Leaders of Objective Force and Beyond	5a. CONTRACT OR GRANT NUMBER DASW01-03-C-0017
	5b. PROGRAM ELEMENT NUMBER 665502

6. AUTHOR(S) Holly C. Baxter , Jennifer Phillips, Jennifer Shafer , and Gary Klein (Klein Associates Inc.); Kathleen Mosier (San Francisco State University)	5c. PROJECT NUMBER M770
	5d. TASK NUMBER
	5e. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Klein Associates Inc. 1750 Commerce Center Blvd. North Fairborn, OH 45324-6362	8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) US Army Research Institute for the Behavioral and Social Sciences Attn: DAPE-ARI-IJ 5001 Eisenhower Ave Alexandria, VA 22304-4841	10. MONITOR ACRONYM ARI
	11. MONITOR REPORT NUMBER Research Report 1816

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES
COR: Richard E. Christ

14. ABSTRACT *(Maximum 200 words)*:
This report was developed under the Phase I Small Business Innovation Research (SBIR) Program.
Information technologies are changing the way organizations do business. In the case of the Army's Objective Force, these technologies will fundamentally transform the way in which battles are fought. They will also transform the decisions, judgments, and cognitive tasks of Soldiers and leaders. Without adequate preparation for these new cognitive requirements, the Army will be ill-equipped to use, much less capitalize on, the new technologies. The need is to (a) identify, in advance, the requirements introduced by Objective Force technologies, and (b) build skill and expertise around those requirements prior to implementation of the new technologies. In this research, a macrocognition framework was employed to study how Objective Force technologies will alter the cognitive landscape for small unit leaders. Data collection methods were developed to capture the macrocognitive requirements associated with the new technologies. Findings suggest that substantial changes will occur with regard to seven macrocognitive activities: the Sensemaking and Coordination functions, and the processes of Maintaining Common Ground, Developing Mental Models, Uncertainty Management, Attention Management, and Turning Leverage Points into Courses of Action. Preliminary implications for training addressing each of these macrocognitive activities are presented.

15. SUBJECT TERMS
Objective Force, Objective Force Warrior, Macrocognition, Cognition, Training Requirements, Sensemaking, Coordination, Synthetic Task Environment, SBIR Phase I Report

SECURITY CLASSIFICATION OF			19. LIMITATION OF ABSTRACT	20. NUMBER OF PAGES	21. RESPONSIBLE PERSON
16. REPORT Unclassified	17. ABSTRACT Unclassified	18. THIS PAGE Unclassified	Unlimited		Richard E. Christ 706-545-2207

x

x

MINDPRINT:
Developing the Soldiers and Leaders
of Objective Force and Beyond

Holly C. Baxter, Jennifer Phillips, Jennifer Shafer, and Gary Klein
Klein Associates Inc.

Kathleen Mosier
San Francisco State University

Infantry Forces Research Unit
Scott E. Graham, Chief

United States Army Research Institute for the Behavioral and Social Sciences
5001 Eisenhower Avenue, Alexandria, VA 22304-4841

January 2004

x

FOREWORD

The Infantry Forces Research Unit of the U. S. Army Research Institute for the Behavioral and Social Sciences conducts research under a Science and Technology Objective, *Training Objective Force Small Unit Leaders and Teams.* One goal of that research is to develop training methods that will permit small unit leaders to exploit the opportunities made possible by emerging information technologies. The new technologies will provide not only more information to military decision makers, but the information will be both more varied and more certain than that currently available. The changing nature of this information has been projected to change the nature of the cognitive processes required to achieve decision-making competence. What is needed are methods to forecast how the processes for handling information and making decisions will be impacted by the technologies, and to link these changes to appropriate training strategies.

This report describes the methods and results of an Army Phase I Small Business Innovation Research (SBIR) project that addressed these challenges. The research used complementary cognitive task analysis techniques to investigate the impact of proposed Future Force information technologies on decision and macrocognitive requirements of Army small unit leaders and Soldiers. Based on the results of this investigation, the authors refined concepts for training leaders and Soldiers to build the decision-making and macrocognitive skills needed to properly exploit the proposed technologies.

The information contained in the report has been discussed with the Directorate of Operations and Training at the U.S. Army Infantry School. The MINDPRINT model used to organize this information should serve to insure that the Future Force community fully comprehends and prepares for the impact that emerging technologies will have on multiple macrocognitive activities of future leaders and Soldiers.

Michael G. Rumsey
Acting Technical Director

MINDPRINT: DEVELOPING THE SOLDIERS AND LEADERS OF OBJECTIVE FORCE AND BEYOND

<u>**EXECUTIVE SUMMARY**</u>

Research Requirements:

The United States Army is transitioning to the Objective Force with the intent of enhancing and improving existing technological capabilities while creating new technological innovations. However, no one has researched how the Soldiers' and leaders' cognitive requirements will need to change to accommodate these new and improved technologies. The objectives of this effort were (a) to explore how Objective Force information technology (IT) will change the decision strategies and cognitive requirements of the Army's Soldiers and leaders, and (b) to refine a concept for identifying the training implications of these new cognitive challenges.

Procedure:

A macrocognitive framework was applied to study the effects of IT on the Soldiers and leaders of Objective Force. While most laboratory research examines "microcognition" under carefully crafted conditions using subjects who are unfamiliar with the task used, in this research, we contrast this approach by studying macrocognitive phenomena in a naturalistic environment. The macrocognition framework delineates six macrocognitive functions—naturalistic decision making, sensemaking, planning, adaptation/replanning, problem detection, and coordination— and six macrocognitive processes that support those functions—maintaining common ground, developing mental models, uncertainty management, turning leverage points into courses of actions (COAs), attention management, and mental simulation story building. To explore the macrocognitive requirements introduced by new IT, a Macrocognitive Knowledge Audit was utilized with Land Warrior specialists to elicit an initial description of requirements associated with the Land Warrior enhancements. The information gained from these interviews was incorporated, along with projected Objective Force capabilities, to create Synthetic Task Environments (STEs). We then utilized these STEs along with the Macrocognitive Knowledge Audit to better ascertain the changes in macrocognitive processes because of the envisioned technology. The data were analyzed and training implications are offered.

Findings:

Objective Force technologies will not alter fundamental decision-making strategies from intuitive and recognitional to more analytic. However, the *types* of decisions will change for the small unit leader. A subset of macrocognitive activities will be particularly affected by the implementation of Objective Force technologies and result in new training requirements.

Sensemaking. The increase in available information, and the range of information sources, will influence sensemaking for Soldiers and leaders alike. Training will be required to address information filtering, information management, and information analysis.

Coordination. Enhanced communication capabilities will enable all Soldiers to have access to more information from the platoon leader, units will span a larger area of the battlefield, and smaller teams will predominate. All of these factors are likely to increase the coordination burden of the platoon and squad leaders and have implications for training.

Maintaining common ground. A larger number of teams, an increased area of responsibility, and the ability to conduct simultaneous tactical actions within a platoon-sized unit will affect the manner by which teams maintain common ground. Training for small unit leaders will need to address the utilization of team members to gather information, the distribution of information to particular subordinates, and the role of each member of the small unit in the common grounding activity.

Developing mental models. New technologies will necessitate the development of new mental models and the alteration of existing ones. Soldiers and leaders will need a working understanding of capabilities and limitations of the new IT and assets, how they break down or provide misleading information, how they function (so that the data can be better judged for credibility), and so forth. Training will need to address cognitively authentic ways to alter current mental models and build new ones.

Uncertainty management. The drastic increase in information availability may produce different strategies for dealing with uncertainty. For example, it is possible that expectations of high certainty will result in paralysis when, in some missions, that expectation is not met. While the training implications for preventing this are not clear, it is an area that should be studied in more depth.

Attention management. Information availability has the potential to draw the attention of leaders, especially the platoon leader, away from the Soldiers and toward the technology. The implications for training are intertwined with those for sensemaking—information filtering, management, and analysis.

Turning leverage points into COAs. New and enhanced capabilities such as the ability to "see around corners" and "see the next block" may well produce a new set of leverage points for decision makers to turn into tactical opportunities. The challenge for training is to build Soldiers' and leaders' mental models of the Objective Force battlefield such that they can recognize the opportunities and realize how to use them to their advantage.

Utilization of Findings

The results of this research will support the design of future investigations to understand how Objective Force technologies will affect Soldiers' and leaders' decision-making strategies and cognitive requirements. They furthermore will contribute to the development of training strategies and methods for enhancing critical cognitive attributes required of the Soldiers and leaders of future forces.

MINDPRINT: DEVELOPING THE SOLDIERS AND LEADERS OF OBJECTIVE FORCE AND BEYOND

CONTENTS

List of Tables

List of Figures

INTRODUCTION

Background

The advent of information technology (IT) in warfare is producing, and will continue to produce, a marked shift in the way the Army fights battles. The successful coupling of decision makers with technologies is perhaps best illustrated by the recent invasion and regime overthrow that took place in Iraq. However, while IT can help increase battlefield dominance, it also alters the nature of the Soldiers' tasks. Beyond merely changing procedures or steps, the IT revolution will create major changes in the decisions and cognitive requirements that drive the successful completion of a task. Some researchers and systems designers have gone so far as to speculate that the introduction of transformational technologies, such as those intended by the Army's Objective Force, will change the fundamental decision strategies that Soldiers employ from intuitive to analytical in nature, or that decision making will largely be removed from the Soldier's purview and become a function of the technology. While we are skeptical of such bold claims, we do expect major shifts in Soldiers' cognitive requirements with new, advanced technologies. The span of control over assets is broader, the geographical terrain to be controlled is larger, and the information flow is greater. By making unmanned aerial vehicle (UAV) assets more widely available, for example, the Army is going to alter the responsibilities of small unit leaders who will have to consider these assets in generating inputs into collection plans and in using the data produced by the UAVs. The ability to have Soldiers send digital images to their fire team and platoon leaders is yet another example of the way technology is going to create new types of cognitive requirements. Without adequate training and practice for the "new" tasks, operators can be left seriously disabled, especially in non-routine situations. This problem is compounded by the fact that in most cases, the changed cognitive requirements are not known or understood until long after the technology has been implemented and major errors are committed.

With the Objective Force, the Army has undertaken a massive effort to transform the way in which it does business. That transformation is highly reliant on the use of IT and the preparation of Soldiers and leaders to leverage those technologies to their advantage. The Army's Training and Doctrine Command (TRADOC) anticipates that the Objective Force fighting unit, or the Unit of Action, will require Soldiers who can work more effectively as a team, and leaders who have a strong situation awareness enabling them to synchronize, coordinate, and dominate the tactical decision-making environment (U.S. Army, 2002). The Navy, Air Force, and Marines are also pursuing IT solutions to vault their capabilities to the next level (Binnendijk, 2002). Given these major programs of technology development, it has become increasingly critical for the human factor's community to support the operators by identifying the changes that will result, and by generating training programs to support users from the inception of the new IT.

The overarching objectives of this research effort were to (a) explore how IT, as envisioned in the Objective Force, will change the decision and cognitive requirements of the Army's Soldiers and leaders in combat situations, and (b) refine a concept for identifying and training to the new cognitive challenges. To best understand how we addressed these objectives, we will first describe the macrocognitive framework we utilized. We will then address the

research approach we chose, the results we found, and the conclusions we were able to draw from our analysis.

Macrocognition

To be inclusive and specific about the ways in which cognitive task requirements will change with the new IT introduced in Objective Force, we structured this research effort around the concept of Macrocognition—the cognitive phenomena that affect naturalistic tasks and settings (e.g., Klein et al., 2003). Most laboratory research examines "microcognition," the set of processes such as serial vs. parallel processing in attention that can only be examined under carefully crafted conditions using subjects who are unfamiliar with the task used. We contrast this approach to studying macrocognitive phenomena such as attention management, which can best be studied in a naturalistic setting with experienced participants. We have identified six primary macrocognitive functions—naturalistic decision making, sensemaking/situation assessment, planning, adaptation/replanning, problem detection, and coordination—and six macrocognitive processes that support those functions—maintaining common ground, developing mental models, uncertainty management, turning leverage points into courses of action (COAs), attention management, and mental simulation story building. Figure 1 depicts the Macrocognition model, and Table 1 provides definitions of each dimension.
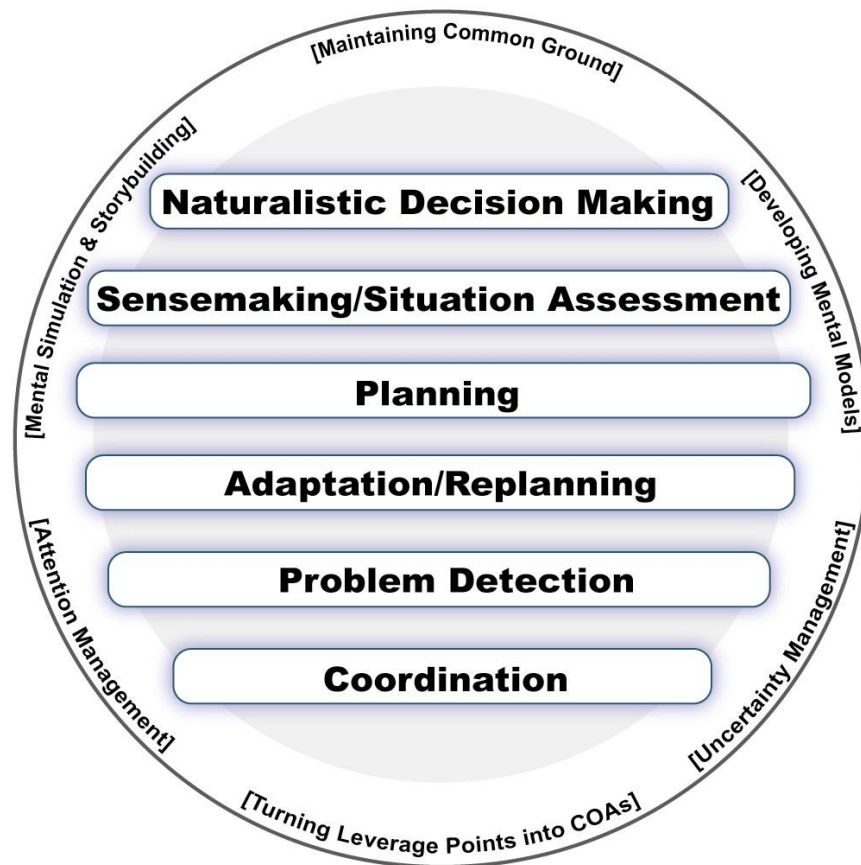
Figure 1. Macrocognition model.

Table 1
Macrocognition Dimensions

Definition of Macrocognitive Functions	Definition of Macrocognitive Processes
Naturalistic Decision Making. The identification of a feasible course of action (COA) from experience accumulated in similar situations; it may involve, but does not require, a comparison of the strengths and weaknesses of alternative COAs.	Maintain Common Ground. Common Ground is a process, really "common grounding," of continually maintaining and repairing the calibrated understanding among team members.
Sensemaking/Situation Assessment. Deliberate, conscious process of fitting data into a frame. The frame may be a story, script, map, or other form of representation; the intention is to reduce complexity and simplify the world in relation to a particular goal.	Develop Mental Models. Mental models are pre-indexed, abstract "packets of knowledge" that are retrieved and applied, as the situation requires. People are able to apply schema-driven reasoning in a context sensitive way, to develop a unique, situation-specific mental model.
Planning. Process of contemplating and devising actions for some future execution following a decision.	Uncertainty Management. Uncertainty is what we do not know or understand about a given situation, defined as "doubt that threatens to block action." Uncertainty involves situations in which key information is missing, unreliable, ambiguous, inconsistent, or too complex to interpret, resulting in a reluctance to act.
Adaptation/Replanning. Once execution of a plan begins, its progress is monitored in relation to unfolding reality. When reality diverges from the plan, the plan may be modified by cycling back into the planning process, or "replanning." Replanning is the process of modifying, adjusting, and possibly replacing a plan.	Leverage Points (option generation). Option generation may include generation or identification of leverage points for short-term or fragmentary actions that represent parts of solutions; leverage points are a means by which COAs are generated in a problem-solving situation. These are opportunities for making critical changes at relatively low effort, based upon the experience of the problem solver.
Problem Detection. The process by which people first become concerned that events may be taking an unacceptable direction; problem detection involves consideration of actions that may counter the perceived trajectory of events.	Attention Management. Attention management is the use of perceptual filters to determine what information a person will seek, and what anomalies she or he will notice. Attention management derives from knowledge, experience, current contexts, goals, and the person's interpretation of the situation and changes in it.
Coordination. Coordination is the attempt by multiple entities to act in concert. Its purpose is to achieve a common goal by carrying out a shared script or plan.	Mental Simulation and Story Building. Mental simulation is the process for consciously enacting a sequence of events, such as imagining how a COA will play out in the future.

In this research, we have identified the types of macrocognitive changes that will stem from the introduction of new IT. We have learned a great deal about how technology will change decision requirements, not by shifting the nature of the decision strategies employed, but by adding an additional layer of requirements around the information technology itself. This new layer includes how the technologies work, how to work with and around them, and how they will impact team coordination.

RESEARCH APPROACH

We have accomplished the following tasks to identify how Objective Force technologies will alter cognitive requirements and to develop a concept for identifying and training to the new cognitive challenges:

a. Developed methodologies for eliciting macrocognitive task requirements.

b. Collected data from Land Warrior specialists.

c. Developed a Synthetic Task Environment approach to elicit macrocognitive requirements associated with future combat systems.

d. Interviewed subjects with Objective Force experience to identify macrocognitive requirements in the Objective Force environment.

e. Conferred with our consultant, Kathy Mosier, on the impact of IT on operators.

f. Identified concepts for structuring training to meet the requirements introduced by the Objective Force technologies.

We will discuss each of these activities in the following sections.

