

Technical Report 1291

Training Tactical-Level Planning Skills: An Investigation of Problem-Centered and Direct Instruction Approaches

Jennifer S. Tucker
U.S. Army Research Institute

Robert P. Semmens
Imprimis, Inc.

Jason Sidman and Alexandra Geyer
Aptima, Inc.

E. Daly Vaughn
Auburn University
Consortium Research Fellows Program

June 2011



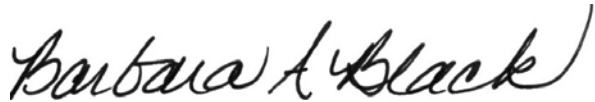
**United States Army Research Institute
for the Behavioral and Social Sciences**

Approved for public release; distribution is unlimited.

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

**Department of the Army
Deputy Chief of Staff, G1**

Authorized and approved for distribution:



**BARBARA A. BLACK, Ph.D.
Research Program Manager
Training and Leader Development
Division**



**MICHELLE SAMS, Ph.D.
Director**

Research accomplished under contract
for the Department of the Army

Imprimis, Inc.
Technical review by

Scott A. Beal, U.S. Army Research Institute
Gregory Goodwin, U.S. Army Research Institute

NOTICES

DISTRIBUTION: Primary distribution of this Technical Report has been made by ARI. Please address correspondence concerning distribution of reports to: U.S. Army Research Institute for the Behavioral and Social Sciences, Attn: DAPE-ARI-ZXM, 2511 Jefferson Davis Highway, Arlington, Virginia 22202-3926.

FINAL DISPOSITION: This Technical Report may be destroyed when it is no longer needed. Please do not return it to the U.S. Army Research Institute for the Behavioral and Social Sciences.

NOTE: The findings in this Technical Report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

REPORT DOCUMENTATION PAGE

1. REPORT DATE (dd-mm-yy) June 2011		2. REPORT TYPE Final		3. DATES COVERED (from. . . to) February 2009 – August 2010	
4. TITLE AND SUBTITLE Training Tactical-Level Planning Skills: An Investigation of Problem-Centered and Direct Instruction Approaches				5a. CONTRACT OR GRANT NUMBER W74V8H-04-D-0047, DO 0014	
				5b. PROGRAM ELEMENT NUMBER 633007	
6. AUTHOR(S) Jennifer S. Tucker (U.S. Army Research Institute), Robert P. Semmens (Imprimis, Inc.), Jason Sidman & Alexandra Geyer (Aptima, Inc.), E. Daly Vaughn (Auburn University, Consortium Research Fellows Program)				5c. PROJECT NUMBER A792	
				5d. TASK NUMBER 360	
				5e. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) US Army Research Institute for the Behavioral and Social Sciences ARI-Ft Benning Research Unit P. O. Box 52086 Fort Benning, GA 31905				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U. S. Army Research Institute for the Behavioral & Social Sciences ATTN: DAPE-ARI-IJ 2511 Jefferson Davis Highway Arlington, VA 22202-3926				10. MONITOR ACRONYM ARI	
				11. MONITOR REPORT NUMBER Technical Report 1291	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.					
13. SUPPLEMENTARY NOTES Contracting Officer's Representative and Subject Matter POC: Dr. Jennifer S. Tucker					
14. ABSTRACT (<i>Maximum 200 words</i>): The purpose of the present research was to inform training developers of the instructional approaches that are most effective in achieving cognitive skill proficiency for problem-based, decision-making/analyzing tasks. Prototype training modules were developed and used in experiments to determine the effects of three different instructional approaches [inquiry-based learning (IBL), direct instruction (DI), and the Invention Framework (IF)] on student outcomes. However, due to the small sample sizes across the three experiments, the results of this research should be considered a pilot effort. Therefore, the contribution of the research is best reflected in the reporting of the instructional design and methodology of each approach as well as an indication of the advantages and disadvantages of using these approaches for US Army training. Further research is needed to determine the validity of the approaches for training a range of tasks under various training and transfer conditions. Future research should draw from the training presented here and develop additional exemplars of each approach that can be further demonstrated and evaluated. The software for the IF approach and full slide packets for the DI and IBL approaches are freely available by contacting the first author of this report at the above address.					
15. SUBJECT TERMS problem-centered learning, inquiry based learning, invention framework, direct instruction, training, tactical-level planning, cognitive skill, junior officers					
SECURITY CLASSIFICATION OF			19. LIMITATION OF ABSTRACT Unlimited	20. NUMBER OF PAGES 142	21. RESPONSIBLE PERSON Ellen Kinzer Technical Publications Specialist 703-545-4225
16. REPORT Unclassified	17. ABSTRACT Unclassified	18. THIS PAGE Unclassified			

Technical Report 1291

**Training Tactical-Level Planning Skills: An Investigation of
Problem-Centered and Direct Instruction Approaches**

Jennifer S. Tucker
U.S. Army Research Institute

Robert P. Semmens
Imprimis, Inc.

Jason Sidman and Alexandra Geyer
Aptima, Inc.

E. Daly Vaughn
Auburn University
Consortium Research Fellows Program

ARI – Fort Benning Research Unit
Scott E. Graham, Chief

U.S. Army Research Institute for the Behavioral and Social Sciences
2511 Jefferson Davis Highway, Arlington, Virginia 22202-3926

June 2011

Army Project Number
63300785A792

Personnel Performance
and Training

Approved for public release; distribution is unlimited.

ACKNOWLEDGEMENT

This research would not have been possible without the involvement of Dr. Thomas Duffy and Dr. Daniel Schwartz who provided insightful comments regarding the inquiry-based learning approach and Invention Framework, respectively, and precious time throughout the project which was invaluable to the instructional design of the approaches and execution of the experiments.

The authors are indebted to 1SG M. J. Lamkins, 2ND Battalion, 11TH Infantry Regiment, HHC 1SG, Fort Benning, GA for his assistance in arranging for the Lieutenants to participate in the three experiments. Our data collection effort would not have been possible without 1SG Lamkins' assistance. Special thanks also go to MSG J. F. Hunter, 2ND Battalion, 11TH Infantry Regiment, S-3 NCOIC, for his support of the experiments. We would not have been able to conduct the experiments without the classrooms, and we appreciate that MSG Hunter took time out of his schedule to coordinate the classrooms for the data collections.

The authors also are grateful for the Lieutenants who graciously gave their time and participated in this project.

The authors also acknowledge the substantial effort of many individuals involved in the execution of the research project. The expertise provided by the SME raters from the Wexford Group International, Mr. Mike Lerario and Mr. Tom Flanagan, was critical in assessing the Lieutenants' performance for the three approaches. Also of special note are Aptima, Inc. personnel who provided a high quality training product for the Invention Framework.

TRAINING TACTICAL-LEVEL PLANNING SKILLS: INVESTIGATING PROBLEM-CENTERED AND DIRECT INSTRUCTION APPROACHES

EXECUTIVE SUMMARY

Research Requirement:

As little empirical research has directly compared different instructional approaches for training cognitive skills, there is a need to better understand the suitability of different approaches for training cognitive skills and the effectiveness of different approaches in terms of student outcomes. Thus, the purpose of the present research was to inform training developers of the instructional approaches that are most effective in achieving cognitive skill proficiency for problem-based, decision-making/analyzing tasks. Prototype training modules were developed and used in experiments to determine the effects of three different instructional approaches on student outcomes.

The present research chose three approaches representing distinct pedagogies and developed the instructional design and training materials for each approach. The different instructional approaches included in the research are: *inquiry-based learning (IBL)*, *direct instruction (DI)*, and the *Invention Framework (IF)*. The DI approach is developed as a part-to-whole instructional strategy such that each step of a procedure or each part of a task is taught in a sequential fashion. That is, the instructor typically provides information for and demonstrates a part of the task and students are provided with opportunities to practice that part. The premise of the IBL approach is that students learn the entire task in the context of one problem. They are presented with a problem prior to receiving any instruction, and all learning resources are available within the problem context. The IF approach as adapted for the present research purports two mechanisms that drive the acquisition of knowledge and transfer of that knowledge to novel situations. First, students develop a structure of the problem, and learning activities are developed so that this representation more closely resembles that of an expert over time. Second, students are presented scenarios with contrasting cases or variations to a common context or setting that differ along a key theme (e.g., a learning objective).

Procedure:

As one key objective of initial entry training for US Army Infantry officers is to develop junior officers' tactical-level planning skills, the present research designed instructional content to develop a selected subset of these skills. In particular, as officers learn the specific knowledge and skills needed to perform troop leading procedures (TLP), the present research focused on a subset of TLP in the design of the instructional and assessment materials.

The research design consisted of a sequence of several steps. First, to determine the specific mission planning elements in which to focus the research as well as to determine specific decision-making processes related to each element, interviews with subject matter experts (SMEs) were conducted. Second, the results from these interviews were used to shape the training content for each instructional approach. It is important to note that although each approach focused on the same mission planning elements, the instructional design and execution of the content varied by approach. Third and concurrent with step two, an assessment was developed and used to compare student performance across all three approaches. Fourth, three different experiments were conducted to evaluate student reactions and performance for each approach. Each instructional approach was allocated one day to

train certain aspects of tactical-level planning and one day to assess the students' performance. Students in the experiments were new Lieutenants who were either graduates of the Infantry Basic Officer Leadership Course (IBOLC) or were waiting to attend the next IBOLC class.

Findings:

It is important to note that due to the small sample sizes across the three experiments, the results of the present research should be considered a pilot effort. Therefore, the contribution of the present research is best reflected in the reporting of the advantages and disadvantages of using these approaches for Army training.

DI. An outcome of the DI approach was that performance scores were the highest for this approach. This was true for both the initial assessment and for the within-person performance gains from the first to the second assessment. An advantage of the DI approach was that if instructors are constrained by time and can only cover certain elements of tactical-level planning, then this yielded adequate performance results. This may have been due to the nature of the DI approach such that the instructor provided examples of adaptive thinking strategies which helped the students perform in the short-term. It is possible that if a longer post-test timeframe was implemented (e.g., six months) higher performance gains may be realized for the problem-centered approaches. Interesting follow-on research would be to determine whether the students in the DI approach can generate their own adaptive thinking strategies (i.e., transfer).

Although the DI approach required the least amount of resources (time, funds, and personnel) in comparison with the problem-centered approaches, it likely required more resources than typical Army classroom instruction due to the inclusion of many more exercises in the training. Finally, a disadvantage of the DI approach was that it was the least engaging of the three approaches due in part to much more time being allocated to PowerPoint presentations during the instruction.

IBL. There were two main outcomes of the IBL approach. First, large gains in performance were obtained (17% to 33% gains from the first to the second assessment). Moreover, this approach had the fewest performance decrements. Second, the students gave higher ratings to this approach regarding the outcomes-based training and education (OBTE) or self-efficacy constructs – accountability, initiative, and confidence. Thus, an advantage of the IBL approach was that the students gradually learned how to shape their mental models in response to changes in the situation. This increased confidence in their abilities may have led to the higher OBTE ratings. A disadvantage of the IBL approach is that it can be resource intensive. As students in an IBL course are exposed to a fewer number of scenarios compared to the other two approaches, additional time and access to SMEs is needed to develop complex problems that encompass many different teaching points.

IF. An outcome of the IF approach is that it received the highest self-report training effectiveness ratings. These results could be partly due to the fact that the instructional design for this approach was implemented within a blended learning framework utilizing specially-designed software. It is clear that the students were more engaged with the tasks as presented by the software which may have led them to rate the “instructor” higher. The students also rated the blended learning framework higher on adequately covering the course topics and as a useful way to present the course material. A disadvantage of the approach is that additional training time may be needed to expose students to the contrasting cases presented in the instruction and thus improve the acquisition of skills. The two-day timeframe may have masked

the true effectiveness of this approach in acquiring and retaining tactical-level planning skills. Additional time also may be required to assess the transfer of skills to novel situations; distributive rather than massed practice may result in increased performance over time.

Utilization and Dissemination of Findings:

As the findings from the present research are best thought of as a pilot effort, future research should draw from the findings presented here and develop additional exemplars of each approach that can be further demonstrated and evaluated. It is important to note that the software for the IF approach is freely available to training developers, instructors and researchers by contacting the first author of this report and that most of the materials for the DI and IBL approaches can be found in the appendices (full slide packets also can be requested from the first author of this report). As limited empirical research has investigated the training effectiveness of these different instructional approaches, especially for applied tasks, fruitful areas of research would be to determine the validity of the approaches for training a range of tasks under various training and transfer conditions. As the findings of the present research suggested benefits of all three approaches depending on the particular method of assessment, additional research is needed to assist training developers and instructors in selecting the most appropriate instructional approaches for their courses.

TRAINING TACTICAL-LEVEL PLANNING SKILLS: INVESTIGATING PROBLEM-CENTERED AND DIRECT INSTRUCTION APPROACHES

CONTENTS

	Page
INTRODUCTION	1
Instructional Approaches.....	1
Direct instruction (DI)	1
Inquiry-based learning (IBL)	1
IF	2
Training Content.....	2
Research Design Overview.....	3
KNOWLEDGE ELICITATION INTERVIEWS	4
Method	4
Students	4
Measures and procedure	4
Results	5
Discussion	7
INSTRUCTIONAL APPROACHES: DESIGN AND PILOT RESEARCH	9
Method	9
Students	9
Measures	9
Procedure / Instructional Design	11
Results	17
T-BARS	17
Post-Training Evaluation Questionnaire	20
NASA-TLX Questionnaire	24
Discussion.....	25
Advantages of the instructional approaches	26
Disadvantages of the instructional approach	27
Future research.....	27
REFERENCES	29
APPENDIX A: KNOWLEDGE ELICITATION SCENARIOS & QUESTIONS	A-1
APPENDIX B: THE NASA-TLX QUESTIONNAIRE	B-1
APPENDIX C: TACTICAL THINKING BEHAVIORALLY ANCHORED RATING SCALES (T-BARS)	C-1
APPENDIX D: POST TRAINING EVALUATION QUESTIONNAIRE.....	D-1
APPENDIX E: DIRECT INSTRUCTION APPROACH.....	E-1
APPENDIX F: TRAINING MATERIALS FOR IBL APPROACH: OPERATIONS ORDER.....	F-1

CONTENTS

	Page
APPENDIX G: TRAINING MATERIALS FOR IBL APPROACH: PLATOON BACKBRIEF	G-1
APPENDIX H: TRAINING MATERIALS FOR IF: FRIENDLY CAPABILITIES	H-1
APPENDIX I: TRAINING MATERIALS FOR IF: TERRAIN AREA OF OPERATIONS BRIEF	I-1
APPENDIX J: TRAINING MATERIALS FOR IF: TERRAIN WARNO	J-1
APPENDIX K: ASSESSMENT COMPANY OPERATIONS ORDER	K-1
APPENDIX L: ASSESSMENT FRAGO 1	L-1
APPENDIX M: ASSESSMENT FRAGO 2	M-1
APPENDIX N: PERFORMANCE RATINGS ON THE T-BARS THEMES	N-1
APPENDIX O: ACRONYM LIST	O-1

LIST OF TABLES

TABLE 1. DEMOGRAPHIC CHARACTERISTICS OF SMEs	4
TABLE 2. STUDENT DEMOGRAPHICS	9
TABLE 3. PERFORMANCE RATINGS BY INSTRUCTIONAL APPROACH	19
TABLE 4. COMPOSITE PERFORMANCE RATINGS BY INSTRUCTIONAL APPROACH	19
TABLE 5. POST-TRAINING QUESTIONNAIRE RATINGS BY INSTRUCTIONAL APPROACH	21
TABLE 6. POST-TRAINING RATINGS OF ACCOUNTABILITY, INITIATIVE, AND CONFIDENCE BY INSTRUCTIONAL APPROACH	22
TABLE 7. SUMMARY OF RESPONSES TO OPEN-ENDED QUESTIONS	23
TABLE 8. MEANS (SD) OF WORKLOAD RATINGS AFTER FRAGO 1	24

Training Tactical-Level Planning Skills: Investigating Problem-Centered and Direct Instruction Approaches

Introduction

As little empirical research has directly compared different instructional approaches for training cognitive skills (for notable exceptions see Dyer et al., 2001, 2005; Klahr & Nigam, 2004; Strand-Cary & Klahr, 2008), there is a need to better understand the suitability of different approaches for training cognitive skills and the effectiveness of different approaches in terms of student outcomes. Thus, the purpose of the present research was to inform training developers of the instructional approaches that are most effective in achieving cognitive skill proficiency for problem-based, decision-making/analyzing tasks. Prototype training modules were developed and used in experiments to determine the effects of three different instructional approaches on student outcomes.

The present research chose three approaches representing distinct pedagogies and developed the instructional design and training materials for each approach. The different instructional approaches included in the research are: *inquiry-based learning (IBL)*, *direct instruction (DI)*, and the *Invention Framework (IF)*. To compare the approaches in regard to student outcomes, one performance assessment was developed and used across all three approaches.

Instructional Approaches

Direct instruction (DI). The direct instruction approach is developed as a part-to-whole instructional strategy such that each step of a procedure or each part of a task is taught in a sequential fashion. That is, the instructor typically provides information for and demonstrates a part of the task and students are provided with opportunities to practice that part. The information presented and demonstrated should be based on real-world examples. The instructor then demonstrates the next part of the task and explains/shows how the new part is related to the part previously learned. Thus, the instruction is divided into chunks based on logical aspects of the entire task, and mini cycles of demonstration-practice-feedback are designed for each chunk (cf., US Department of the Army, 2009). After all of the steps or parts of the task are covered by the instructor, the students receive a culminating practice exercise in which they are given the opportunity to practice the task in its entirety. It is important to note that all information and resources relevant to each part of the task are provided by the instructor during the demonstration of the task.

Inquiry-based learning (IBL). The premise of the IBL approach is that students learn the entire task in the context of one problem. They are presented with a problem prior to receiving any instruction, and all learning resources are available within the problem context. As such, the learning approach follows a whole-to-part approach in which the entire task is presented to the students at the beginning of the instruction. Students receive information and demonstrations from the instructor only after they have had the opportunity to explore the problem context and work on solving the problem and/or completing the required tasks. It is important to note that the instructor's role is that of a coach or facilitator in asking questions that guide the students to think more deeply or broadly about the problem and/or their solutions (cf., US Department of the Army, 2009). Ideally, the students are provided with several other practice problems and feedback on their performance. All of the problems are intended to be as realistic as possible in terms of the types of situations students are responding to and the types of tasks the students are required to perform.

Invention Framework (IF). The IF as adapted for the present research purports two mechanisms that drive the acquisition of knowledge and transfer of that knowledge to novel situations (Schwartz, 2009). First, students need to develop a structure of the problem, and learning activities are developed so that this representation more closely resembles that of an expert over time. Similar to the IBL approach, students are provided with information regarding the tasks and other resources after they have been presented with a problem. Second, and in conjunction with the first, scenarios are carefully designed to guide the students' exploration of the problem. Specifically, students are presented with contrasting cases, or variations along a common scenario that differ along a key theme (e.g., a learning objective). The attention students place on discovering the deep structures of the problem rather than the surface features should help them succeed in novel situations. Therefore, unlike IBL, the instruction is divided into mini cycles of problem-contrasts-information so that the students work on several different problems over the same time period.

In summary, the instructional approaches were chosen for the present research because they offer different methods for training cognitive skills. IF can be thought of as a form of IBL in that both of these approaches are constructivist methods. That is, student inquiry guides instruction as students engage in self-directed learning, establish their own learning goals, and develop unique strategies for solving complex problems. IF differs from IBL in that students work on several smaller scenarios in which certain features are contrasted across the scenarios (in IBL students work within the context of one large scenario). Both IF and IBL offer instructor guidance typically after students have analyzed the problem and offered a preliminary solution. On the other hand, in the DI approach, instructor guidance and task demonstration is provided at the onset of the exercise and at pre-determined points in the sequence of instruction. Finally, the DI and IF approaches are similar in that these approaches provide more structured exercises and standardized content compared to the IBL approach in which students are encouraged to seek relevant information and resources beyond what is provided in the exercise.

Training Content

As one key objective of initial entry training for US Army Infantry officers is to develop junior officers' planning skills, the present research designed instructional content to develop a selected subset of these skills. In particular, as officers learn the specific knowledge and skills needed to perform troop leading procedures (TLP), the present research focused on a subset of TLP in the design of the instructional and assessment materials. Specifically, the TLP consists of eight steps: 1) receive mission, 2) issue warning order, 3) make a tentative plan, 4) initiate movement, 5) reconnoiter, 6) complete plan, 7) issue operations order (OPORD), and 8) supervise.

The present research focused on step 3, which includes conducting mission analysis and developing a tentative course of action based on that analysis. Specifically, a leader conducts mission analyses to

help him start developing his vision, and to confirm what he must do to accomplish his mission. At the lower levels, leaders conduct their mission analyses by evaluating the factors of METT-TC [Mission, Enemy, Terrain & weather, Troops & support, Time, Civil considerations]. They make significant deductions about the terrain, enemy, and own forces that affect tactical operations. These significant deductions drive the planning process and the execution of operations. (US Department of the Army, 2006, p. 2-10)

As the scope of the present research could not include all of the METT-TC elements, the focus was on the factors considered the most critical when developing an initial plan and changing the plan based on new information (see below).

Research Design Overview

The research design consisted of a sequence of several steps.

- Determining the training focus. First, to determine the specific METT-TC elements in which to focus the research as well as to determine specific decision-making processes related to each element, interviews with subject matter experts (SMEs) were conducted. Although the knowledge elicitation phase of the instructional design is likely to differ across all three instructional approaches, only one set of interviews were conducted for the present research due to resource constraints.
- Developing the instructional materials. Second, the results from the interviews were used to shape the instructional materials for each instructional approach. It is important to note that although each approach focused on the same METT-TC elements, the instructional design and execution of the content varied by approach. That is, the subsequent section and appendices of the report describe the design of each approach and explain how the instructional materials differed across each approach (when possible the same training scenarios were employed across the approaches).
- Developing the assessment measures. Third and concurrent with step two, an assessment was developed to measure student performance following the instruction of each approach. *To compare the approaches in regards to student outcomes, one performance assessment was developed and used across all three approaches.*
- Evaluating the approaches. Fourth, three different experiments were conducted to evaluate student reactions and performance for each approach. The next section of the report describes the method, results, and conclusions for the SME interviews. Subsequent sections report the instructional design for each approach and the results from the experiments.

Knowledge Elicitation Interviews

Method

Students. Interviews were conducted with six platoon trainer/mentors (TMs) from the Joint Readiness Training Center (JRTC), Fort Polk, LA; three officers from the Ranger Training Brigade (RTB); and two small group instructors from the Infantry Basic Officer Leadership Course (IBOLC). Table 1 shows key demographic characteristics for each group.

Table 1
Demographic Characteristics of SMEs

Students (Frequency)	Rank	Branch/Military Occupational Specialty (MOS)	Average Years in Service	Average OIF Deployments	Current Position
JRTC (6)	SFC (6)	11B: Infantry (5) 19D: Cavalry Scout (1)	12.83	1.83	TM (6) Average number of unit rotations observed = 20
RTB (3)	CPT (3)	Infantry (2) Quartermaster (1)	4.3	1	BDE AS3 BDE S1 BDE S4
IBOLC (2)	CPT (2)	Infantry (2)	5	1	IBOLC instructor (2) Number of classes taught = 3 ^a

Note. ^aBased on data from only one IBOLC instructor.

Three additional interviews were conducted with new Army officers; two pre-IBOLC Lieutenants and one post-IBOLC Lieutenant. As these were new Army officers, demographic data were not collected. These interviews were conducted to determine a baseline level of knowledge and skill regarding Army planning processes and were integral to the IBL and IF approaches.

Measures and procedure. A scenario-based knowledge elicitation technique was used to conduct these interviews (Sidman & Garrity, 2007). In using this technique, data regarding the elements of METT-TC were collected in the context of responses to a scenario. For the present research, three different scenarios were developed to examine the SME responses to changes in METT-TC features. However, SMEs typically only responded to two of the scenarios (see Appendix A).

The first scenario required the SMEs to plan an offensive mission with relatively open terrain and a small enemy force in the context of a larger battalion attack. The second scenario required the SMEs to plan for the defense of a marketplace in an urban environment with a less-defined insurgent enemy force. The third scenario was a less traditional operation that asked the SMEs to secure a drop zone against a conventional enemy during a supply recovery operation while considering the impact of both mountainous and open terrain.

For each scenario, the SMEs were first presented with the task organization of their platoon and then presented with the fragmentary order (FRAGO) for that scenario. The SMEs were given additional information regarding the terrain in the form of aerial and first-person pictures, and they could ask questions of the interview team in terms of available assets, etc. There were many advantages of this approach including the use of a standardized method for collecting information regarding METT-TC as well as the ability to use some of the interview materials in the instructional design of the training approaches. This method allowed for abstract concepts regarding mission analysis, such as areas of observation and fields of fire, to be put in specific terms, such as where a support by fire position would be placed, and allowed the expert to indicate why he would make this decision.

As noted in Appendix A, some questions were structured across the interviews (e.g., *What impact will terrain have on how you accomplish this mission?*); however, some questions also were asked for clarification depending on the information provided by the SME. That is, if not discussed by the SME as they described their plan, key probing questions reflected the contingencies thought about as they planned, whether they thought their plan was flexible and could be easily adapted if the situation on the ground changed, whether they considered enemy actions as they planned, and whether they wanted additional information that was not provided in the FRAGO. The SMEs were allowed to take as much time as needed to describe their initial plan and actions on contact.

It is important to note that the interviews followed a two-part structure. First, the SMEs were asked some demographic questions (see Table 1), then they were presented with the scenarios and asked questions regarding each scenario that drew from their experiences as experts in the area of Army planning. Following each scenario, the SMEs were asked to think of the scenario as an instructor (their current position) and were asked questions regarding the types of challenges that new Lieutenants might have if planning for that particular mission (see Appendix A).

Results. Perhaps the most striking finding from the interviews was that neither the SMEs nor new Army leaders organized their responses explicitly according to the METT-TC framework, despite knowing that the purpose of the research was to learn about how they approach terrain analysis. It was expected that new Army leaders in particular would leverage a familiar framework such as METT-TC, especially to help them respond to challenging scenarios. One could imagine that when the tactical solution is not obvious, new Army leaders would revert back to fundamentals; perhaps by creating a table or chart that outlined elements of METT-TC. However, none of the responses reflected this strategy. While the SMEs were likely implicitly analyzing elements of METT-TC, they also did not use it as a framework for structuring their responses. Instead, their responses indicated a focus on predicting contingencies and possible outcomes. Thus, a key finding from the interviews was that the formulation of mental models was a critical cognitive step in understanding how the elements of enemy, friendly, and terrain affect mission planning.

Consequently, the data were analyzed to determine how the SMEs integrated these elements into their decision-making processes. That is, the present research sought to elucidate the higher order principles (i.e., mental models) by which Army leaders analyzed the effects of the elements on the mission. We were interested in understanding the cognitive processes by which the commander relates the elements to each other so that, as the mission unfolds, he determines how a change in one element affects the others and responds appropriately (i.e., understanding the interactive effects of the elements on the mission).

Drawing from previous research, Lussier, Shadrack, and Prevou (2003) found that the macrocognitive skills underlying expert tactical decision making could be categorized according to eight themes (know and use all available assets, focus on the mission and higher's intent, model a thinking enemy, consider effects of terrain, consider timing, see the big picture, consider contingencies and remain flexible, and visualize the battlefield). These themes were then used to develop a scenario-based training program to foster leader tactical decision making. For the present research, it was expected that by applying these higher-order principles to the SME responses, we would be better able to integrate the METT-TC elements into both the instructional design for each approach and into more rigorous assessments of these cognitive processes.

Although many of the themes applied, content analyses of the data indicated that the cognitive skills of considering terrain, modeling a thinking enemy, and focusing on the mission and higher's intent were the most relevant for the present research. Moreover, the results indicated that it is the consideration of the interaction between these three cognitive skills that reflect the tactical decision making processes for Army planning. These skills can be thought of as indicators of a higher-order skill reflecting modeling a dynamic situation (defined in part as "avoiding the temptation to simplify the situation by treating the cause of the crisis as static or simply reactive," Shadrack, Shaefer, & Beaubien, 2007, p. B-2). Although earlier research on crisis action planning and execution posited modeling a dynamic situation as another theme on the same level of cognitive skill as the eight themes discussed above (Shadrack et al.), the present research posits this skill as a higher-order cognitive skill reflecting the interaction of three of the lower-order skills – considering terrain, enemy, and friendly factors. This is similar to the revised interpretation of the themes by Phillips, Shafer, Ross, Cox, and Shadrack (2006) who posited the first four themes as the basic building blocks of mental models needed to perform the higher cognitive functions inherent in the last four themes. For example, "an experienced tactician can estimate how long it will take to move a bridging asset from one point to another (Timing in the context of Assets) or predict what the enemy will attempt as the situation plays out (Visualization in the context of Enemy)" (Phillips et al., 2006, p. 14). The present research proposes that modeling a dynamic situation should be considered as a fifth higher-order mental operation that is conducted in the context of the first three skills represented in the SME responses (considering terrain, enemy, and friendly factors).