Interview Methods for Eliciting Macrocognitive Task Requirements

We needed to design a methodology to anticipate the macrocognitive requirements introduced by new IT. To that end, we designed two data collection techniques to elicit macrocognitive requirements. First, we reconfigured the Knowledge Audit into a version suited to understand the broader concept of macrocognition. The Knowledge Audit is a technique within the family of Cognitive Task Analysis methodologies. It comprises a set of probes aimed at identifying specific aspects of expertise in a domain, such as perceptual discriminations that subject-matter experts (SMEs) can make, abilities to diagnose problems, abilities to generate expectancies and spot anomalies, and so forth (Klein & Militello, in press; Militello & Hutton, 1998). We developed a new set of probes that addresses the macrocognitive functions and processes in order to interview operators about the macrocognitive requirements of a task. The Macrocognitive Knowledge Audit elicits from the interviewee experiences and incidents that are exemplars of the different macrocognitive dimensions. For example, a probe about *sensemaking* would be intended to elicit an incident experienced by the interviewee in which he or she had to

determine what was happening in a situation or develop a situation assessment. The Macrocognitive Knowledge Audit, thus, is incident-based in that it elicits multiple real-world examples.

The second interview method we designed used a scenario-based approach similar to a technique that we have utilized in past Cognitive Task Analysis projects (e.g., Miller et al., 2003; Phillips et al., 2001). This technique employs a single scenario as the context for the entire interview (whereas the Macrocognitive Knowledge Audit elicits multiple contextualized events). Existing Military Operations in Urban Terrain (MOUT) scenarios involving a building clearing mission (taken from Phillips et al., 2001) were used as the context around which to frame this interview technique. The researchers employed a set of probes to determine the decisions and judgments required to accomplish the mission given Land Warrior capabilities. The queries centered around decision points, information requirements, strategies and tactics, aspects of team coordination, and usage of the new capabilities and technologies.

Both techniques were applied in our first round of data collection, with Land Warrior specialists. We chose to utilize two different techniques in order to compare their utility for identifying macrocognitive requirements under the Land Warrior program. The insights gleaned from using the distinct methods enabled us to identify promising approaches for designing a general methodology to anticipate macrocognitive requirements of new IT.

Data Collection with Land Warrior Specialists

Four interviews were conducted with two Land Warrior specialists. The interviews lasted two hours each. The two male interviewees were both senior, prior-enlisted Army personnel who are currently employed by Omega Training Group, Inc. Both have been working with the Land Warrior system since its inception. The goal of the interviews was to begin to identify how the decision and macrocognitive requirements of platoon leaders in MOUT would change from current day operations to those accomplished using Land Warrior enhancements. To properly prepare leaders for Objective Force, the training environment must replicate the operational environment (U.S. Army, 2002). Consequently, MOUT scenarios were chosen due to the Army's anticipation that Units of Action will increasingly encounter urban and complex terrain, and the Land Warrior and Objective Force systems must support such operational environments. We decided at this stage to examine Land Warrior rather than the Objective Force, because the Land Warrior capabilities are well defined, while Objective Force capabilities and platforms are still under discussion and development.

Two of the four interviews were structured around the scenario-based approach to eliciting the macrocognitive requirements of Soldiers equipped with Land Warrior enhancements. The other two interviews utilized the Macrocognitive Knowledge Audit to glean the same types of macrocognitive requirements. Interviewees were asked how Land Warrior capabilities would impact their performance along a subset of highly relevant macrocognitive dimensions. For example, interviewers probed as to how sensemaking and team coordination would be accomplished under Land Warrior in comparison to current day operations.

These interviews resulted in a number of important and unexpected findings, which will be discussed in detail in the Results section of this report. Overall, the data suggest that while Land Warrior will provide substantial enhancements to leaders and Soldiers, the Land Warrior capabilities will **not** fundamentally change the way Soldiers and leaders make decisions. Further, these two Land Warrior SMEs did not identify any ways in which the Land Warrior technology would alter the cognitive requirements of the mission and tasks. In some ways, this was disappointing because we were trying to establish the types of cognitive differences that would emerge from Land Warrior. However, in other ways, this finding was a useful reminder that technology alone may not necessarily transform the cognitive landscape of the mission. We are going to have to dig deeper to appreciate the ways in which IT does and does not affect macrocognitive functions.

The interview findings indicated that a subset of the macrocognitive activities is particularly susceptible to significant alterations with the implementation of advanced technologies. These include:

1. <u>Sensemaking</u>: The increase in available information, and the range of information sources, will influence sensemaking for leaders and Soldiers alike.

2. <u>Coordination</u>: Enhanced communication capabilities will enable all Soldiers to have access to more information from the platoon leader, units will span a larger area of the battlefield, and smaller teams (e.g., two-person buddy teams rather than four-person fire teams) will predominate. All of these factors are likely to increase the coordination burden of the platoon and squad leader.

3. <u>Maintaining common ground</u>: A larger number of teams, an increased area of responsibility, and the ability to conduct simultaneous tactical actions within a platoon-sized unit, will all affect the manner by which teams maintain common ground.

4. <u>Developing mental models</u>: New technologies will necessitate the development of new mental models—what are the capabilities, what are the limitations, how can they break down or provide misleading information, how do they work (so that the data can be better judged for credibility), and so forth.

5. <u>Uncertainty management</u>: The drastic increase in information availability may produce different strategies for dealing with uncertainty. For example, it is possible that expectations of high certainty will result in paralysis when, in some missions, that expectation is not met.

6. <u>Attention management</u>: Again, information availability has the potential to draw the attention of leaders, especially the platoon leader, away from the Soldiers and more toward the technology.

7. <u>Turning leverage points into COAs</u>: New and enhanced capabilities such as the ability to "see around corners" and "see the next block" may well produce

24

a new set of leverage points for decision makers to turn into tactical opportunities.

For the remainder of the project, we chose to focus on these particular activities as we further explored the impact of new IT on macrocognitive task requirements. Future research should expand our exploration to include the other dimensions. However, for the purposes of this research, it was prudent to direct our investigation to the areas of high impact.

Synthetic Task Environment Approach

Another key finding from the Land Warrior interviews was the utility of the scenario-based interview format. This format was valuable in that it added context to the envisioned-world discussion, leading to a more grounded description of the capabilities and affordances of the new technologies and the manner in which Soldiers were likely to use them. We believe this is an important starting point in addressing the envisioned world problem. Emboldened by the success, we expanded our techniques for capturing the macrocognitive requirements of future combat systems. We reconfigured our scenario-based interview technique into a Synthetic Task Environment (STE) approach. Correspondingly, we decided at this stage to move beyond Land Warrior, to incorporate some of the IT called out in the Objective Force. We were interested in identifying macrocognitive requirements that would stem from *new* (technologies that are not currently used by Soldiers), rather than just *enhanced* (improved versions of technologies that Soldiers are already familiar with) combat capabilities.

STEs are used to study complex behaviors found in real-life settings (e.g., Gray, 2002; Hess, MacMillan, Elliott, & Schiflett, 1999; Martin, Lyon, & Schreiber, 1998). They vary in realism from flight simulators that are remarkably similar to the naturalistic task, to pencil-and-paper laboratory experiments that are low-fidelity versions of the real-world task. The key feature of STEs is that they isolate some particular aspect of an environment in order to more effectively measure that aspect. Because the Objective Force platforms have not yet been identified, we believe an STE that incorporates the intended capabilities rather than the specifics regarding the platforms themselves will be most informative as a testbed for examination of the impact of future technologies on macrocognitive requirements.

Following the STE methodology, we revised four of our existing MOUT building clearing scenarios (Phillips et al., 2001) to incorporate the capabilities and characteristics of the Objective Force battlefield. We also retained the original versions of the scenarios to serve as a comparison case, since they reflect the present-day technologies. The four scenarios that were chosen covered the spectrum of skill levels from basic to intermediate to advanced. They also covered a range of decision requirements critical to building clearing missions, including how to approach a building and navigate streets, how to enter the building, and how to conduct the actual clearing once inside the building. Table 2 provides a description of each scenario's decision requirements and teaching points.

Table 2

MOUT Scenarios and Associated Decision Requirements and Teaching Points

Scenario Title	Decision Requirements	Cognitive Training Objectives
Two Intersections B (Basic)	d.　Determine how to Secure the Perimeter e.　Determine how to Approach the Building f.　Determine how to Enter the Building g.　Determine how to Evacuate the Building	h.　How to regroup forces in the midst of a firefight; i.　How to place units to maintain control of an area yet support each other from enemy threats; j.　How to weigh the impact of not accomplishing a mission against the threat to the platoon if the mission is undertaken; k.　How to know whether to move from a known secure location to an unknown location as ordered; and l.　How to cover unknown enemy threats from two different directions.
The Clearout Sale (Basic)	m.　Determine how to Enter the Building n.　Determine how to Clear the Building	o.　How to choose a route of approach; p.　How to select breach/entry points including the possibility of a roof entry; and q.　How to notice key terrain in order to anticipate enemy locations.
A Deadly Approach (Intermediate)	r.　Determine how to Secure the Perimeter s.　Determine how to Approach the Building	t.　How to infer hostile intent; u.　How to apply rules of engagement to an ambiguous situation; v.　How to determine the best method for navigating streets; w.　How to determine where to place security elements; and x.　How to judge key terrain.
El Dia Del Guapo (Advanced)	y.　Determine how to Secure the Perimeter z.　Determine how to Approach the Building	aa.　How to diffuse an escalating situation before it gets out of hand; bb.　How to stop armed civilians with unclear intent; cc.　How to operate within established rules of engagement where your role is as peacekeeper; dd.　How to determine the appropriate level of action when clearing a building with civilians;

		and
		ee. How to interpret civilian intent and envision progression of events.

Objective Force technology was inserted into the text of the scenarios to simulate its actual projected use. For example, reconnaissance information was more detailed and contained UAV-collected imagery, and emergent situations were shared through captured digital photos rather than verbal reports. The maps that accompany the scenarios were altered to suggest the greater range of motion and hence information available through helmet-mounted displays used to track team members' positions. In addition, in some cases, the text of the scenario was altered slightly to depict the greater decision-making responsibility of the individual under Objective Force conditions. For example, in the legacy force version of "El Dia Del Guapo" the player is given verbal directions by the company commander after calling that individual to report the situation, while in the Objective Force version, the player receives no instruction because the situation report is transmitted via e-mail. In "Two Intersections B," an additional task was added to the Objective Force mission: the player was asked to occupy a church as well as the museum specified in the original version. By revising the scenarios, we were able to design an STE of Objective Force. We have included both the legacy and Objective Force versions of the scenarios in Appendix A.

Data Collection with Objective Force Specialists

This round of data collection utilized the STE scenarios in conjunction with a set of interview probes refined from the Macrocognitive Knowledge Audit. Eight male subjects, provided through Omega Training Group, Inc., participated in the sessions, which lasted approximately two hours each. Four of the participants had enlisted military experience and four had officer-level experience. They ranged in rank from Sergeant to Major and had 129 years of collective military experience (they ranged from having 4 years of service to 29 years with an average of 16.1 years). All had small unit leadership experience and a basic understanding of the concepts and the technology planning activities for the Objective Force.

Each participant was given the legacy version and the Objective Force version of each scenario. They were asked to read the scenarios in advance and prepare answers to the following questions for both versions of the scenario:

- What would you do in advance of this mission? For example, what would your leader recon consist of?

- As you envision this mission unfolding, what will be the decision points?

- What is your plan for accomplishing the mission?

- As your plan plays out, what information will you obtain and how will you get it?

During the session, each participant was interviewed as to how he perceived the changes due to Objective Force technologies would affect his macrocognitive functions. To gather this information, we utilized a semi-structured interview format based upon the Macrocognitive Knowledge Audit used in the first round of interviews. The initial probes employed are captured in Table 3.

Table 3

Initial Macrocognitive Probes for the Second Round of Data Collection Interviews

Macrocognitive Dimension	Macrocognitive Probes
Sensemaking	ff. What is going to be difficult about synthesizing the different types of data, on the fly? gg. What information or information source is likely to be the most important to you in this situation? Why? hh. Describe what you think is happening in this situation. Why do you believe that? What are you unsure about? Does anything NOT fit into your assessment? ii. What sorts of analysis will the platoon leader (PL) have to do on the information received, in order to make good use of it? jj. How (when?) will the PL know that enough information to make an accurate assessment?
Coordination	kk. What additional plans are you going to have to develop to synchronize the data collection assets available to you? ll. What data collection assets are you most likely to use? mm. What data will you share with other platoon members? With whom will you share which information? nn. How will you coordinate with Company and the adjacent platoons? oo. What information will you send to Company and the adjacent platoons? When would you send it? pp. How will the platoon work differently together under Objective Force than under the current capabilities? qq. What will be difficult about coordinating the platoon?
Common Ground	rr. How can different teams lose common ground in this scenario? Assume they lost common ground. How did that happen, with all the information available to them? ss. Can you imagine what procedures the leader might have to implement to prevent the platoon from losing common ground?
Mental Models	tt. If the leader and team members do not have a good understanding for how these new capabilities work, how can it get them in trouble? uu. What must Soldiers and leaders know about the new capabilities to take full advantage of them? vv. What will be difficult for Soldiers and leaders to understand with respect to how the new capabilities integrate with each other?
Uncertainty Management	ww. Given all these assets, how could a smart and determined adversary still create uncertainty? xx. What are you uncertain about in this scenario? yy. What will you do about your uncertainty? Collect more information? Act despite it?

Table 3 (Continued)
Initial Macrocognitive Probes for the Second Round of Data Collection Interviews

Macrocognitive Dimension	Macrocognitive Probes
Attention Management	zz. How will a leader have to exercise discipline to not to become fixated on some of the compelling information assets? aaa. Should the PL be looking for any disconfirming information? If yes, what? bbb. What will the leader actually be doing during this mission? Where will the leader be located? ccc. What will the leader be most focused on as this mission unfolds? Where will the leader's attention be focused? ddd. Which overlay(s) will be most important during this mission? Why? How would the leader get that information under the current capabilities?
Leverage Points	eee. Given the Future Combat Systems capabilities available, what sorts of opportunities are going to open up, individually and in combination? fff. What tactics (or approaches) will you employ under Objective Force that you would not employ under the current capabilities? ggg. What is the friendly's greatest advantage in this situation? What is the enemy's greatest advantage? hhh. What, if anything, could undermine or turn this advantage?

The primary challenge in conducting the second round of interviews was, not surprisingly, the envisioned-world problem. The participants found it difficult to play the Objective Force scenarios and imagine how they would carry out the mission. They frequently responded to interview probes saying, "It will be the same as it is now." The participants, all of whom are representative of the operational community, had difficulty in imagining the new tactics and believed that no significant changes would emerge given the enhanced IT technology. They were also cautious about blindly accepting a set of revolutionary changes in tactics—they had gone through previous cycles of technology insertion that were touted as opening up revolutionary changes, and had not. Therefore, their caution had some justification. In retrospect, we should have coupled the interview scenarios with one or two examples to illustrate how the technology could alter tactics, just to break them loose from their mindset.

While many changes will result with the implementation of Objective Force technologies, the subjects still felt that humans will remain the best sources of information. The type of information necessary for mission accomplishment will remain the same, although the means by which you can gather it will change, and access to additional information will not change timelines at the small unit level—whatever time is available is the time you will use to prepare, be it long or short.

Although these SMEs had difficulty in using the scenarios to envision alternate mission tactics, the scenarios did help us to articulate some of the key cognitive requirements for mission

performance, especially requirements that might be affected by the information technology. Therefore, we do believe the interview data did provide some valuable insights regarding the macrocognitive requirements of the Objective Force environment. Nevertheless, in our analysis we found it necessary to extrapolate from the data, using what we know about how people perform the macrocognitive processes. On the one hand, this seems a natural outcome given the envisioned-world context; extrapolation is necessary for prediction. On the other hand, we realize that more work needs to be done in order to simulate the future environment and perfect the data collection techniques.

In our analysis to date, we have identified many areas that will potentially require a new or different set of macrocognitive training requirements. As these are initial findings, they will require verification. We will present the results of our analysis in the Results section below.

Collegial Discussions on the Impact of IT on Decision Strategies

In parallel with our data gathering, we conducted technical discussions with our consultant, Kathy Mosier, regarding her accounts of the effects of information technology. We were eagerly expecting some sharp debates and disagreements that would create conceptual tangles to be sorted out. After all, we have assumed that military command and control, even at the small unit level, would be largely dominated by recognitional decision strategies whereas Mosier (2001) has suggested that new technology is going to increase the amount of analysis. We had all the classic ingredients of a debate.

However, in our discussions with Mosier, we found that we were in agreement. Mosier does not believe IT will push Soldiers into multi-attribute utility analysis or decision analysis. She agrees with us that the dominant strategy will continue to be recognition-primed decisions. When she talks about "analysis," it is in the context of Soldiers who will no longer be relying so heavily on perceptual data, and will now be dealing with digital data. The subconscious perceptual processes are going to give way to more deliberate and conscious examinations of these unfamiliar and non-natural data formats. This view matches with our recent research on sensemaking (Klein, Phillips, Battaglia, Wiggins, & Ross, 2002), which we define as a conscious and deliberate effort to interpret data elements. Furthermore, these conclusions match the Level 2 description of the Recognition Primed Decision (RPD) model, which describes situations requiring deliberate sensemaking as opposed to purely perceptual recognition.

In our discussions, Mosier stated the following:

The introduction of IT also means that Soldiers will be responsible not only for accurate recognition of the situation, as they would have to be with purely perceptual cues, but also for the comprehensive and rational integration of IT data into their situational assessment. (This is the coherence part—how does everything fit together, and does it present a coherent representation of the situation?) What I would predict will happen in military command and control is that Soldiers will have to alternate between a focus on accuracy in recognition (e.g., does this building look like one it may contain enemy troops—*correspondence*) and a focus on the gathering, analysis, interpretation, and incorporation of new information. The latter is what [Klein has] called intelligence assets (e.g., the data say that enemy troops were seen at xyz coordinates…check the map and

tell me how far that is from here… is it in miles or kilometers?…ok, that's 8 miles from here… at 0200… that's 1 hour ago… does that fit with the last report we got?…is there any newer information available?… it says they were on foot… is there any more information about those troops?…how does this information fit with our other data and with the 'look' of the building?… —*coherence*).

These processes are what we are calling sensemaking—an analytical process geared toward coherence. We make these distinctions because correspondence and coherence are not synonymous with intuition and analysis—although in the kinds of situations we are talking about—RPD versus a more information-analytical approach to situation analysis—they do match. RPD is both intuitive and correspondence-based; interpreting or making sense of data is both analytical and coherence-based.

We anticipate an alternation between the two strategies will be necessary for complete situation assessment. Moreover, if the non-natural data presented are accurate representations of the real thing, a coherent understanding of the situation will also enable an accurate assessment of the situation. Klein (2003) has discussed the importance of intuition plus analysis, arguing that neither is sufficient. We expect that information technology will still require a blend of intuition and analysis. The platoon leader and fire team leader are not going to be getting a great deal of numeric and quantitative data. They will be seeing images from UAVs, Unmanned Ground Vehicles (UGVs), digital imagery from rifles, and so forth. If anything, their need to intuitively manage attention will increase, not decrease.

Therefore, our theoretical discussions concerning coherence and correspondence with Mosier were very useful in (a) clarifying what is meant by "analysis" and how that matches with our work on sensemaking; and (b) opening up an important direction in seeing how small unit leaders are going to engage in information management. Based in large part on Mosier's ideas on correspondence (which, in the case of RPD, involves intuitive decision making) and coherence (which, in most cases, particularly when non-natural data are involved, entails analytical decision making), we can appreciate how the small unit leader in Objective Force is going to have to consciously consider all of the following as part of information management:

1. Intelligence assets available as part of planning a mission. These can include UAV and UGV feeds, or even digital images from Soldiers.

2. Information assets available as part of executing a mission. The placement of individual Soldiers will be a function of the imagery they can provide, not just the lethality they can bring to bear. In the middle of a firefight, a small unit leader may have to carve out time to look away from the battle, to study computer screens and to prioritize data elements. This is a different aspect of attention management than is usually found at this level. It will not only involve a switch of attention but also potentially a switch of cognition (to interpretation and analysis of data).

3. Analysis of data. The small unit leader will have to synthesize the IT data elements into other perceptual data flows and perform analysis of battlefield conditions that are more deliberate than recognitional.

4.   Dissemination of findings. Soldiers cannot be bombarded with data elements and messages, particularly in the middle of execution. Small unit leaders will face an additional deliberate burden to decide what to report down (and up) the chain, and in what format. Will they pass along the data themselves or their interpretation/synthesis/sensemaking of the data?

RESULTS

With regard to the important question of whether IT alters fundamental decision-making strategies, we believe the answer is "no." Our interviews have not produced any evidence of a shift from heavily intuitive decision strategies to predominantly analytic strategies. This met our expectation based on two decades of our own research (e.g., Klein, 1998; Klein, 2003) and the Army's recent declaration that intuition plays an important role in combat decision making (U.S. Army, 2003).

While we do not believe decision *strategies* will fundamentally change, we have preliminary evidence that IT will impact the *types* of decisions that become prominent for the small unit leader. Of most significance is the finding that, even for the small unit leader, the Objective Force technologies will produce a change in the type of wars that are fought. No longer will battles be primarily contingent on the quality of tactics and the firepower and accuracy of weaponry. Information technology will create additional requirements for information collection, interpretation, and dissemination, along with tactics and weaponry. We believe the focus will shift to information collection first, and tactics and weaponry second. The implication is that the small unit leader must be, to some degree yet unknown, an information gatherer and analyst. To be successful, the leader will require a new skill set as well as a radical change in mental models for conducting operations. This shift to information-centric warfare will become more apparent as we discuss our findings. In the remainder of this section, we discuss each of the macrocognitive dimensions that were previously identified to be most significantly impacted by future combat systems: Sensemaking, Coordination, Maintaining Common Ground, Developing Mental Models, Uncertainty Management, Attention Management, and Turning Leverage Points into COAs. We will show how each dimension is likely to be altered for small unit leaders with the introduction of Objective Force technologies.

Sensemaking

The *Sensemaking* function will be heavily affected by IT. In another ongoing research effort for the U.S. Army Research Institute, we have developed a Data/Frame Model of sensemaking that illustrates how data from the environment interact with the frame, or set of relevant mental models, brought to bear by the sensemaker. The goal of the sensemaking process is to generate an explanation for the situation (Klein et al., 2002). This is the model we have utilized to consider the particular effects of Objective Force technologies on the sensemaking activity.

In this Data/Frame account, the frame guides the search for relevant data and the interpretation of those data. The frame is a continuous construction of a story, script, or map that consists of the sensemaker's mental models and data from the environment that have been fitted

into the frame. The implication for sensemaking of new combat technologies is that relevant data are likely to appear differently, and appropriate frames to guide data search will be lacking due to the initial immaturity of mental models that take into account the new technologies. A new set of data will become available under the Objective Force—imagery, the digital representation of the battlespace, text messages, and voice communications from individual Soldiers who are not team leaders. New frames will be necessary to select relevant data, interpret them, and assimilate them with the current state of situation awareness.

Within the sensemaking function, we believe three activities will be impacted by new technologies: information filtering, information management, and information analysis.

As described by the Data/Frame Model, *information filtering* is the activity of selecting relevant data from the signal stream. Under the Objective Force, UAVs and UGVs will be new sources of information. SMEs indicated that these unmanned vehicles would be quite useful in reconnaissance and scouting roles. They afford the platoon leader an ability to collect data without putting Soldiers in harm's way. A potential downside of the use of robots for information gathering is that they will send the platoon leader much more data than would a Soldier. Soldiers know to communicate relevant information and filter out the irrelevant; they transmit by exception. Unmanned vehicles will transmit a video feed that includes useful and non-useful information (imagine watching five minutes of a clear alleyway as opposed to hearing a five-second transmission from a Soldier indicating the alley is clear). As a result, the leader's signal stream is significantly increased and requires additional attention to manage. The other side of this argument, of course, is that a skilled leader may be able to pick up critical visual cues by watching the UGV video (e.g., signs of camouflaged traps), whereas a less experienced Soldier may not pick up on such cues. Regardless, leaders will require additional training and practice to incorporate video feeds into their sensemaking process.

Given the large quantities of information available, we believe *information management* will be a critical new skill for leaders to develop. SMEs indicated that platoon leaders (and perhaps squad leaders, depending on the information delivered from the platoon leader) will need to discriminate between information that is immediately relevant to their mission, information that is relevant to a next phase of their mission, and that which is nice to know because it pertains to the big picture, but is not immediately applicable. One requirement is to make the judgment as to which pieces of information fall into which category. Platoon leaders already make that judgment under current technologies, so this may or may not be a significant adjustment under the Objective Force. Another requirement is to appropriately store video transmissions, email, and the like that are not immediately relevant but should later be recalled. Furthermore, there is the need to discard data so as not to bog down the technologies. A platoon leader requirement, therefore, is to judge which information to discard and which to keep. According to the Data/Frame Model, data are judged relevant depending on the frame in current use. If we therefore speculate there to be a high probability that important data will be discarded because the platoon leader has an inadequate frame (i.e., a lack of relevant experience) or because the mission has changed and a new frame is more appropriate, important data can be discarded. Data that were once immaterial have the potential to become critical. We must address this eventuality.

As we have previously suggested, we believe *information analysis* will become a much more pronounced task for leaders under Objective Force. Small unit leaders will be required to analyze imagery, video feeds, and GPS (Global Positioning System) data (i.e., the positions on their digital displays). These are new sources of information for platoon- and squad-level operators. The need is to acquire skill in making meaning out of the data and in synthesizing data from numerous sources. This is a nontrivial macrocognitive requirement. In fact, we speculate that this requirement could potentially alter the stance of the platoon and squad leader from a leader-fighter to a leader-manager.

Coordination

The *coordination* function will also be altered with the new technologies. First, it is likely that the leader will have a larger area of responsibility. In addition, more simultaneous actions can occur within a platoon than under the present technologies. This is a tactical advantage, but increases the coordination burden of the platoon leader, who will have to maintain situation awareness on a larger scale, potentially make more decisions, and deliver more orders. Furthermore, platoon leaders will have a larger "team" to manage; the unmanned assets (UAVs and UGVs), according to SMEs, will become robotic team members in that they can scout for information prior to a mission, can enter buildings to determine whether they are clear, can lay down suppressive fire or use direct fire, and so forth. As Woods (1986) and others have pointed out, technology becomes a team player, particularly semi-autonomous information technology. This is regarded as a significant advantage because it decreases the risk to human lives. However, like any team member, there are strengths and limitations to be considered when deploying unmanned vehicles. For example, one SME we interviewed indicated the need to consider how locals would react to spotting a robot versus an American Soldier. He believed that depending on the culture, a robot might be more threatening than a Soldier who can use body language to confer a sense of ease. There is a requirement for platoon leaders to judge when and when not to utilize these robotic assets.

Another aspect of coordination is the means by which the unit shares information. In our interviews, responses as to what information a platoon leader should distribute to squad leaders and team leaders were across the board. Some would share everything; others would share "only what they need to know to do the next mission." There is a clear need for training and practice in judging *what* information to share, *when* to share it, and with *which* members of the unit. There is an additional need to develop new voice communication procedures. Under the Objective Force, all Soldiers in a platoon will have radios and therefore voice links to the entire platoon. This is a tactical advantage; teams can communicate by whispering into their headset rather than yelling to each other or using hand signals. This may enable stealth (and other) operations to occur on a larger, more distributed scale, or over a longer, more complex mission. There are likely to be other implications of this advantage. Will Soldiers have to carry heavier ammunition loads and more water? What is the impact on morale of longer periods of time between regrouping/consolidation of the unit?

Coordination with adjacent platoons will also change under Objective Force. Currently, most communication with another platoon is via radio or face-to-face, and this is often the only way to keep track of that platoon's location. SMEs felt this would change with the GPS systems

projected to be available for Objective Force. They would be able to visually track other platoons without a radio and avoid calling fire on them. However, we also heard that GPS locators are unlikely to work when the individual is inside a building. At the level of one's own platoon, it should be relatively easy to keep track of where Soldiers are located when their "dots" on the digital display drops off. Radios can be used as a backup to confirm locations. However, the additional burden of keeping track of adjacent platoons when their "dots" drop off the screen may be too much to manage, especially when one's own platoon is engaged. Pre-established boundaries on the battlefield may well be sufficient to prevent fratricide; however, exchanges of critical information between platoon leaders may suffer if the GPS locators are relied upon and leaders lose track as to where adjacent platoons are located.

On the positive side, the new technologies will enable faster transmission of better information between platoons (e.g., video feeds that will be relevant to another platoon's operation). Again, however, this requires platoon leaders who can judge what information will be relevant and when it should be transmitted.

While many of the SMEs believed Objective Force would improve communication, they also felt it could cause coordination to be more difficult. Many indicated that the entire design of the platoon would need to change. Some Soldiers would have to be capable of on-site repair, and some would need to be dedicated to the functioning of the UAVs and UGVs. Another fear of the SMEs associated with coordination is that Soldiers and leaders become so engrossed in the technology that they engage in organizational forgetting where tried and true tactics cease to be utilized and are summarily forgotten. When the technology goes down, a completely new coordination scheme must be ready to implement. Finally, the logistics of coordinating technology within the platoon will be greater. The leader will need to ensure that the unit has sufficient batteries and spare parts to keep all of the technology functioning.

Maintaining Common Ground

There will be new capabilities for establishing *common ground*. This macrocognitive process supports the coordination function discussed above. We consider the activity of maintaining common ground to be the process by which a team establishes shared assumptions, monitors for confusion, detects breakdowns in common understanding about the situation, and re-calibrates. Related to this process is team sensemaking—exchanging and synthesizing data and frames. Data are usually held by different team members. They need to appreciate what information to transmit to other team members, without broadcasting everything they know. Further, unique frames are held by different team members. The platoon sergeant, for example, is likely to have a much more elaborate frame (i.e., mental model) than the platoon leader due to levels of experience. How, then, can the platoon leader take advantage of the platoon sergeant's and other team members' expertise by enabling them to consider the data using their frames, while not bogging them down with too much information? The essential purpose of a team is to make use of different types of skills and knowledge. How do effective teams access the appropriate expertise at the appropriate time?

Under Objective Force, all members of the platoon will have access to both the digital map display and to voice communications. Text, imagery, and verbal messages can be sent to

anyone in the platoon. The leader can also task any Soldier to collect and transmit information about the particular area in which they are located. The leader's coordination of platoon Soldiers as not only fighters but also information gatherers becomes critical. We realize that Soldiers in present day operations are already information collectors. However, the Objective Force technologies will so significantly enhance collection capabilities that the decision requirements to leverage them and the associated challenges will be new for the platoon leader.

The unit can lose common ground in many ways. Under the legacy systems, this occurs when information is not adequately distributed, when the unit becomes depleted and Soldiers take on alternative jobs, or when communication is lacking for any number of reasons. With the Objective Force technologies, SMEs are concerned that the capabilities introduced by the technologies can be distracting and interfere with common grounding. For example, information overload can hamper the Soldier's ability to focus on the current situation and the mission goals. Increased access to information from all corners of the battlefield can produce unfounded rumors. The technology itself can persuade Soldiers to focus in on the digital representation of the team and the battlefield rather than the actual team members and the actual terrain.

Developing Mental Models

Mental models are internal representations of the external world. They comprise knowledge, based on experience, of "how things work" in a task or setting. They include sets of patterns and environmental or situational cues to which the individual attaches meaning. Because of the meaning attached to cues, the individual is able to set expectancies and detect anomalies within a particular situation. When new situations are faced, a subset of mental models is called forward in the individual's mind. The mental models help with an interpretation of the situation by enabling the individual to associate the current circumstances with previous encounters. The Army's Soldiers and leaders currently retain mental models and expertise based on operating within the evolving legacy systems. With the infusion of new Objective Force technologies, at first there will be no experts, or even proficient individuals. No one will have extensive mental models containing knowledge as to how to perform missions with the new technologies. In essence, because the inputs and mental models will be so different from present day operations, expert leaders will in a sense be stripped of a portion of their expertise and required to relearn a different, albeit comparable, domain.

Current mental models will need to be revised and updated to incorporate Objective Force capabilities. As previously noted, the leader's area of responsibility will increase and the capabilities of subordinate units will be enhanced. This will open the door to new tactics and an integration of tactical actions. The platoon leader will need to develop a revised understanding of a platoon leader's role under the new systems. For example, under Objective Force the platoon leader may monitor a building clearing from another building rather than by entering the target building. The platoon leader's unit employment mental model will need to be revised. When a two-person "buddy team" can accomplish the same effect that previously required an entire fire team, the employment of Soldiers in the area of responsibility will be different. Leaders will also need to adjust their mental models to include the new robotic team members and their capabilities and limitations. They will need to establish an understanding of what circumstances warrant their use and which do not. Leaders will also need to adjust the way in which they

examine an area for dangers, when a video feed replaces actual eyes-on. These mental models will impact how they task the UGVs and UAVs to scan the battlefield. A human scout can focus attention on a particular area if the cues—such as recently disturbed dirt, potentially indicative of a hidden explosive—warrant it. A robot must be directed to focus the camera on areas of interest for a sufficient period of time. Moreover, the human operator must extract critical cues from a video feed rather than directly perceiving them in the environment. In addition, Soldiers and leaders alike will need to refine their mental models around map reading to incorporate the digital representation of the battlefield and its continuously updated GPS icons.

Furthermore, the information-centric nature of Objective Force warfare will require an entirely *new* set of mental models for the small unit leader, whose job will begin to resemble present-day intelligence analysts. The most significant effort will be to comprehend the functionality and limitations of the systems in order to understand the story behind the data that are provided. For example, leaders will need to know how the icons on their Enemy Situation overlay were generated. They will need to know that the battalion intelligence officer is responsible for updating the overlay, which means that the view would be geared toward battalion and not platoon operations. The implication is that enemy units smaller than company-sized may not appear on the Common Operating Picture, even if they do exist. As another example, leaders will need to know how sensor coverage impacts the representation of enemy units on the display. In a Marine Corps advanced technology project, we saw operators rely on the digital display for an accurate picture of the battlespace (e.g., Klein, Phillips, Klinger, & McCloskey, 1998). However, it was very difficult for them to be sensitive to the time stamp of the unit seen on the display—sometimes, enemy icons were 24 hours old. Further, it was easy for them to interpret a lack of enemy icons as an area devoid of enemy, when in actuality the area was simply devoid of sensors; the enemy was there, but there was no means by which to see them.

Objective Force will introduce new affordances and new challenges. The leader will also have a different set of expectancies around a mission than the present-day leader. The accuracy of mental models will directly impact performance. In fact, the Army has noted that a key element of leader development should be to instill mental agility and versatility to master transitions across the spectrum of operations (U.S. Army, 2002). The bad news is that many mental models will need to be altered for success. The good news is that this is an issue of building up one's mental experience base through careful training, and is therefore attainable.

Uncertainty Management

In every new environment, there is some level of uncertainty that needs to be managed. Even given all of the assets of Objective Force, a smart and determined enemy could still create uncertainty. One SME from our second data collection effort pointed out the following:

> We won't always be fighting an inferior enemy; it's a global environment. Technology moves rapidly. The enemy does the same thing we do; they have just as much opportunity for technology as we do (i.e., China). The enemy can hide its forces, deceive us, just as we can. We can use smoke, obscure the battlefield, use night observation devices—but maybe the enemy will have infrared, too. Someone on the same level will find a way to obscure and deceive us just as we do; that's the way to win.