At the platoon level, modeling a dynamic situation is reflected in the way that leaders develop a scheme of maneuver (considering terrain and enemy and friendly forces) and conduct rehearsals. Platoon leaders model a dynamic situation as they plan platoon operations and develop a mental model of the mission and the consequences of their actions. The depth and complexity of the mental model is dependent on the amount of time available for planning and rehearsals, as well as on the platoon leader's experience with the type of mission and his familiarity with the enemy and the terrain in the area of operations. The platoon leader should do what he can to verify assumptions he has made about the enemy and terrain, yet also realize that the relationships between these factors will change over time. Several planning activities contribute to building and improving the model, including developing the initial scheme of maneuver into a full course of action, wargaming, and rehearsals. To fit within the scope of the present research, only changes in the leader's scheme of maneuver over time were the focus for the instruction and assessment.

An example of how one SME modeled a dynamic situation for scenario 1 included the consideration of the relationship of the support by fire element to the assault element, the enemy, and the terrain. This was evident in the information that the SME (as a platoon leader) relayed to his support by fire position. He discussed target reference points, engagement

criteria, surface danger zones, and coordination signals to prevent fratricide. With regard to the enemy, the SME considered enemy actions and reactions and indicated that the enemy would most likely offer some light resistance and then attempt to flee. The SME considered likely enemy evasion routes and planned the attack to either observe or prevent the enemy from using those routes. With respect to the terrain, the SME considered the implications of the chicken coop, canals, and the vegetation, such that for the support by fire the vegetation and chicken coop limited the field of view yet provided some concealment for the platoon. The canal provided possible concealment for the assault element. The SME indicated that these factors likely affected the coordination between the two friendly elements as well as when the enemy was likely to react to the presence of the platoon.

For the second scenario, one SME modeled a dynamic situation by considering the relationship between his platoon and the engineer assets. The SME considered the movement from the platoon's current location to the marketplace and considered the coordination of clearing the market place, then making it more defensible. He also considered the relationship with the locals who lived in the surrounding area, because he indicated that the success of the mission relied on them to provide intelligence about the enemy. With regard to the enemy, the SME indicated that intelligence must be gathered about the threat to answer such questions as, *Why is this market being targeted? What do the insurgents hope to gain by preventing the people from buying goods? What will be the enemy's reaction to a functioning marketplace? How else will they attempt to gain/maintain power in the area?* With regard to the terrain, the SME indicated that the imagery was limited, so he requested additional information regarding the surrounding buildings, specifically the building where the sniper attack had taken place.

Discussion. The analyses of the SME responses focused on determining the cognitive skills used in the process of modeling a dynamic situation as described above (i.e., understanding the interactive effects of the friendly, enemy, and terrain elements on the mission). The results were used to design the instruction and training materials for each approach as well as to develop the assessments of student performance following the training. The key learning activities of developing a course of action (COA) statement and sketch were identified that related to the METT-TC elements of friendly and enemy forces and terrain and were included in the design for all of the approaches.

A COA statement includes the mission for the platoon (specified and implied tasks, timeline), commander's intent (description of the endstate with respect to enemy, friendly, and terrain), and a narrative of what each subordinate element will do and why. A COA sketch is a graphical representation of the information provided in the statement with graphical control measures. The overall outcome of modeling a dynamic situation is a tactical plan that anticipates the most likely engagement and possible branches between an enemy and friendly force intended to produce a favorable tactical result.

One way to assess the tactical plans of junior officers (platoon leaders) and determine whether they have modeled a dynamic situation is to look at their initial plans developed with respect to the order received from the higher headquarters. The results from the SME interviews revealed that behavioral indicators reflecting a high level of performance regarding Army planning for platoon leaders include the following:

- The platoon leader read through all of the information in the company order and only included the information that is relevant to his platoon. There was not a lot of "cut and paste;" the platoon leader focused the effort of the platoon.

- The platoon leader described the enemy's most likely course of action and most dangerous course of action with respect to the effects on the platoon. In addition, it is reflected in contingencies or "be prepared" tasks for the platoon.
- The platoon leader created a plan for his platoon to support the company objective. He assigned goals to each squad so that they worked together to accomplish the platoon goal. The way he accomplished the platoon goal supported the company operation.
- The platoon leader organized his forces to accomplish the platoon goal. If one squad had a difficult part of the goal, he gave them part of another squad to help out.
- The platoon leader made realistic timelines for movement across terrain (i.e., reasonable speed to travel) given the effects of light (i.e., day vs. night) and weather (e.g., snow affecting visibility, rain making roads muddy).
- The platoon leader identified the information that he wanted from reconnaissance assets or higher headquarters to finalize his plan.
- The platoon leader identified contingencies and included them in his plan.
- The platoon leader understood how the terrain affected the employment of weapon systems, for both friendly and enemy forces. He included in his plan ways to maximize the effects of friendly weapons while minimizing the effects of enemy weapon systems.

In summary, the findings from the SME interviews indicate that training focused on modeling a dynamic situation (i.e., creating a robust mental model of the relationship between the enemy forces, friendly forces, and the terrain) develops critical Army planning skills. By creating effective mental models to guide decision-making processes during the planning phase of a mission, it is anticipated that platoon leaders will be more likely to recognize changes in the situation that have tactical consequences and adjust their plans and orders appropriately.

Instructional Approaches: Design and Pilot Research

Method

Students. Thirty-nine Lieutenants participated as the *students* in the present research (DI = 20; IBL = 8; IF = 11). As shown in Table 2, there were some differences between the three groups of students. For example, the students in the DI approach had not yet attended the IBOLC course; however, most (85%) had attended the Officer Candidate School (OCS). The students in the DI approach also had more prior enlisted experience than the other two groups. It is important to note that although the students in the DI approach had not yet attended IBOLC it is reasonable to expect that these students would have had a good background in Army planning and in the type of content covered in the experiments because TLP are taught in OCS.

Table 2
Student Demographics

Instructional Approach	Pre or Post IBOLC	Average Age ^a (in years)	Commissioning Source <i>n</i> (%)	Prior Enlisted <i>n</i> (%)	Deployed to OIF/OEF ^b <i>n</i> (%)
DI (<i>n</i> = 20)	Pre-IBOLC	27.7	ROTC ^b 2 (10.0%)	9 (45.0%) Average years of service = 9.8	6 (30.0%)
			USMA ^b 1 (5.0%)		
			OCS 17 (85.0%)		
IBL (<i>n</i> = 8)	Post-IBOLC	23.6	ROTC 2 (25.0%)	1 (12.5%) Average years of service = 6.5	0 (0.0%)
			USMA 4 (50.0%)		
			OCS 2 (25.0%)		
IF (<i>n</i> = 11)	Post-IBOLC	23.8	ROTC 7 (63.6%)	1 (9.1%) Average years of service = 7.7	1 (9.1%)
			USMA 0 (0.0%)		
			OCS 4 (36.4%)		

^aQuestionnaire responses for three students were missing for this item (one missing within each instructional approach).

^bROTC = Reserves Officers' Training Corps; USMA = United States Military Academy; OIF = Operation Iraqi Freedom; OEF = Operation Enduring Freedom.

Measures. The following measures were used for all three training groups.

Pre-post experimental scenarios. Two of the scenarios and questions used in the knowledge elicitation interviews were used as pre- and post-experimental measures (the first two scenarios in Appendix A). The purpose of collecting these data was to establish a baseline measure of the students' tactical-level planning skills, especially given the demographic differences of the three groups.

NASA-TLX Questionnaire. The NASA-TLX Questionnaire (Hart & Staveland, 1988) consists of six items designed to elicit students' perceptions of the total workload required to perform a task as well as how certain characteristics of the task contributed to the workload. Task characteristics included: mental demand, physical demand, temporal demand, own performance, effort, and frustration. Items were presented in a 21-point visual analog format anchored by the end points Very Low to Very High. The intent was to distribute the questionnaire three times during the assessment to all three groups; once during the initial

OPORD production, once in response to FRAGO 1, and once in response to FRAGO 2. However, in the execution of the assessments, the questionnaire was only consistently administered across all three groups after FRAGO 1, thus, the results are only reported for this assessment period (see Appendix B for the items).

Tactical Thinking Behaviorally Anchored Rating Scales (T-BARS). A modified version of the T-BARS that measures cognitive proficiency in tactical thinking was used to score the students' performance on the assessment events described below (Phillips et al., 2006; see Appendix C). Specifically, Phillips et al. (2006) suggested that the following themes reflect the underlying cognitive processes for the development of mental models for tactical thinking: 1) Know and Use All Available Assets; 2) Keep a Focus on the Mission and Higher's Intent; 3) Model a Thinking Enemy or Populace; and 4) Consider Effects of Terrain. Phillips et al. posited that the development of mental models precedes the cognitive processes of more proficient tactical thinkers. Phillips et al. (2006) argued that proficient tactical decision makers perform higher-order mental operations (i.e., Seeing the Big Picture, Timing, Visualization, Contingencies) in the context of the basic mental models represented by the first four themes. As indicated in the previous section of this report, the present research posits that modeling a dynamic situation is a fifth higher-order cognitive function that is performed in the context of a mental model for tactical thinking which determines the effects of the terrain and enemy and friendly actions on the mission.

As the students in the present research are new Lieutenants it was expected that they are novice tactical decision makers. Thus, the four themes associated with the development of mental models were employed as the assessment criteria for the present research. Further, it is important to note that all four of the themes assessed by the T-BARS are indicators of *Modeling a Dynamic Situation* (i.e., the relationship between friendly, enemy, and terrain) which was the general training content area for all three approaches. Themes 1 and 2 represent key features of understanding the friendly forces, Theme 3 represents understanding the enemy force, and Theme 4 represents an understanding of the terrain. The training content for all three approaches emphasized key behavioral indicators of each theme.

All four themes were scored on a five-point scale with specific anchors for each theme. For example, for theme 2 "Keep a Focus on the Mission and Higher's Intent" the anchor for the first point = "Focuses on Own Mission" and the anchor for the fifth point = "Supports Intent." As can be seen in Appendix C, each anchor consists of descriptions of specific behaviors that would receive that particular score.

The T-BARS was used by two SMEs to rate the students' performance on the platoon-level OPORD and two FRAGOs. Both SMEs served 20 years or more in both conventional and US Special Operations Forces (SOF) units with multiple deployments to various countries performing offensive, defensive, and stability operations. Moreover, both SMEs had extensive planning experience at the battalion, brigade, and Joint Special Operations Task Force levels.

The two raters were trained on how to use the T-BARS to score performance on the assessment events. In particular, the training focused on framing the students' performance according to what would be expected from *new* platoon leaders compared to more experienced platoon leaders. Further, both raters read through the assessment OPORD independently and created an initial plan. After doing so, they reviewed the T-BARS and commented on what they expected to see in the students' written orders for each of the four performance themes (Know and use all assets, etc.). Then, the raters independently scored four different student orders to calibrate their ratings on the four themes; any discrepancies were discussed to consensus.

The results of the calibration process demonstrated that the anchors for the high end of the scales (i.e., 4s and 5s) were more reflective of performance expected of experienced tactical decision makers. Due to the students' limited tactical-level planning experience, the raters agreed that scores of 1 should be viewed as average performance, scores of 2 as above average performance, and scores of 3 as exceptional performance. As such, preliminary analyses indicated that a score of 4 was only given once across all students and performance themes while a score of 5 was never given.

Post-Training Evaluation Questionnaire. The Post-Training Evaluation Questionnaire measured students' reactions to the training and included 16 items reflecting the following themes (see Appendix D): perceived utility of training (four items; e.g., *The topic areas covered in this class will clearly benefit me*); the degree to which the mission planning process was covered (three items; e.g., *The instruction gave me a much better understanding of the mission planning process*); the instructor's understanding of the content area (1-item; *The instructor had a thorough understanding of the topic material*); adequacy of time allotment during the training (1-item; *The time devoted to explaining concepts and group discussions was adequate*); and class engagement (1-item; *I was thoroughly engaged throughout the class*). Items followed a five-point Likert-type response scale (1 = Strongly Agree; 5 = Strongly Disagree).

Items 11-13 were designed to measure different student outcomes than training effectiveness (see Appendix D for the items). In particular, certain training approaches (e.g., outcomes based training and education, OBTE) suggest that training should focus on developing the traits that make adaptive leaders, such as confidence, initiative, and accountability.¹ We were therefore interested in any differences that may have emerged among the three instructional approaches with respect to the development of these traits. It would be informative if some of the approaches promoted these traits more than others. For example, if the three approaches did not differ in terms of student performance but one or two clearly were more effective in developing these traits, then that may influence a recommendation of which approaches to adopt. Responses were rated on a five-point scale with three anchors that differed across each item (e.g., for accountability 1 = "I believe the instructor should guide me to the correct solution" and 5 = "I believe that I can influence my own education inside and outside the classroom;" see Appendix D for all of the response scales).

Finally, items 14-16 asked for short answer responses related to training (i.e., aspects of the instruction that were liked the most, the least, and any critical topics that were omitted).

Procedure / Instructional Design. For all three training approaches, each group of students received one day of training (approximately seven training hours) and one day of assessment events (approximately six assessment hours). For all three groups, students first completed a packet of pre-experimental measures including a short demographic sheet and the planning scenario. The planning scenarios were counterbalanced such that half of the students received the first scenario found in Appendix A (p. A-3) while the other half received the second scenario found in Appendix A (p. A-7). Following each experiment, all three groups completed the post-training evaluation questionnaire and the planning scenario not completed as a pre-experimental measure.

¹ For a complete review of OBTE, please see John Hopkins University (2009, May).

The following sections describe the instructional design and sequence of steps for each training approach. It is important to note that when appropriate the same scenarios were used across all of the approaches. Due to the instructional design, however, some scenarios were created that were unique to each approach. It was expected that all scenarios used throughout the instruction as student practice exercises had the same level of difficulty, stressed the same aspects of METT-TC, etc. The present research pilot tested the materials, and the results are interpreted with this confound in mind. *It also is important to note that although the training materials differed somewhat depending on the instructional approach, the assessment materials were the same for all groups.*

Each group also received a digital folder containing resources that could be accessed at any point during the instruction and the assessment events. The folder included doctrinal resources (e.g., Field Manuals, handouts of terms and symbols) and job aids (e.g., annotated OPOD format, COA development information, specific details regarding the country of interest).

DI instructional design. To develop training on modeling a dynamic situation using the DI approach, the following general training principles were followed:

- General approach – a task/skill is presented in a simple to complex manner.
 - o Objectives; goals; connections to prior knowledge; domain knowledge;
 - o Worked-out example;
 - o Completion exercises;
 - o Goal free or reverse exercises;
 - o Feedback; and
 - o *This process is repeated for each task/skill* (Van Merriënboer, Kirschner, & Kester, 2003).
- For more complex tasks, several completion exercises may be needed such that each subsequent exercise provides a lower level of support (c.f., Association of the United States Army, 2007; Van Merriënboer et al., 2003).
- Domain knowledge information is presented at the beginning of each set but is available throughout in the form of job/memory aides.
- Procedural information is provided just-in-time. Any step-by-step instruction is provided at the time that the task is performed – not beforehand.
- Demonstration – one approach is for the instructor to provide good and bad examples of each task and describe the differences between them (Klahr & Nigam, 2004). “A powerful instructional strategy to avoid inert knowledge to yield far-transfer performance is to provide varied context examples (varying either the surface or deep structures), which will allow students to focus on building flexible schema based on the deep structure and show that it may be activated for a variety of surface features” (Clark & Wittrock, 2000, p. 78).
- Many different scenarios may be needed so that the platoon leaders have sufficient practice performing each task. “Learning is best when the practice requires solving increasingly complex problems with varying conditions” (US Department of the Army, 2009, p. 101).

- “As problems develop in a course, new problems should include elements that can only be solved by using knowledge from previous lessons so that problems become ‘cumulative’ and wider in scope, giving trainees an opportunity to continue to practice previously learned procedures” (Clark, 2004, p. 46).
- “In longer training exercises, it is very important to occasionally insert very large exercises that draw on many previous lessons and ask trainees to assemble everything they have learned to that point and practice a series of procedures together. These ‘cumulative exercises’ do not have to be preceded by a demonstration and can ‘stand alone’ in a training course. An informal rule is that every four to five lessons should be followed by a cumulative exercise and that one should occur at the end of every course” (Clark, 2004, p. 46).

From these principles, a training sequence (i.e., storyboards) for modeling a dynamic situation was created. First the objectives of the training were established as follows:

1. Objectives of the training
 - A. TLO²: To model a dynamic situation
 - i. ELO A³: Understand friendly capabilities and composition
 - ii. ELO B: Understand enemy capabilities and composition
 - iii. ELO C: Understand interaction of friendly and enemy capabilities
 - iv. ELO D: Understand impact of terrain on friendly/enemy capabilities
 - v. ELO E: Understand how the enemy synchronizes capabilities
 - vi. ELO F: Understand how friendly forces synchronize capabilities
 - vii. ELO G: Determine appropriate questions or resources needed to complete the plan
 - viii. ELO H: Apply synchronized forces to the terrain
 - ix. ELO I: Recognize elements of a good plan
 - x. ELO J: Recognize impact of changes and update plan

Second, the content and exercises were developed for each ELO (as the complete PowerPoint slide presentation included 109 slides, please see Appendix E for a description of the content and exercises for each ELO and exemplar instructor demonstrations). An example is provided below for the ELO H, Apply synchronized forces to the terrain:

- H. Apply synchronized forces to the terrain
 - i. Information regarding COA development, decisive operation, decisive point, and endstate.
 - ii. Instructor demonstration of what the decisive point should be and why, given a specific mission.
 - iii. Information regarding generate options, array initial forces, develop schemes of maneuver, assign headquarters, prepare course of action statement and sketch.
 - iv. Instructor demonstration of a COA sketch.
 - v. Student exercise creating a COA statement and sketch to include practicing all tasks learned throughout the training.

² TLO = terminal learning objective; a term used in the development of US Army programs of instruction.

³ ELO = enabling learning objective; a term used in the development of US Army programs of instruction.

IBL instructional design. The instructional design for the IBL approach drew from prior research (e.g., Duffy & Raymer, 2009) indicating that students should analyze the problem prior to receiving information from the instructor. A rich problem was developed so that the students could discover for themselves the inter-relatedness of the friendly, enemy, and terrain elements. The instructional design, therefore, had the following general flow, although in theory the student should influence how and when these activities happen:

1. Overview of the research project, the project goals, the procedure and schedule for the day, and the products the students were expected to produce.
2. Instructor presentation of the problem to the students, which in the present research was in the form of a company OPORD brief (see Appendix F). All of the supporting material that would be provided to a platoon leader, such as an Area of Operation orientation briefing, a handbook that described the enemy forces, and the OPORD, which included the battalion concept statement and sketch prior to the platoon leader developing his platoon plan, was provided to the students. These products were intended to be as realistic as possible. Although the students had much less time to digest this information than they would if they were receiving it while preparing to deploy, this provided an “opportunity cost” for the students. What they attended to would have an impact on their plan.
3. Individual student work on an initial analysis of the mission and in developing their first ideas regarding the platoon-level OPORD.⁴ Insights learned at this stage were the students’ initial thoughts and concerns regarding the plan, what the students see as opportunities, and what additional data the students need to further develop their plans. This took the form of a platoon backbrief, which included a section for “requests for information (RFIs)” from the company commander. With the exception of answering questions about the company plan and responding to the RFIs, it is important to note that instructor feedback on student performance was not provided at this time. Students were given as much time as needed to analyze the mission and create their initial plans. Once the students recorded their initial thinking on the backbrief form (see Appendix G), they developed a complete COA statement and sketch.
4. Instructor interaction with the students to determine what the students considered as key issues and decisive points in their tactical plans. This “think aloud” session allowed the instructor to better understand how the students thought about the problem. The instructor did not provide direct feedback during this session.
5. Presentation of expert solutions were provided by the instructor based on data from the two SMEs as described in the T-BARS section above.
6. Entire class discussion of how the expert thinking may have been different from their own.
7. Instructor presentation of information related to tactical-level planning including METT-TC, friendly and enemy capabilities, terrain analysis (observation and fields of fire, avenues of approach, key terrain, obstacles, cover and concealment; OAKOC), key indicators of modeling a dynamic situation (e.g., how platoon leaders would respond to changes in enemy, friendly, and terrain), steps in developing a COA statement and sketch, elements of a good plan, relationships between friendly, enemy, and terrain, description of battlefield effects, and decision-making biases (information was presented using selected slides from the DI PowerPoint presentation).

⁴Although some IBL researchers recommend group work due to the social learning outcomes of group exercises, the design for the present research was based on individual work.

IF instructional design. The design for the IF approach drew from prior research suggesting that, similar to the IBL approach, students should first analyze a problem and then receive information from the instructor regarding key principles, etc. (Schwartz & Bransford, 1998; Schwartz & Martin, 2004). However, there were two significant differences between the IBL and IF approaches that are worth noting. First, the initial problem presented to students in the IBL approach was larger in scope and more complex than the problems presented to the students in the IF approach. Although the intent of the IBL approach was to present students with follow-on problems that were diverse from the initial problem, time constraints in the present research prohibited multiple, complex scenarios to be incorporated into the IBL instructional design. On the other hand, for the IF approach, the focus was on mini-scenarios that were smaller in scope and less complex, which permitted several scenarios to be included in the instructional design.

Second, although the IBL approach suggests that diverse scenarios should be used in the instruction, the goals and objectives for using these follow-on scenarios are not as explicit as in the IF approach. That is, in the IF approach, multiple mini-scenarios are developed with the intent of helping students to build (invent) a solution for a broader problem, specifically by using contrasting cases that focus students more on the critical deep structures of the problem (cf. Schwartz & Martin, 2004). As students are presented with the different scenarios, they have the opportunity to apply their solution across a range of situations and make refinements regarding their thinking of the larger problem. The goal of this type of approach is to better transfer these skills to novel situations.

Similar to the IBL approach, the IF approach posits that when students invent a solution to a problem prior to being presented with information in the form of instructor presentations or demonstrations they have a greater understanding of the key concepts (cf., Schwartz & Black, 1996; Schwartz & Bransford, 1998; Schwartz, Sears, & Chang, 2008). Therefore, mini-scenarios were designed to contrast along their relative focus on friendly, enemy, and terrain. It is important to note that a key emphasis of the training was to provide students with opportunities to consider the interactions of all three elements within any one scenario. As such, a computer-based instructional design was developed that included the following steps:

A. Friendly capabilities content area

- i. Presentation of a problem focused on analyzing friendly capabilities (see Appendix H for screen shots of the computer-based instruction).
- ii. Student exercise regarding additional information that is needed to ensure a successful mission.
- iii. Presentation of the range of factors and questions that the students should have considered.
- iv. Presentation of selected information from the company operations order – information on friendly and enemy capabilities and terrain (weather, avenues of approach, concept of operations).
- v. Student exercise regarding specified and implied tasks, tentative platoon mission statement, factors to consider for a successful mission, and issues/concerns.
- vi. Presentation of the responses from two subordinate leaders (platoon sergeant and a squad leader) in how they would approach the operation.
- vii. Student exercise specifying the strengths and weaknesses of the subordinate leaders' plans.
- viii. Student exercise regarding information requests and additional information that would help in developing their plan.

- ix. Video presentation of an expert (background characteristics provided in the TBARS section) talking about what factors are important and what information he would like to know.
 - x. Student exercise developing a COA statement and sketch. A software tool named the Tactical Decision Exercise (TDE) Builder was developed and embedded in the software that allowed the students to type in responses for the COA statement and use graphics to draw the COA sketch [see Appendix H for a screen shot of the tool; also see Tucker, Sidman, Geyer, Mizrahi, & O'Driscoll (2010) for a complete description of the tool].
 - xi. Two student exercises requiring an analysis of the plans of the two subordinate leaders after additional information was provided. Required a determination of whether the plans would be successful, partially successful, or unsuccessful.
 - xii. Student exercise revising the COA statement and sketch using the TDE Builder.
 - xiii. Student self-evaluation regarding key factors of the planning process related to using available assets, focusing on mission and higher's intent, modeling a thinking enemy, and considering the effects of terrain (see Appendix H).
- B. Enemy capabilities content area
- i. The steps for the enemy capabilities topic area were very similar to those of the friendly capabilities topic area (due to size considerations these screen shots are not shown). One main difference is that in step 11 described above students completed four exercises. A self-evaluation also was given related to the same topics described above.
- C. Terrain content area
- i. Presentation of an area of operations (AO) brief (see Appendix I).
 - ii. Presentation of a warning order (WARNO; see Appendix J) including coordinating instructions and company commander's guidance.
 - iii. The subsequent steps for this content area followed steps 5-13 described above with the exception of step 9 (as these screen shots are similar they are not shown).

Assessment. The assessment of student performance following the training for the respective approaches consisted of a series of scenario-based testing events developed to mirror key aspects of the platoon-level planning process. It is important to note that all three groups received the same assessment procedure and materials. The testing events were as follows:

1. Presentation of the AO briefing.
2. Presentation of company command OPORD (see Appendix K).
3. Individual work on the platoon-level OPORD.
4. Presentation of first fragmentary order (FRAGO 1; see Appendix L).
5. Individual work on changes to plan given FRAGO 1.
6. Presentation of second fragmentary order (FRAGO 2; see Appendix M).
7. Individual work on changes to plan given FRAGO 2.

For events 1, 2, 4 and 6 the instructor played the company commander for the AO, company OPORD, and FRAGO briefings. The AO brief was similar to a briefing a unit might get during a Relief in Place/Transfer of Authority (RIP/TOA) and provided background information so that the students could familiarize themselves with the situation.

For event 3 (work on platoon-level OPORD), each student played a platoon leader for 3rd platoon, Alpha company and was asked to write their own individual platoon order. They were allowed to use whatever OPORD format they wanted (e.g., matrix) and were given two hours to complete their initial plan.

For events 5 and 7 (work on FRAGOs 1 and 2), students made changes to their initial plan based on the new information they received in the FRAGOs. The students were given 30 minutes following each FRAGO brief by the instructor to make any changes.

The student work was recorded in notebooks which were provided to the two SME raters following the experiments (students were not provided with individual feedback during the assessment process; a debrief by the instructor occurred following the conclusion of the experiment). Each SME used the T-BARS to score the student performance.

Results

T-BARS. Due to the small sample sizes across the three approaches, significance testing was not employed for the T-BARS data. Instead, we examined trends in the data by determining the degree to which performance increased, decreased, or was unchanged across the different measurements (OPORD, FRAGO 1, FRAGO 2). Table 3 shows performance on the initial assessment measure, the OPORD, and changes in performance for the second assessment measure (FRAGO 1). As indicated in the method section, the raters suggested that scores above 1 on the T-BARS should be considered above average results. Thus, the first column of Table 3 shows the percentage of scores within each approach that were above 1 on the initial measure, the OPORD. As all responses were rated on the same four themes (see Appendix C; Know and use all assets available, Keep a focus on the mission and higher's intent, Model a thinking enemy, Consider effects of terrain), the denominator for each calculation is 4 x the number of students within that training condition, and the numerator for each calculation is the total number of themes across all students that were scored above 1 (2, 3, or 4). The results demonstrated that performance on the OPORD was highest for the DI approach (39% of all of the scores were above 1) followed by the IF (25%) and IBL (17%) approaches. Similar results were found for the composite scores (means) of these measures (Table 4). Notably, the students in the DI approach were pre-IBOLC students and thus had less experience conducting tactical-level planning (i.e., developing platoon OPORDs, adjusting their plan in response to changes in the situation) than the students in the other approaches. However, 85% of the DI students were OCS graduates and thus gained some experience in planning from that leader course.

Table 3 also shows performance gains from the OPORD measure to FRAGO 1. First, all within-person positive changes in performance were summed across all four themes (i.e., increases in performance from the OPORD scores). Second, scores were summed across all students within each condition. The results indicated that performance increases at FRAGO 1 were the greatest for the DI approach (34% of scores increased from the OPORD scores) followed by the IBL (33%) and IF (20%) approaches. Similar results were found by examining the composite scores of these measures (Table 4). It is important to note that the IBL approach had the fewest performance decrements (only 4% of the FRAGO 1 scores were worse than the OPORD scores) followed by the DI (9%) and IF approaches (14%; Table 3).

Finally, Table 3 reports that a large proportion of scores did not change over time. For all three approaches, more than half of the scores did not change from the OPORD scores (DI 56%; IBL 63%; IF 66%). As one goal of the present research was to develop skills reflecting *modeling a dynamic situation*, we expected to see increases in performance as the students responded to a change in the initial situation, especially for the IF and IBL approaches. The large percentages of scores that did not change from the first measurement to the second measurement suggest that the training did not focus enough on developing these particular skills. It seems likely that both the instructional design and content of each approach would need to be revised to increase the acquisition of these skills and achieve greater gains in performance in response to changing situations. It is important to note, however, that the selected measures may not have (1) tapped the same aspects of tactical decision making that were taught in the instruction or (2) been sensitive enough to detect the changes in performance.

By examining the ratings for each T-BARS theme, the results indicated that, overall, the training affected students' performance related to *Keeping a Focus on Mission and Higher's Intent* more than the other themes (see Appendix N). The training seemed to be least effective for the *Consider Effects of Terrain* theme.

For the FRAGO 2 measure, the results indicated minimal changes in performance ratings from the FRAGO 1 measure regardless of instructional approach (Table 4). The only changes that were observed were for the DI approach (2 performance gains) and for the IF approach (3 performance gains and 2 performance decrements). As the changes in FRAGO 2 built on changes to the plans from FRAGO 1, we expected that performance would improve as students came to a better understanding of the situation and of their unit's capabilities. As this did not occur, it provides additional evidence that revisions to the instructional design and training content are needed to increase the acquisition of skills related to *modeling a dynamic situation*.