Another SME we interviewed noted, "They don't even need to be as technologically advanced as we are to create uncertainty." He pointed to Iraq as an example of the enemy doing the unexpected by using women and children as shields, dressing in civilian clothes, and using hospitals and schools to store weapons. They can also change their timetable and attack before our forces are at full strength.

The good news is that Soldiers, at least the SMEs we interviewed, are not expecting that relying on Objective Force will wipe out all uncertainty. That would be an unrealistic expectation. However, the possibility exists that we maintain a suspicion that *uncertainty management* skills may degrade under Objective Force technologies. With increased access to data and the expectation that data should be available, we may see a reliance on large amounts of information in order to take action. A leader's comfort zone may shift such that only a small amount of uncertainty is tolerated. This is especially likely given that the security of heavy armor and the close proximity of Soldiers and units to one another are being traded for the information dominance capabilities. It will be interesting to see what role uncertainty management plays with regard to operational tempo. The advanced technologies are intended to speed operations through quick access to information, but it is possible that some of the value will be offset by low tolerance for uncertainty.

SMEs interviewed also indicated that the Objective Force technologies could bestow an unwarranted degree of uncertainty that could promote "laziness" and non-vigilance. As an example, data from the rifle-mounted sights or UGVs may show an absence of enemy Soldiers around a corner or down an alley. Nevertheless, these data are only good for the particular time at which they were gathered. Enemy Soldiers can easily enter the area or emerge from behind an obstacle after the photograph or video is taken. These SMEs worried that Soldiers may proceed with less caution than they would under legacy systems, when no such imagery is available. Rather than maintaining vigilance and continuing to collect information, Soldiers may rely on insufficient data to make key judgments and decisions.

Attention Management

Of particular interest to us with regard to the sensemaking function is the process of *attention management*. Specifically, we are concerned with the impact of new visual information sources such as UAV/UGV imagery and the digital map display with its various overlays. Consider the attention required to process visual and auditory inputs. We have seen on numerous occasions how skillfully commanders can monitor multiple (e.g., four or more) radio nets simultaneously, all while carrying on a face-to-face conversation. When they hear something from one of the inputs that requires more focused attention, then they filter out the others. This ability does not transfer to visual inputs. We have repeatedly seen commanders only able to attend to a single visual source in order to make sense of it. There is no bandwidth for simultaneously monitoring several visual inputs. Neither is there much bandwidth for monitoring auditory inputs while attending to a visual display. We are concerned and curious about how this phenomenon will impact small unit leaders, when a substantial amount of their information will arrive in visual form.

As previously noted, we are also curious about how leaders will manage the "attention" or course of the unmanned vehicles as they collect information. Robots cannot determine which geographical areas contain critical information and which do not. An operator will have to continuously direct the unmanned vehicles to ensure that relevant information is not overlooked.

In terms of where the platoon leader focuses attention during a mission, most SMEs believed Objective Force would not produce any changes. They believed that platoon leaders would still be focused on what the unit is doing, how to avoid fratricide, maintaining security, and accomplishing the mission. However, within these tasks, the information sources would change, and thus focus of attention will be different.

Turning Leverage Points into COAs

With new capabilities and better information will come new *leverage points* to exploit. The challenge is to build leaders' and Soldiers' mental models of the Objective Force battlefield such that they can recognize the opportunities and realize how to use them to their advantage.

The SMEs saw the unmanned vehicles—UAVs and UGVs—as the most promising for introducing new leverage points. These robots can assist with everything from clearing minefields and launching weapons to reconnaissance and intelligence gathering. Not only does their use reduce risks to human life, but it also reduces the fatigue level of Soldiers. If a UGV can enter a breached building to determine whether there are enemy occupants, Soldiers are spared the potentially strenuous physical activity and the highly stressful mental activity. Other new leverage points may arise as the result of better communication with all members of the team. Under legacy systems, it is impossible to talk to all members of the platoon. With Objective Force, all members of the team would be able to report an opportunity in their respective sectors, and the platoon leader will have the tools to exploit it (e.g., imagery exchange to see the opportunity, and voice communication to issue orders). SMEs interviewed also believed the new technologies will produce improved response times for engaging the enemy, and for retreating when necessary.

Some of our subjects were careful to delineate where Objective Force would have an impact, and where it might not affect tactics. However, not all SMEs believed Objective Force would offer additional opportunities. One Soldier from our second data collection effort noted the following:

> There are five phases: planning for the fight, moving to the fight, the actual fight, consolidation/reorganization, and after the fight. Then it starts all over. Objective Force mostly deals with the first two and the last one, but very little to do with the actual fight; and in my opinion, that's the most important. I'd rather have something that's going to help me in the actual fight. Send robots in to kill everybody, but you can't fight a war with robotics; you don't own anything unless [your Soldier is] standing there with a rifle.

CONCLUSIONS

This research effort has successfully addressed our two objectives: (a) to explore how IT, as envisioned in the Objective Force, will change the decision and cognitive requirements of the Army's Soldiers and leaders in combat situations, and (b) to refine a concept for identifying and training to the new cognitive challenges. As to the first objective, we have gathered preliminary indications as to how the macrocognitive requirements will change. We do not believe decision *strategies* will change from intuitive to analytic, but we do contend that new decisions and judgments will arise. We have begun to speculate as to how, specifically, the decisions will change, and we have begun to offer suggestions for addressing those changes through training.

As to the second objective, we have found the macrocognition framework to be a very useful structure for identifying and investigating the emerging cognitive requirements associated with new technologies. We have also experimented with techniques for capturing the macrocognitive requirements of an envisioned world, and while we do not believe we have reached a satisfactory conclusion as to how to accomplish that, we have offered suggestions to better elicit this information. Finally, we have identified macrocognitive elements that are key to training Soldiers and leaders and suggested a more immersive synthetic task environment to help build the cognitive skills for the Future Force.

The preliminary implications for training based on this research focus on a number of the macrocognitive dimensions. Of particular interest to us with regard to the *sensemaking* function is the process of *attention management*. As previously discussed, in terms of where the platoon leader focuses attention during a mission, most SMEs believed the Objective Force would not produce any changes. However, within these mission tasks, the new information sources, such as robots will be highly relevant and different; and thus, the focus of attention will be altered. Within *sensemaking* and *attention management*, we believe implications will include the need for training with regard to: information filtering, information management, and information analysis. We foresee each of these requirements increasing, and training will be needed to aid the small unit leader in transitioning to the Objective Force.

The *coordination* function will also be altered. It is likely that the leader will have a larger area of responsibility and will need to deal with more simultaneous actions than occur within a platoon under the present technologies. In addition, the means by which the unit shares information with each other and adjacent platoons will change. Each of these changes foreshadows implications for training these leaders.

Related to coordination, we believe there will be new capabilities for establishing *common ground*, and thus training implications. The primary issue for the Objective Force platoon leader is how to manage information sharing across the team without bogging individuals down with the huge amounts of information that will be available, but not necessarily relevant. Training will need to address the utilization of team members to gather information, the distribution of information to particular subordinates, and the role of each member of the small unit in the common grounding activity. A portion of this process is team sensemaking—exchanging and synthesizing data and frames. However, the Objective Force technologies will so significantly enhance collection capabilities that the decision requirements to leverage them and the associated challenges will be new for the platoon leader.

The need to train Soldiers to revise or build new *mental models* is also key to the Objective Force. With the infusion of new Objective Force technologies, at first there will be no experts, or even proficient individuals. Current mental models will need to be revised and updated to incorporate Objective Force capabilities. Furthermore, the information-centric nature of Objective Force warfare will require an entirely *new* set of mental models for the small unit leader, whose job will begin to resemble present-day intelligence analysts. The training implication is to provide Soldiers and leaders with ample practice opportunities in low and high fidelity simulations, where they can construct their own mental models by applying the new Objective Force technologies and capabilities to a simulated mission.

Uncertainty management skills may degrade under Objective Force technologies. Subject matter experts indicated that the Objective Force technologies could bestow an unwarranted degree of certainty that could promote "laziness" and non-vigilance. While the training implications for preventing this are not clear, it is an area that should be studied in more depth.

With new capabilities and better information will come new *leverage points* to exploit. The challenge is to build Soldiers' and leaders' mental models of the Objective Force battlefield such that they can recognize the opportunities and realize how to use them to their advantage.

While it is not possible to identify or predict all of the possible cognitive changes that will occur because of Objective Force technologies, enhanced methodologies could expand and enrich our findings. We feel the use of a synthetic task environment is vital for envisioned world types of research. However, we have found paper and pencil descriptions of an envisioned world are not sufficient to build the mental models necessary for simulating the outcomes of futuristic events. We suggest that future research in this area work with the Objective Force virtual simulations at the Dismounted Battlespace Battle Laboratories at Fort Benning, Georgia. The addition of visual and auditory cues to help engage Soldiers in a more immersive experience to gain better mental models and enhance other macrocognitive functions would be vital to building the Soldiers and leaders in the Objective Force. This would also add to the cognitively authentic aspect of the research by allowing Soldiers to experience real-time radio transmissions and visualizations to build mental models and practice the macrocognitive functions described above. From this research, we could better illustrate the necessary changes in cognitive requirements, thus clarifying the cognitive training requirements. These training requirements could then be transferred to develop lower fidelity simulations that would be effective in building the Soldiers of tomorrow.

This project has identified several aspects of macrocognition that will need to be considered in training for Objective Force. We believe that addressing the issues described here will aid in maintaining battlefield awareness and acuity, and meeting the new cognitive challenges faced by tomorrow's Soldier. The macrocognitive level of description appears to be highly promising for identifying cognitive training requirements, and for transforming those requirements into the design of training scenarios and the identification of macrocognitive metrics. Objective Force is going to create new potential capabilities and require new cognitive skills. This research serves as merely a first step in developing the Soldiers and leaders of Objective Force to handle the challenges of information technology.

References

Binnendijk, H. (Ed.). (2002). *Transforming America's Military*. Washington, DC: National Defense University.

Gray, W. (2002). Simulated task environments: The role of high-fidelity simulations, scaled worlds, synthetic environments, and microworlds in basic and applied cognitive research. *Cognitive Science Quarterly, 2*(2), 205-227.

Hess, S. M., MacMillan, J., Elliott, L. R., & Schiflett, S. (1999). Team-in-the-loop, synthetic simulation: Bridging the gap between laboratory and field research. *Proceedings of the Human Factors and Ergonomics Society, 43rd Annual Meeting, 1*, 308-312.

Klein, G. (1998). *Sources of power: How people make decisions*. Cambridge, MA: MIT Press.

Klein, G. (2003). *Intuition at work*. New York: Doubled.

Klein, G., & Militello, L. (in press). The knowledge audit as a method for cognitive task analysis. In H. Montgomery & R. Lipshitz & B. Brehmer (Eds.), *How professionals make decisions*. Mahwah, NJ: Lawrence Erlbaum Associates.

Klein, G., Phillips, J. K., Battaglia, D. A., Wiggins, S. L., & Ross, K. G. (2002). *Focus: A model of sensemaking* (Interim Report - Year 1. Prepared under Contract 1435-01-01-CT-31161 [Dept. of the Interior] for the U.S. Army Research Institute for the Behavioral and Social Sciences, Alexandria, VA). Fairborn, OH: Klein Associates Inc.

Klein, G., Phillips, J. K., Klinger, D. W., & McCloskey, M. J. (1998). *The Urban Warrior Experiment: Observations and recommendation for ECOC functioning* (Contract #SYN-S01- 8291-54 for Synetics Corporation, King George, VA). Fairborn, OH: Klein Associates Inc.

Klein, G., Ross, K. G., Moon, B. M., Hoffman, R. R., Klein, D. E., & Hollnagel, E. (2003). Macrocognition. *IEEE Intelligent Systems, 18*(3), 81-85.

Martin, E., Lyon, D. R., & Schreiber, B. T. (1998). Designing synthetic tasks for human factors research: An application to uninhabited air vehicles. *Proceedings of the Human Factors Society, 42nd Annual Meeting, 1*, 123-127.

Militello, L. G., & Hutton, R. J. B. (1998). Applied Cognitive Task Analysis (ACTA): A practitioner's toolkit for understanding cognitive task demands. *Ergonomics, Special Issue: Task Analysis, 41*(11), 1618-1641.

Miller, T. E., Phillips, J. K., Battaglia, D. A., Wiggins, S. L., Baxter, H., Mills, J. A., & Ross, K. G. (2003). *Collaborative online training for operations other than war (OOTW)* (Final Technical Report for Contract #F33165-00-C-6003 Air Force Research Laboratory, Mesa, AZ). Fairborn, OH: Klein Associates Inc.

Mosier, K. (2001). Cognition in the automated cockpit: A coherence perspective, *Proceedings of the 45th annual meeting of the Human Factors and Ergonomics Society* (pp. 68-72). Minneapolis/Saint Paul, MN.

Phillips, J., McCloskey, M., McDermott, P. L., Wiggins, S., Battaglia, D. A., Thordsen, M. L., & Klein, G. (2001). *Decision-centered MOUT training for small-unit leaders.* (Research Report 1776). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (DTIC Accession Number ADA394066)

U.S. Army. (2002). *CHANGE 1 to TRADOC Pamphlet 525-3-90 O&O; The United States Army, Objective Force, Operational and Organizational Plan, Unit of Action.* Fort Knox, KY: Unit of Action Maneuver Battle Lab.

U.S. Army. (2003). *Mission Command: Command and Control of Army Forces (Field Manual 6-0.* Washington, DC: Author.

Woods, D. D. (1986). Cognitive technologies: The design of joint human-machine cognitive systems. *The A.I. Magazine, 6*, 86-92.

APPENDIX A

Two Intersections B — Basic—Current

You are the leader of 2nd Platoon, Bravo Company, 1st Battalion, 5th Infantry, 52nd Infantry Division (Light).

I. Situation

The country of Vada has recently been invaded by their neighbors to the north, the Gashans. The region has been unstable for decades due to religious tensions and disagreements over ownership of historical sites. The Gashans have raided the towns, forcing civilians to evacuate. The Vadans have assembled their army and retaliated; however, they do not have the personnel or the capabilities to drive the Vadans out of the country. Task Force Thunder, 2nd Brigade, 52nd Infantry Division (Light) has been sent as part of a U.N. task force to assist the Vadans and remove invading Gashan troops. The U.N. operation began 3 weeks ago.

Intelligence on the Gashans suggests that they are an organized force, but relatively unsophisticated. Gasha is a poor country, and this is reflected in their military's training and equipment. Although they were proactive in their initial invasion of Vada, they have been mostly reactive since U.N. troops began operations.

A. *Enemy Forces (Intelligence Reports)*

The Gashans seem to operate in sectors with platoon-sized units or smaller in each sector. As a result of their initial invasion of Vada, their weapon systems are at about 60% and their troops at about 70%. They have been using small arms, mortars, and anti-tank weapons. They are occupying defensive positions in the towns, however their security measures (e.g., booby traps) are simplistic and not well disguised. They do tend to employ snipers in key locations, but their sniper force is not large enough for full coverage of the occupied areas. Generally, assume 1-2 snipers per platoon.

Weather is overcast, warm and muggy. Temperature is 85F, with very light winds out of the northwest.

B. *Friendly Forces*

1st Battalion, 5th Infantry attacks to seize the Ridu Bridge in order to allow 2nd Battalion, 5th Infantry to continue its attack to the north.

II. Mission

Bravo Company attacks to clear Ridu of enemy forces in order to allow Charlie Company to seize the Ridu Bridge, which is northwest of the city.

III. Execution

A. Commander's Intent

I want to control key locations in the western and southern parts of Ridu; then, force the enemy out of the town to the east. I want to clear the town hall no later than 2400. The enemy must be driven from Ridu within 24 hours so that we can link up with Charlie Company to support their attack on the bridge to the northwest.

B. Concept of the Operation

1st Platoon, main effort, attacks to clear Second Street to the north in order to link up with Charlie Company. 2nd Platoon clears the museum in order to force enemy forces east of the city. 3rd Platoon establishes a blocking position south of First and Main Streets in order to prevent enemy forces from moving south. Priority of mortar support is to 1st Platoon.

IV. Rules of Engagement

Nothing in these ROE limits your right to take appropriate action to defend yourself and your unit.

   a. In this high-intensity conflict, you have the right to use force to take appropriate action to defend yourself and your unit, and to achieve your mission.

   b. Hostile fire may be returned effectively and promptly to stop a hostile act.

   c. U.N. forces can use any force deemed necessary under the circumstances and proportional to the threat.

   d. Detention of civilians is authorized for security reasons, self-defense, or to support achievement of the mission.

V. Assets and Equipment

Your platoon is equipped with the following:

20 M16 rifles with 210 rounds for each rifleman.

6 M203 grenade launchers with 24 40-mm rounds for each grenadier.

6 M249 squad automatic weapons (SAWs) with 600 rounds for each automatic rifleman.

2 M240B machine guns with 1200 rounds for each machine gun team.

Night vision equipment for each platoon member.

MBITR (multiband inter/intra-team radio) for each squad leader and the platoon leader.

2 hand grenades for all other platoon members, including flash-bangs.

VI. Scenario

Your platoon has successfully cleared the courthouse and encountered no enemy occupants. Now that you control that building, you've been tasked to move in and occupy the museum. 1st platoon will be moving up to take positions within the courthouse in 1 hour. Once you and 1st platoon control the courthouse and museum, your company will have the foothold needed to push the enemy east out of the town.

Your leader recon determined that an enemy sniper is still in the church tower and the town hall is occupied by approximately two enemy squads. While monitoring the situation from the courthouse, your platoon has seen enemy patrols of 2 men each in the vicinity of the museum, the old chapel, and the market. You believe they are aware of your occupation of the courthouse, but they have not attempted to run you out. They have, however, stepped up their security around the intersection of Main and First and seem to be paying more attention to the intersection of Main and Second. You expect that they've called in reinforcements and are waiting for their arrival to make any offensive move.