Table 3
Performance Ratings by Instructional Approach

OPORD – Initial Performance (Performance Ratings Above 1 on Any Theme)		FRAGO 1 – Performance Gains (Higher Ratings on Any Theme from OPORD Scores)		FRAGO 1 – Performance Decrements (Lower Ratings on Any Theme from OPORD Scores)		FRAGO 1 – No Change (No Change from OPORD Scores)	
DI (25 / 64 scores)	39%	DI (22 / 64 scores)	34%	IBL (1 / 24 scores)	4%	DI (36 / 64 scores)	56%
IF (11 / 44)	25%	IBL (8 / 24)	33%	DI (6 / 64)	9%	IBL (15 / 24)	63%
IBL (4 / 24)	17%	IF (9 / 44)	20%	IF (6 / 44)	14%	IF (29 / 44)	66%

Table 4
Composite Performance Ratings by Instructional Approach

Assessment Measure and Instructional Approach ^a	<i>N</i>	Mean	<i>SD</i>	Percent Increase from Previous Measure
OPORD Composite Scores ($\alpha = .64$)				
DI	18	1.42	.44	--
IF	10	1.25	.22	--
IBL	6	1.17	.13	--
FRAGO 1 Composite Scores ($\alpha = .76$)				
DI	18	1.67	.62	18%
IBL	6	1.46	.37	25%
IF	10	1.32	.20	5%
FRAGO 2 Composite Scores ($\alpha = .78$)				
DI	18	1.69	.69	1%
IBL	6	1.46	.37	0%
IF	10	1.34	.17	2%

Note. ^aInstructional approach rank ordered by the highest mean composite performance rating for each measure.

Post-Training Evaluation Questionnaire. The results of the Post-Training Evaluation Questionnaire revealed some divergent findings compared to the T-BARS results. That is, although the IF approach resulted in the least performance gains and most performance decrements from the OPORD to FRAGO 1, the students' ratings of this approach were the highest for most of the questionnaire categories (Table 5). The only item that was rated lower by the students in the IF approach was the item tapping time concerns; 30% of the students in this approach disagreed/strongly disagreed that there was adequate time devoted to explaining concepts and group discussions. On the other hand, students in the IBL approach rated the items reflecting self-efficacy and meta-cognitive skills constructs (personal accountability, initiative, and awareness) higher than the students in the other two approaches (Table 6).

Student comments to the open-ended responses provided additional insight to the scaled responses reported above (Table 7). Overall, students in the DI approach felt that the strengths of the DI approach reflected the instructor expertise, focus on critical thinking, and the varied use of scenarios. However, they felt that there was too much use of PowerPoint and that the class was monotonous.

In general, students in the IF approach felt that the quality of the instruction was high and that it was some of the best training received to date in the Army. Specifically, they responded positively to the computer-based training and the scenarios used in the instruction. However, some students felt that the timing of the research project hindered them from preparing for Ranger school (these students were IBOLC graduates, and the majority of these students were waiting for the next Ranger school class to start). Finally, similar to the scaled responses, some students felt rushed to complete the training.

For the IBL approach, some students liked the approach because it was flexible in allowing for multiple solutions and interpretations of the problem. They also liked the scenario, evaluation process, and instruction. However, some did not like the PowerPoint sections of the training and wanted to be given a clearer purpose for the training.

Table 5
Post-Training Questionnaire Ratings by Instructional Approach^a

Theme and Instructional Approach ^b	<i>N</i>	Mean	<i>SD</i>	Percent of Students			
				Disagree / Strongly Disagree	Neutral	Agree	Strongly Agree
Perceived Utility^c ($\alpha = .89$)							
IF	10	4.28	.65	0%	10%	30%	60%
DI	18	3.85	.74	0%	11%	56%	33%
IBL	6	4.00	.55	0%	17%	50%	33%
Adequacy of Coverage^d ($\alpha = .71$)							
IF	10	4.33	.67	0%	10%	30%	60%
DI	18	3.76	.51	0%	11%	67%	22%
IBL	6	4.00	.21	0%	0%	83%	17%
Instructor's Understanding of Content							
IF	10	4.90	.32	0%	0%	10%	90%
DI	18	4.50	.51	0%	0%	50%	50%
IBL	6	4.17	.41	0%	0%	83%	17%
Time Allotment							
IF	10	3.70	1.25	30%	0%	40%	30%
DI	18	3.83	.79	6%	22%	56%	17%
IBL	6	4.00	.63	0%	17%	67%	17%
Class Engagement							
IF	10	4.00	1.15	20%	0%	40%	40%
IBL	6	3.67	1.37	33%	0%	33%	33%
DI	18	3.11	1.18	28%	33%	28%	11%

Notes. ^aSee Appendix D for complete item descriptions. ^bInstructional approach was rank ordered by the percentage of respondents reporting agree/strongly agree. ^cFour items in scale; ^dThree items in scale; anchors are approximate for the composite items.

Table 6
Post-Training Ratings of Accountability, Initiative, and Confidence by Instructional Approach

Theme and Instructional Approach ^b	<i>N</i>	Mean	<i>SD</i>	Percent of Students		
				Low Levels of Accountability, Initiative, & Confidence	Moderate Levels of Accountability, Initiative, & Confidence	High Levels of Accountability, Initiative, & Confidence
Accountability						
IBL	6	4.67	.61	0%	17%	83%
IF	10	4.10	.88	0%	30%	70%
DI	18	4.06	.76	0%	33%	67%
Initiative						
IBL	6	4.25	.88	0%	33%	67%
IF	10	3.88	.88	10%	20%	70%
DI	18	3.67	1.11	6%	33%	61%
Confidence						
IBL	6	4.08	1.11	17%	0%	83%
DI	18	3.64	1.05	6%	50%	44%
IF	10	3.18	1.05	10%	60%	30%

Notes. ^aSee Appendix D for complete item descriptions. ^bInstructional approach rank ordered by the percentage of respondents reporting high levels of the attribute.

Table 7
Summary of Responses to Open-Ended Questions^a

Item	DI (n = 18)	IF (n = 10)	IBL (n = 6)
Liked most about the instruction	- Instructor expertise (e.g., use of real world examples, identifying/understanding important information; 6 students) - Focus on critical thinking, flexibility in planning, fluidity of situation (5) - Realistic and varied use of scenarios presented in training material (5) - Improvement in understanding of the mission planning process (4) - Group, hands on discussion in sharing of ideas (1) - Conducting the OPORD which allowed for autonomy and freedom (1)	- Quality of instruction (some of the best instruction since joining the Army; 3) - Effective use of technology to improve upon standard (IBOLC) mission planning training (3) - Use of realistic/interesting scenarios (3) - Different way to think about the enemy and friendly situation (2) - Challenging training (1)	- Flexibility in allowing consideration and discussion of multiple appropriate solutions and interpretations (3) - Iraq scenario stimulated thinking of what to do once deployed there (1) - Evaluation process allowed students to critically analyze OPORD (1) - Feedback and suggestions from "Commander" (1) - Presented a simplified method to "break down" an OPORD (1)
Liked least about the instruction	- Extensive use of PowerPoint delivery method (death by PowerPoint; 8) - Class was tedious/boring/monotonous (7) - Lack of clarity or purpose in class or exercises (4) - Too lengthy/rushed (3) - Distracting student took away from class tasks (2) - OPORD examples did not reflect real combat situations (1) - Prefers handouts with North Korea brief (1)	- Timing of course (post- instead of pre-IBOLC; prior to Ranger school; 3) - Too lengthy given time period/rushed (3) - More clarity on desired end result/goals/expectations (2) - Thought class was a waste of time and that they had already learned to an acceptable extent (1) - Relied too heavily on computers/ bugs in the program (1) "Adapt" portion of training did not incorporate a dramatic enough change (1) - More scenarios in less depth if adaptability is really focus of training (1)	- Periods in the class where PowerPoint lecture was the delivery method (liked discussion more; 2) - Vague/Unclear of Purpose (2) - Use of mental model oversimplifies complex interactions and restricts thought (1) - Unnecessary tangents (1) - Trained to time, not standard (1)
Topics not addressed but should be included in training	- No/unsure/none come to mind (6) - More effective/better review of fundamentals in writing OPORDs and conducting the mission planning process (4) - Better explanation of purpose/expectations of research (3) - More discussion of enabler capabilities (1)	- No, everything was covered (3) - Very little ASCOPE; civilian population overview was very light for a unit that had been in area for 6 months (1)	- No, everything was covered (1) - Cost/benefit analysis, particularly when dealing with potential to lose Soldiers in a mission (1) - Use of more real world examples (i.e., Iraq, Afghanistan rather than North Korea; 1)

Notes. ^aSee Appendix D for complete items descriptions. Some responses counted toward more than one identified theme.

NASA-TLX Questionnaire. The results for the perceived levels of workload, success in accomplishing the task and frustration/irritation following the FRAGO 1 measure for each instructional approach are presented in Table 8. The results indicated that the students in the DI approach felt that they were the most successful in accomplishing the task, requiring them to adjust their plans in response to changes in the situation, compared to students in the other approaches. The DI students also were the least frustrated and irritated compared to the students in the other approaches. However, student perceptions of workload (i.e., the degree to which students felt that they had to work to accomplish their performance) were the highest in the DI approach. On the other hand, student perceptions of the degree to which the FRAGO 1 task was mentally demanding and the degree to which the pace of task was hurried or rushed were the highest in the IF approach.

Table 8
Means (SD) of Workload Ratings After FRAGO 1^a

Instructional Approach	Mentally Demanding	Physically Demanding	Hurried/Rushed Pace	Success in Accomplishing the Task	Workload	Frustration/Irritation
DI (<i>n</i> = 18)	12.67 (4.10)	2.83 (2.92)	9.22 (4.85)	13.33 (3.91)	12.67 (2.22)	8.89 (4.65)
IBL (<i>n</i> = 6)	10.50 (3.02)	2.33 (1.75)	10.67 (3.08)	12.50 (2.66)	10.83 (3.43)	11.67 (6.38)
IF (<i>n</i> = 10)	13.10 (4.82)	1.60 (.70)	11.30 (4.67)	12.20 (3.55)	12.20 (4.64)	11.30 (5.08)

Notes. ^aResponses were made on a 21-point scale with higher scores indicating higher levels of the attribute being assessed. See Appendix B for complete item descriptions.

Discussion

Due to the small sample sizes across the three experiments, the results of the present research should be considered a pilot effort.⁵ Therefore, the contribution of the present research is best reflected in the reporting of the instructional design and methodology of each approach as well as an indication of the advantages and disadvantages of using these approaches for Army training.

Although some specific disadvantages of each approach will be noted, there were some constraints that affected the overall execution of the research design for the experiments, thus affecting all three approaches.⁶ First, although pre- and post-experimental scenarios were developed and administered in order to obtain baseline data regarding skills related to tactical-level planning, cost constraints prohibited the scoring of these data. Thus, future research should include a baseline measure of these skills so that individuals who are already expert planners can be identified and more rigorous tests of the data can be conducted (see Klahr & Nigam, 2004; Strand-Cary & Klahr, 2008 for compelling analyses of expert data).

Second, the experiments for the present research were constrained to a two-day timeframe – one day for the training and one day for the assessment. Although a two-day time period reflects the amount of time allocated to classroom instruction on tactical-level planning in an Army institutional training course, better results (increased within-person changes across the assessments) would have likely been obtained with a longer training and assessment period. For example, significant training effects on student outcomes were found in a research project investigating a problem-centered approach over 16 weeks (Pleban, Graves, Miller, Branciforte, Donigian, & Matthews, 2010).

Finally, the results for the performance scores may have been affected by a floor effect. That is, the results indicated that the anchors for the fourth and fifth points on the T-BARS reflected performance of much more experienced Army leaders. As such, most of the students received 1s or 2s on the 5-point scale. If the anchors would have been developed to better match the expected performance goals of new Army leaders, then the ratings would have likely been higher. However, it is important to note that, although this would have raised the level of performance, it may not have changed the distribution of the scores.

On the other hand, the initial low performance ratings and few within-person changes over time, especially from FRAGO 1 to FRAGO 2 may be a result of a mismatch between the training and assessment methods. As there are many different ways to assess the acquisition and retention of knowledge and skills, a more accurate representation of the effects of each approach on student outcomes may have been obtained by including several different assessment techniques. For example, graduated prompting (Bransford, Brown, & Cocking, 2000; Campione & Brown, 1987) and dynamic assessments (Bransford & Schwartz, 1999) reflect Vygotsky's (1978) premise of assessment (see also Miller, 1997) which determines the skill level that an individual can achieve with some prompts/cues from instructors. Bransford and Schwartz suggest that determining the degree to which a person learns over time is a more accurate assessment of the acquisition/retention of skills than the end-of-training assessments typically conducted and include measures of trainees' abilities to learn new sets of materials, to carefully evaluate new information rather than simply assimilating it to existing schemas, to

⁵ As students for the present research were either pre- or post-IBOLC students, data collection efforts were constrained by IBOLC class schedules and post taskings.

⁶ Constraints reflected the limited resources of time, funds, and personnel in executing the experiments.

reach sound conclusions based on existing evidence, to work collaboratively with others, and to reflect on their learning processes and strategies (Bransford & Schwartz, 1999).

Advantages of the instructional approaches. The advantages of the three approaches reflect both instructional design elements as well as the pilot research findings. For the DI approach, few resources may be required to develop this approach. Although current Army classroom instruction on tactical-level planning more closely resembles this approach than the problem-centered approaches, the current research followed the best practices as indicated by the US Army Training and Doctrine Command (TRADOC) and academic researchers when developing the research design. Consequently, the instructional design outlined in the present research included many more mini instructor and student exercises with a final exercise that tapped all of the lessons learned throughout the training. Thus, rather than only using PowerPoint slides to convey the information, the DI approach in the present research spent much more time than typically allotted in classroom settings on instructor demonstrations and student exercises. In summary, although the approach required the least amount of resources (time, funds, personnel) in comparison with the problem-centered approaches (as they were designed and executed in the present research), it likely required more resources than typical Army classroom instruction. It also is important to note that the DI approach as designed and executed in the present research did not follow the Guided Experiential Learning (GEL) approach (Clark, 2004) in that the knowledge elicitation process was a much different method than the resource-intensive cognitive task analyses required by GEL.

An outcome of the DI approach was that performance scores were the highest for this approach. This was true for both the initial assessment and for the within-person performance gains from the first to the second assessment. An advantage of the DI approach was that if instructors are constrained by time and can only cover certain elements of tactical-level planning, then this approach may yield adequate performance results. This may have been due to the nature of the DI approach such that the instructor provided examples of adaptive thinking strategies which helped the students perform in the short-term. It is possible that if a longer post-test timeframe was implemented (i.e., post test at six months) higher performance gains may be realized for the problem-centered approaches. That is, longer-term assessments would enable the students to apply their learning to new situations and thus would likely be a more accurate assessment of the students' abilities to solve new problems (cf., Bransford & Schwartz, 1999). Post tests that occur immediately following the training may mask the true level of knowledge and skills that are transferred across domains (c.f., Bransford & Schwartz, 1999). In the present research, it is possible that the level of knowledge and skills actually transferred to on the job performance may have been overestimated for the DI approach and underestimated for the problem-centered approaches. Interesting follow-on research would be to determine whether the students in the DI approach can generate their own adaptive thinking strategies (i.e., transfer).

There were two main outcomes of the IBL approach. First, large gains in performance were obtained (17% to 33% gains from the first to the second assessment). Moreover, this approach had the fewest performance decrements. Thus, the students' performance improved over time which was expected in terms of modeling a dynamic situation (i.e., responding to changes in the situation and making changes to one's initial plan due to these changes).

Second, the students gave higher ratings to this approach regarding the OBTE or self-efficacy constructs – accountability, initiative, and confidence. As the premise of the IBL approach is to first immerse the students in the problem context and require them to develop an initial plan prior to any input from the instructor, the students may have felt challenged by this requirement and accountable for their own performance on the task. Positive feedback from the instructor may have helped to increase their motivation to perform the task thus leading to feelings of initiative and confidence. Thus, an advantage of the IBL approach was that the students gradually learned how to shape their mental models in response to change in the situation. This increased confidence in their abilities may have led to the higher OBTE ratings.

On the other hand, the IF approach had the highest self-report training effectiveness ratings. These results could be partly due to the fact that the instructional design for this approach was implemented within a blended learning framework utilizing specially-designed software. It is clear that the students were more engaged with the tasks as presented by the software. However, it is interesting that the ratings were higher for the instructor's understanding of the content as the instructor had less interaction with the students in this approach compared to the other approaches. The higher level of engagement with the tasks as presented by the software may have led the students to rate the "instructor" higher. The students also rated the blended learning framework higher on adequately covering the course topics and as a useful way to present the course material.

Disadvantages of the instructional approaches. Student comments suggested that the DI approach was the least engaging of the three approaches. Although the DI instructional design for the present research included many instructor demonstrations and student exercises, much more time was allocated to PowerPoint presentations during this instruction than for the other approaches. Additionally, although fewer resources were used to design and implement the DI instruction compared to the problem-centered approaches, additional resources (i.e., time, contractor support) would be needed if the instructional design included the use of Clark's (2004) cognitive task analysis (CTA) to elicit knowledge from SMEs regarding the tasks.

The IBL approach can be resource intensive depending on the different instructional techniques employed to demonstrate "expert" solutions. For example, if the training developer/instructor incorporates videos into the instruction, additional time will be required to video the experts as they make decisions regarding the particular problem and to edit the videos into small clips that can be inserted into a PowerPoint presentation. Also, as students in an IBL course are exposed to a fewer number of scenarios compared to the other two approaches, additional time and access to the appropriate SMEs is needed to develop complex problems that encompass many different teaching points.

A disadvantage of the IF approach is that additional training time may be needed to expose students to the contrasting cases presented in the instruction and thus improve the acquisition of skills. The two-day timeframe may have masked the true effectiveness of this approach in acquiring and retaining tactical-level planning skills. Additional time also may be required to assess the transfer of skills to novel situations; distributive rather than massed practice may result in increased performance over time.

Future research. As the findings from the present research are best thought of as a pilot effort, future research should draw from the training presented here and develop additional exemplars of each approach that can be further demonstrated and evaluated. It is important to note that the software for the IF approach is freely available to training developers, instructors and researchers by contacting the first author of this report and that most of the materials for the

DI and IBL approaches can be found in the appendices (full slide packets also can be requested from the first author of this report). As limited empirical research has investigated the training effectiveness of these different instructional approaches, especially for applied tasks, fruitful areas of research would be to determine the validity of the approaches for training a range of tasks under various training and transfer conditions. As the findings of the present research suggested benefits of all three approaches depending on the particular method of assessment, additional research is needed to assist training developers and instructors in selecting the most appropriate instructional approaches for their courses.

In terms of content, one interesting finding from the knowledge elicitation data which could be elaborated on in future research is the notion that very junior Army leaders tend to focus more on their units' capabilities and COAs (friendly) than on the enemy's. Future research on tactical-level planning may want to focus on the skill of *thinking like the enemy* and develop and evaluate different instructional designs to determine how best to teach this skill. It is important to note that recent research has examined a problem-centered approach in developing this skill (Lussier et al., 2003). It would be interesting to compare training effectiveness data for this approach with the approaches evaluated in the present research.

References

- Association of the United States Army. (2007, Spring). *Adapting institutional training to meet operational challenges*. Arlington, VA: Author.
- Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). *How people learn: Brain, mind, experience, and school*. Washington, DC: National Academy Press.
- Bransford, J. D., & Schwartz, D. L. (1999). Rethinking transfer: A simple proposal with multiple implications. In A. Iran-Nejad & P. D. Peason (Eds.), *Review in research in education* (Vol. 24, pp. 61-100). Washington, DC: American Educational Research Association.
- Campione, J. C., & Brown, A. L. (1987). Linking dynamic assessment with school achievement. In C. Schneider-Lidz (Ed.), *Dynamic assessment: An interactional approach to evaluating learning potential* (pp. 83-115). New York: Guilford Press.
- Clark, R. E. (2004). *Design document for a guided experiential learning course*. Report prepared for the US Army Training and Doctrine Command. Fort Monroe, VA.
- Clark, R., & Wittrock, M. C. (2000). Psychological principles in training. In S. Tobias & J. D. Fletcher (Eds.), *Training and retraining: A handbook for business, industry, government, and the military* (pp. 51-84). NY: Macmillan.
- Dyer, J. L., & Salter, R. (2001, December). *Working memory and exploration in training knowledge and skills required of digital systems*. (ARI Research Report 1783). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. DTIC No. ADA399507
- Duffy, T., & Raymer, P. (2009). *A practical guide and a constructivist rationale for inquiry based learning*. Manuscript in preparation.
- Dyer, J. L., Singh, H., & Clark, T. L. (2005). *Computer-based training approaches for training interactive digital map displays* (ARI Research Report 1842). Arlington, VA: US Army Research Institute for the Behavioral and Social Sciences. (DTIC No. ADA440171)
- John Hopkins University (2009, May). *Outcome-Based Training and Education (OBTE) Integration Workshop—Final Report* (National Security Analysis Department Report NSAD-R-2009-123). Laurel, Maryland: Author.
- Klahr, D., & Nigam, M. (2004). The equivalence of learning paths in early science instruction: Effects of direct instruction and discovery learning. *Psychological Science*, 15, 661-667.
- Lussier, J. W., Shadrick, S. B., & Prevou, M. (2003). *Think like a commander prototype: Instructor's guide to adaptive thinking*. (ARI Research Product 2003-02). Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (DTIC No. ADA413046)
- Miller, P. H. (1997). *Theories of developmental psychology*. New York: W.H. Freeman and Company.

- Phillips, J. K., Shafer, J., Ross, K. G., Cox, D. A., & Shadrick, S. B. (2006). *Behaviorally anchored rating scales for the assessment of tactical thinking mental models* (ARI Research Report 1854). Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (DTIC No. ADA452068)
- Pleban, R. J., Graves, T. R., Miller, M. L., Donigian, A. M., Branciforte, J. V., & Matthews, M. D. (2011). *Evaluating a problem-based learning strategy for enhancing ethical awareness in negotiation* (ARI Research Report 1938). Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.
- Schwartz, D. (2009, March). *Crux move instruction – CMI*. Presentation to the US Army Research Institute. Fort Benning, GA.
- Schwartz, D. L., & Black, J. B. (1996). Shuttling between depictive models and abstract rules: Induction and fallback. *Cognitive Science: A Multidisciplinary Journal*, 20(4), 457-497.
- Schwartz, D. L., & Bransford, J. D. (1998). A time for telling. *Cognition and Instruction*, 16(4), 475-522.
- Schwartz, D. L., & Martin, T. (2004). Inventing to prepare for future learning: The hidden efficiency of encouraging original student production in statistics instruction. *Cognition and Instruction*, 22(2), 129-184.
- Schwartz, D. L., Sears, D., & Chang, J. (2008). *Reconsidering prior knowledge*. Retrieved from <http://aaalab.stanford.edu/papers/Schwartz-Reconsidering-Prior-K.pdf>
- Shadrick, S. B., Schafer, P. S., & Beaubien, J. (2007). *Development and content validation of crisis response training package Red Cape: Crisis action planning and execution*. (ARI Research Report 1875). Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (DTIC No. ADA472136)
- Sidman, J., & Garrity, M. (2007). *Training requirements for visualizing time and space at company and platoon levels*. (ARI Technical Report 1207). Arlington, VA: US Army Research Institute for the Behavioral and Social Sciences. (DTIC No. ADA471960)
- Strand-Cary, M., & Klahr, D. (2008). Developing elementary science skills: Instructional effectiveness and path independence. *Cognitive Development*, 23, 488-511.
- Tucker, J. S., Sidman, J., Geyer, A., Mizrahi, G., & O'Driscoll, J. (2010). *Developing a blended learning approach for Army leader planning*. (ARI Research Product No 2010-03). Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (DTIC No. ADA 528755)
- US Department of the Army. (2009, May). *Training: Guide to Army training and education development: Process, Frameworks, Models and Efficiencies* (DRAFT TRADOC Pamphlet 350-70-4). Fort Monroe, VA: Author.
- US Department of the Army. (2006, July). *The Infantry Rifle Company* (FM 3-21.10). Washington, DC: Author.

van Merriënboer, J. J. G., Kirschner, P. A., & Kester, L. (2003). Taking the load off a learner's mind: Instructional design for complex learning. *Educational Psychologist*, 38, 5-13.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press: Cambridge, MA.

Appendix A

Knowledge Elicitation Scenarios & Questions

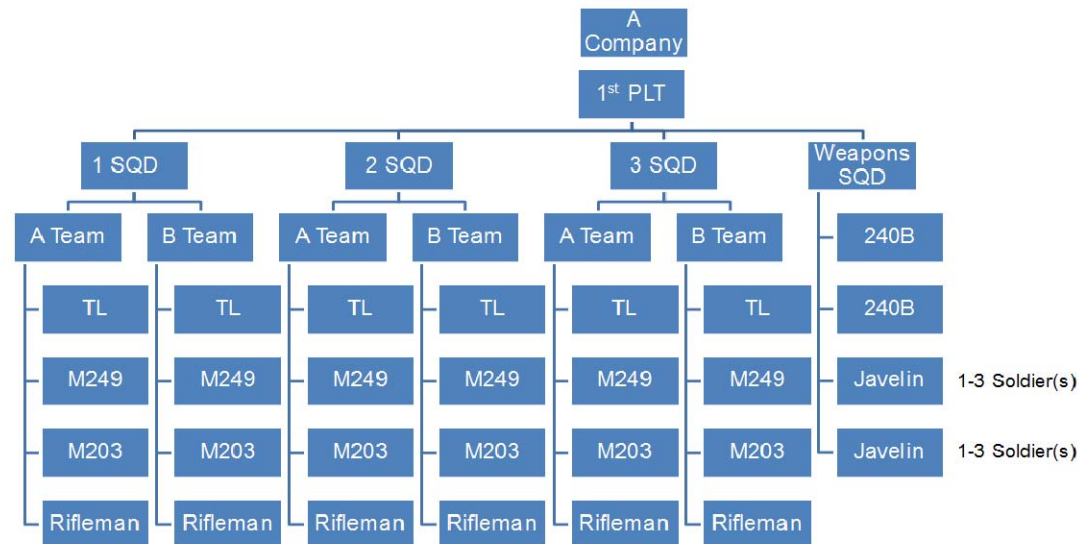


Blended Learning

Scenarios



Task Organization



29-30 Soldiers / Four (4) Up-Armored BFVs



Fragmentary Order (Scenario 1)

FRAGO 01 TO 1/A/1-504 PIR OPORD 09-05-01

References: 1st Person Perspective Images; Satellite Imagery

Time Zone Used Throughout the Order: UNIFORM (Local).

1. SITUATION.

Enemy Forces. Three infantry personnel of the Hezbollah/Commando Division have set-up defensive positions in an Enemy Observation Post (OP) 300m to the North. The enemy is armed with AK-47's and possible Rocket Propelled Grenade Launchers (RPGs). The enemy has been in position for approximately 24hrs.

2. MISSION.

1st PLT, A. Company must secure and hold key terrain (x2 Bridges-300m NE) of the enemy OP NLT 17:45, MAY 20th. This bridge is vital for advancement of key elements of the 52nd ID. Seize the enemy observation post. If possible, the enemy personnel should be spared (captured) for intelligence gathering.

3. EXECUTION.

Intent: Conduct area reconnaissance NLT 16:00, MAY 20th to obtain detailed information on all routes, obstacles, and terrain. The enemy forces (OP) within the zone must be cleared by any means available NLT 17:30, MAY 20th.

KEY TASKS:

Maintain connectivity to enable split based C2 systems

4. SERVICE SUPPORT. – No change

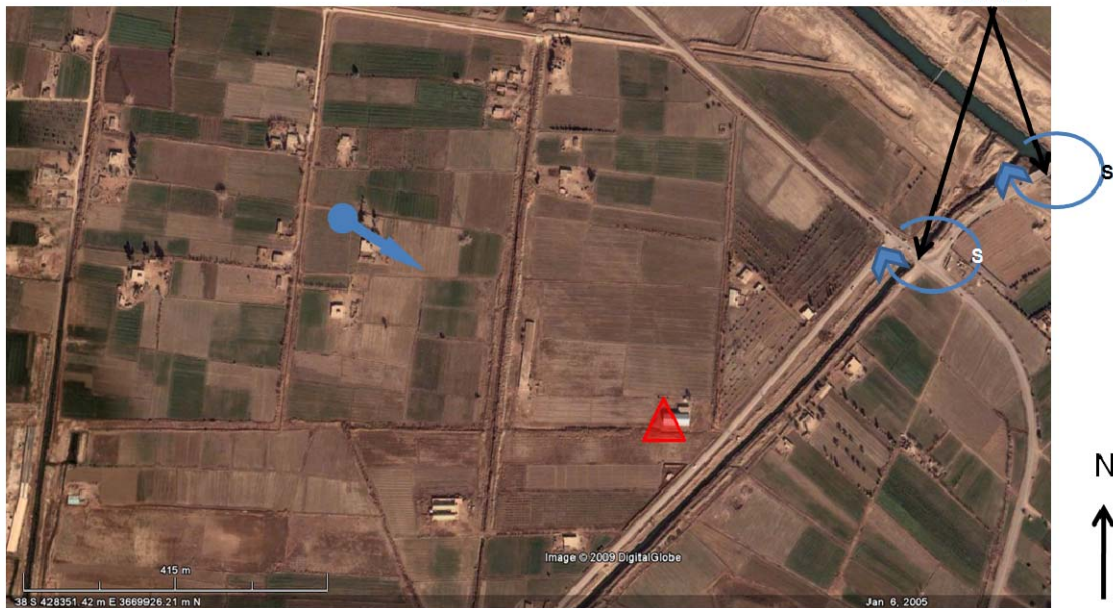
5. COMMAND AND SIGNAL.

a. Command. Succession of Command: PSG, WPNS, 3rd, 1st, 2nd

b. Signal. SOI, EDITION A in effect



Scenario 1



- A 3 man observation post is located in the building in front of you. You have been informed that they are most likely armed with AK-47's and possibly an RPG. Their OP is located near two bridges that your battalion must move supplies across to continue it's attack. Their suspected mission is to disrupt the movement of supplies forward across the bridges.



Scenario 1



- Your light infantry platoon is at full strength. You have been detached from your company to clear the enemy from the area and allow the battalion trains to move forward unhindered. You have no indirect fires available, as the rest of the battalion continues to press the attack to the southwest.
- You are in the closest covered and concealed position to the enemy, which is about 300m from the building. What impact will terrain have on how you accomplish this mission?



Fragmentary Order (Scenario 2)

FRAGO 01 TO 1/A/1-504 PIR OPORD 09-05-02

References: Video Game Screen Shots, Satellite Imagery

Time Zone Used Throughout the Order: UNIFORM (Local).

1. SITUATION.

Enemy Forces. Sunni insurgents - up to 20 – have set-up defensive positions in the town of Mosul. The key terrain that the insurgents have control over is the local market place. Snipers have been targeting local shop owners (snipers are expected to be outside the marketplace). Suicide bombers have been disguised as a policeman. The number of kidnappings have increased (primarily shop owners). The enemy is armed with AK-47's and Steyr HS50 sniper rifles, along with possible Rocket Propelled Grenade Launchers (RPGs).

2. MISSION.

1st PLT, A. Company must secure the local market place for reconstructive efforts NLT 21:00, 20 MAY. This is the next market day.

3. EXECUTION. Intent: Conduct area reconnaissance NLT 18:00, 15 MAY. Establish high priority targets and areas that your attached engineer asset can help your platoon choke out the enemy. The engineer platoon will only be available for 48hrs. You also have a civil-affairs team attached to negotiate with local civilians and help conduct thorough IPB. You also have a hardened team of tactical psyops attached to help prevent civilian interference with tactical operations.

4. SERVICE SUPPORT. – TBP

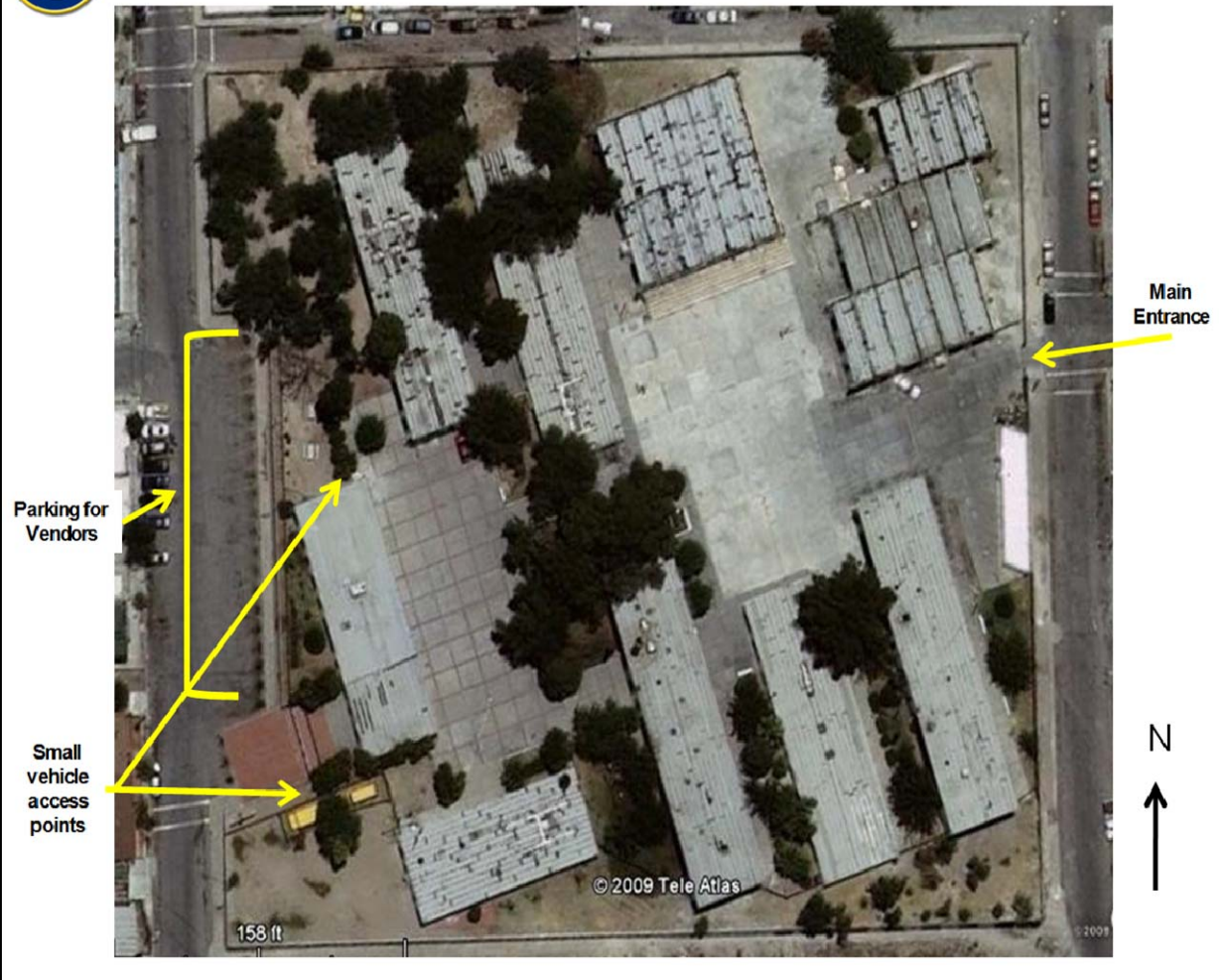
5. COMMAND AND SIGNAL.

- a. Command. Succession of Command
- b. Signal. SOI, EDITION A in effect



Scenario 2

Market Place





Scenario 2

Expected Sniper Location



- Your platoon has been tasked to secure the marketplace. Recently, insurgents have used a variety of conventional and unconventional methods to disrupt the market each week. Those methods included snipers targeting shop owners, suicide bombers, and a kidnapping. Needless to say, attendance at the market has been low, yet it is seen as a key reconstructive effort by the brigade commander.
- The engineer platoon leader, who has access to barrier material and concertina wire, wants to know what help you would like in securing the marketplace. The next market day is five days from now. Your platoon, a civil-affairs team, and a tactical psyops team will be the the only forces available on market day.
- Based on the terrain, what directions will you give the engineer platoon leader? How do you expect his actions to support your defensive positions in the market?



Fragmentary Order 3

FRAGO 01 TO 1/A/1-504 PIR OPORD 09-05-03

References: 1st Person Perspective Images; Satellite Imagery

Time Zone Used Throughout the Order: UNIFORM(Local)

1. SITUATION.

Enemy Forces. Expect insurgents to have eyes on the expected drop zone. Expect 60mm mortars to be the primary weapon of choice for the disruption of the DZ. The range of the 60mm mortar will give the enemy the ability to attack beyond the range of most direct-fire weapons. Infiltration of small 2-3 man teams, using terrain to their advantage will be expected. The teams will be equipped with AK-47's and Steyr HS50 sniper rifles, along with possible Rocket Propelled Grenade Launchers (RPGs). Expect insurgents to be positioned on key terrain to take advantage of sniper rifles and direct fire weapons. The enemy has the ability to reinforce via technical vehicles and may attempt to use a VBIED to disrupt our operations.

2. MISSION.

1st PLT, A. Company must secure the DZ for resupply drop NLT 18:00, 20 MAY 09.

3. EXECUTION. Intent: The purpose of the company mission is to deny the enemy the ability to effect operations on the drop zone. We will accomplish this by creating a defense in depth, which will consist of counterreconnaissance patrols, obstacles, and fortified defensive positions for our crew served weapons.

4. SERVICE SUPPORT. – TBP

5. COMMAND AND SIGNAL

- a. Command. Succession of Command
- b. Signal. SOI, EDITION A in effect



Scenario 3 Overhead



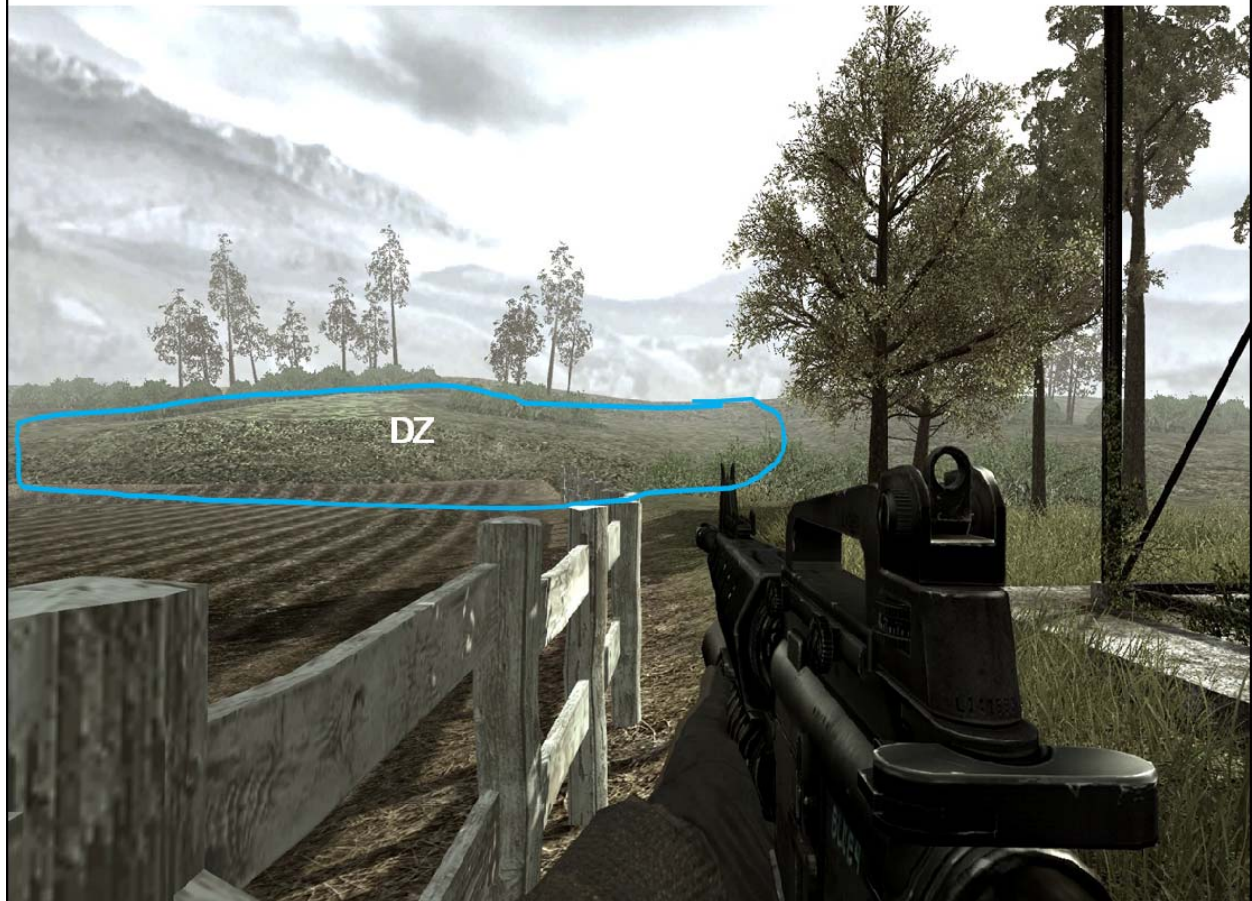


Scenario 3: Facing West





Scenario 3: Facing North





Scenario 3: Facing East





Questions

Planning

- What did you see in the satellite image that affected your planning?
- What did you see in the first person perspective image that affected your planning?
- Did you have to adjust your initial plan from the satellite image based on what you saw in the first person perspective image?
- What changes in terrain would have changed your plan?
- If there's one aspect of terrain that could most impact your plan, what would it be?

Questions



Regarding enemy

- How do you expect the enemy to leverage this terrain?
- Where specifically in these images are points of interest for the enemy?

Regarding METT-TC

- How would you change your plan if you had more/less time?
- What types of civil considerations would make you change your plan?

Regarding OAKOC

- What do you see on the image that provides you with information about obstacles/avenues of approach/etc.
- How did this information affect your planning?

Questions



Regarding terrain analysis in general

- Do you generally have too much or too little information?
- How do you determine what is relevant?
- Was there information that you needed to have that you could not obtain?
- Retrospectively, what should you have sought that you did not?
- What types of systems and products are available to assist you?
- Which are most helpful to you?
- Which are least helpful to you?
- Which component of visualization (e.g., weather, terrain, time, enemy) do they address?

Questions



For experts/instructors

- What aspects of terrain might a novice/student spend too much time focusing on?
- What aspects of terrain might a novice/student not spend enough time focusing on?
- Personal experiences
 - Effective/Ineffective terrain analysis
 - Please tell us a little about the background.
 - Who were the key players?
 - What did each of them do?
 - Why was this example particularly effective?
 - What were the primary skills involved?
 - What was the primary "lesson learned" from this event?
 - If you had to do it over again, what would you have done differently?

Backup Slides

Review—OAKOC

- **O**bservation and Fields of Fire: The potential offered to observe enemy approach and the fields of fire offered in terms of the range and other characteristics of weapons available.
- **A**venues of Approach: On the offense, avenues of approach afford greatest protection and places attackers at enemy vulnerable spots. In the defense, expected routes of enemy approach to a position, to be covered by fires from defenders.
- **K**ey Terrain: Terrain whose seizure or retention affords a marked advantage to either combatant. Hills, plateaus, or other terrain features which could provide an advantage to the element occupying that position would be considered key terrain.
- **O**bstacles: In the attack, the effect of restrictive terrain on the maneuverability of the unit. On the defense, the availability of natural or man-made obstacles to disrupt, turn, fix, or block an enemy force and protect friendly forces from enemy assault.
- **C**over and Concealment: The potential for providing cover from both direct and indirect fire and concealment from enemy observation.

METT-TC

- **Mission:** A clear concise statement of what is to be done and for what purpose. Whenever possible commanders assign subordinates an objective and a zone with few restrictive measures. A time is specified to coordinate actions of various subordinate units.
- **Enemy.** The enemy's dispositions, equipment, doctrine, capabilities and probable courses of action. Then aggressively seek enemy weaknesses. Requires a constant active and predictive intelligence effort oriented on critical units and areas.
- **Terrain and Weather.** Terrain to provide maneuver opportunities and cover and concealment. Key terrain directly impacts the success or failure of an operation, providing a significant advantage to the force controlling it. Weather and visibility conditions can provide concealment from enemy forces and opportunities for friendly forces.
- **Troops Available.** Troops available affect the tactical plan. Choosing which units for which types of actions is vital to success and is influenced by the status of the units' training and the experience of their leaders. Units are employed according to their capabilities and perform the functions of the battlefield operating systems.
- **Time.** Timing is critical to the synchronization of the battlefield operating systems. Rapid execution is key to conducting operations that keep the enemy off balance, acting inside his decision cycle.
- **Civilian Considerations:** civilian populations, culture, organizations, natural environment, to include cultural sites, in all operations directly or indirectly affecting civilian populations. Commanders include civilian political, economic, and information matters as well as more immediate civilian activities and attitudes.

Appendix B

The NASA-TLX Questionnaire

Please respond to the questions below by circling the point on the scale that corresponds to how you feel regarding your perceived workload and effort following each task.

(1) How mentally demanding was the task?



Very Low

Very High

(2) How physically demanding was the task?



Very Low

Very High

(3) How hurried or rushed was the pace of the task?



Very Low

Very High

(4) How successful were you in accomplishing what you were asked to do?



Very Low

Very High

(5) How hard did you have to work to accomplish your level of performance?



Very Low

Very High

(6) How frustrated, irritated, and annoyed were you?



Very Low

Very High

Appendix C

Tactical Thinking Behaviorally Anchored Rating Scales (T-BARS)

1	2	3	4	5
Performance is abstract and rule based, and focuses on variables in isolation.	Performance reflects simple analytical processing using a limited experience base.	Performance reflects a mental model of asset utilization, but remains dependent on analysis and planning rather than recognition and intuition.	Performance reflects a recognitional or intuitive assessment of the situation, but analytical decision making where the individual deliberates about a course of action.	Performance reflects a recognitional ability to assess and decide.
Theme 1. Know and Use All Assets Available Combat leader must not lose sight of the synergistic effects of fighting their command as a combined arms team this includes not only all assets under their command, but also those which higher headquarters might bring to bear to assist them.				
1 Knows Textbook Capabilities	2 Matches Assets to Mission Requirements	3 Utilizes Organic Assets to Accomplish Mission Objectives	4 Recognizes Full Range of Assets Required based on Situational Demands	5 Applies Full Range of Assets to Direct the Outcome of the Battle
Individual knows facts about standard capabilities of organic assets such as ranges of weapons, number of vehicles per unit. The foundational knowledge required to analyze how assets can be applied to the situation has not yet developed.	Individual knows facts about standard capabilities of organic assets such as ranges of weapons, number of vehicles per unit. The foundational knowledge required to analyze how assets can be applied to the situation has not yet developed.	Individual can prioritize mission tasks and predict how the situation could unfold, and an asset utilization plan is generated against that analysis. However, execution is driven by the plan over the situation, so individual has difficulty adjusting asset utilization to meet changing demands.	Individual recognizes the availability of non organic and non military assets in addition to his own organic assets. For example, civilians are recognized to be valuable sources of HUMINT. Situational demands drive asset utilization, rather than the plan or the organic assets at the individual's disposal.	Individual can visualize specific outcomes of asset utilization and has the ability to avoid unwanted consequences. For example, he knows how to command and maneuver his forces to avoid an uprising by the locals. Individual leverages and coordinates organic, non organic, and on military assets to achieve mission objectives.
Theme 2. Keep a Focus on the Mission and Higher's Intent. Combat leaders must never lose sight of the purpose and results they are directed to achieve even when unusual and critical events may draw them in a different direction.				
1 Focuses on Own Mission	2 Discriminates Intent and Explicit Mission	3 Models Effects of Own Mission and HQ Intent	4 Makes Accurate Predictions	5 Supports Intent
Individual fixates on own mission rather than considering larger organization's mission. He is unable to consider higher intent.	Mission tasks are paramount to all else, and intent can be articulated but not operationalized. Individual has difficulty prioritizing tasks for mission accomplishment and is often uncertain or overwhelmed as situation evolves. There is a tendency to rely on direction from higher HQ rather than making own decisions.	Individual can prioritize mission tasks and predict how the situation could unfold, and an asset utilization plan is generated against that analysis. However, execution is guided by an efficient but rigid plan that is not adapted to account for changes in the situation.	Individual recognizes how situational factors impact the mission and the path to achieving intent.	Individual can quickly and accurately assess the situation, visualize contingencies, and devise and action plan that accomplishes the intent while avoiding unwanted consequences.

Theme 3. Model a Thinking Enemy or Populace. Combat leaders must not forget that the adversary is a reasoning human being, intent on defeating them it's tempting to simplify the battlefield by treating the enemy as static or simply reactive. Likewise, the local populace has its own motivations that drive its actions within the battlespace.				
1	2	3	4	5
Uses Enemy Templates	Regards the Enemy as Static	Regards the Enemy as Intelligent and Dynamic	Predicts Enemy Actions	Denies Enemy Intent
Individual acknowledges the enemy superficially and equates him with theoretical or doctrinal templates.	Enemy is understood to have an impact on the mission, but is regarded as static, non thinking adversary. Individual has trouble distinguishing centers of gravity from the rest of the enemy picture.	Individual analyzes the enemy situation and predicts enemy actions. Ideas about enemy objectives and COA are constructed, but they are general and imprecise.	Individual continually updates his assessment of the enemy situation and his predictions about the enemy's next steps based on situational factors.	Individual visualizes how enemy is act and react, and takes actions to deny enemy intent.
Theme 4. Consider Effects of Terrain Combat leaders must not lose sight of the operational effects of the terrain on which they must fight every combination of terrain and weather has a significant effect on what can and should be done to accomplish the mission.				
1	2	3	4	5
Uses Terrain Checklists	Identifies Important Terrain Features	Incorporates Terrain into Own Plan	Recognizes How the Enemy May Use Terrain	Turns Terrain to Own Advantage
Individual uses standard checklists to determine relevant terrain features. The foundational knowledge required to analyze the impact of terrain on the mission has not yet developed.	Important terrain features are identified and prominent problem areas such as chokepoints are avoided. However, individual remains unable to leverage terrain to own advantage.	Individual performs an analysis of the terrain and incorporates terrain features into the plan. However, the individual tends to adhere to the plan even after the situation has evolved and new information about the terrain becomes available.	Individual continually updates his view on terrain and its impact on the mission as the situation evolves and new terrain features and patterns are discovered.	Individual is quickly able to visualize how terrain will impact the friendly mission and predict enemy actions. He leverages the terrain to his own advantage and denies the enemy's ability to do the same.

Appendix D

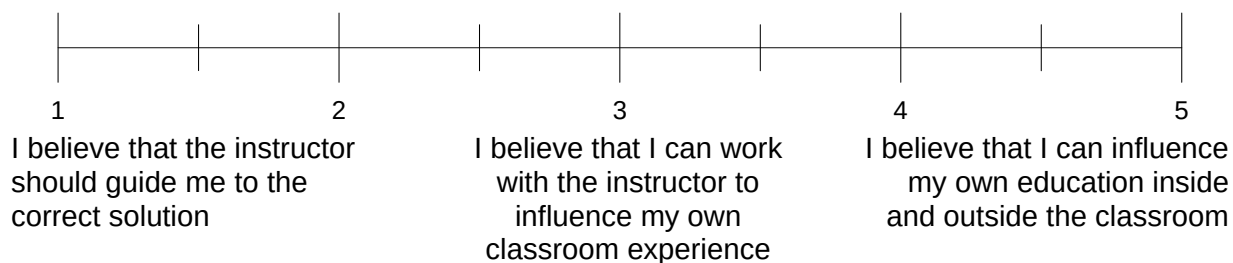
Post Training Evaluation Questionnaire

Using the scale below, please fill in the bubble to indicate your feelings toward the instruction you received.

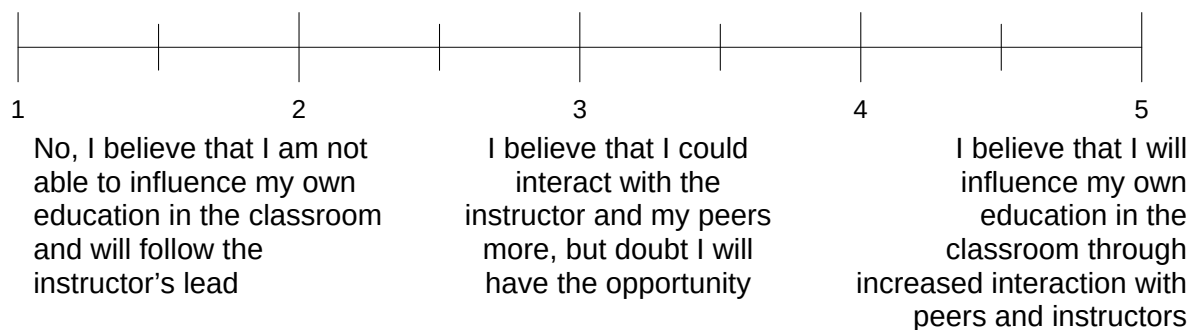
	Strongly Agree	Agree	Neither Disagree or Agree	Disagree	Strongly Disagree
1. The instruction gave me a much better understanding of the mission planning process.	☐	☐	☐	☐	☐
2. The instructor had a thorough understanding of the topic material.	☐	☐	☐	☐	☐
3. The time devoted to explaining concepts and group discussions was adequate.	☐	☐	☐	☐	☐
4. The instructor covered issues and nuances in the mission planning process that were very helpful.	☐	☐	☐	☐	☐
5. The instruction provided valuable insights on how to effectively approach the mission planning process.	☐	☐	☐	☐	☐
6. The instruction improved my ability to critically analyze and plan an Infantry mission.	☐	☐	☐	☐	☐
7. The class content was valuable to me as a platoon leader.	☐	☐	☐	☐	☐
8. The topic areas covered in this class will clearly benefit me.	☐	☐	☐	☐	☐
9. I was thoroughly engaged throughout the class.	☐	☐	☐	☐	☐

10. I feel that I am better adaptive thinker as a result of this class.	☐	☐	☐	☐	☐
---	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

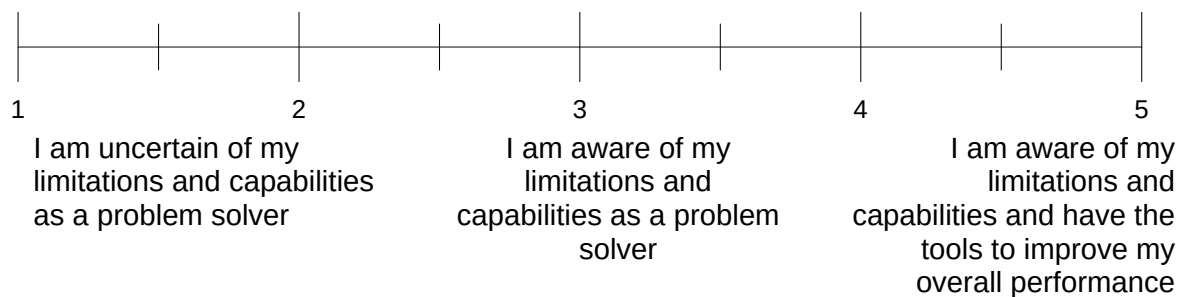
11. Do you feel that you have a sense of personal accountability for your own education?



12. Do you feel that you will take initiative as a student in future classroom situations as a result of the class?



13. Do you feel that you have more awareness regarding your personal capabilities as a result of the class?



14. What aspects of the instruction did you like most? Please explain.

15. What aspects of the instruction did you like least? Please explain.

16. Were there any topic areas that were not addressed, but should be included in training the mission planning process?

Appendix E

Direct Instruction Approach

1. Objectives of the training

- A. TLO: To model a dynamic situation
 - i. ELO A: Understand friendly capabilities and composition
 - ii. ELO B: Understand enemy capabilities and composition
 - iii. ELO C: Understand interaction of friendly and enemy capabilities
 - iv. ELO D: Understand impact of terrain on friendly/enemy capabilities
 - v. ELO E: Understand how the enemy synchronizes capabilities
 - vi. ELO F: Understand how friendly forces synchronize capabilities
 - vii. ELO G: Determine appropriate questions or resources needed to complete the plan
 - viii. ELO H: Apply synchronized forces to the terrain
 - ix. ELO I: Recognize elements of a good plan
 - x. ELO J: Recognize impact of changes and update plan

2. Description of content and exercises for each ELO

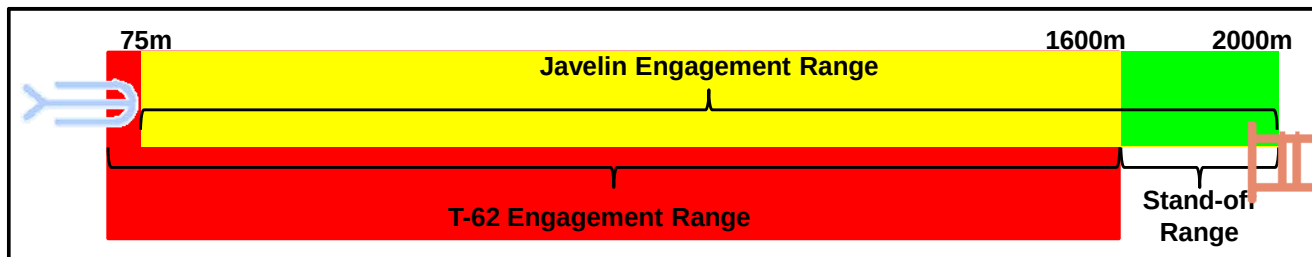
- A. Understand friendly capabilities and composition
 - i. Information regarding the importance of understanding friendly capabilities and direct fire friendly strengths in the defense.
 - ii. Instructor demonstration of how to determine how long a unit will be able to suppress a target, without considering the effects on the enemy or terrain.
 - iii. Student exercise to determine how long it will take them to emplace a wire obstacle.
- B. Understand enemy capabilities and composition
 - i. Information regarding composition/disposition/strength.
 - ii. Instructor demonstration without considering the terrain, how the enemy is likely regarding stand-off, speed of vehicles (build up engagement), breach, mindfield, and time-distance calculations.
- C. Understand interaction of friendly and enemy capabilities
 - i. Demonstration of how to determine how much time a gunner will have to engage a T72 tank (see Figure E-1 below).
 - ii. Student exercise: Determine stand-off range and engagement times for the Bradley and M1A2 given the following specification sheets for friendly and enemy capabilities.
 - iii. Emphasize that the interaction is important, and the information provided in various references are a starting point to determine the specific interaction.
- D. Understand impact of terrain on friendly/enemy capabilities
 - i. Information regarding METT-TC, OAKOC; military aspects of weather, intelligence preparation of the battlefield (IPB), area of operations, area of interest, describe battlefield effects, ASCOPE (areas and structures, capabilities, organizations, people, and events).