The museum is a two-story building constructed of brick and concrete. Three entrances exist: a double-door entrance with steps leading up to it on the south side of the building, and two back doors on the north side. There is no sign of enemy occupation of the building. Your job is to clear and control the museum.

The time is 1000. You instruct 3rd squad to set up overwatch elements to the north and south between the courthouse and museum. Then you instruct 1st squad to move to the museum from the southeast entrance of the courthouse. You are still located in the courthouse with 2nd squad. As 1st squad begins to move out, you suddenly hear machine-gun shots fired. "Shots from the south side of Main!" is all you hear from 1st squad leader. From the south side overwatch you hear, "Shots from either the market or the old chapel! I can't see any other activity!" Thirty seconds later you receive a report from the north side overwatch: "Lieutenant, I see forward enemy elements coming down Second Street. Unit size unknown. Forward elements will arrive here in about 5 minutes."

VII. Requirement

Please develop written answers to the following questions:

What would you do in advance of this mission? For example, what would your leader recon consist of?

As you envision this mission unfolding, what will be the decision points?

What is your plan for accomplishing the mission?

As your plan plays out, what information will you obtain and how will you get it?
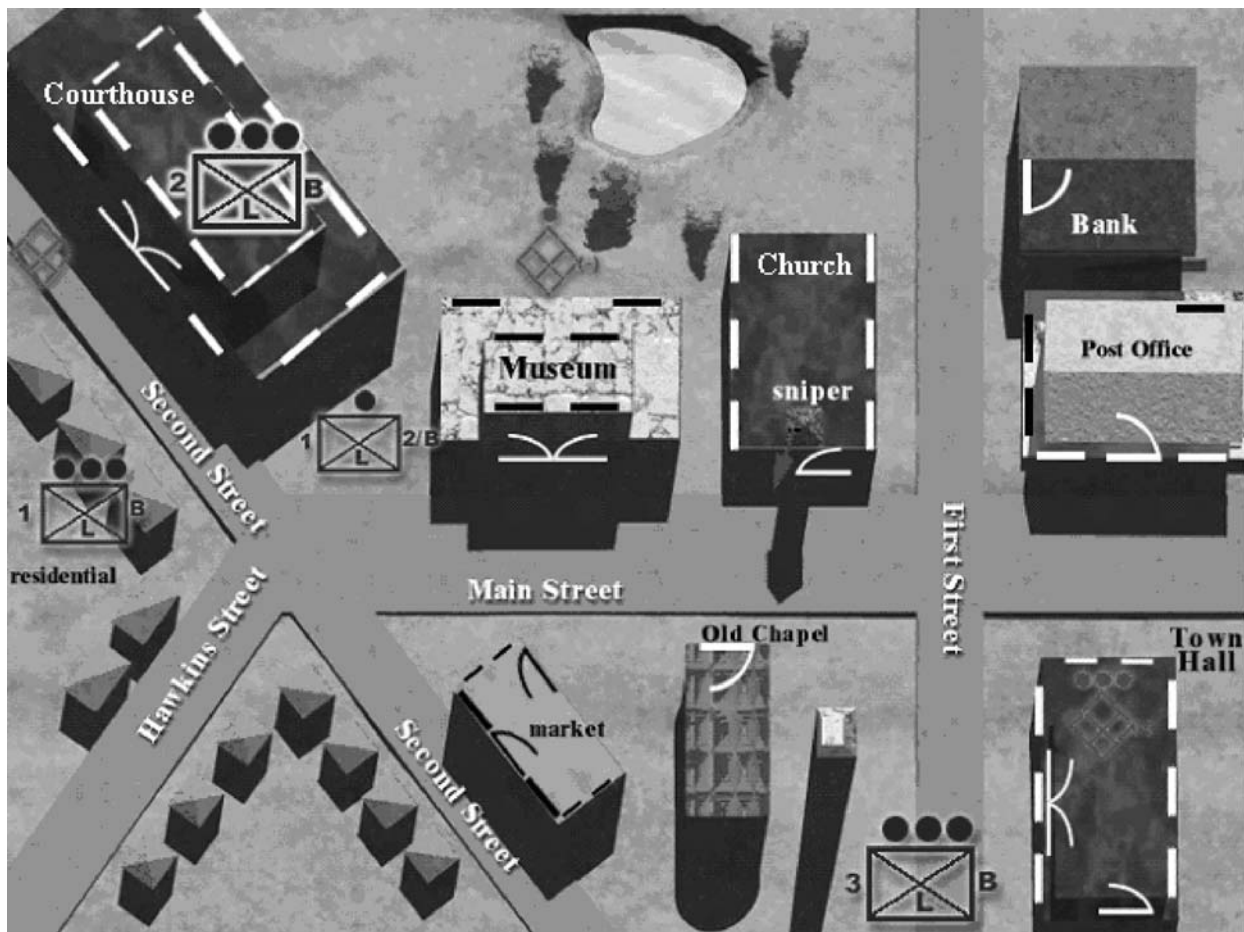
Two Intersections B

Basic—OFW

You are the leader of 2nd Platoon, Bravo Company, 1st Combined Arms (CA) Battalion, 5th Infantry, 2nd Unit of Action (UA) Brigade, 52nd Unit of Employment (UE) Division.

I. Situation

The country of Vada has recently been invaded by their neighbors to the north, the Gashans. The region has been unstable for decades due to religious tensions and disagreements over ownership of historical sites. The Gashans have raided the towns, forcing civilians to evacuate. The Vadans have assembled their army and retaliated; however, they do not have the personnel or the capabilities to drive the Vadans out of the country. Task Force Thunder, 1st CA Battalion, 5th Infantry, 2nd UA Brigade, 52nd UE Division has been sent as part of a U.N. task force to assist the Vadans and remove invading Gashan troops. The U.N. operation began 3 weeks ago.

Intelligence on the Gashans suggests that they are an organized force, but relatively unsophisticated. Gasha is a poor country, and this is reflected in their military's training and equipment. Although they were proactive in their initial invasion of Vada, they have been mostly reactive since U.N. troops began operations.

A. Enemy Forces (Intelligence Reports)

The Gashans seem to operate in sectors with platoon-sized units or smaller in each sector. As a result of their initial invasion of Vada, their weapon systems are at about 60% and their troops at about 70%. They have been using small arms, mortars, and anti-tank weapons. From time to time, they have employed advanced anti-armor weaponry that has been highly effective against coalition Armored Personnel Carriers (APCs) and other fighting vehicles. They are occupying defensive positions in the towns, however their security measures (e.g., booby traps) are simplistic and not well disguised. They do tend to employ snipers in key locations, but their sniper force is not large enough for full coverage of the occupied areas. Generally, assume 1-2 snipers per platoon.

Weather is overcast, warm and muggy. Temperature is 85F, with very light winds out of the northwest.

B. Friendly Forces

1st CA Battalion, 5th Infantry, 2nd UA Brigade, 52nd UE Division attacks to seize the Ridu Bridge in order to allow 2nd CA Battalion, 5th Infantry, 2nd UA Brigade, 52nd UE Division to continue its attack to the north.

II. Mission

Bravo Company, 1st CA Battalion, 5th Infantry attacks to clear Ridu of enemy forces in order to allow Charlie Company to seize the Ridu Bridge, which is northwest of the city.

III. Execution

A. Commander's Intent

I want to control key locations in the western and southern parts of Ridu; then, force the enemy out of the town to the east. I want to clear the key buildings near the intersections of Main and Second, and Main and First. We need to control the sector no later than 0600 tomorrow. The enemy must be driven from Ridu within 24 hours so that we can link up with Charlie Company to support their attack on the bridge to the northwest.

B. Concept of the Operation

1st Platoon, main effort, attacks to clear the Courthouse and Second Street to the north in order to link up with Charlie Company. 2nd Platoon clears the museum and church in order to force enemy forces east of the city. 3rd Platoon clears the market and old chapel to force enemy forces east and prevent them from moving south. Priority of mortar support is to 1st Platoon.

IV. Rules of Engagement

Nothing in these ROE limits your right to take appropriate action to defend yourself and your unit.

In this high-intensity conflict, you have the right to use force to take appropriate action to defend yourself and your unit, and to achieve your mission.

Hostile fire may be returned effectively and promptly to stop a hostile act.

U.N. forces can use any force deemed necessary under the circumstances and proportional to the threat.

Detention of civilians is authorized for security reasons, self-defense, or to support achievement of the mission.

Your platoon is equipped with the following:

12 XM29 Rifles with bursting technology with the standard complement of rounds for each platoon member.

6 M203 Grenade Launchers with 24 40-mm rounds per weapon.

6 M249 Squad Automatic Rifles (SAWs) with 600 rounds per weapon.

10 M4 Carbines with 210 rounds per weapon.

2 M240B Machine Guns with 12,000 rounds per weapon

A Daylight Video Sight with the capability to capture images like a digital camera for each weapon system.

Wearable computers for all members of the platoon.

Visual display of battlefield.
GPS locator; locations of all or a subset of the platoon members is available on the digital display.
Email-like ability to send and receive text and imagery with higher, adjacent, and own units.

Sensor fusion (Soldier, UAV, UGV, thermal, and night-vision) images are available to be fused into a single view.

Non-lethals for each platoon member, including: rubber bullets; 40-mm ceramic powder bags that will knock a person unconscious; glue-like substances to immobilize; gas; chemical agents that cause victims to cough and gag.

MBITR (multiband inter/intra-team radio) for all platoon members.

An integral suit for each platoon member. This is a one-piece, exoskeletal, full-spectrum protection suit. Incorporates body armor, climate control, fully integrated physiological monitor, onboard power generation, and nuclear/chemical/biological protectant.

You have access to two UAVs and your organic four small UGVs.

4 grenades for all platoon members, including flash-bangs.

Multifunction Lasers (MFLs) with the capability to determine range by laser range finder, bullet strike by aiming point, and target identification by infrared illumination.

You have access to the following indirect fire assets:

Non-line of sight (NLOS) cannon vehicle with 120-mm cannon. Uses smart submunitions and fire and forget seeker technology.

NLOS mortar vehicle with 120 mm mortar gun.

VI. Scenario

1st platoon has successfully cleared the courthouse and encountered no enemy occupants. Now that your company controls that building, your next task is to move in and occupy the museum and the church. The museum is a two-story building constructed of brick and concrete. Three entrances exist: a double-door entrance with steps leading up to it on the south side of the building, and two back doors on the north side. There is no sign of enemy occupation of the building. The church is a one-story building with a tower. It is constructed of brick. There is a single entrance at the front of the building, and three windows on each side (facing east and west).

Your leader recon determined that an enemy sniper is still in the church tower and the town hall is occupied by approximately two enemy squads. While monitoring the situation from the courthouse, your platoon has seen enemy patrols of 2 men each in the vicinity of the museum, the old chapel, and the market. You believe they are aware of your occupation of the courthouse, but they have not attempted to run you out. They have, however, stepped up their security around the intersection of Main and First and seem to be paying more attention to the intersection of Main and Second. You expect that they've called in reinforcements and are waiting for their arrival to make any offensive move. When you checked your digital display three hours ago you saw two company-sized enemy units about 15 km north of Ridu in the town of Norpa. Ten minutes ago, you saw that most of the group was still in Norpa, but one company had broken off and was just north of the Ridu Bridge.

The time is 1000. You instruct 3rd squad to set up overwatch elements to the north and south between the courthouse and museum. Then you instruct 1st squad to move to the museum from the southeast entrance of the courthouse. You are still located in the courthouse with 2nd squad. As 1st squad begins to move out, you suddenly hear machine-gun shots fired. "Shots from the south side of Main!" you hear from 1st squad leader. From the south side overwatch you hear, "Shots from either the market or the old chapel! I can't see any other activity!" Thirty seconds later you receive a report from the north side overwatch: "Lieutenant, I see forward enemy elements coming down Second Street. Forward elements will arrive here in about 5 minutes."

VII. Requirement

Please develop written answers to the following questions:

What would you do in advance of this mission? For example, what would your leader recon consist of?

As you envision this mission unfolding, what will be the decision points?

What is your plan for accomplishing the mission?

As your plan plays out, what information will you obtain and how will you get it?
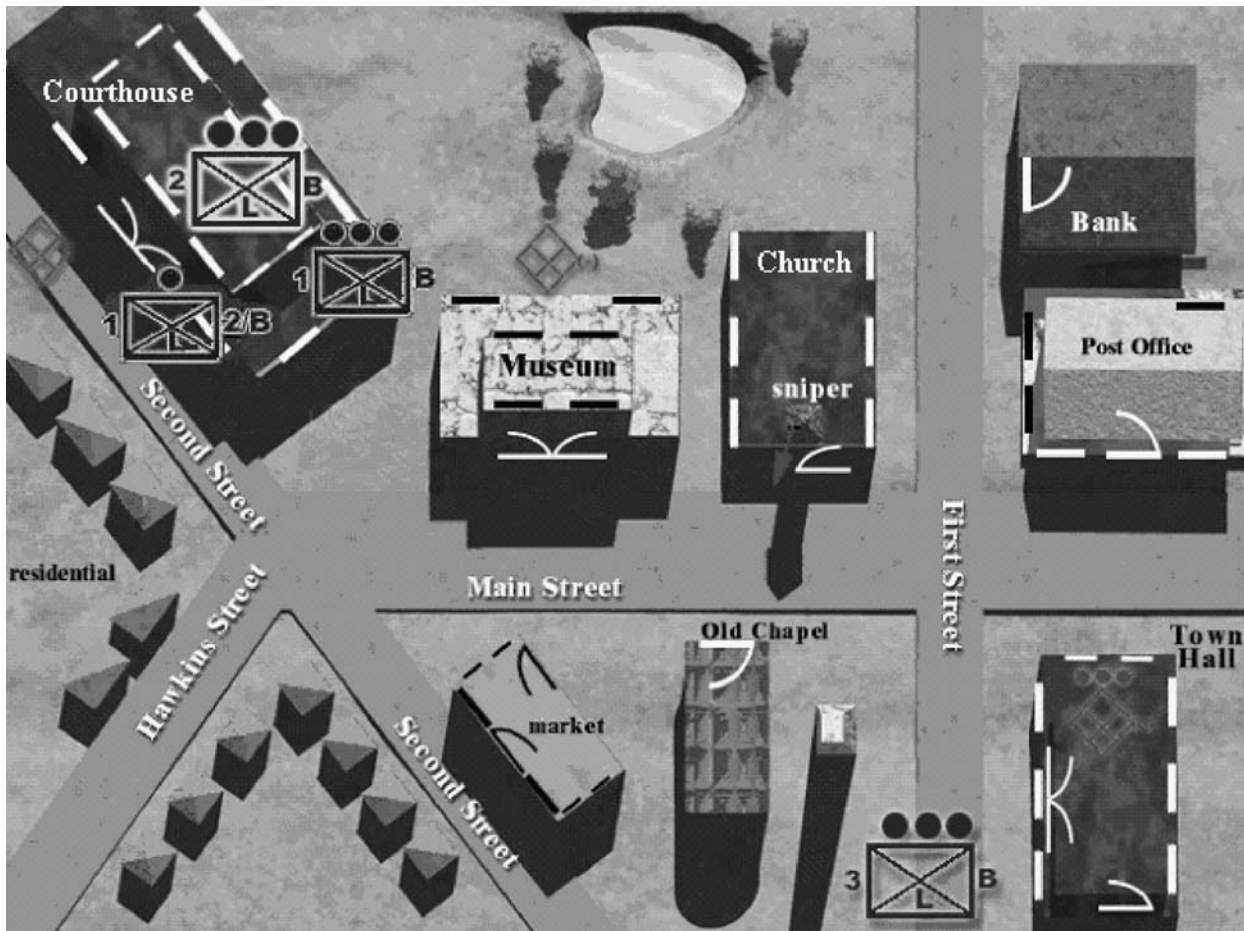
Contingencies:

a. If PL notes receipt of digital photos from overwatch elements, indicate that the south side overwatch has taken two pictures, one of the market and one of the old chapel, and neither show any enemy. In other words, when the Soldier peered the camera around the corner, the enemy had taken cover and were not in sight. The implication is that either you can act now or you can wait, try to take more photos to get the precise location, and then act.

b. If PL looks at GIG to see what battalion intel shows about enemy activity, indicate the display still shows a company on the north side of the Ridu Bridge, about 10km north of the platoon's position, and a company up in the town of Norpa which is about 15km north.

The Clearout Sale

Basic—Current

You are the leader of 1ˢᵗ Platoon, Bravo Company, 1ˢᵗ Battalion, 5ᵗʰ Infantry, 52ⁿᵈ Infantry Division (Light)

I. Situation

The small, allied Middle Eastern nation of Slavia has been invaded by a neighboring country, Candia. The Candians have ruthlessly pushed south through countless small villages in an effort to reach the capital city of Taznia. Task Force Hammer, 2ⁿᵈ Brigade, 52ⁿᵈ Infantry Division (Light) has been deployed as part of a multi-nation, U.N. fighting force to repel the invaders. The U.N. force has succeeded in halting the advance of the invading forces, and is currently pushing the remaining enemy battalion back toward their national boundary and clearing all scattered enemy forces they encounter in the small villages they approach. Any non-U.N. personnel that are encountered are assumed to be enemy forces.

A. Enemy Forces (Intelligence Reports)

In the past week, the enemy forces have been mainly reactive and attacking only sporadically. They have been operating in small groups of 4-8 Soldiers, and have been hesitant to launch any significant offensive efforts. The forces have been passive, and are typically armed with small arms, mortars, and anti-tank weapons.

B. Friendly Forces

1ˢᵗ Battalion, 5ᵗʰ Infantry clears AO Fist in order to allow U.N. forces to reestablish the Slavia national boundary.