- E. Understand how the enemy synchronizes capabilities
 - i. Demonstration of Javelin engagement range with enemy considerations (see Figure E-2 below).
 - ii. Information regarding enemy capabilities and attack formation
 - iii. Student exercise regarding where the North Koreans synchronize their assets without consideration of terrain.
- F. Understand how friendly forces synchronize capabilities
 - i. Information regarding commander's visualization, nesting of tasks, control measures, impact of one unit's actions on another unit, direct fire, field artillery, indirect fire assets – capabilities, engineer assets, and air defense assets.
 - ii. Student exercise regarding defensive positions and key terrain for friendly assets on terrain in Korea.
- G. Determine appropriate questions or resources needed to complete the plan
 - i. Information regarding course of action statement and sketch and priority intelligence requirement (PIR).
- H. Apply synchronized forces to the terrain
 - i. Information regarding course of action (COA) development, decisive operation, decisive point, and endstate.
 - ii. Instructor demonstration of what the decisive point should be and why given a specific mission.
 - iii. Information regarding generate options, array initial forces, develop schemes of maneuver, assign headquarters, prepare course of action statement and sketch.
 - iv. Instructor demonstration of a COA sketch (see Figure E-3 below).
 - v. Student exercise creating a COA statement and sketch to include practicing all tasks learned throughout the training.
- I. Recognize elements of a good plan
 - i. Information regarding the analysis of friendly (e.g., Did I use special attachments in the most effective way?) and enemy capabilities (e.g., Have I thought about what the enemy will do to negate my actions?) and terrain features (e.g., Do I realize that additional information that I gain during the leader's recon may require me to change my initial plan?).
- J. Recognize impact of changes and update plan
 - i. Summary information regarding contingencies, coordination with other units, intelligence, and attached assets.

Demonstration

Range for Standoff

- JAVELIN range: 75m to 2000 m
- T-62, main gun is 1600m, coax 7.62 is 1000m, avg. speed is 30km/hr (30,000m/hr) on-road and 20km/hr (20,000 m/hr) off-road
- For how long will we have standoff over the enemy?



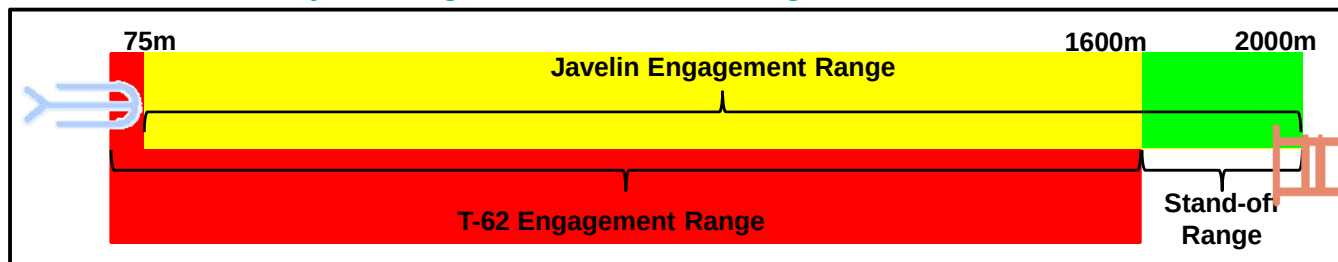
- 2000m - 1600 m = 400m of stand-off range
- 2000m – 75m = 1925 m of engagement
- On Road:
 - 30,000 m/hr / 3600 sec/hr = 8.33 m/s on road
 - 400 m / 8.33 = 48 seconds of standoff (1925 m / 8.33 = 3 min 51 sec before Javelin is a paperweight)
- Off Road:
 - 20,000 m/hr / 3600 sec/hr = 5.55 m/s off road
 - 400 m / 5.55 = 72 seconds of standoff (1925 m / 5.55 = 5 min 46 sec)

What's a good rate of fire for a Javelin gunner?

Figure E-1. Demonstration of how to determine how much time a gunner will have to engage a T72 tank.

Let's Go Back

- For how long will we have standoff over the enemy?
- Do you think this issue has occurred to the enemy? (Remember, he wants to die about as much as you do.)
 - What is he doing about it?
 - What are you doing about what he's doing?



- $2000\text{m} - 1600\text{m} = 400\text{m}$ of stand-off range
- $2000\text{m} - 75\text{m} = 1925\text{m}$ of engagement
- On Road:
 - $30,000\text{ m/hr} / 3600\text{ sec/hr} = 8.33\text{ m/s}$ on road
 - $400\text{ m} / 8.33 = 48\text{ seconds}$ of standoff ($1925\text{ m} / 8.33 = 3\text{ min } 51\text{ sec}$ before Javelin is a paperweight)
- Off Road:
 - $20,000\text{ m/hr} / 3600\text{ sec/hr} = 5.55\text{ m/s}$ off road
 - $400\text{ m} / 5.55 = 72\text{ seconds}$ of standoff ($1925\text{ m} / 5.55 = 5\text{ min } 46\text{ sec}$)

What's a good rate of fire for a Javelin gunner?

Figure E-2. Demonstration of Javelin engagement range with enemy considerations.

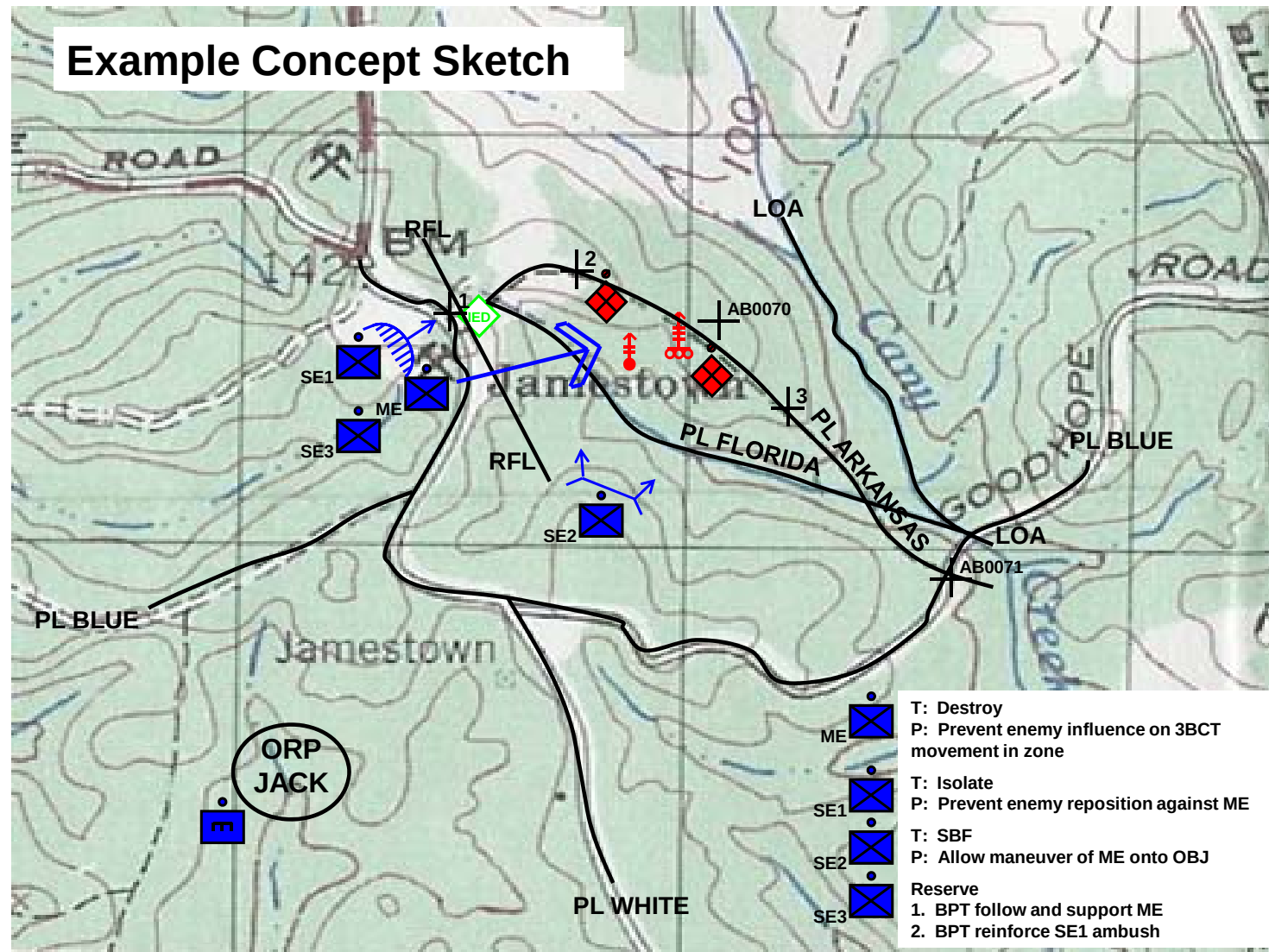


Figure E-3. Instructor demonstration of a COA sketch.

Appendix F

Training Materials for IBL Approach: Operations Order

UNCLASSIFIED

A/1-504 Company Operations Order OPORD 11-02 OPERATION CHOSUN

References:

Mapsheet—

Area of Operations Orientation Briefing

Time Zone Used Throughout Order: Zulu

Copy ___ of ___ Copies

A/1-504

OSAN AFB, Republic of Korea

19 0900 FEB 11

Fictionalized Intelligence/Scenario. For Training Only

UNCLASSIFIED

Situation

1a. Enemy Forces.

Elements of the nK II Corps continue movement toward and build-up near the DMZ as the political situation in the region deters. While indications and warnings do not show that attack is imminent, UNC/CFC continue defensive preparations throughout the ROK.

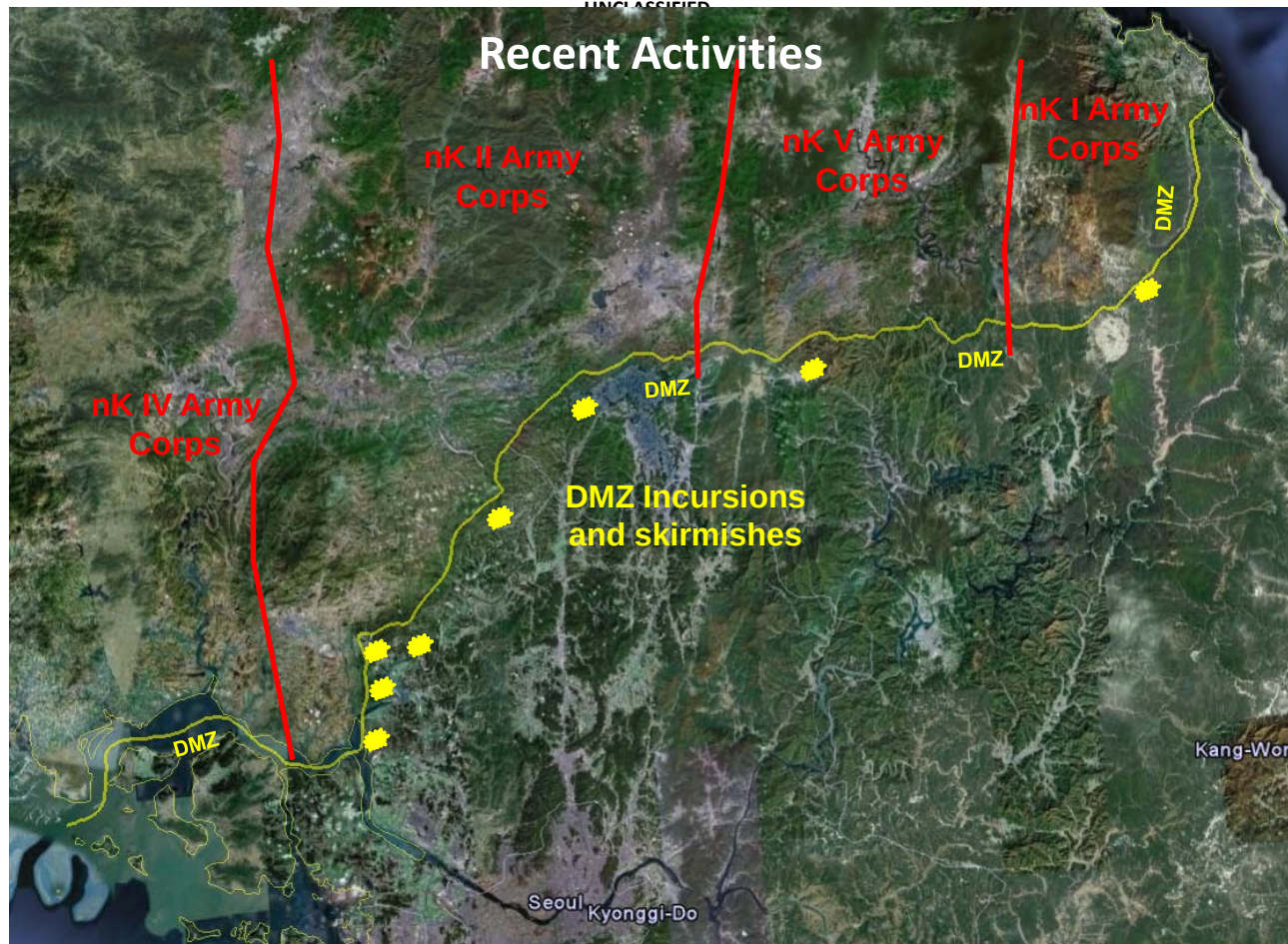
Specifically, elements of the 33rd Infantry Division are massing in the TF 2-9 Area of Interest. Imagery indicates the 33rd has been augmented with the addition of at least one tank battalion, bringing the total number to two tank battalions. Should an attack occur, the first echelon will likely be comprised of tanks in order to secure the main Avenue of Approach running directly through the Task Force sector to Seoul. The strength of the 33rd Infantry Division appears to be near 100%.

nK continues light infantry patrols into the DMZ, with incursions into the ROK side of the border. These patrols are meant to gather intelligence on the disposition of UNC/CFC forces. On occasion, these patrols have lead to minor skirmishes but not a protracted battle. As nK force movements and the build-up of UNC/CFC defenses continues, the frequency of the patrols has increased. Additionally, while undetected to this point, it is assumed that nK special forces have infiltrated our AO, disguised as locals or civilians fleeing the impending violence.

The number of nK soldiers inside the Joint Security Area has doubled since the beginning of regional tensions. A potential, lesser, enemy COA is to seize the Joint Security area without conducting a full attack.

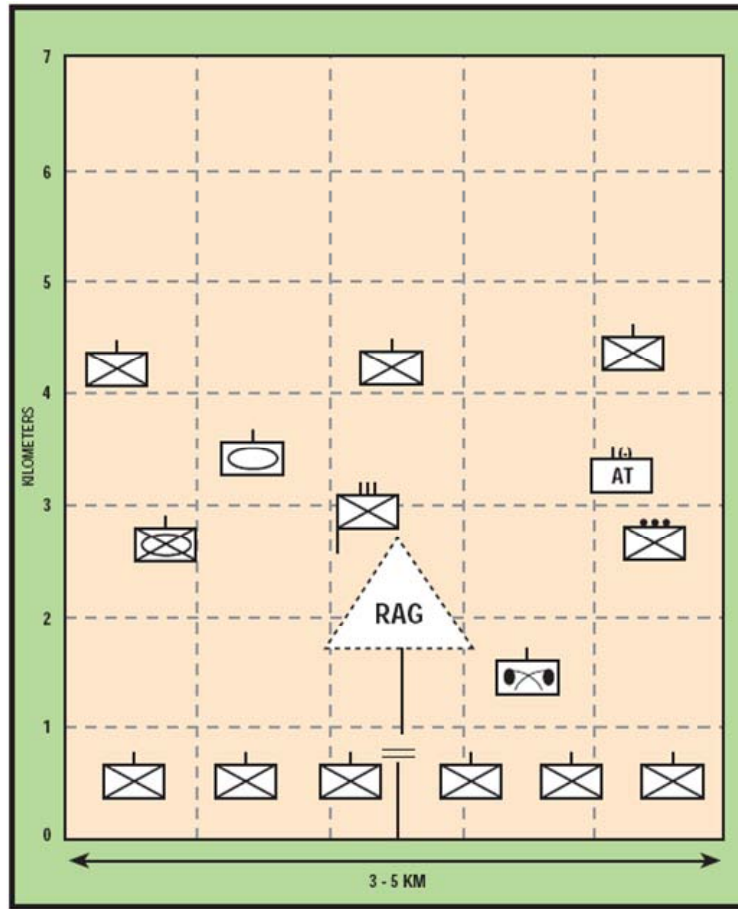
Battalion expects a light infantry regiment to attack along two avenues of approach, therefore, I expect that we will initially encounter approximately half of the regiment.

Fictionalized Intelligence/Scenario. For Training Only



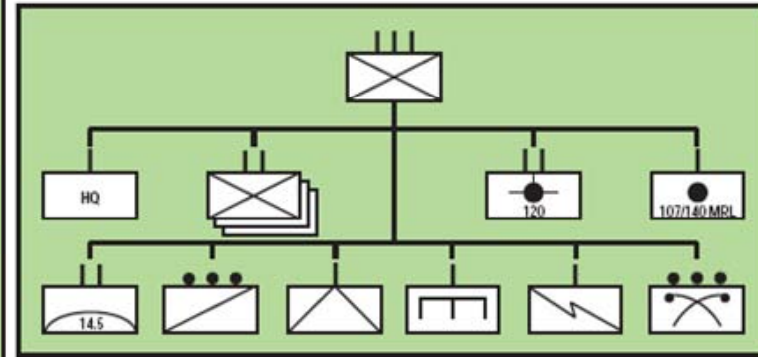
UNCLASSIFIED

Composition: nK Regiment



Regiment in the Attack

Source: MCIA-2630-NK-016-97



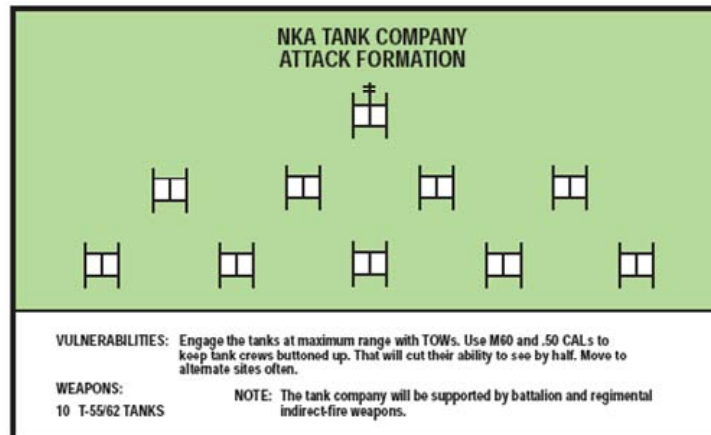
INFANTRY REGIMENT	Total	INF Bn	MTR Bn	AAA Bn	MRL Btry	AT Btry	Eng Co	Sig Co	Recon Plt	CML Plt	HHC
T-63RPU (107/140 MRL)	9				9						
M39 (76.2 AT Gun)	4					6					
AT-3 SAGGER	9	3									
B-10/11 (82/167 RG)	9	3									
RPG-7 (AT Lch)	192	50	8				3	3			4
M-43 (120mm Mortar)	27		27								
M-37 (82mm Mortar)	27	9									
SA-7b	12	3		3							
2PU-2R (14.5 AAA HMG)	18			18							
V-415 Jeep	8	1	1	1							3
2 V2T Utility Truck	126	8	31	33	9	7	5	5	5		7
Flamethrower	4						4				
RPD-RP-465MG	217	81	8				3	3			
AK Rifle	1896	360	156	259	70	73	61	54	30	25	88
M1601 30 Rifle	18	6									
T-64R8 Pistol	182	29	26	23	5	5	5	5	1	1	24
Personnel	2379	476	206	282	75	78	76	65	31	26	112
Officer	162	29	26	23	5	5	5	5	1	1	24
Enlisted	2197	447	180	259	70	73	71	60	30	25	88

Infantry Regiment

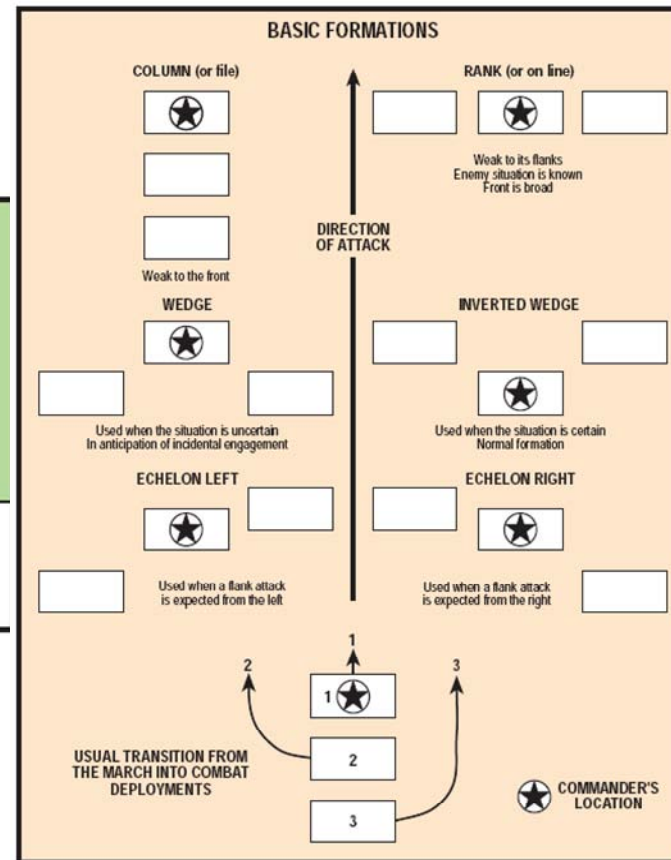
Fictionalized Intelligence/Scenario. For Training Only

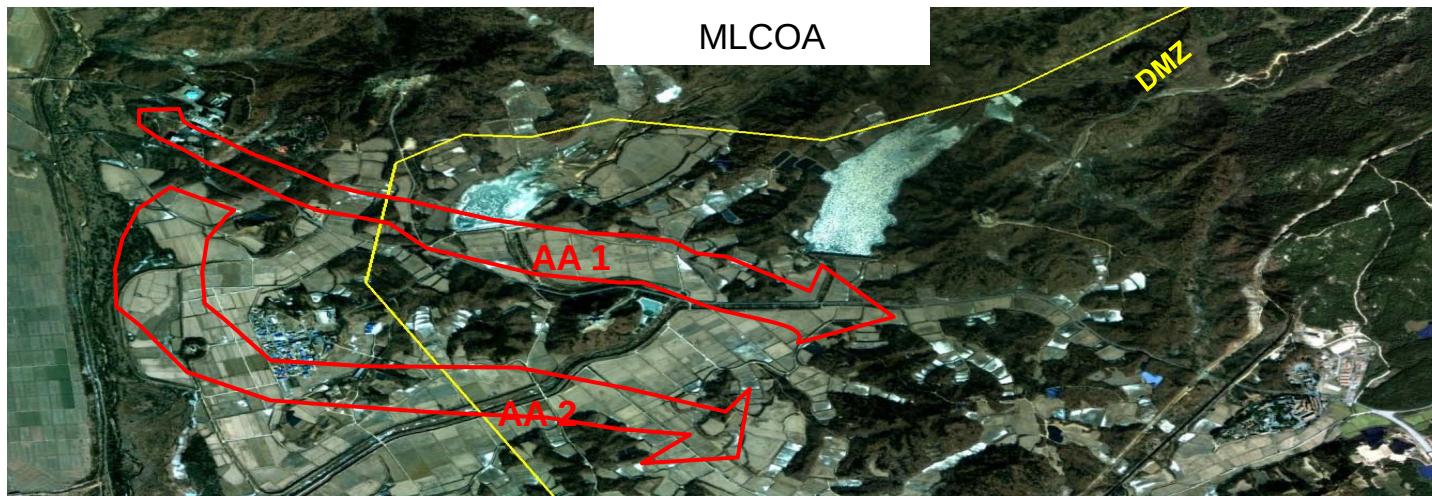
UNCLASSIFIED

Composition: Tank Company in Attack



Source: MCIA-2630-NK-016-97





Phase I

Both AA1 and AA2 will be probed by 6 companies of light infantry to determine weaknesses in our defense. AA1 will be the most likely axis of advance and all companies will merge toward AA1.

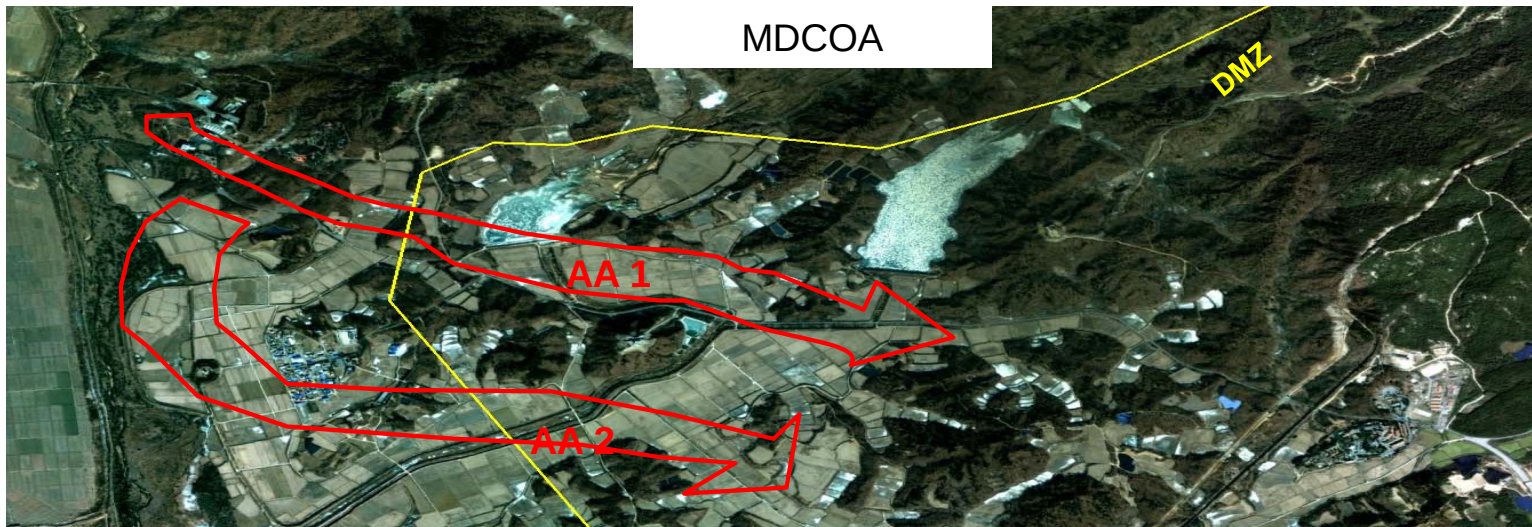
Phase II

Light infantry will try to bypass defensive positions to attack from flank or rear. If these forces cannot bypass then they will move forward down AA1. These forces are to set the stage for a penetration attack using mech and armor forces. This phase will begin with 82mm mortars (M-37s) focused on destroying CPs and OPs along AA1 as well as clearing a path through obstacles for the follow on attack in Phase III. nK forces will advance using the inverted wedge and will use RPG-7s to destroy or disable (fix) our mechanized forces thereby collapsing our defensive organization.

Phase III

This attack will begin with 120mm (M-43) mortars. These will be used forward of the light infantry to aide in their advance and disrupt our defensive positions thereby clearing a path for mech and armor forces. Mech forces will move forward and dismount to penetrate primary / secondary defensive positions. Their goal will be to destroy our forces and find a path across our obstacles for the nK tanks. Armored forces will move forward to aide in penetration if heavy resistance is met and/or to combat our ME along the tank ditch.

Fictionalized Intelligence/Scenario. For Training Only



Phase I

TBMs, Mortars, and Artillery use annihilation fire and rolling barrages advancing from DMZ south across our defensive lines.

Phase II

nK and Chinese infantry advance along AA1 and AA2 using number superiority to engage CFC forces. The goal is to find weaknesses in the defense and exploit those areas. These forces will follow behind the rolling barrages. They will use 82mm mortars as well as RPG-7s to destroy or fix our mechanized forces. Their ultimate goal is to penetrate our mech forces and push toward the tank ditch and ME.

Phase III

Mechanized and Tank forces move forward to engage remaining CFC armor and infantry. Cross our obstacles and move south toward Seoul.

Fictionalized Intelligence/Scenario. For Training Only

UNCLASSIFIED

1.b. Friendly Situation

- Refer to AO Orientation Briefing
- A/1-504 remains at Osan AFB and continues preparations for air movement to Camp Bonifas, then foot movement north.
- 1st HBCT, 2 ID will occupy pre-planned defensive positions along the DMZ and increase patrols in sector. The intent of this operation is to allow for the preparations of defensive positions around Seoul. Additionally, they hope to deter further nK aggression as the political situation continues to deter.
- 1st HBCT intends to fight as a combined arms team and has requested light infantry support. A/1-504 will be attached to 2-9IN (M) for this mission as they defend in sector.

Fictionalized Intelligence/Scenario. For Training Only

UNCLASSIFIED

Area of Operations/Interest



F-9

Fictionalized Intelligence/Scenario. For Training Only

UNCLASSIFIED



TF 2-9 occupies defensive positions in sector IOT allow further preparations to the south.

Intent. The purpose of this operation is to allow defensive preparations to the south. This will prevent the North Korean occupation of Seoul.

Key Tasks. – Turn enemy into EA TORCH. Destroy armored and mechanized infantry element.

Endstate. – Enemy's mechanized and armor assets destroyed forward of the tank entrapment, friendly forces have withdrawn south and east to prepare for follow-on operations.

F-10

Fictionalized Intelligence/Scenario. For Training Only

UNCLASSIFIED

Task Force Graphics



F-11

Fictionalized Intelligence/Scenario. For Training Only

Terrain and Weather

- Terrain:
 - Observation and Concealment: Winter rice paddies offer good observation, whereas wooded areas will conceal dismounted troops.
 - Cover and Fields of Fire: Mountainous areas will provide ample opportunities for cover and will limit the effects of low angle indirect assets. Clear fields of fire are best provided by rice paddies, although the berms that surround each field provide cover against small arms munitions. (see penetration data)
 - Avenues of Approach and Obstacles: The mountainous and numerous rivers and tributaries will naturally canalize mounted movement. Dismounts will attempt to use the wooded areas and limit their exposure in rice paddies.
 - Key Terrain: The “fork” at xxxx xxxxx where we must turn the enemy to the west represents key terrain that we must be able to affect
- Weather
 - For the next few days, the highs will be in the mid thirties, the lows in the teens. Humidity has been consistent around 65%, impact on visibility unknown

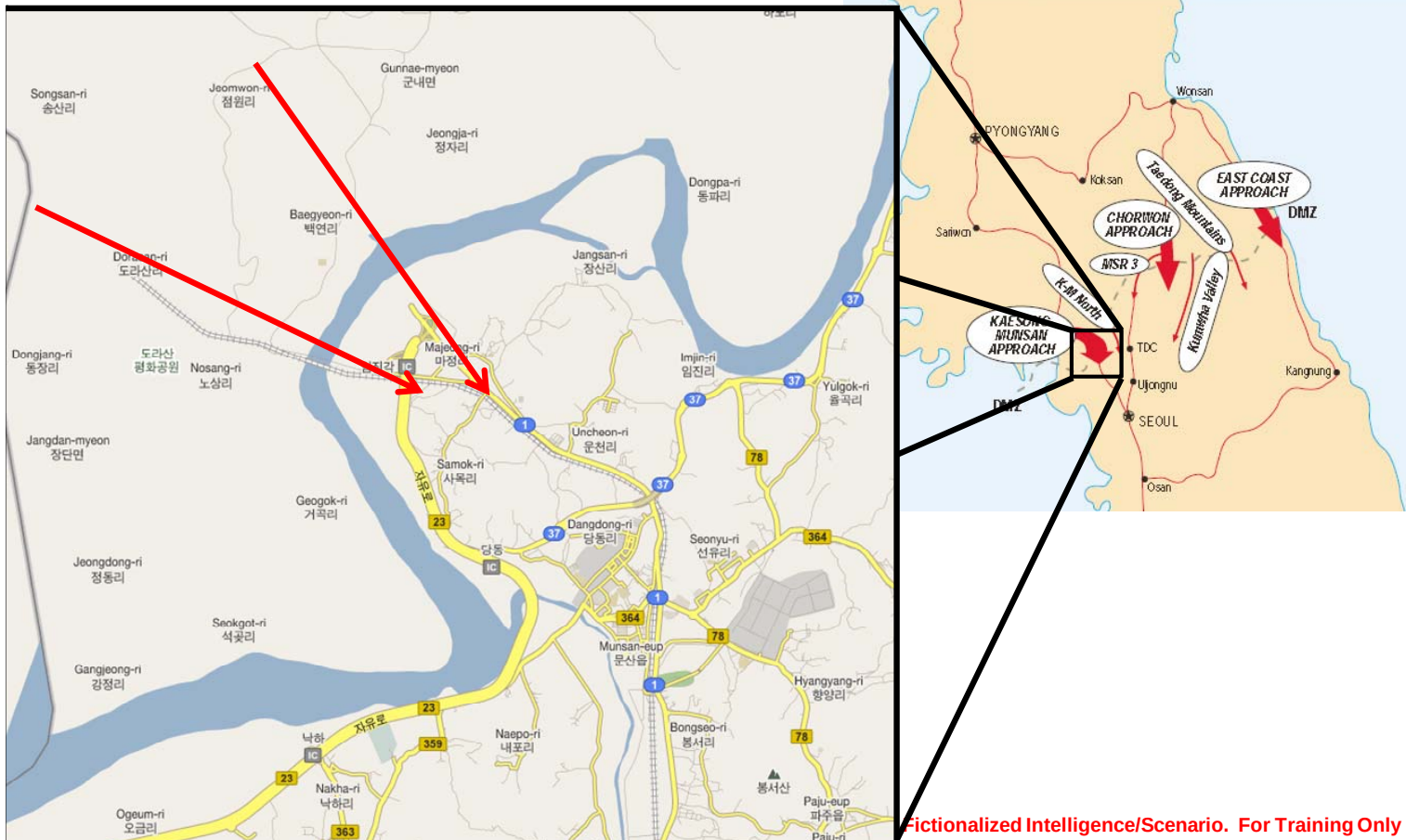
Date	BMNT	Sunrise	Sunset	EENT	Moonrise	Moonset	% Illum
10 Feb	0630	0728	1805	1903	1029	1257(+1)	41
11 Feb	0629	0727	1806	1904	1105	0156(+1)	51
12 Feb	0628	0726	1807	1905	1148	0254(+1)	62

ining Only

UNCLASSIFIED Avenues of Approach

In the battalion sector, there are two bridges that will naturally canalize the enemy approach.

KAESONG-MUNSAN	CHORWON VALLEY	EAST COAST
Kaesong-Munsan North	Kumwha Valley Chorwon West (MSR 3)	Taedong Mountains

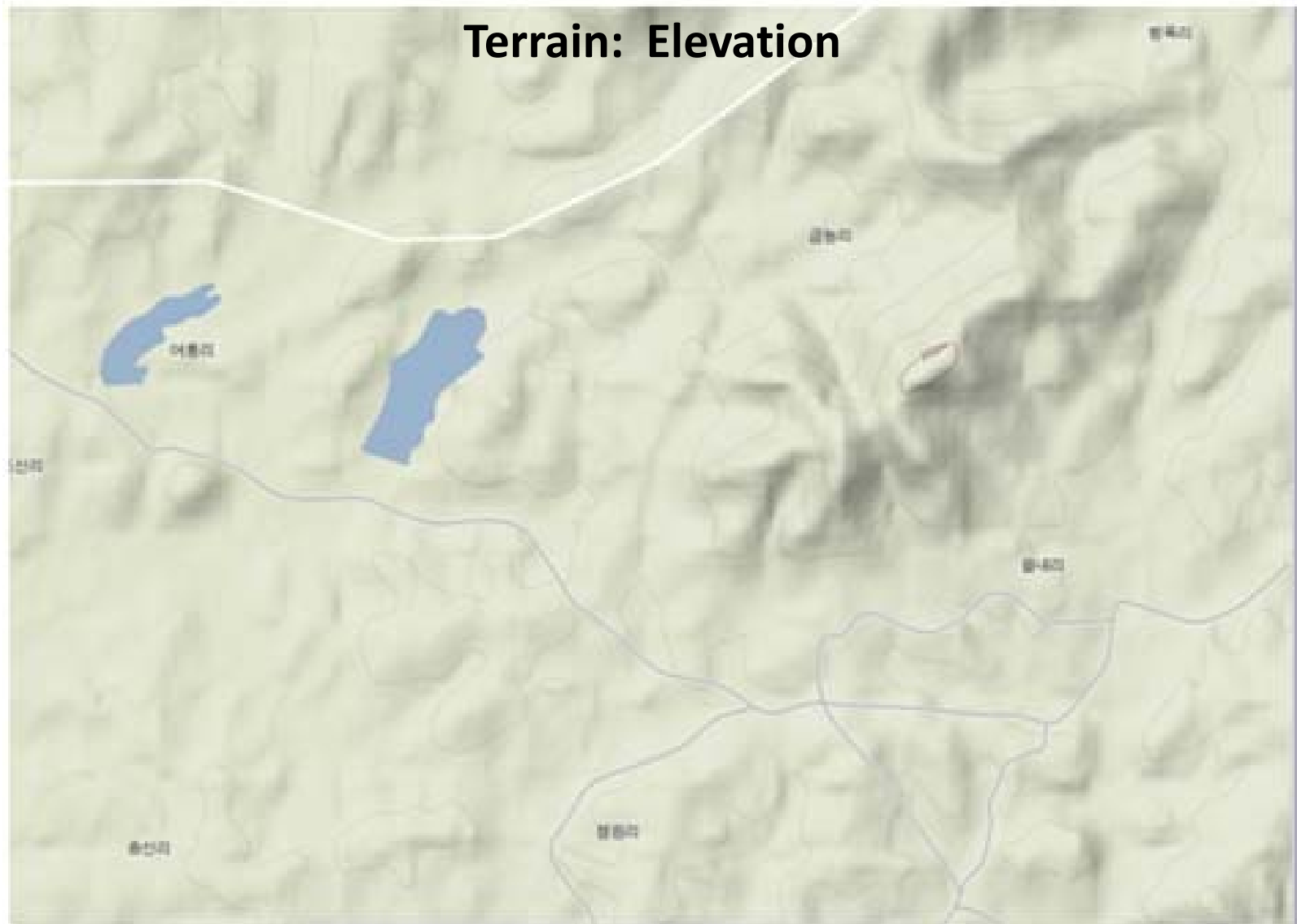


Fictionalized Intelligence/Scenario. For Training Only



F-14

Fictionalized Intelligence/Scenario. For Training Only



F-15

Fictionalized Intelligence/Scenario. For Training Only

UNCLASSIFIED

Terrain: Camp Bonifas



Fictionalized Intelligence/Scenario. For Training Only

F-16

Fictionalized Intelligence/Scenario. For Training Only

UNCLASSIFIED

1.d. Attachments and Detachments

A/1-504 PIR Current Task Organization

	HQ	1/A/1-504 (-)	2/A/1-504	3/A/1-504
Personnel	10	33 (2 FO's)	40 (minus FO)	34
Organization				
Equipment		2x 240B	2x 240B 4x Javelin 12x Javelin Rounds	2x 240B 2x Javelin 2x Javelin Rounds

Air Movement Seat Allocation

	HQ	1/A/1-504 (-)	2/A/1-504	3/A/1-504
Chalk 1	5		5	34
Chalk 2		33 (plus barrier material)		
Chalk 3			35	
Chalk 4	5			

Fictionalized Intelligence/Scenario. For Training Only

Company Mission

A/1-504 fixes NLT 10 1900 FEB vic BH 9807 0182 in order to prevent the enemy from bypassing EA TORCH.

Commander's Intent

The purpose of this operation is to prevent the enemy from bypassing EA TORCH. This will enable the battalion to destroy the enemy's mechanized and armor elements to allow further defensive preparations to the south.

Key tasks:

- Identification of enemy main effort
- Destruction of enemy C2 elements
- Withdrawal of forces to enable follow-on operations

At endstate, A/1-504 has identified the enemy's main effort, has enabled A/2-9 to engage the enemy, and has withdrawn east to consolidate, reorganize, and conduct follow-on operations.

Fictionalized Intelligence/Scenario. For Training Only

A/1-504 fixes NLT 24 1900 FEB vic BH 9807 0182 in order to prevent the enemy from bypassing EA TORCH.

The purpose of this operation is to prevent the enemy from bypassing EA TORCH. This will enable the battalion to destroy the enemy's mechanized and armor elements to allow further defensive preparations to the south.

Scheme of Maneuver: A/1-504 will air assault into sector in 2 lifts. In lift 1, 1st and 3rd PLT will begin counter reconnaissance patrolling and establish TRPs while 2nd PLT conducts a leader recon for EA development. After lift 2 arrives, counter mobility preparations will begin in earnest.

Fires: Fires will be used to disrupt the enemy's advance. Priority of fires goes to 1/A. Once the enemy's main effort has been identified, fires will shift to 2/A.

Engineer: The purpose of engineer efforts are to fix the enemy using wire/mine obstacle. 2/A has priority of support if received. Priorities will shift from counter mobility to survivability upon completion of the fixing obstacle.

3.a. Concept of Operations

1km



Task: A/1-504 fixes NLT 24 1900 FEB vic BH 9807 0182 in order to prevent the enemy from bypassing EA TORCH.

The purpose of this operation is to prevent the enemy from bypassing EA TORCH. This will enable the battalion to destroy the enemy's mechanized and armor elements to allow further defensive preparations to the south.

Key tasks:

- Identification of enemy main effort
- Destruction of enemy C2 elements
- Withdrawal of forces to enable follow-on operations

At endstate, A/1-504 has identified the enemy's main effort, has enabled A/2-9 to engage the enemy, and has withdrawn east to consolidate, reorganize, and conduct follow-on operations.

Decisive Operation: 2/A/1-504 fixes vicinity BP SWORD IOT prevent the enemy from bypassing EA TORCH

Shaping Operations:

1/A/1-504 conducts counter reconnaissance to determine enemy main effort and pre-registers TRPs.

3/A/1-504 secures to allow 2/A to complete engagement and aid in withdrawal.

3.a. Concept of Operations

1km



1/A/1-504 (-) (SO1):

- Conduct counter-reconnaissance within sector to deny enemy collection of intelligence of our defenses
- Pre-register FASCAM and TRPs along suspected AAs
- Coordinate reward passage of lines with QRF at Panmunjeom
- Destroy enemy recon elements
- Establish early warning countermeasures in wooded areas
- Identify enemy main effort
- On order, exfiltrate to the east along marked route

2/A/1-504 (+) (DO):

- Occupy defensive positions vic. BP SWORD in order to maximize range of the JAVELIN
- Destroy enemy C2 elements in order to create discontinuous command and control in the enemy force
- Establish obstacle plan in order to fix enemy advance
- O/O, withdraw to the east along marked route and evade enemy contact

3/A/1-504 (-) (SO2):

- Secure to the north of BP SWORD to allow ME to complete engagements
- Establish and mark withdraw route
- Provide guides during withdraw
- Screen to prevent enemy engagement of CO during withdraw

3.b. Tasks to Maneuver Units



Execution—Coordinating Instructions

- 1) Order goes into effect immediately.
- 2) Commander's Critical Information Requirements:
 - PIR:
 1. What does the nK patrol activity inside the DMZ indicate about the enemy?
 2. Will the enemy employ light infantry in support of armored forces in the event of attack?
 3. Will and where will the enemy commit his main attack?
 4. Will the enemy re-positioning forces from adjacent positions to support an adjacent unit?
 - EEFI:
 1. Location of patrols
 2. Location of adjacent units
 3. Best avenues of approach out of our sector for withdraw
 - FFIR:
 1. Loss of crew served weapons
 2. Loss of JAVELIN
 3. Engagement areas of adjacent units

Fictionalized Intelligence/Scenario. For Training Only

UNCLASSIFIED

Execution - Coordinating Instructions

- 3) Risk Reduction Control Measures:
 - No changes from current SOP
- 4) ROE and SPINS are in effect as of 10 0000Z FEB11
- 5) Provide obstacle and mine requests to XO NLT 09 1500 FEB, to include grid to desired delivery location
- 6) Lift will consist of 2x CH-47's, with a 2 hour turn between lifts. Coordinate manifest with 1SG.
- 7) Coordinate direct fire control measures with commander once on the ground.

Fictionalized Intelligence/Scenario. For Training Only

UNCLASSIFIED

Coordinating Instructions (cont'd.)

- Timeline
 - 09 1000 FEB 11 Recon Element PCI/PCC complete
 - 09 1100 FEB 11 CO OPORD
 - 09 1300 FEB 11 Backbrief
 - 09 2100 FEB 11 PMCS Complete on Crew Served Weapons
 - 10 0900 FEB 11 Company Rehearsals; PCI's complete
 - 10 1100 FEB 11 Platoon/Squad/Crew Rehearsals
 - 10 1300 FEB 11 Mandatory Rest
 - 10 1600 FEB 11 Chalk Briefs, PCC's complete
 - 10 1700 FEB 11 First Chalk launches

Fictionalized Intelligence/Scenario. For Training Only

UNCLASSIFIED

Service Support

- **Concept:**
 - As necessary, A/1-504 will air move the majority of its supplies needed for a sustained defense in Chalk 4.
- **CL I: Ration cycle for 10 FEB: A-M-M**
- **CL V: All units will SP with ABL, having confirmed speedball ammo resupply and intended location. CSR is 1/3 Basic Load**
- **CL VIII: All Medic / CLS bags will be complete prior to SP**
- **Maintenance**
 - All crew served weapons and radios must be inspected NLT 23 1600 FEB
- **Medical Evacuation**
 - CCP and AXP will be TBD.

Fictionalized Intelligence/Scenario. For Training Only

UNCLASSIFIED

Command and Signal

- **Command**
 - Commander and XO will be at BP SWORD, 1SG will facilitate linkup between 1st and 3rd Platoons.
 - Succession of CMD: XO, 2/A PL, 3/A PL, 1/A PL.
- **Signal**
 - All BN and Task Force Nets per current SOP
 - MEDVAC Freq. 32.000
 - Air Support Freq. 340.000 (Sabre)
 - SOI index 1-9 in effect
 - 2 successive star clusters signal key task complete and and withdrawing –if radio is ineffective

Fictionalized Intelligence/Scenario. For Training Only

Appendix G

Training Materials for IBL Approach: Platoon Backbrief

1. SPECIFIED TASKS:

IF I DO NOTHING ELSE I WILL:

OTHER SPECIFIED TASKS:

2. IMPLIED TASKS:

3. TENTATIVE PLATOON MISSION STATEMENT:

4. TENTATIVE TASK ORGANIZATION:

--	--	--	--	--

5. WHAT WILL ENSURE YOUR SUCCESS FOR THIS MISSION?

6. ISSUES/CONCERNS:

--

7. COORDINATIONS I MUST CONDUCT/REQUESTS FOR INFORMATION:

NEED INFO FROM:	INFO NEEDED:	IMPACT ON PLAN:

Appendix H

Training Materials for IF: Friendly Capabilities

Aptima Blended Learning System

BIG IDEA

PREPARE **INFORM** **TEST** **ADAPT** **EXECUTE** **FRIENDLY CAPABILITIES**

IDEA ORDERS ANALYSIS CONSULT REQUEST PLAN PLAY REVISE REVIEW EVALUATE

It's one thing to know the maximum effective range or maximum rate of fire of a weapon. It's another to use the impact of that fact in making your plan.

Opening Problem:

- Your light infantry company is attacking an enemy supply depot, where counter insurgents return to refit after conducting operations. While temporary in nature, surveillance has determined that this depot has been in place for at least a week.
- Your light infantry platoon has been designated the support by fire element for a company attack. You are doing a map recon, and believe that a reverse slope offers a good approach and fields of fire, and is about 400m from the OBJ.
- The commander has attached the weapons squad from the assault platoon, and detached your third squad from you. The M240's have 1200 rounds each, and the M249's have 600 rounds each.
- In discussions with the commander, he is relying on you to enable the breaching element by suppressing the fighting positions closest to the breaching element. You have divided the OBJ into two parts and will use 1 weapons squad and 1 rifle squad for each half of the objective.

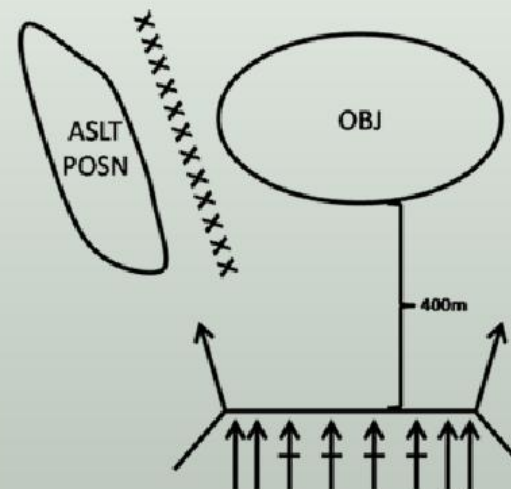
The diagram illustrates a tactical scenario. On the left, an oval labeled 'ASLT POSN' (Assault Position) is connected by a dashed line of 'x' marks to a larger oval labeled 'OBJ' (Objective). Below the 'OBJ' is a horizontal line representing a breaching element, with six upward-pointing arrows indicating fire. A vertical line connects the 'OBJ' to this breaching element, with a label '400m' indicating the distance. The entire scene is set against a light gray background.

Similar to friendly capabilities it is important to understand not just the characteristics of the weapon system, but how they interact with the friendly force, but also, how they are used in combination against the friendly force.

Returning to the Opening Problem:

We have learned that the enemy has constructed two bunkers closest to the obstacle, and you feel that if you suppressed those bunkers, you might be successful.

What else do you need to know to about the enemy to have reasonable confidence that you will enable the breach?



Aptima Blended Learning System

BIG IDEA

PREPARE

IDEAORDERSANALYSIS

INFORM

CONSULTREQUEST

TEST

PLANPLAY

ADAPT

REVISEREVIEW

EXECUTE

EVALUATE

FRIENDLYCAPABILITIES

Did you consider the following?

(check those that apply)

☒ a.) Distance from the assault position to the obstacle?

☐ b.) How long it will take to breach?

☒ c.) How long it will take the assault element to pass through the breach?

☐ d.) Rate of fire and area of the objective that will yield suppression?

Submit and Continue

Resolution:

In short, you need to imagine what conditions will allow the breach to take place. It is simple enough to calculate that you will be able to suppress for 12 minutes with the M240's (1200 rounds/ 100 rounds per minute = 12 minutes). However, will the 240's provide "suppression?" In order to answer that, we need to know more about the enemy? How long have they been in the area? Are they expecting contact? Will they have dug in? Are there supplies on the OBJ, such as fuel or vehicles, that might create a distraction if destroyed?

We also need to know about how the terrain will affect the breach element. Will the breach element have to low crawl to the OBJ? How long will that take? What do we know about the obstacle? What is the plan to reduce the obstacle, and how long will that take? Who is coordinating the passage of the assault element through the breach element?

H-3

Fictionalized Intelligence/Scenario. For Training Only

Friendly Capabilities: Orders Information

- For the purposes of the exercise, today is 09 FEB 2011.
- A/1-504 PIR has arrived in South Korea at Osan AFB, and is conducting preparations for onward movement to tactical positions in the vicinity of Camp Bonifas just outside the Demilitarized Zone (DMZ).
- Standing missions:
 - Conduct security patrols in sector to dissuade North Korean (nK) probing
 - Augment QRF for the defense of Panmunjom
 - Defend tank barricade along main AA

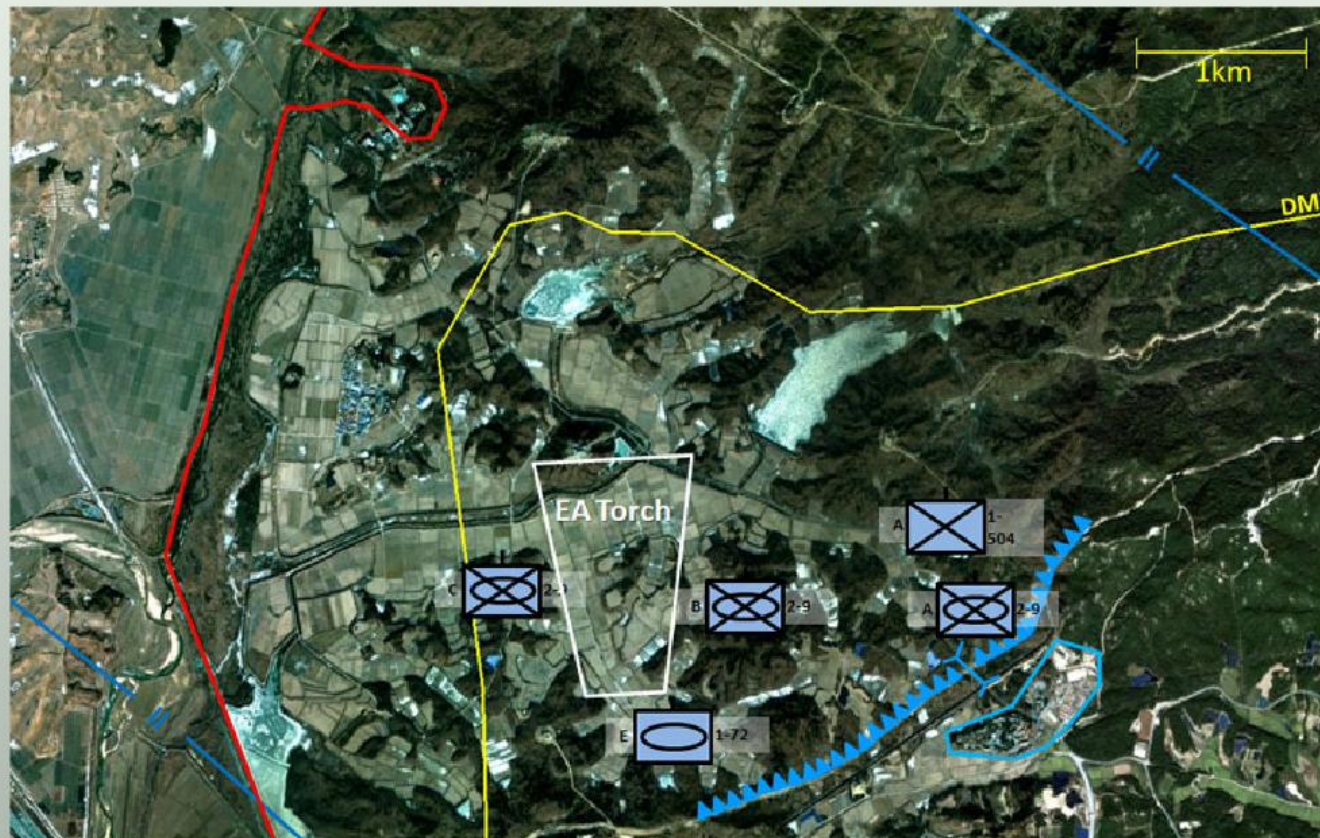
ENEMY SITUATION

Elements of the nK II Corps continue movement toward and build-up near the DMZ as the political situation in the region deters. While indications and warnings do not show that attack is imminent, UNC/CFC continue defensive preparations throughout the ROK.

Specifically, elements of the 33rd Infantry Division are massing in the TF 2-9 Area of Interest. Imagery indicates the 33rd has been augmented with the addition of at least one tank battalion, bringing the total number to two tank battalions. Should an attack occur, the first echelon will likely be comprised of tanks in order to secure the main Avenue of Approach running directly through the Task Force sector to Seoul.

nK continues light infantry patrols into the DMZ, with incursions into the ROK side of the border. These patrols are meant to gather intelligence on the disposition of UNC/CFC forces. On occasion, these patrols have lead to minor skirmishes but not a protracted battle. As nK force movements and the build-up of UNC/CFC defenses continues, the frequency of the patrols has increased.

Task Force Graphics



H-5

Fictionalized Intelligence/Scenario. For Training Only

SITUATION AND OP
ORDERSPREPARE
IDEA ORDERS ANALYSISINFORM
CONSULT REQUESTTEST
PLAN PLAYADAPT
REVISE REVIEWEXECUTE
EVALUATEFRIENDLY
CAPABILITIES

1/A/1-504 (-) (SO1):

- Conduct counter-reconnaissance within sector to deny enemy collection of intelligence of our defenses
- Pre-register FASCAM and TRPs along suspected AAs
- Coordinate reward passage of lines with QRF at Panmunjeom
- Destroy enemy recon elements
- Establish early warning countermeasures in wooded areas
- Identify enemy main effort
- On order, exfiltrate to the east along marked route

2/A/1-504 (+) (DO):

- Occupy defensive positions vic. BP SWORD in order to maximize range of the JAVELIN
- Destroy enemy C2 elements in order to create discontinuous command and control in the enemy force
- Establish obstacle plan in order to fix enemy advance
- O/O, withdraw to the east along marked route and evade enemy contact

3/A/1-504 (-) (SO2):

- Secure to the north of BP SWORD to allow ME to complete engagements
- Establish and mark withdraw route
- Provide guides during withdraw
- Screen to prevent enemy engagement of CO during withdraw

3.a. Concept of Operations



Aptima Blended Learning System

MISSION ANALYSIS

PREPARE: IDEA ORDERS ANALYSIS INFORM: CONSULT REQUEST TEST: PLAN PLAY ADAPT: REVISE REVIEW EXECUTE: EVALUATE FRIENDLY CAPABILITIES

Mission Analysis : Specified Tasks

If I do nothing else, I will

Other Specified Tasks

Implied Tasks

Tentative Platoon Mission Statement

Who	What	When	Where	Why

What will ensure your success in this mission?