II. Mission

Bravo Company clears the village of Gidia to protect Charlie Company's right flank as it attacks the village of Sultan to the West.

III. Execution

A. Commander's Intent

I want all buildings in Gidia thoroughly searched and cleared of all enemy elements. Once a building is cleared, ensure you use visible markers to identify a cleared building.

B. Concept of the Operation

1st Platoon, main effort, clears Zone Blue to establish a support by fire position to assist Charlie Company. 2nd Platoon clears Zone Red of enemy forces to prevent enemy attack on 1st Platoon's right flank. 3rd Platoon secures First Street from the west to allow 2nd Platoon to clear Zone Red.

IV. Rules of Engagement

Nothing in these ROE limits your right to take appropriate action to defend yourself and your unit.

a. In this high-intensity conflict, you have the right to use force to take appropriate action to defend yourself and your unit, and to achieve your mission.

b. Hostile fire may be returned effectively and promptly to stop a hostile act.

c. U.N. forces can use any force deemed necessary under the circumstances and proportional to the threat.

1. Detention of civilians is authorized for security reasons, self-defense, or to support achievement of the mission.

V. Assets and Equipment

Your platoon is equipped with the following:

1. 14 M16 rifles with 210 rounds for each rifleman.

2. 4 M203 grenade launchers with 24 40mm rounds for each grenadier.

3. 3 M249 squad automatic weapons (SAWs) with 600 rounds for each automatic rifleman.

4. 2 M240B machine guns with 1200 rounds for each machine gun team.

5. Night vision equipment for each platoon member.

6. MBITR (multiband inter/intra-team radio) for each squad leader and the platoon leader.

7. 2 hand grenades for all other platoon members, including flash-bangs.

Gidia is a small town and generally run down. Most of the buildings in this village are single story and are made mostly of reinforced concrete. They are generally separated by 10-20 feet, or by narrow alleys. Residences and small shops are intermixed. While some of the shops appear to be left untouched by the fighting, most of the buildings have broken windows, blocked by furniture or covered with wire mesh. The streets are barely wide enough for 2-way traffic. There are very few automobiles on the streets, and there appears to be no electricity in the town.

The company commander has tasked you with clearing one of the remaining buildings in the village, a small grocery store on the corner of First and Main. Initial recon suggests that there may be as many as five to six enemy Soldiers holed up in the store. The grocery store has no electricity, and no food on the aisles. It has not been used, at least not as a grocery store, in weeks. Based on the sketch you have been provided, the grocery store appears to have one main shopping area and two back rooms. The only window or door to the outside is the large, glass double-door entry in the front (which is partially broken out). The roof is flat with standard air ducts and graveled tar surface.

Your platoon is currently at about 60%. Your 3rd squad was detached to secure the Battalion Main CP. You're out of anti-tank weapons and javelins. You are located south of the intersection of First and Main. The time is 0500. Sunrise is 0630. The Captain wants the building cleared by dawn.

What is your plan?

VII. Requirement

Please develop written answers to the following questions:

What would you do in advance of this mission? For example, what would your leader recon consist of?

As you envision this mission unfolding, what will be the decision points?

What is your plan for accomplishing the mission?

As your plan plays out, what information will you obtain and how will you get it?
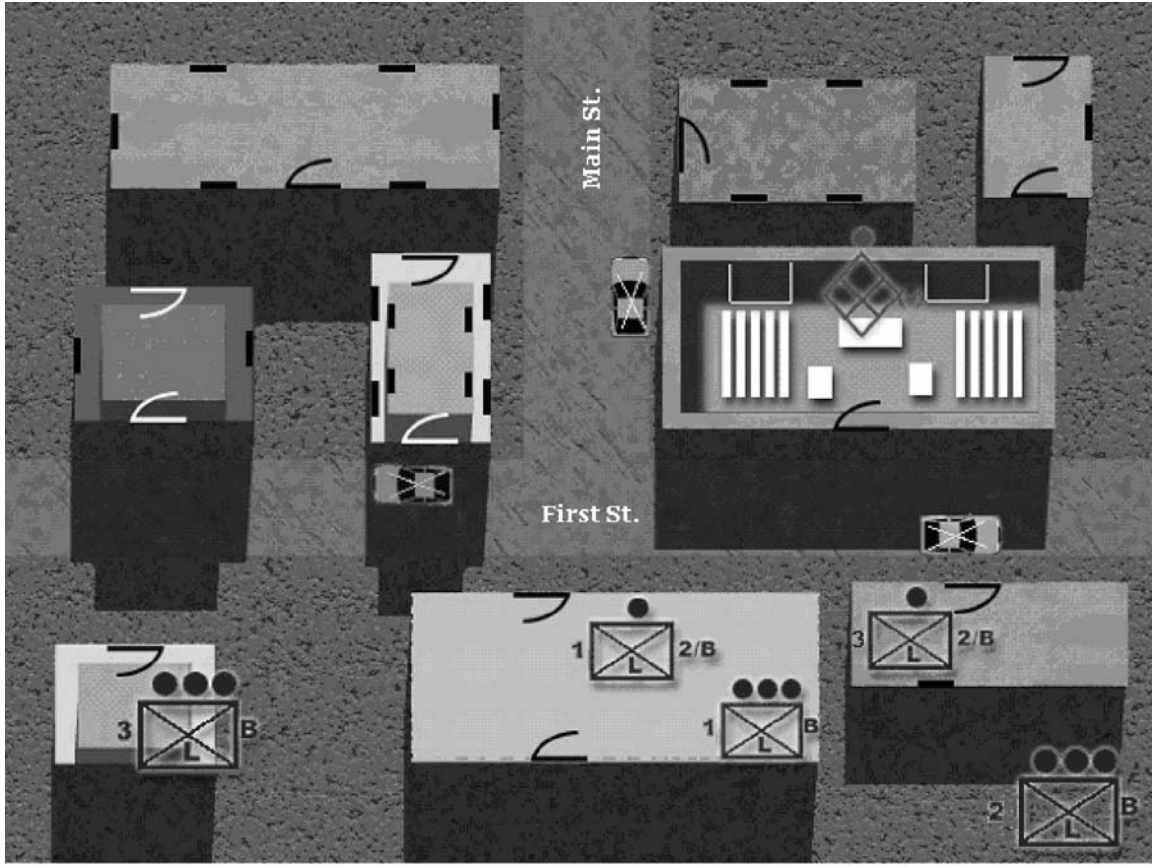
Title	Difficulty Level
The Clearout Sale	**Basic—OFW**

You are the leader of 1ˢᵗ Platoon, Bravo Company, 1ˢᵗ Combined Arms (CA) Battalion, 5ᵗʰ Infantry, 2ⁿᵈ Unit of Action (UA) Brigade, 52ⁿᵈ Unit of Employment (UE) Division.

I. Situation

The small, allied Middle Eastern nation of Slavia has been invaded by a neighboring country, Candia. The Candians have ruthlessly pushed south through countless small villages in an effort to reach the capital city of Taznia. Task Force Hammer, 1ˢᵗ CA Battalion, 5ᵗʰ Infantry, 2nd UA Brigade, 52ⁿᵈ UE Division has been deployed as part of a multi-nation, U.N. fighting force to repel the invaders. The U.N. force has succeeded in halting the advance of the invading forces, and is currently pushing the remaining enemy battalion back toward their national boundary and clearing all scattered enemy forces they encounter in the small villages they approach. Any non-U.N. personnel that are encountered are assumed to be enemy forces.

A. Enemy Forces (Intelligence Reports)

In the past week, the enemy forces have been mainly reactive and attacking only sporadically. They have been operating in small groups of 4-8 Soldiers, and have been hesitant to launch any significant offensive efforts. The forces have been passive, and are typically armed with small arms, mortars, and anti-tank weapons.

B. Friendly Forces

1ˢᵗ CA Battalion, 5ᵗʰ Infantry, 2ⁿᵈ UA Brigade, 52ⁿᵈ UE Division clears AO Fist in order to allow UN forces to reestablish the Slavia national boundary.

II. Mission

Bravo Company, 1st CA Battalion, 5th Infantry clears the village of Gidia to protect Charlie Company's right flank as it attacks the village of Sultan to the West.

III. Execution

A. Commander's Intent

I want all buildings in Gidia thoroughly searched and cleared of all enemy elements. Once a building is cleared, ensure you use visible markers to identify a cleared building.

B. Concept of the Operation

1st Platoon, main effort, clears Zone Blue to establish a support by fire position to assist Charlie Company. 2nd Platoon clears Zone Red of enemy forces to prevent enemy attack on 1st Platoon's right flank. 3rd Platoon secures First Street from the west to allow 2nd Platoon to clear Zone Red.

IV. Rules of Engagement

Nothing in these ROE limits your right to take appropriate action to defend yourself and your unit.

a. In this high-intensity conflict, you have the right to use force to take appropriate action to defend yourself and your unit, and to achieve your mission.

b. Hostile fire may be returned effectively and promptly to stop a hostile act.

c. U.N. forces can use any force deemed necessary under the circumstances and proportional to the threat.

d. Detention of civilians is authorized for security reasons, self-defense, or to support achievement of the mission.

V. Assets and Equipment

Your platoon is equipped with the following:

7 XM29 Rifles with bursting technology with the standard complement of rounds for each platoon member.

4 M203 Grenade Launchers with 24 40-mm rounds per weapon.

4 M249 Squad Automatic Rifles (SAWs) with 600 rounds per weapon.

5 M4 Carbines with 210 rounds per weapon.

2 M240B Machine Guns with 12,000 rounds per weapon

A Daylight Video Sight with the capability to capture images like a digital camera for each weapon system.

Wearable computers for all members of the platoon.

    a.   Visual display of battlefield.

    b.   GPS locator; locations of all or a subset of the platoon members is available on the digital display.

    c.   Email-like ability to send and receive text and imagery with higher, adjacent, and own units.

Sensor fusion (Soldier, UAV, UGV, thermal, and night-vision) images are available to be fused into a single view.

Non-lethals for each platoon member, including: rubber bullets; 40-mm ceramic powder bags that will knock a person unconscious; glue-like substances to immobilize; gas; chemical agents that cause victims to cough and gag.

10. MBITR (multiband inter/intra-team radio) for all platoon members.

An integral suit for each platoon member. This is a one-piece, exoskeletal, full-spectrum protection suit. Incorporates body armor, climate control, fully integrated physiological monitor, onboard power generation, and nuclear/chemical/biological protectant.

You have access to two UAVs and your organic four small UGVs.

4 grenades for all platoon members, including flash-bangs.

Multifunction Lasers (MFLs) with the capability to determine range by laser range finder, bullet strike by aiming point, and target identification by infrared illumination.

You have access to the following indirect fire assets:

1. Non-line of sight (NLOS) cannon vehicle with 120-mm cannon. Uses smart submunitions and fire and forget seeker technology.

2. NLOS mortar vehicle with 120 mm mortar gun.

VI. Scenario

Gidia is a small town and generally run down. Most of the buildings in this village are single story and are made mostly of reinforced concrete. They are generally separated by 10-20 feet, or by narrow alleys. Residences and small shops are intermixed. While some of the shops appear to be left untouched by the fighting, most of the buildings have broken windows, blocked by furniture or covered with wire mesh. The streets are barely wide enough for 2-way traffic. There are very few automobiles on the streets, and there appears to be no electricity in the town.

The company commander has tasked you with clearing one of the remaining buildings in the village, a small grocery store on the corner of First and Main. Initial recon suggests that there may be as many as five to six enemy Soldiers holed up in the store. The grocery store has no electricity, and no food on the aisles. It has not been used, at least not as a grocery store, in weeks. Based on the sketch you have been provided, the grocery store appears to have one main shopping area and two back rooms. The only window or door to the outside is the large, glass double-door entry in the front (which is partially broken out). The roof is flat with standard air ducts and graveled tar surface.

As part of your leader recon, you have deployed a UAV to scan the area around the objective building. The imagery shows no obstructions or people in the alley behind the objective. In fact, you see no signs of activity from the imagery: nothing on the roofs of surrounding buildings, no people wandering the streets, and no vehicles driving on the roads. This imagery is 1 hour old.

Your platoon is currently at about 60%. Your 3rd squad was detached to secure the Battalion Main CP. You're out of anti-tank weapons and javelins. You are located south of the intersection of First and Main. The time is 0500. Sunrise is 0630. The Captain wants the building cleared by dawn.

VII. Requirement

Please develop written answers to the following questions:

What would you do in advance of this mission? For example, what would your leader recon consist of?

As you envision this mission unfolding, what will be the decision points?

What is your plan for accomplishing the mission?

As your plan plays out, what information will you obtain and how will you get it?

Possibilities for session and debrief:

Give a visual that is similar to what they would see on their hand held computers.

Ask them to edit the map as they would want to.

Decision Requirements Exercise:

a. What are the main decisions or judgments you have to make?
b. What is difficult about those decisions? Or Why are they difficult?
c. What information given by the scenario are you using to make those decisions?
d. What information would you actively seek, and how?
e. What information would you like to have but NOT seek? Why?
f. What's the one piece of information you would most like to have?

Title	Difficulty Level
A Deadly Approach	**Intermediate—Current**

You are the leader of 2nd Platoon, Bravo Company, 1st Battalion, 5th Infantry, 52nd Infantry Division (Light).

I. Situation

In the past six months, the province of Amwellia has suffered terrorist activities of increasing magnitude, most of which have been aimed at the Muslim population and their religious sites. The Kona, a semi-organized rebel faction from a neighboring province, has all but admitted to the terrorism. In response to the attacks, the Amwellian Muslims have organized a military group that has carried out its own terrorist activities aimed at the Kona. The Muslims call themselves the Butri.

Two weeks ago, after escalation of terrorism by both sides, the Kona invaded the Amwellian city of Botswell. Botswell has a population of about 20,000, about half of which are Muslims. Since the initial invasion, the Kona and Butri have been vying for control of the city, neither group able to establish and maintain a strong foothold.

Task Force Strongarm, 2nd Brigade, 52nd Infantry Division (Light) has been deployed as part of a U.N. humanitarian effort in Amwellia. As a result of the fighting, the city has been cut off from the rest of the country, and civilians are beginning to feel the food and supply shortages. The UN is responding by initiating relief efforts to Botswell.

There are two major, armed factions fighting for control of this high-desert country. Violent clashes with Soviet-made weapons – typically AK-47s and RPGs and truck-mounted machine guns—are not uncommon. The factions are very difficult to distinguish, and often they appear no different from the local civilians.

A. Enemy Forces (Intelligence Reports)

The Kona are a group of a few hundred men, most of whom are armed with rifles and hand grenades. A few have been seen with machine guns and RPGs. They tend to move in groups of 5-6. It is unclear who their leader is, and how well they are organized. Their communications gear seems to be primitive and basic, and on a good day the groups of 5-6 men will have one radio amongst them. The Kona tend to fight only if they have the upper hand, but when they do, they attack fiercely to seize control of a building or area.

The Butri seem to have more men than the Kona, but are less well equipped. Their weapon types are the same as the Kona, but they have fewer of them, and sometimes not enough

to arm all their Soldiers. Their operations are only semi-organized, and mostly defensive in nature. They tend to dig into key areas of the city to prevent the Kona from taking those areas.

The civilians in Botswell are clearly siding with the Butri, but not to the extent that they will join in the fighting. They tend to stay close to their homes as much as possible, however, it is not unlikely to see groups of 2 or 3 walking briskly down the streets to the market. Some of the more affluent civilians have evacuated the town, but about 70% remain.

The city of Botswell covers approximately 10 square miles. It is situated in a slight valley, with rolling hills on the outskirts of the city. Vegetation is desert-like, with brush and occasionally small trees dotting the landscape. Within the city, trees have been preserved but brush has been removed. The roads within the city are mostly dirt, with a few major roads paved with cement slabs. Almost all roads are 12 feet wide, the major ones perhaps 14 feet wide. The buildings in Botswell vary quite a bit in terms of their construction. Most are one-story, with a few 2- and 3-story buildings located in the central, "downtown" area. The residential buildings are generally made of plaster or wood, while the more commercial and governmental buildings tend to be made of brick or concrete blocks. Across the street from the town hall and in the area surrounding the mosque are sacred courtyards contained by 2-feet high stone walls.

Intel has reported that there has been a significant amount of unrest in Amwellia in the past week. Small bands of 5-6 men from the factions will pass though town, and have often started skirmishes or drawn sniper fire, resulting in significant civilian injuries and even deaths. You have been told that you are currently the only peacekeeping forces in the village.

The weather is muggy and dry, winds are variable, and the temperature is 80F.

B. Friendly Forces

1st Battalion, 5th Infantry provides security in Amwellia in order to support U.N. efforts to provide humanitarian relief to affected civilian populations.

II. Mission

Bravo Company provides security for medical and food relief missions in Botswell to protect U.N. personnel and allow civilians free and unhindered access to U.N. medical and food relief teams.

III. Execution

A. Commander's Intent

I want each platoon positioned in the vicinity of the relief operation sites in Botswell to provide security against any hostile force intent on disrupting the food and medical distribution. Ensure that civilians have access to each site. Secure the site and prevent disruption from factional elements. Protect the U.N. operation at your site. Remain on station to allow the medical team to depart unharmed out of the area.

B. Concept of the Operation

1st platoon secures Site East in order to protect and allow civilian access to U.N. relief teams. 2nd platoon secures Site Central in order to protect and allow civilian access to U.N. relief teams. 3rd platoon secures Site West in order to protect and allow civilian access to U.N. relief teams. No fire support is available.

IV. Rules of Engagement

Nothing in these rules negates your inherent right to use reasonable force to defend yourself against dangerous personal attack.

1. Deadly force may be used only when fired upon, when clear evidence of hostile intent exists, or when armed elements, mobs, and/or rioters threaten human life, sensitive equipment and aircraft, or open and free passage of relief supplies.

2. In situations where deadly force is not appropriate, use the minimum force necessary to accomplish the mission.

3. Unattended means of force (e.g., mines, booby traps, trip guns) are not authorized.

4. US forces will not endanger or exploit the property of the local population without their explicit approval.

5. Treat all persons with dignity and respect.

6. Placing fire on religious sites is not authorized.

V. Assets and Equipment

Your platoon is equipped with the following:

20 M16 rifles with 210 rounds for each rifleman.

6 M203 grenade launchers with 24 40-mm rounds for each grenadier.

3 M249 squad automatic weapons (SAWs) with 600 rounds for each automatic rifleman.

2 M240B machine guns with 1200 rounds for each machine gun team.

Night vision equipment for each platoon member.

MBITR (multiband inter/intra-team radio) for each squad leader and the platoon leader.

2 hand grenades for all other platoon members, including flash-bangs.

Your platoon's current mission is to take control of a key intersection in central Botswell and secure the area so that food and medical supplies can be distributed to civilians from the town hall. In order to secure this intersection, you must clear and take control of the town hall, which is on the southeast corner of Manna and Holti Streets. S-2 reports do not indicate that either faction occupies the town hall or any nearby buildings. However, you have been warned of their potential presence in the area, given the centrality of the intersection.

It is 0100 and the skies are cloudy. Your platoon consists of 5 fire teams with 3 SAWs (2nd squad is heavy by a fire team). Your plan is to walk south down Manna Street and set up an overwatch in the two-story warehouse on the northwest corner; the warehouse has second-story windows that provide a good view of the town hall and the entire intersection. You need to have the town hall cleared in time for food and supplies to be distributed starting at 0800 tomorrow.

As you approach the warehouse, you notice that the backdoor has seen better days – there are at least three sizable dents in the door, and the lock and handle apparatus look to have been jimmied. But you can't tell from your current position whether the perpetrators were successful at getting into the warehouse. The ground floor window to the right of the door has also been broken. You peer in with your NVGs and see that the warehouse's first floor is a single large room. You see some boxes and crates lining the walls and a few in the middle of the warehouse floor.

You scan the area outside the warehouse, and spot two men with rifles slung, carrying large duffle bags, walking quickly but cautiously across Manna Street, heading west from the town hall. Then you get a radio call from your platoon sergeant: "There's some commotion over here in the residential area. I can't tell who they are, but I see at least 20 people moving around. Looks like they're up to no good. What do you want to do?

VII. Requirement

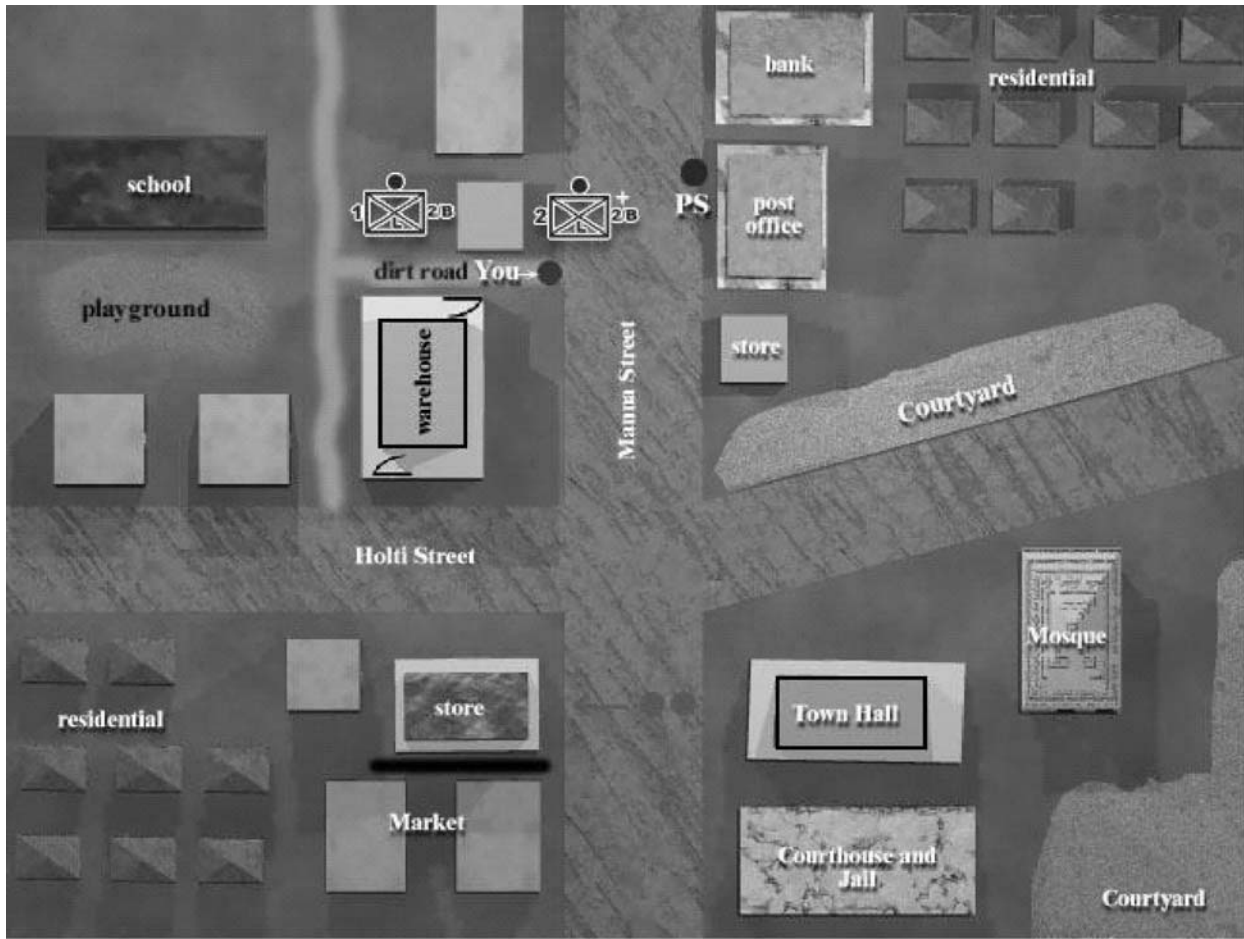Please develop written answers to the following questions:

What would you do in advance of this mission? For example, what would your leader recon consist of?

As you envision this mission unfolding, what will be the decision points?

What is your plan for accomplishing the mission?

As your plan plays out, what information will you obtain and how will you get it?

Title	Difficulty Level
A Deadly Approach	**Intermediate—OFW**

You are the leader of 2nd Platoon, Bravo Company, 1st Combined Arms (CA) Battalion, 5th Infantry, 2nd Unit of Action (UA) Brigade, 52nd Unit of Employment (UE) Division.

I. Situation

In the past six months, the province of Amwellia has suffered terrorist activities of increasing magnitude, most of which have been aimed at the Muslim population and their religious sites. The Kona, a semi-organized rebel faction from a neighboring province, has all but admitted to the terrorism. In response to the attacks, the Amwellian Muslims have organized a military group that has carried out its own terrorist activities aimed at the Kona. The Muslims call themselves the Butri.

Two weeks ago, after escalation of terrorism by both sides, the Kona invaded the Amwellian city of Botswell. Botswell has a population of about 20,000, about half of which are Muslims. Since the initial invasion, the Kona and Butri have been vying for control of the city, neither group able to establish and maintain a strong foothold.

Task Force Strongarm, 1st CA Battalion, 5th Infantry, 2nd UA Brigade, 52nd UE Division has been deployed as part of a U.N. humanitarian effort in Amwellia. As a result of the fighting, the city has been cut off from the rest of the country, and civilians are beginning to feel the food and supply shortages. The UN is responding by initiating relief efforts to Botswell.

There are two major, armed factions fighting for control of this high-desert country. Violent clashes with Soviet-made weapons—typically AK-47s and RPGs and truck-mounted machine guns—are not uncommon. The factions are very difficult to distinguish, and often they appear no different from the local civilians.

A. Enemy Forces (Intelligence Reports)

The Kona are a group of a few hundred men, most of whom are armed with rifles and hand grenades. A few have been seen with machine guns and RPGs. They tend to move in groups of 5-6. It is unclear who their leader is, and how well they are organized. Their communications gear seems to be primitive and basic, and on a good day the groups of 5-6 men will have one radio amongst them. The Kona tend to fight only if they have the upper hand, but when they do, they attack fiercely to seize control of a building or area.

The Butri seem to have more men than the Kona, but are less well equipped. Their weapon types are the same as the Kona, but they have fewer of them, and sometimes not enough to arm all their Soldiers. Their operations are only semi-organized, and mostly defensive in nature. They tend to dig into key areas of the city to prevent the Kona from taking those areas.

The civilians in Botswell are clearly siding with the Butri, but not to the extent that they will join in the fighting. They tend to stay close to their homes as much as possible, however, it is not unlikely to see groups of 2 or 3 walking briskly down the streets to the market. Some of the more affluent civilians have evacuated the town, but about 70% remain.

The city of Botswell covers approximately 10 square miles. It is situated in a slight valley, with rolling hills on the outskirts of the city. Vegetation is desert-like, with brush and occasionally small trees dotting the landscape. Within the city, trees have been preserved but brush has been removed. The roads within the city are mostly dirt, with a few major roads paved with cement slabs. Almost all roads are 12 feet wide, the major ones perhaps 14 feet wide. The buildings in Botswell vary quite a bit in terms of their construction. Most are one-story, with a few 2- and 3-story buildings located in the central, "downtown" area. The residential buildings are generally made of plaster or wood, while the more commercial and governmental buildings tend to be made of brick or concrete blocks. Across the street from the town hall and in the area surrounding the mosque are sacred courtyards contained by 2-feet high stone walls.

Intel has reported that there has been a significant amount of unrest in Amwellia in the past week. Small bands of 5-6 men from the factions will pass though town, and have often started skirmishes or drawn sniper fire, resulting in significant civilian injuries and even deaths. You have been told that you are currently the only peacekeeping forces in the village.

The weather is muggy and dry, winds are variable, and the temperature is 80F.

B. Friendly Forces

1st CA Battalion, 5th Infantry, 2nd UA Brigade, 52nd UE provides security in Amwellia in order to support U.N. efforts to provide humanitarian relief to affected civilian populations.

II. Mission

Bravo Company provides security for medical and food relief missions in Botswell to protect U.N. personnel and allow civilians free and unhindered access to U.N. medical and food relief teams.

III. Execution

Commander's Intent

I want each platoon positioned in the vicinity of the relief operation sites in Botswell to provide security against any hostile force intent on disrupting the food and medical distribution. Ensure that civilians have access to each site. Secure the site and prevent disruption from factional elements. Protect the U.N. operation at your site. Remain on station to allow the medical team to depart unharmed out of the area.

Concept of the Operation

1st platoon secures Site East in order to protect and allow civilian access to U.N. relief teams. 2nd platoon secures Site Central in order to protect and allow civilian access to U.N. relief teams. 3rd platoon secures Site West in order to protect and allow civilian access to U.N. relief teams. No fire support is available.

IV. Rules of Engagement

Nothing in these rules negates your inherent right to use reasonable force to defend yourself against dangerous personal attack.

Deadly force may be used only when fired upon, when clear evidence of hostile intent exists, or when armed elements, mobs, and/or rioters threaten human life, sensitive equipment and aircraft, or open and free passage of relief supplies.

In situations where deadly force is not appropriate, use the minimum force necessary to accomplish the mission.

Unattended means of force (e.g., mines, booby traps, trip guns) are not authorized.

US forces will not endanger or exploit the property of the local population without their explicit approval.

Treat all persons with dignity and respect.

Placing fire on religious sites is not authorized.

V. Assets and Equipment

Your platoon is equipped with the following:

12 XM29 Rifles with bursting technology with the standard complement of rounds for each platoon member.

6 M203 Grenade Launchers with 24 40-mm rounds per weapon.

3 M249 Squad Automatic Rifles (SAWs) with 600 rounds per weapon.

10 M4 Carbines with 210 rounds per weapon.

2 M240B Machine Guns with 12,000 rounds per weapon

A Daylight Video Sight with the capability to capture images like a digital camera for each weapon system.

Wearable computers for all members of the platoon.

Visual display of battlefield.
GPS locator; locations of all or a subset of the platoon members is available on the digital display.
Email-like ability to send and receive text and imagery with higher, adjacent, and own units.

Sensor fusion (Soldier, UAV, UGV, thermal, and night-vision) images are available to be fused into a single view.

Non-lethals for each platoon member, including: rubber bullets; 40-mm ceramic powder bags that will knock a person unconscious; glue-like substances to immobilize; gas; chemical agents that cause victims to cough and gag.

MBITR (multiband inter/intra-team radio) for all platoon members.

An integral suit for each platoon member. This is a one-piece, exoskeletal, full-spectrum protection suit. Incorporates body armor, climate control, fully integrated physiological monitor, onboard power generation, and nuclear/chemical/biological protectant.

You have access to two UAVs and your organic four small UGVs.

4 grenades for all platoon members, including flash-bangs.

Multifunction Lasers (MFLs) with the capability to determine range by laser range finder, bullet strike by aiming point, and target identification by infrared illumination.

VI. Scenario

Your platoon's current mission is to take control of a key intersection in central Botswell and secure the area so that food and medical supplies can be distributed to civilians from the town hall. In order to secure this intersection, you must clear and take control of the town hall, which is on the southeast corner of Manna and Holti Streets. The S-2 overlay, delivered to you 3 hours ago, shows a substantial number of Kona rebels (~30) about 1 km northeast of the town hall, in and around buildings at the corner of Holti and Banner. The overlay also shows a small number of Butri elements (~10) near the school which is northwest of the intersection you are to secure. One hour ago you released a UAV to gather imagery around the intersection. The UAV feed shows 10-15 Butri vicinity of the school and 10-15 Kona vicinity of the courtyard southeast of the town hall.

It is 0100 and the skies are cloudy. Your platoon consists of 5 fire teams with 3 SAWs (2nd squad is heavy by a fire team). Your plan is to walk south down Manna Street and set up an overwatch in the two-story warehouse on the northwest corner; the warehouse has second-story windows that provide a good view of the town hall and the entire intersection. You need to have the town hall cleared in time for food and supplies to be distributed starting at 0800 tomorrow.

As you approach the warehouse, you notice that the backdoor has seen better days – there are at least three sizable dents in the door, and the lock and handle apparatus look to have been jimmied. But you can't tell from your current position whether the perpetrators were successful at getting into the warehouse. The ground floor window to the right of the door has also been broken. You use your thermal sights to peer through the window. You can tell that the first floor of the building is one large, open room. Boxes and crates line the walls and a few are in the middle of the warehouse floor. You can detect about 6 people standing at the far end of the building.

You scan the area outside the building and spot two men with rifles slung, carrying large duffle bags, walking quickly but cautiously across Manna Street, heading west from the town hall. Then you get a radio call from your platoon sergeant: "There's some commotion over here in the residential area. I can't tell who they are, but I see at least 20 people moving around. Looks like they're up to no good. What do you want to do?"
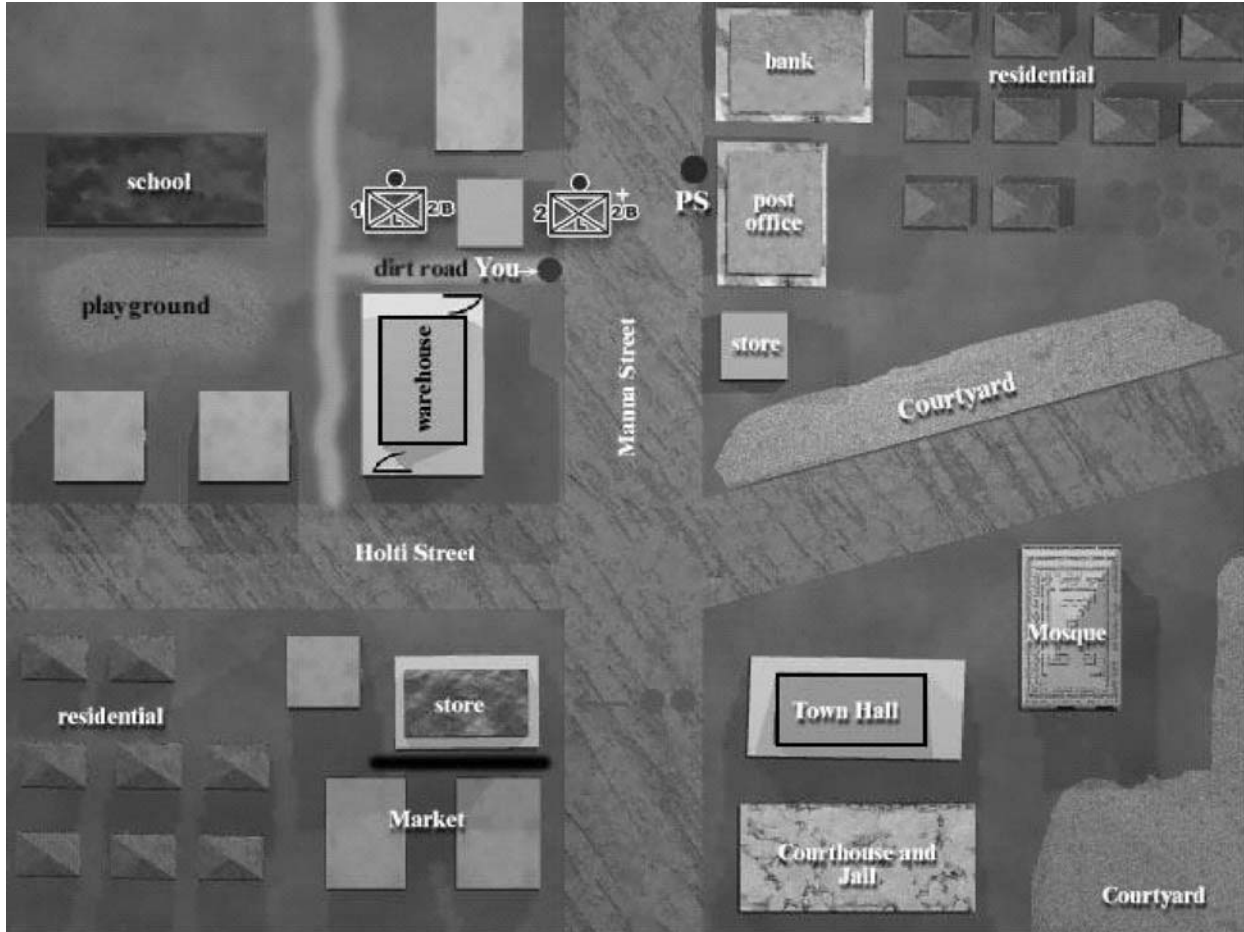
VII. Requirement

Please develop written answers to the following questions:

What would you do in advance of this mission? For example, what would your leader recon consist of?