Issues/Concerns:

Submit and Continue

H-7

Fictionalized Intelligence/Scenario. For Training Only

CONSULT

PREPARE
IDEA ORDERS ANALYSISINFORM
CONSULT REQUESTTEST
PLAN PLAYADAPT
REVISE REVIEWEXECUTE
EVALUATEFRIENDLY
CAPABILITIES**SSG's Sandoval's Plan**

"Sir, I think we could best accomplish this mission using a mobile defense. If we cached the rounds at various locations, then we could move the gunners from one place to another to engage the threats—where they could do the most damage."

3.a. Concept of Operations

1km

1/A/1-504T: counterrecon
P: to prevent breach of obstacle**3/A/1-504**T: secure
P: to allow ME to complete engagements

SWORD

**2/A/1-504**T: fix
P: to prevent the enemy from bypassing EA TORCH

Strengths and Weaknesses

Record what you perceive as the strengths and weaknesses of each leader's plan.



SFC Hooten
Platoon Sargent

Strengths

Weaknesses



SSG Sandoval
3rd Squad Leader

Strengths

Weaknesses

Submit and Continue

Aptima Blended Learning System

INFORMATION REQUEST

PREPARE
IDEA ORDERS ANALYSIS

INFORM
CONSULT REQUEST

TEST
PLAN PLAY

ADAPT
REVISE REVIEW

EXECUTE
EVALUATE

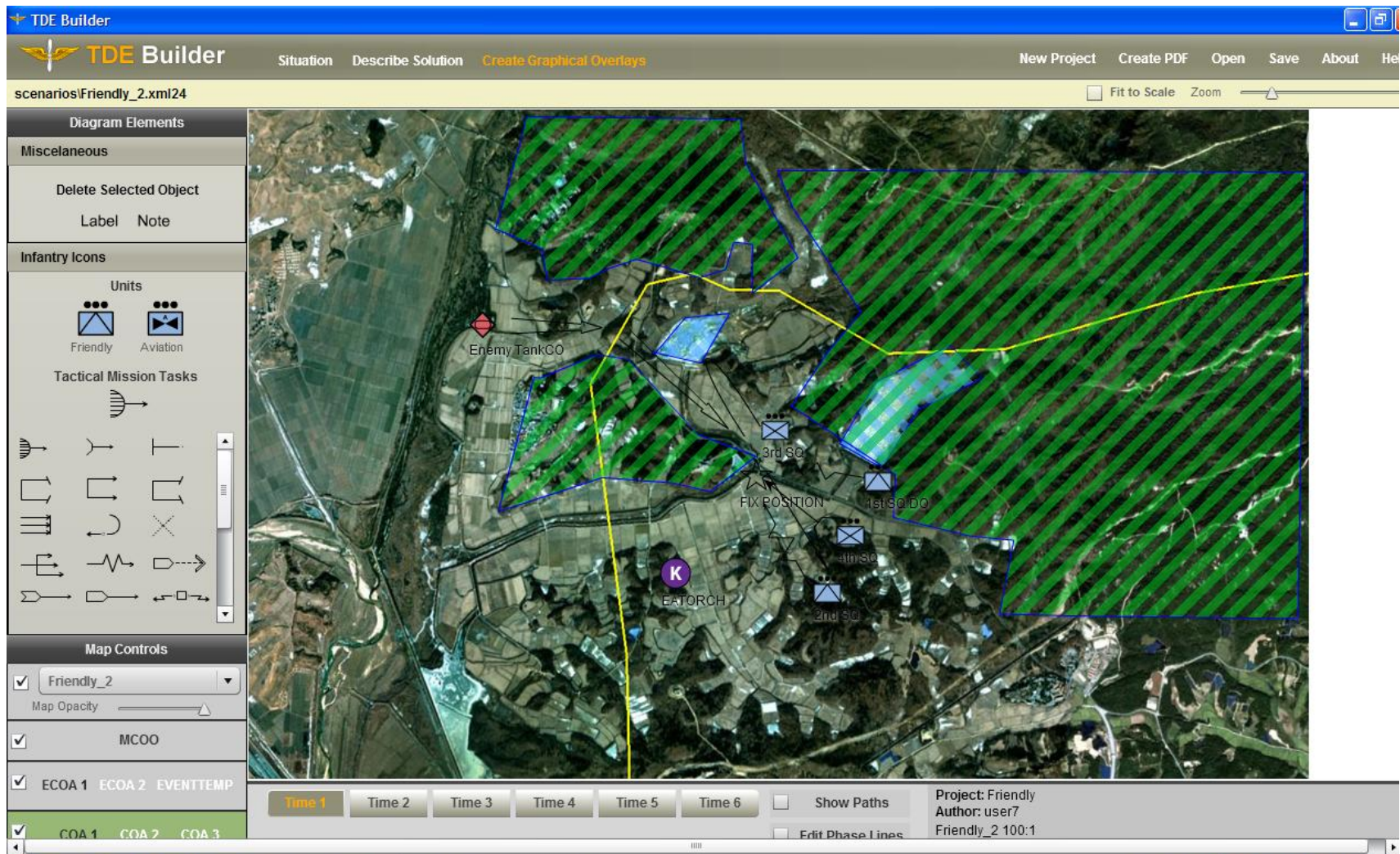
FRIENDLY CAPABILITIES

Information Requests

- When you're conducting planning, especially when you're on a Forward Operating Base, there will be many resources that you can access to help you with your plan. Returning patrols, other units such as civil affairs or ODA teams who have been out may have useful information. Your company commander may have to rely on you to get the information you need, then brief him on it later.
- Occasionally, if early enough in the process, you can request ISR assets through your chain of command. It is a skill to request information and a collection asset that is feasible for the information it will yield.
- This section represents the ability to request additional information that will help you with your plan.

In the entry area below enter any questions you would like answered or additional information that you think would help you with your plan.

Submit and Continue



H-11

Fictionalized Intelligence/Scenario. For Training Only

Play It Forward #2

The company commander does a poor job coordinating fire control measures with A/2-9.



Platoon Sargents Plan

"Surround the building, and develop the situation"

- ☒ Successful
- ☐ Partially Successful
- ☐ Unsuccessful



Weapon Squad Leader's Plan

"Knock with 7.62mm, seize the building, and worry about the rebel response later."

- ☐ Successful
- ☐ Partially Successful
- ☒ Unsuccessful

Submit and Continue

Aptima Blended Learning System

SELF-EVALUATE AND ARCHIVE

PREPARE

IDEA ORDERS ANALYSIS

INFORM

CONSULT REQUEST

TEST

PLAN PLAY

ADAPT

REVISE REVIEW

EXECUTE

EVALUATE

FRIENDLY CAPABILITIES

Self-Evaluate

Know and Use All Assets Available:

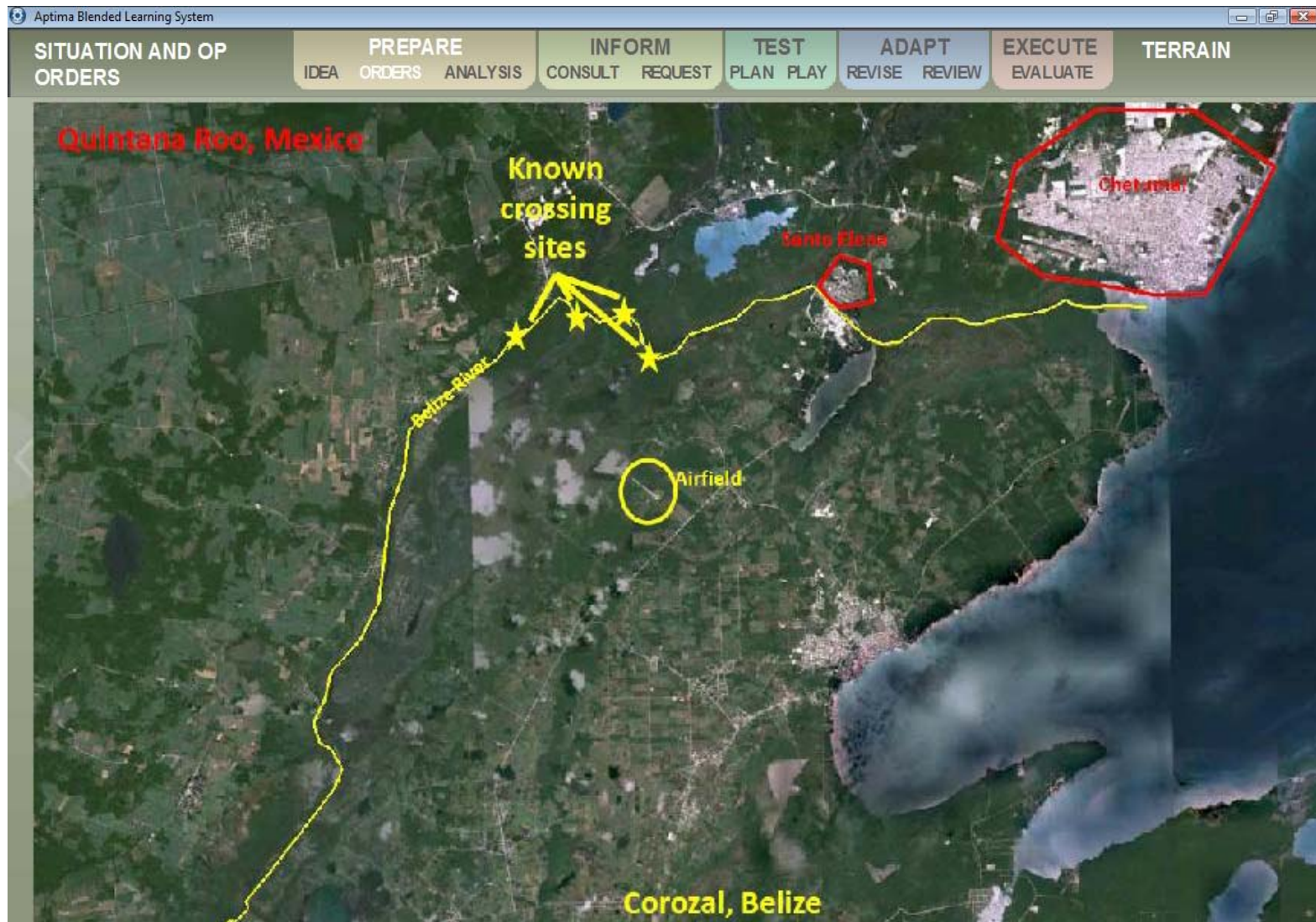
- Combat leaders must not lose sight of the synergistic effects of fighting their command as a combined arms team--this includes not only all assets under their command, but also those which higher headquarters might bring to bear to assist them.

DID You:	YES	PARTIAL	NO	NOT APPLICABLE
Identify your main effort and supporting efforts?	☐	☐	☐	☐
Ensure that the purpose of the supporting efforts were synergistic with the main effort?	☐	☐	☐	☐
Use attachments to accomplish tasks that you could not accomplish with your platoon?	☐	☐	☐	☐
Use geographic control measures to monitor and coordinate your unit spatially?	☐	☐	☐	☐
Use on order tasks to synchronize the actions of your forces in time?	☐	☐	☐	☐
Did you request additional assets or information based on your mission analysis?	☐	☐	☐	☐

Submit and Continue

Appendix I

Training Materials for IF: Terrain Area of Operations Brief



I-1

Fictionalized Intelligence/Scenario. For Training Only

Aptima Blended Learning System

SITUATION AND OP ORDERS	PREPARE IDEA ORDERS ANALYSIS	INFORM CONSULT REQUEST	TEST PLAN PLAY	ADAPT REVISE REVIEW	EXECUTE EVALUATE	TERRAIN
----------------------------	---------------------------------	---------------------------	-------------------	------------------------	---------------------	---------

Friendly Situation

- Refer to AO Orientation Briefing
- 1-504 has been placed on 72-hour alert for deployment to Belize, and will conduct a night parachute drop into the area of operations. 1-504 PIR will utilize the indicated airfield as the base of operations.
- No resistance is expected from drug cartel personnel who believe they have attained regional dominance over the BDG BPF.
- A/1-504 will establish operations in the vicinity of Santa Elena along the Belize river with the priority of effort to interdicting arms imports by providing intelligence to the BDF and BPF, and the secondary effort to interdicting drug flow across the Belize River in the AO.

Aptima Blended Learning System

SITUATION AND OP ORDERS	PREPARE	INFORM	TEST	ADAPT	EXECUTE	TERRAIN
	IDEA ORDERS ANALYSIS	CONSULT REQUEST	PLAN PLAY	REVISE REVIEW	EVALUATE	

TF 1-504 establishes observation points along suspected routes for drug and weapons trafficking and conducts patrols in sector to develop intelligence for the Belize Defense Force and Belize National Police.

Intent. TF 1-504 intends to deter and interrupt the flow of weapons into Belize, and the flow of drugs out of Belize. Our forces will have strict rules of engagement placed on us, as our involvement in the region is not a combat operation. Our primary goal is to develop intelligence so the BDF and BNP can conduct interdiction operations.

Key Tasks. – Identify trade route for weapons and drugs across the Belize and Mexico border. Locate and identify drug production facilities. Located and identify drug crops.

Shaping Operations. – TF 1-504 with the assistance BDF personnel establish rapport with local populations that have been coerced by drug cartel violence to gain intelligence.

Appendix J

Training Materials for IF: Terrain WARNO

Aptima Blended Learning System

SITUATION AND OP
ORDERS

PREPARE
IDEA ORDERS ANALYSIS

INFORM
CONSULT REQUEST

TEST
PLAN PLAY

ADAPT
REVISE REVIEW

EXECUTE
EVALUATE

TERRAIN

Warning Order

Mission: A/1-504 conducts night parachute drop into the AO in the vicinity of Santa Elena in order to establish observation of trade routes for weapons and drugs, and conducts patrols to gather intelligence on the location of drug crops and processing facilities.

Execution:

- **Intent.** Our purpose is to gather intelligence for the BDF and BNP to conduct interdiction operations. Strict rules of engagement will require us to move mostly under cover of darkness and establish observation posts during daylight hours. Engagement criteria are TBD and will be published in the OPORD.
- **Concept of Operations.** TBD
- **Tasks to Maneuver Units**
 - Prepare chawks for jump operations.

Aptima Blended Learning System

SITUATION AND OP ORDERS	PREPARE IDEA ORDERS ANALYSIS	INFORM CONSULT REQUEST	TEST PLAN PLAY	ADAPT REVISE REVIEW	EXECUTE EVALUATE	TERRAIN
----------------------------	---------------------------------	---------------------------	-------------------	------------------------	---------------------	---------

Coordinating Instructions

Risk Guidance—no change from current SOPs

Deception Guidance

- We will attempt to conceal our movement to and from observation posts by movement only in hours of darkness. Patrols will be conducted under darkness.

Priorities

- Rehearse night linkup, drop zone assembly
- PCI/PCC all crew served weapons
- Observation of trade routes
- Reconnaissance of suspected trade routes
- Reconnaissance of suspected drug production facilities
- Reconnaissance of suspected drug crop locations

Aptima Blended Learning System

SITUATION AND OP ORDERS	PREPARE		INFORM		TEST		ADAPT		EXECUTE		TERRAIN
	IDEA	ORDERS	ANALYSIS	CONSULT	REQUEST	PLAN	PLAY	REVISE	REVIEW	EVALUATE	

Company Commander's Guidance

"Guys, we don't have much to work with here, other than what was in the WARNO. I want you to begin good parallel planning based on the following:

- Primarily, I see this as a demonstration. The very fact that we are jumping in will send a signal to the Narcos, and under the best circumstances, they will avoid contact.
- That being said, I think we should be very conservative until we can develop the situation on the ground. I don't know what the QRF situation will be, I don't know how fast the Belize Police will respond when we call something in. Be able to defend yourself against the threat. Don't forget that we have the 60mm and WP that can support you. One round of WP can change someone's mind in a hurry.
- I think all three platoons will have the same task and purpose, which is to screen, with the intent to provide early warning to the Belize Police. The main effort will be the most likely avenue of approach. I will be located with the center platoon.
- Plan contingencies. Let me and your soldiers know what will cause you to trigger those contingency plans."

Appendix K

Assessment Company Operations Order

UNCLASSIFIED

A/1-504 Company Operations Order OPORD 07-12 OPERATION TURGIDSON

References:

Mapsheet—

Area of Operations Orientation Briefing

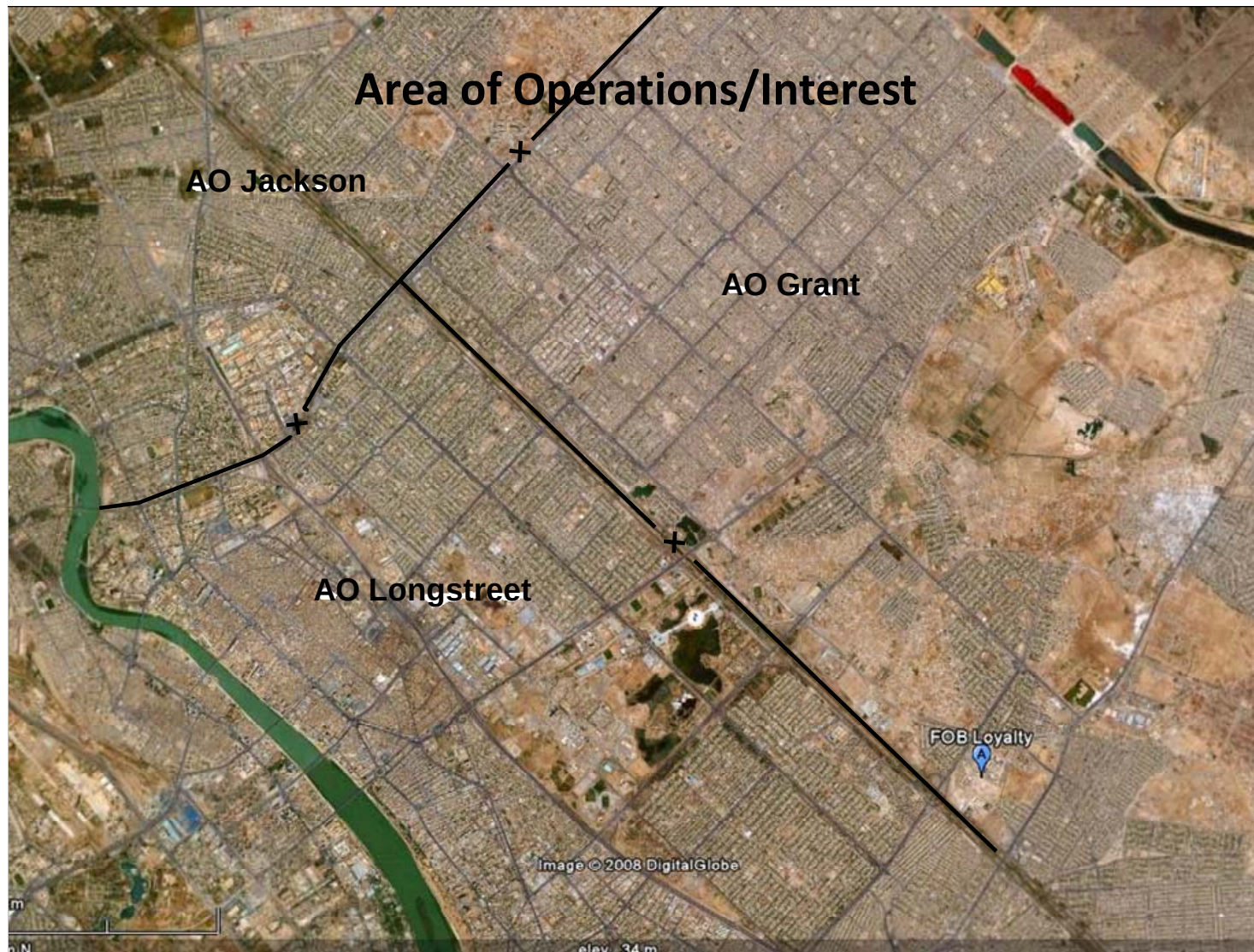
Time Zone Used Throughout Order: Local

Copy ___ of ___ Copies

A/1-504

FOB Loyalty, Baghdad, Iraq

23 0900 SEP 07



K-2

Fictionalized Intelligence/Scenario. For Training Only

UNCLASSIFIED

Situation

1a. Enemy Forces.

Shia elements of the Sadrist Jaysh al-Mahdi (JAM) militia are continuing to try to fuel sectarian violence in Baghdad.

Specifically, IED materiel has been tracked from Iran to several locations near Sadr City in AO Jackson. It is believed that vehicle-borne IED's are to be assembled at several locations, including OBJ Hammer. JAM militia intends to infiltrate AO Longstreet and detonate the IEDs in order to undermine coalition and Sunni efforts to stabilize the Al Fadel neighborhood.

For this operation, the enemy's most probable course of action is to avoid decisive engagement and attempt to flee the area. The most dangerous course of action is to reinforce engaged forces from Sadr city and attempt a series of baited ambushes as coalition forces attempt to pursue militants.

A mosque is located on OBJ Anvil. The Mullah in that mosque supports Anti-Coalition Forces (ACF) sentiment. Friday prayers advocate support for insurgencies, and this attitude further enables and legitimizes ACF activities within the neighborhood populace, including construction of IED's.

Situation

- **1b. Friendly Forces.**

3rd BDE, 3rd ID conducts counter terrorism and counter insurgency operations against JAM militia in AO Jackson.

3rd BDE will use RSTA elements to identify key routes that are bringing materiel into AO Jackson. We will then develop specific missions to target distribution points and IED fabrication facilities to disrupt the insurgent ability to destabilize the region.

UNCLASSIFIED

Terrain & Weather

- Terrain: Refer to AO Brief
- Weather:
 - The weather has started to cool. For the next three days:
 - Highs are expected to be in the mid 90's
 - Lows are expected to be in the mid 60's
 - Humidity should be around 27%
 - Visibility has been good, and is expected to stay about 10km
 - The maximum wind speed recorded yesterday was 25.2 km/h, and the mean wind speed was 15.4 km/h
 - Light Data

Date	BMNT	Sunrise	Sunset	EENT	Moonrise	Moonset	% Illum
23 SEP	0557	0651	1859	1952	1700	0243	88
24 SEP	0558	0652	1857	1951	1734	0351	94
25 SEP	0559	0652	1856	1949	1805	0500	98

TF 1-15 seizes OBJ Hammer (MB 43526 91747) NLT 24 1900 SEP07 IOT prevent the enemy from manufacturing IEDs..

Intent: The purpose of this operation is to increase security along sectarian "fault lines" to enable transfer of authority to the Iraqi Police.

Key tasks:

- Clearing OBJ Hammer
- Seizing JAM bomb making equipment and weapons

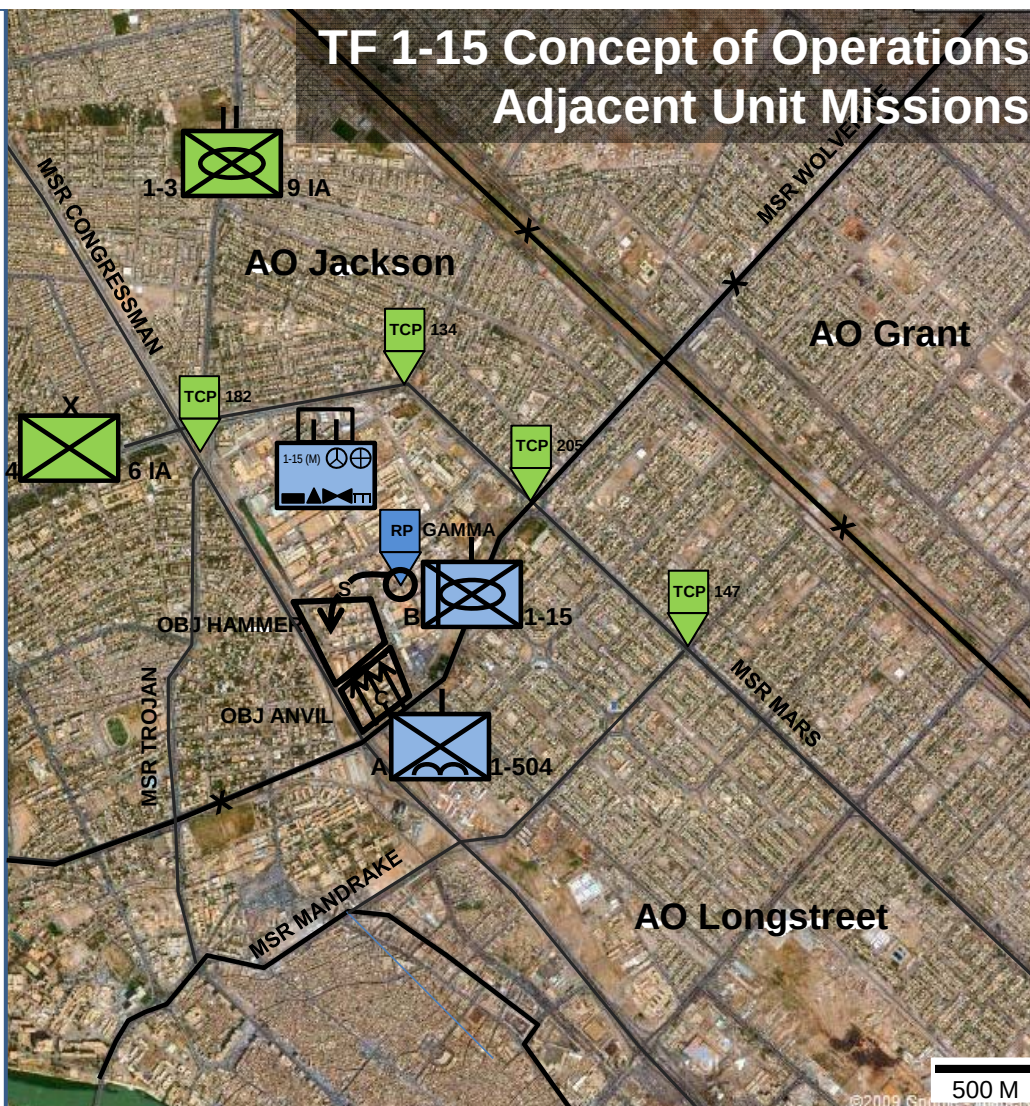
At end state, bomb making material is seized or destroyed, and the facility is rendered non-operational.

Decisive Operation: B/1-15 seizes OBJ Hammer IOT prevent the exfiltration of ACM from OBJ Hammer.

Shaping Operations:

A/1-504 clears OBJ Anvil IOT prevent the reinforcement of JAM forces on OBJ Hammer.

4-6 IA conducts circulation control security at TCPs 182, 134, and 205
1/3-9 IA conducts circulation control security at TCP 147



UNCLASSIFIED

1.d. Attachments and Detachments

A/1-504 PIR Current Task Organization

OPCON C/1-504				
	HQ	1/A/1-504	2/A/1-504	3/A/1-504
Personnel	10	30	32	34
Organization	CO C2 element able to dismount 1x TERP	3x TM able to dismount, w/ PLT C2 element	3x TM able to dismount, w/ PLT C2 element 1x TERP	1x TERP 3x TM able to dismount, w/ PLT C2 element
Equipment	2x M1151 2x .50cal 1x LMTV 1x	7x M1151 2x .50cal 3x M240B 2x MK19	7x M1151 2x .50cal 3x M240B 2x MK19	7x M1151 2x .50cal 2x M240B 3x MK19

Released from QRF Attached 1/A/1-504

	2/D/1-504	1/SCTS/1-504		
Personnel	18	6		
Organization	No dismount capability	4 Scouts 1x Sniper Team 1x TERP		
Equipment	5x M1151 2x .50cal 2x M240B & MK19	1x M24		

UNCLASSIFIED

Company Mission

A/1-504 attacks to clear OBJ Anvil (MB43656 91494) NLT 24 1700 SEP 07, in order to prevent the reinforcement of JAM forces on OBJ Hammer.

Commander's Intent

The purpose of OPERATION TURGIDSON is prevent the enemy from manufacturing IEDs. Their capability consists of both materiel and facilities. At end state, the enemy forces will not be able to effect OBJ Hammer, A/1-504 is postured to conduct follow on operations based on any intelligence gained while on OBJ Anvil.

A/1-504 attacks to clear OBJ Anvil (MB 43656 91494) NLT 241700SEP07, in order to prevent the reinforcement of JAM forces on OBJ Hammer.

Intent: The purpose of this operation is to destroy the enemy's capability to manufacture IEDs vic OBJ Hammer. Their capability consists of both materiel and facilities.

Scheme of Maneuver:

1/A/1-504 (with Scouts) are OPCON to C/1-504 to insert scouts and to saturate patrols along potential avenues of approach to the OBJ. This will ID the best avenues of approach and disguise the rest of the company movement. Scouts establish LP/OP vic MB 4359 9091 to observe and listen to broadcasts from Mosque and confirm presence of JAM on OBJ Anvil. At 24 1700, A/1-504 (-) crosses LD, order of movement 2/D, 3/A, 2/A. (Actions on OBJ detailed on next slide.)

Concept of Fires:

CCA severely restricted within AO Jackson; any assets would :

Task: disrupt JAM elements attempting to reinforce OBJ Hammer

Purpose: to allow ground forces to reposition appropriately.