As you envision this mission unfolding, what will be the decision points?

What is your plan for accomplishing the mission?

As your plan plays out, what information will you obtain and how will you get it?

Title	Difficulty Level

El Dia Del Guapo

Advanced—Current

You are the leader of 2nd Platoon, Bravo Company, 1st Battalion, 5th Infantry, 52nd Infantry Division (Light).

I. Situation

Task Force Hardnose, 2nd Brigade, 52nd Infantry Division (Light) has been deployed as part of a U.N. humanitarian effort to provide relief to the war-ravaged country of Nubania. Nubania has several towns of impoverished, hungry civilians, many of who have been left homeless by the war that has recently ended. The task force's broad mission is as it has been for the three months that they have been deployed in Nubania: To maintain order and discipline and to provide a security presence.

All villages in the area are in the same condition generally. The towns are in a state of impoverished decay. Homes are simple. They are all basically constructed of plywood and are one story. The structure is the same for the dwellings: four small rooms, each room often packed full of residents. Most street blocks have four homes – two per side, backing two others. Separating the back yards of the houses are rickety 6- foot wooden fences. The local marketplace consists of several small stands covered by tent-tops, where elderly women sell food and clothing.

A. Enemy Forces (Intelligence Reports)

Your platoon is operating in the town of Corbia. Corbia's local police force is virtually non-existent since order is only now being restored to this region. You know many of the civilians fairly well, and they are familiar with you. Most seem to appreciate your presence, although a few malcontents are not uncommon. You have a pretty decent understanding of who the more troublesome civilians are in this town, since you have been there for so long. Since the police force is not a presence to speak of, you have been assigned the additional duty of policing the town, quelling disturbances and dealing with domestic disputes. The civilians have access to few weapons. Occasionally you must confiscate a Molotov cocktail, a grenade, or an old semi-automatic rifle from a rabble-rouser, but so far no one in your platoon has been injured.

Lately, however, civilians have been telling you that a few of the more rebellious townspeople are plotting some form of uprising for the anniversary of the death of the rebel who started the uprising that the U.N. has helped to suppress. Given the language barrier and the way rumors have been spreading in this area, you are not sure how much stock to put in this latest one.

The weather is hot and humid, winds are variable, and the temperature is 80F.

B. Friendly Forces

1st Battalion, 5th Infantry performs security operations in Sector Zulu to prevent civilian unrest and maintain peace until Nubania reorganizes its police force.

II. Mission

Bravo Company secures Corbia, Tranganu, and Finki in order to prevent civilian unrest and maintain peace until Nubania reorganizes its police force.

III. Execution

A. Commander's Intent

I want each village tightly controlled to prevent civilian casualties. Ensure all weapons are promptly confiscated and destroyed per SOP. Keep good intelligence on troublemakers, but attempt to prevent provocation. Evacuate any casualties promptly to the Battalion Aid Station. Keep a special eye out for demonstrations and protests or any acts of violence by the locals.

B. Concept of the Operation

1st platoon secures Tranganu in order to prevent civilian unrest and maintain peace until Nubania reorganizes its police force. 2nd platoon secures Corbia in order to prevent civilian unrest and maintain peace until Nubania reorganizes its police force. 3rd platoon secures Finki in order to prevent civilian unrest and maintain peace until Nubania reorganizes its police force. No fire support is available.

IV. Rules of Engagement

Nothing in these ROE limits your right to take appropriate action to defend yourself and your unit.

    a.   You have the right to use force to defend yourself against attacks or threats of attack.

    b.   Hostile fire may be returned effectively and promptly only to promote the safety of peacekeeping forces.

    c.   U.S. forces should use the minimum force necessary under the circumstances and proportional to the threat.

    d.   You may seize property of others to accomplish your mission.

e. Detention of civilians is authorized for security reasons or self-defense.

f. Placing fire on religious or cultural centers or towards schools or hospitals is forbidden.

V. Assets and Equipment

Your platoon is equipped with the following:

20 M16 rifles with 210 rounds for each rifleman.

6 M203 grenade launchers with 24 40-mm rounds for each grenadier.

6 M249 squad automatic weapons (SAWs) with 600 rounds for each automatic rifleman.

2 M240B machine guns with 1200 rounds for each machine gun team.

Night vision equipment for each platoon member.

MBITR (multiband inter/intra-team radio) for each squad leader and the platoon leader.

2 hand grenades for all other platoon members, including flash-bangs.

VI. Scenario

Your platoon is conducting an on-foot patrol of Corbia on the eve of El Dia Del Guapo, the anniversary of the death of the instigator of the uprising. You are walking north on Sosa Avenue, and you notice an unnatural emptiness to the streets. Your platoon sergeant is up with 3rd squad, about 50 meters north of you and 2nd squad. 1st squad is to the rear. Your platoon sergeant radios in: "Sir, we've just spotted four civilians carrying crates from a truck into the warehouse on Corona and Sosa. Two more civilians are guarding them with AK-47s. It looks like whatever they're unloading, they're protecting it closely. From what I can see inside the warehouse, there are at least three more men in there. Some I recognize as town troublemakers. I don't recognize the others. And one other thing…there are roughly three children in there as well."

You call the company commander, who is with 3rd platoon in Finki, roughly 2 km away, and inform the commander of the situation. "We're seeing the same thing going on here," he informs you. "We've already confiscated a couple crates of grenades and '47s. It's getting hairy here. 3rd platoon had one casualty today. A couple civilians tell me that at sundown tonight, the plan is for all hell to break loose. Apparently these guys all plan on shooting anything or anyone they see. You need to clear that warehouse immediately and stop things before they start."

As you contemplate your next steps, 3rd squad leader radios in: "Another truck just pulled up to the warehouse on Corona from the east. There look to be crates in the back, but I couldn't

tell how many. I also saw a couple men in the back and they had weapons slung. They didn't see me." The time is 1900…thirty minutes until sundown.

VII. Requirement

Please develop written answers to the following questions:

What would you do in advance of this mission? For example, what would your leader recon consist of?

As you envision this mission unfolding, what will be the decision points?

What is your plan for accomplishing the mission?

As your plan plays out, what information will you obtain and how will you get it?
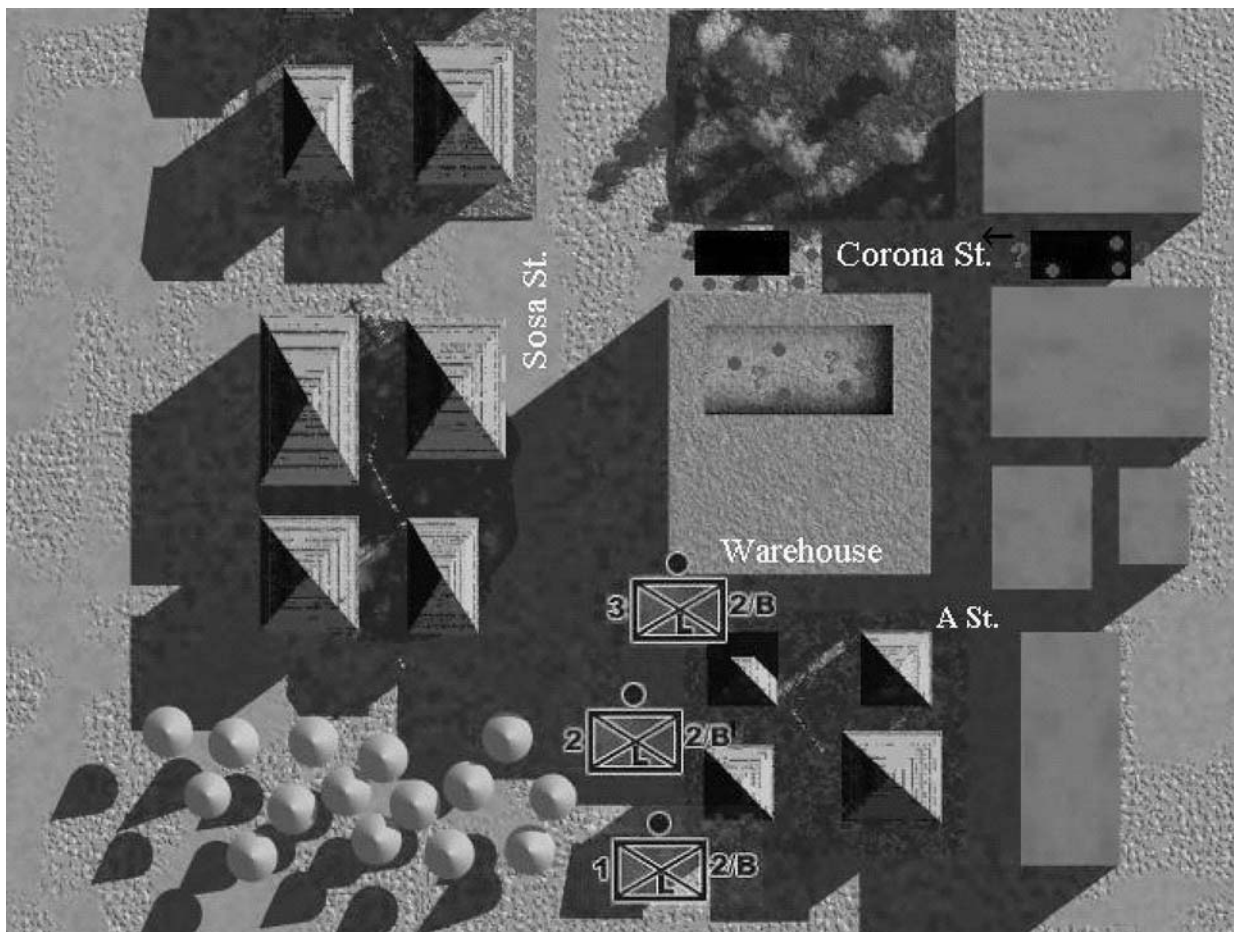
Title	Difficulty Level
El Dia Del Guapo	**Advanced—OFW**

You are the leader of 2nd Platoon, Bravo Company, 1st Combined Arms (CA) Battalion, 5th Infantry, 2nd Unit of Action (UA) Brigade, 52nd Unit of Employment (UE) Division.

I. Situation

Task Force Hardnose, 1st CA Battalion, 5th Infantry, 2nd UA Brigade, 52nd UE Division has been deployed as part of a U.N. humanitarian effort to provide relief to the war-ravaged country of Nubania. Nubania has several towns of impoverished, hungry civilians, many of who have been left homeless by the war that has recently ended. The task force's broad mission is as it has been for the three months that they have been deployed in Nubania: To maintain order and discipline and to provide a security presence.

All villages in the area are in the same condition generally. The towns are in a state of impoverished decay. Homes are simple. They are all basically constructed of plywood and are one story. The structure is the same for the dwellings: four small rooms, each room often packed full of residents. Most street blocks have four homes—two per side, backing two others. Separating the back yards of the houses are rickety 6-foot wooden fences. The local marketplace consists of several small stands covered by tent-tops, where elderly women sell food and clothing.

A. *Enemy Forces (Intelligence Reports)*

Your platoon is operating in the town of Corbia. Corbia's local police force is virtually non-existent since order is only now being restored to this region. You know many of the civilians fairly well, and they are familiar with you. Most seem to appreciate your presence, although a few malcontents are not uncommon. You have a pretty decent understanding of who the more troublesome civilians are in this town, since you have been there for so long. Since the police force is not a presence to speak of, you have been assigned the additional duty of policing the town, quelling disturbances and dealing with domestic disputes. The civilians have access to few weapons. Occasionally you must confiscate a Molotov cocktail, a grenade, or an old semi-automatic rifle from a rabble-rouser, but so far no one in your platoon has been injured.

Lately, however, civilians have been telling you that a few of the more rebellious townspeople are plotting some form of uprising for the anniversary of the death of the rebel who started the uprising that the U.N. has helped to suppress. Given the language barrier and the way rumors have been spreading in this area, you are not sure how much stock to put in this latest one.

The weather is hot and humid, winds are variable, and the temperature is 80F.

B. Friendly Forces

1st CA Battalion, 5th Infantry, 2nd UA Brigade, 52nd UE Division performs security operations in Sector Zulu to prevent civilian unrest and maintain peace until Nubania reorganizes its police force.

II. Mission

Bravo Company, 1st CA Battalion, 5th Infantry secures Corbia, Tranganu, and Finki in order to prevent civilian unrest and maintain peace until Nubania reorganizes its police force.

III. Execution

A. Commander's Intent

I want each village tightly controlled to prevent civilian casualties. Ensure all weapons are promptly confiscated and destroyed per SOP. Keep good intelligence on troublemakers, but attempt to prevent provocation. Evacuate any casualties promptly to the Battalion Aid Station. Keep a special eye out for demonstrations and protests or any acts of violence by the locals.

B. Concept of the Operation

1st platoon secures Tranganu in order to prevent civilian unrest and maintain peace until Nubania reorganizes its police force. 2nd platoon secures Corbia in order to prevent civilian unrest and maintain peace until Nubania reorganizes its police force. 3rd platoon secures Finki in order to prevent civilian unrest and maintain peace until Nubania reorganizes its police force. No fire support is available.

IV. Rules of Engagement

Nothing in these ROE limits your right to take appropriate action to defend yourself and your unit.

You have the right to use force to defend yourself against attacks or threats of attack.

Hostile fire may be returned effectively and promptly only to promote the safety of peacekeeping forces.

U.S. forces should use the minimum force necessary under the circumstances and proportional to the threat.

You may seize property of others to accomplish your mission.

Detention of civilians is authorized for security reasons or self-defense.

Placing fire on religious or cultural centers or towards schools or hospitals is forbidden.

V. Execution

Your platoon is equipped with the following:

12 XM29 Rifles with bursting technology with the standard complement of rounds for each platoon member.

6 M203 Grenade Launchers with 24 40-mm rounds per weapon.

6 M249 Squad Automatic Rifles (SAWs) with 600 rounds per weapon.

10 M4 Carbines with 210 rounds per weapon.

2 M240B Machine Guns with 12,000 rounds per weapon

A Daylight Video Sight with the capability to capture images like a digital camera for each weapon system.

Wearable computers for all members of the platoon.

Visual display of battlefield.
GPS locator; locations of all or a subset of the platoon members is available on the digital display.
Email-like ability to send and receive text and imagery with higher, adjacent, and own units.

Sensor fusion (Soldier, UAV, UGV, thermal, and night-vision) images are available to be fused into a single view.

Non-lethals for each platoon member, including: rubber bullets; 40-mm ceramic powder bags that will knock a person unconscious; glue-like substances to immobilize; gas; chemical agents that cause victims to cough and gag.

MBITR (multiband inter/intra-team radio) for all platoon members.

An integral suit for each platoon member. This is a one-piece, exoskeletal, full-spectrum protection suit. Incorporates body armor, climate control, fully integrated physiological monitor, onboard power generation, and nuclear/chemical/biological protectant.

You have access to two UAVs and your organic four small UGVs.

4 grenades for all platoon members, including flash-bangs.

Multifunction Lasers (MFLs) with the capability to determine range by laser range finder, bullet strike by aiming point, and target identification by infrared illumination.

VI. Scenario

The time is 1855. Your platoon is conducting an on-foot patrol of Corbia on the eve of El Dia Del Guapo, the anniversary of the death of the instigator of the uprising. You are walking north on Sosa Avenue, and you notice an unnatural emptiness to the streets. Your platoon sergeant is up with 3rd squad, about 50 meters north of you and 2nd squad. 1st squad is to the rear. Your platoon sergeant radios in: "Sir, we've just spotted four civilians carrying crates from a truck into the warehouse on Corona and Sosa. Two more civilians are guarding them with AK-47s. It looks like whatever they're unloading, they're protecting it closely. From what I can see inside the warehouse, there are at least three more men in there. Some I recognize as town troublemakers. I don't recognize the others. And one other thing…there are roughly three children in there as well."

You check your email traffic to see whether there are any indications of other similar activities. You see a message from 3rd platoon in Finki, which is roughly 2 km away. It reads, "At 1800 we confiscated two crates of grenades and 12 AK-47's. One casualty was taken," A message from 1st platoon reads, "Civilians inform us that 'something major' is planned for sundown tonight. We are seeing strange behavior but we have not found any weapons." You do not see any recent messages from your company commander.

As you contemplate your next steps, you receive a transmission from 3rd squad leader. It is a picture of a pickup truck approaching the warehouse on Corona St. from the east. It is packed full of crates. Three men are riding in the front and two are in the bed of the pickup. The two in the back both have weapons slung at their sides. It is clear they don't see your 3rd squad leader. The time is 1900…thirty minutes until sundown.

VII. Requirement

Please develop written answers to the following questions:

What would you do in advance of this mission? For example, what would your leader recon consist of?

As you envision this mission unfolding, what will be the decision points?

What is your plan for accomplishing the mission?

As your plan plays out, what information will you obtain and how will you get it?