A/1-504 attacks to clear OBJ Anvil (MB43656 91494) NLT 241700SEP07, in order to prevent the reinforcement of JAM forces on OBJ Hammer.

Intent: The purpose of this operation is to destroy the enemy's capability to manufacture IEDs vic OBJ Hammer. Their capability consists of both materiel and facilities.

Key tasks:

- Observation of Mosque to confirm presence of JAM vic MB 437 914
- Saturate C/1-504 in order to disguise movement to OBJ Anvil
- Secure mosque to allow ME freedom of maneuver

End state: the enemy forces will not be able to effect OBJ Hammer, A/1-504 is postured to conduct follow on operations based on any intelligence gained while on OBJ Anvil.

Decisive Operation: 2/A/1-504 clears OBJ Anvil IOT prevent the exfiltration of ACM from OBJ Hammer.

Shaping Operations:

2/D/1-504 interdicts vic MB43874 91457 IOT prevent counterattack from Sadr City.

1/A/1-504 blocks vic MB43483 91471 IOT prevent vehicular exfiltration along high speed avenue of approach.

3/A/1-504 secures vic MB43735 91404 OBJ Anvil IOT to allow 2/A/1-504 freedom of maneuver.



1/A/1-504 (SE3):

- Block vic MB 4349 9144 IOT prevent vehicular exfiltration of OBJ Anvil
- Block vic MB 4357 9131 IOT prevent vehicular exfiltration of OBJ Hammer
- Conduct counterreconnaissance within C/1-504 sector to deceive enemy of actual objective
- Establish OP vic MB 4357 9093 to confirm presence of JAM on OBJ Anvil
- On order, establish LZ vic MB 4350 9131 in order to allow reinforcement of the decisive operation

2/A/1-504 (ME):

- Coordinate passage of lines with C/1-504 and 3rd BDE, 3ID
- BPT follow and assume 3/A/1-504 to prevent reinforcement of OBJ Hammer
- Clear OBJ Anvil IOT prevent reinforcement of OBJ Hammer
- Be prepared to attack by fire on OBJ Hammer from vic MB 4353 9152
- Be prepared to receive and employ scouts upon establishment of ABF position.

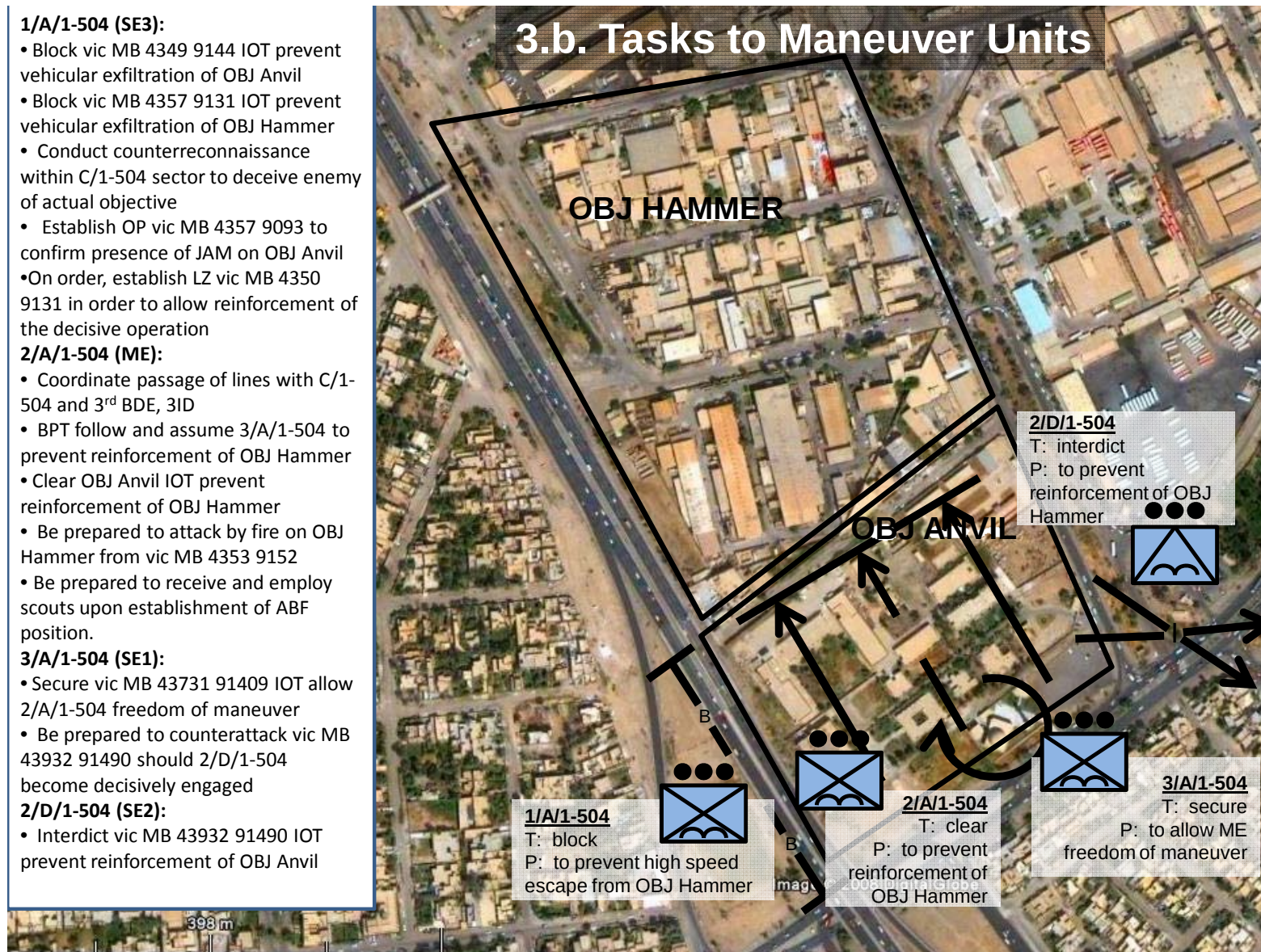
3/A/1-504 (SE1):

- Secure vic MB 43731 91409 IOT allow 2/A/1-504 freedom of maneuver
- Be prepared to counterattack vic MB 43932 91490 should 2/D/1-504 become decisively engaged

2/D/1-504 (SE2):

- Interdict vic MB 43932 91490 IOT prevent reinforcement of OBJ Anvil

3.b. Tasks to Maneuver Units



UNCLASSIFIED

Execution - Additional Imagery

Vic MB 43830 91517, looking
northeast. Avenue of approach to
OBJ Anvil; near 2/D/1-504 area to
interdict



Vic MB 43251 91878, looking
South. West of OBJ Hammer; near
1/A/1-504 area to block

K-12

Fictionalized Intelligence/Scenario. For Training Only

Execution—Coordinating Instructions

- 1) Order goes into effect immediately.**
- 2) Commander's Critical Information Requirements:**
 - **PIR:**
 - 1. What does the activity vic Mosque on OBJ Anvil indicate about the enemy?**
 - 2. Will the enemy employ IEDs or obstacles on our approach routes?**
 - 3. Will and where will the enemy commit his counter attack (Sadr City)?**
 - 4. Will the enemy re-positioning forces from adjacent defensive positions to support an adjacent unit?**
 - **EEFI:**
 - 1. Location of Scouts**
 - 2. Location of Company Assault Position and release points**
 - 3. Best avenues of approach out of our sector leading to the release point**
 - **FFIR:**
 - 1. Loss of crew served weapons**
 - 2. Loss of mobility of any truck**
 - 3. Frontline trace of B/1-15 as they clear OBJ Hammer**

Execution - Coordinating Instructions

3) Risk Reduction Control Measures:

- **Mounted patrols must have min of 4 trucks**
- **Every truck must have a crew served weapon**
- **Every patrol must have at least 1 BFT**
- **Lead vehicle must have current lead vehicle IED defeat technology (e.g. Rhino)**
- **Dismounted patrols must have min 8 individuals, SINGARS radio, and squad automatic weapon**

4) ROE and SPINS are in effect as of 20 0000Z SEP07

7) Additional:

- **All routes vic. OBJ Hammer and OBJ Anvil black for units not involved with OPERATION TURGIDSON upon crossing of MSR Wolverines**

UNCLASSIFIED

Coordinating Instructions (cont'd.)

- Timeline
 - 23 0800 SEP 07 Recon Element PCI/PCC complete
 - 23 0900 SEP 07 CO OPORD
 - 23 1100 SEP 07 Backbrief
 - 23 1200 SEP 07 NLT—Reconnaissance Elements SP
 - 23 2100 SEP 07 PMCS Complete on Vehicles, Crew Served Weapons
 - 24 0900 SEP 07 Company Rehearsals; PCI's complete
 - 24 1100 SEP 07 Platoon/Squad/Crew Rehearsals
 - 24 1300 SEP 07 Mandatory Rest
 - 24 1600 SEP 07 Convoy Briefs, PCC's complete
 - 24 1630 SEP 07 SP JSS
 - 24 1700 SEP 07 Cross LD

Service Support

- **Concept:**
 - As necessary, A/1-504 will receive tailgate resupply via the QRF. Ammunition will be prepped by the platoons and coordinated with the QRF. Other classes of supply will be coordinated through BN TOC.
- **Class I:** 1 case of bottled water in each vehicle, MRE's as desired
- **Class V:** 1 AT-4 in each vehicle, Basic Load for all WPN Systems, CSR is 1/3 Basic Load
- **Maintenance**
 - PLs will report to Company CP with vehicle inspection status NLT 23 1900. Provide status of identified deficiencies NLT 24 0900 SEP.
 - All crew served weapons and radios must be inspected NLT 23 1600 SEP
- **Medical Evacuation**
 - CCP and AXP will be located at RP.
 - 1/A will secure HLZ as needed.

Command and Signal

- **Command**
 - Commander will move behind 3rd PLT, XO will move behind 1st PLT, 1SG will move behind 2/D. CP will be located vic the Mosque after actions on the objective have commenced.
 - Succession of CMD: XO, 3/A PL, 2/A PL, 2/D PL, 1/A PL.
- **Signal**
 - All BN and CO Nets per current SOP
 - MEDVAC Freq. 32.000
 - Air Support Freq. 340.000 (Sabre)
 - SOI index 1-9 in effect
 - 2 successive star clusters signal enemy counter attack
 - PL's, nominate additional signals to CO RTO NLT 24 1200 SEP

Appendix L

Assessment FRAGO 1

A/1-504 Company Fragmentary Order #1 FRAGO 07-12-1 OPERATION TURGIDSON

References:

Mapsheet—

Area of Operations Orientation Briefing

Time Zone Used Throughout Order: Zulu

Copy ___ of ___ Copies

A/1-504

FOB Loyalty, Baghdad, Iraq

24 0900 SEP 07

Instructions

- Scenario: The commander has received new information that is in this FRAGO. He wrote the FRAGO prior to going to the BN rehearsal. He didn't have time to wait for everyone to get in, so he left this hard copy.
- You have not issued your platoon order yet, so digest the changes in this FRAGO and update your order. The changes to the original order are highlighted in red.
- Use a different color of pen to indicate your changes. You should have been provided one when you were given this FRAGO.

1.d. Attachments and Detachments

A/1-504 PIR Current Task Organization

OPCON C/1-504				
	HQ	1/A/1-504	2/A/1-504	3/A/1-504
Personnel	10	30	32	34
Organization	CO C2 element able to dismount 1x TERP	3x TM able to dismount, w/ PLT C2 element	3x TM able to dismount, w/ PLT C2 element 1x TERP	1x TERP 3x TM able to dismount, w/ PLT C2 element
Equipment	2x M1151 2x .50cal 1x LMTV 1x	7x M1151 2x .50cal 3x M240B 2x MK19	7x M1151 2x .50cal 3x M240B 2x MK19	7x M1151 2x .50cal 2x M240B 3x MK19

Attached 1/A/1-504 Attached 3/A/1-504

	2/D/1-504	1/SCTS/1-504	TAC. PSYOPS	
Personnel	18	6	4	
Organization	No dismount capability	4 Scouts 1x Sniper Team 1x TERP		
Equipment	5x M1151 2x .50cal 2x M240B & MK19	1x M24	1x M1151 1x M240B Leaflets,	

Fragmentary Order

- Situation: Recent intelligence indicates that several of the more knowledgeable bomb-makers will be on OBJ Hammer to supervise the construction of the IEDs.
- Mission: A/1-504 attacks to isolate OBJ Anvil (MB 43656 91494) NLT 241700SEP07, in order to prevent the reinforcement of JAM forces on OBJ Hammer.
- Commander's Intent:
 - The purpose of OPERATION TURGIDSON is to destroy the enemy's capability to manufacture VBIEDs vic OBJ Hammer. Their capability consists of both materiel and facilities, and bomb making expertise. At end state, the enemy forces will not be able to affect OBJ Hammer, AIF and bomb-makers are killed or captured, and A/1-504 is postured to conduct follow on operations based on any intelligence gained while on OBJ Anvil.

TF 1-15 **neutralizes** OBJ Hammer (MB 43526 91747) NLT 24 1900 SEP07 IOT prevent the enemy from manufacturing IEDs.

Intent: The purpose of this operation is to increase security along sectarian "fault lines" to enable transfer of authority to the Iraqi Police.

Key tasks:

- Contain OBJ Hammer
- Defeat JAM/ACF on/around OBJ Hammer
- Destroy JAM equipment and weapons

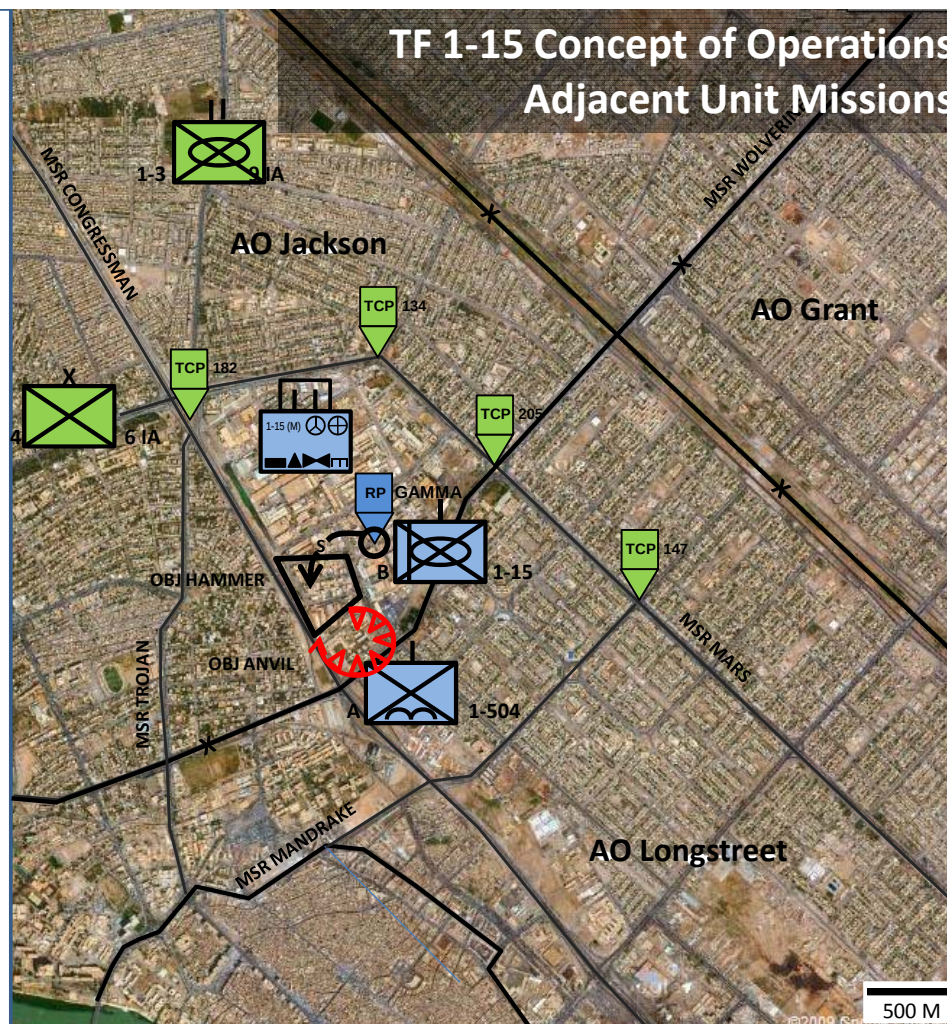
At end state, bomb making material is seized or destroyed, the facility is rendered non-operational, and ACF personnel are killed or captured.

Decisive Operation: B/1-15 seizes OBJ Hammer IOT prevent the exfiltration of ACM from OBJ Hammer.

Shaping Operations:

A/1-504 **isolates** OBJ Anvil IOT prevent the reinforcement of JAM forces on OBJ Hammer.

4-6 IA conducts circulation control security at TCPs 182, 134, and 205
1/3-9 IA conducts circulation control security at TCP 147



A/1-504 attacks to **isolate** OBJ Anvil (MB 43656 91494) NLT 241700SEP07, in order to prevent the reinforcement of JAM forces on OBJ Hammer.

Intent: The purpose of this operation is to destroy the enemy's capability to manufacture IEDs vic OBJ Hammer. Their capability consists of both materiel and facilities, **and bomb making expertise**.

Scheme of Maneuver:

1/A/1-504 (with Scouts) are OPCON to C/1-504 to insert scouts and to saturate patrols along potential avenues of approach to the OBJ. This will ID the best avenues of approach and disguise the rest of the company movement. Scouts establish LP/OP vic MB 4359 9091 to observe and listen to broadcasts from Mosque and confirm presence of JAM on OBJ Anvil. At 24 1700, A/1-504 (-) crosses LD, order of movement 2/D, 3/A, 2/A. (Actions on OBJ detailed on next slide.)

Concept of Fires:

CCA severely restricted within AO Jackson; any assets would :

Task: disrupt JAM elements attempting to reinforce OBJ Hammer
Purpose: to allow ground forces to reposition appropriately.



A/1-504 attacks to clear OBJ Anvil (MB43656 91494) NLT 241700SEP07, in order to prevent the reinforcement of JAM forces on OBJ Hammer.

Intent: The purpose of this operation is to destroy the enemy's capability to manufacture IEDs vic OBJ Hammer. Their capability consists of both materiel and facilities, **and bomb making expertise.**

Key tasks:

- Observation of Mosque to confirm presence of JAM vic MB 437 914
- Saturate C/1-504 in order to disguise movement to OBJ Anvil
- Kill or capture ACF**
- Isolate mosque to prevent repositioning of forces on OBJ Anvil

End state: the enemy forces will not be able to affect OBJ Hammer, A/1-504 is postured to conduct follow on operations based on any intelligence gained while on OBJ Anvil.

Decisive Operation: **3/A/1-504** isolates vic MB43735 91404 OBJ Anvil IOT prevent the reinforcement of JAM forces on OBJ Hammer.

Shaping Operations:

2/D/1-504 interdicts vic MB43874 91457 IOT prevent counterattack from Sadr City.

1/A/1-504 blocks vic MB43483 91471 IOT prevent vehicular exfiltration along high speed avenue of approach.

2/A/1-504 clears OBJ Anvil IOT prevent the exfiltration of ACF from OBJ Hammer.

3.a. Concept of Operations



1/A/1-504 (SE3):

- Block vic MB 4349 9144 IOT prevent vehicular exfiltration of OBJ Anvil
- Block vic MB 4357 9131 IOT prevent vehicular exfiltration of OBJ Hammer
- Conduct counterreconnaissance within C/1-504 sector to deceive enemy of actual objective
- Establish OP vic MB 4357 9093 to confirm presence of JAM on OBJ Anvil
- On order, establish LZ vic MB 4350 9131 in order to allow reinforcement of the decisive operation

2/A/1-504 (ME):

- On order, clear OBJ Anvil IOT prevent the exfiltration of ACF of OBJ Hammer
- BPT Follow and assume 3/A/1-504 to prevent reinforcement of OBJ Hammer
- Be prepared to attack by fire on OBJ Hammer from vic MB 4353 9152
- Be prepared to receive and employ scouts upon establishment of ABF position.

3/A/1-504 (SE1):

- Isolate vic MB 43731 91409 IOT prevent the reinforcement of JAM forces on OBJ Hammer
- Be prepared to counterattack vic MB 43932 91490 should 2/D/1-504 become decisively engaged

2/D/1-504 (SE2):

- Interdict vic MB 43932 91490 IOT prevent reinforcement of OBJ Anvil
- Coordinate passage of lines with C/1-504 and 3rd BDE, 3ID



Synchronization Matrix

	Planning/ Deception/ Observation	CO (-) LD to RP	Isolate Mosque	Clear OBJ Anvil	Decision Point: CATK from SADR City	Decision Point: ABF on OBJ Hammer
1/SCTS/1-504	OPCON 1/A Establish LP/OP	Observe	Observe	Observe	OPCON 2/D	OPCON 2/A
1/A/1-504	OPCON C/1-504		Block	Block	BPT establish LZ	BPT establish LZ
2/A/1-504		3 rd in OOM	Staged at RP	Clear		ABF
3/A/1-504		2 nd in OOM	Isolate	Isolate	Reinforce 2/D	Follow and Assume 2/A
2/D/1-504	Coordinate passage of lines	1 st in OOM	Interdict	Interdict	Interdict	Interdict
Priority of Fires: Mortars (Illum only) CCA			Illum: 3/A CCA:		Illum: 2/D CCA: 2/D	Illum: 2/A CCA: 2/A
Medical	CCP: TBD AXP: TBD	CCP: Enroute AXP: C/1-504 COP	CCP: RP AXP: RP	CCP: ACP AXP: RP	CCP: 1SG Establishes behind 2/D AXP: RP	CCP: 1SG Establishes behind 2/A AXP: RP
Ammo Resupply Priority	As needed	Unit in Contact	3/A, then units in contact	2/A, then units in contact	2/D, then 3/A	2/A, then 3/A
C2		1SG: behind 2/D CO: behind 3/A XO: behind 2/A				

Coordinating Instructions

Commander's Critical Information Requirements:

- PIR:
 1. What does the activity vic Mosque on OBJ Anvil indicate about the enemy?
 2. Will the enemy employ IEDs or obstacles on approach our routes?
 3. Will and where will the enemy commit his counter attack (Sadr City)?
 4. Will the enemy re-positioning forces from adjacent defensive positions to support an adjacent unit?
 5. What do captured AIF know about VBIED manufacturing capability?
- EEFI:
 1. Location of Scouts
 2. Location of Company Assault Position and release points
 3. Best avenues of approach out of our sector leading to the release point
- FFIR:
 1. Loss of crew served weapons
 2. Loss of mobility of any truck
 3. Frontline trace of B/1-15 as they clear OBJ Hammer

Fragmentary Order

- Additional Coordinating Instructions:
 - Stop all individuals leaving the OBJ. Immediately detain anyone missing fingers.
- Service Support
 - Female search teams will be at FOB Loyalty, called on demand to OBJ
- Command and Signal
 - No change

Appendix M

Assessment FRAGO 2

**A/1-504 Company Fragmentary Order #2
FRAGO 07-12-1 OPERATION TURGIDSON**

References:

Mapsheet—

Area of Operations Orientation Briefing

Time Zone Used Throughout Order: Zulu

Copy ___ of ___ Copies

A/1-504

FOB Loyalty, Baghdad, Iraq

24 0900 SEP 07

M-1

Fictionalized Intelligence/Scenario. For Training Only

Fragmentary Order

- Task Organization:
 - In effect as of this FRAGO
 - 1/A/1-504 returns to company control NLT 24 1900 SEP 07 (see coordinating instructions)
 - 1st Squad of 2/C/1/4-6 IA attached to 3/A/1-504
- Situation: Iranian national, Mahmoud Abkar is suspected of being in vicinity of the Mosque on OBJ Anvil. He has extensive IED experience and is assessing the capability of local IED manufacturing operations.
- Mission: A/1-504 attacks to isolate OBJ Anvil (MB 43656 91494) NLT 242300SEP07, in order to prevent the reinforcement of JAM forces on OBJ Hammer.
- Execution:
 - Concept of Operations: No change
 - Tasks to Maneuver Units: No change

Synchronization Matrix

	Planning/ Deception/Obser vation	CO (-) LD to RP	Isolate Mosque	Clear OBJ Anvil	Decision Point: CATK from SADR City	Decision Point: ABF on OBJ Hammer
Enemy						
1/SCTS/1-504	OPCON 1/A Establish LP/OP	Observe	Observe	Observe	OPCON 2/D	OPCON 2/A
1/A/1-504	OPCON C/1-504	Return to CO Control NLT 24 2300	Block	Block	BPT establish LZ	BPT establish LZ
2/A/1-504		3 rd in OOM	Staged at RP	Clear		ABF
3/A/1-504		2 nd in OOM	Isolate	Isolate	Reinforce 2/D	Follow and Assume 2/A
2/D/1-504	Coordinate passage of lines	1 st in OOM	Interdict	Interdict	Interdict	Interdict
Priority of Fires: Mortars (Illum only) CCA			Illum: 3/A CCA:		Illum: 2/D CCA: 2/D	Illum: 2/A CCA: 2/A
Medical	CCP: TBD AXP: TBD	CCP: Enroute AXP: C/1-504 COP	CCP: RP AXP: RP	CCP: ACP AXP: RP	CCP: 1SG Establishes behind 2/D AXP: RP	CCP: 1SG Establishes behind 2/A AXP: RP
Ammo Resupply Priority	As needed	Unit in Contact	3/A, then units in contact	2/A, then units in contact	2/D, then 3/A	2/A, then 3/A
C2		1SG: behind 2/D CO: behind 3/A XO: behind 2/A				

Coordinating Instructions

Commander's Critical Information Requirements:

- **PIR:**
 1. What does the activity vic Mosque on OBJ Anvil indicate about the enemy?
 2. Will the enemy employ IEDs or obstacles on approach our routes?
 3. Will and where will the enemy commit his counter attack (Sadr City)?
 4. Will the enemy re-positioning forces from adjacent defensive positions to support an adjacent unit?
 5. What do captured AIF know about VBIED manufacturing capability?
 6. What does the HVT look like?
- **EEFI:**
 1. Location of Scouts
 2. Location of Company Assault Position and release points
 3. Best avenues of approach out of our sector leading to the release point
- **FFIR:**
 1. Loss of crew served weapons
 2. Loss of mobility of any truck
 3. Frontline trace of B/1-15 as they clear OBJ Hammer

Fragmentary Order

- Additional Coordinating Instructions:
 - Due to activity on MSR Congressmen the operation has been delayed to 24 2300 SEP
- Service Support
 - Female search teams will be at FOB Loyalty, called on demand to OBJ
- Command and Signal
 - No change

Appendix N

Performance Ratings on the T-BARS Themes

Table N1

T-BARS Theme 1: Know and Use All Available Assets

OPORD – Initial Performance (Performance Ratings Above 1 on Theme 1)		FRAGO 1 – Performance Gains (Higher Ratings on Theme 1 from OPORD Scores)		FRAGO 1 – Performance Decrements (Lower Ratings on Theme 1 from OPORD Scores)		FRAGO 1 – No Change (No Change from OPORD Scores)	
IF (3 / 11)	27%	Direct Instruction (6 / 16)	38%	Direct Instruction (0 / 16)	0%	Direct Instruction (10 / 16)	63%
Direct Instruction (4 / 16)	25%	IBL (1 / 6)	17%	IBL (0 / 6)	0%	IF (7 / 11)	64%
IBL (1 / 6)	17%	IF (1 / 11)	9%	IF (3 / 11)	27%	IBL (5 / 6)	83%

Table N2

T-BARS Theme 2: Keep a Focus on the Mission and Higher's Intent

OPORD – Initial Performance (Performance Ratings Above 1 on Theme 2)		FRAGO 1 – Performance Gains (Higher Ratings on Theme 2 from OPORD Scores)		FRAGO 1 – Performance Decrements (Lower Ratings on Theme 2 from OPORD Scores)		FRAGO 1 – No Change (No Change from OPORD Scores)	
Direct Instruction (8 / 16)	50%	IBL (3 / 6)	50%	IBL (0 / 6)	0%	Direct Instruction (8 / 16)	50%
IBL (2 / 6)	33%	Direct Instruction (7 / 16)	44%	Direct Instruction (1 / 16)	6%	IBL (3 / 6)	50%
IF (3 / 11)	27%	IF (4 / 11)	36%	IF (1 / 11)	9%	IF (6 / 11)	55%

Table N3

T-BARS Theme 3: Model a Thinking Enemy or Populace

OPORD – Initial Performance (Performance Ratings Above 1 on Theme 3)		FRAGO 1 – Performance Gains (Higher Ratings on Theme 3 from OPORD Scores)		FRAGO 1 – Performance Decrements (Lower Ratings on Theme 3 from OPORD Scores)		FRAGO 1 – No Change (No Change from OPORD Scores)	
Direct Instruction (9 / 16)	56%	IBL (2 / 6)	33%	IBL (1 / 6)	17%	Direct Instruction (7 / 16)	44%
IF (3 / 11)	27%	IF (3 / 11)	27%	IF (2 / 11)	18%	IBL (3 / 6)	50%
IBL (1 / 6)	17%	Direct Instruction (4 / 16)	25%	Direct Instruction (5 / 16)	31%	IF (6 / 11)	55%

Table N4

T-BARS Theme 4: Consider Effects of Terrain

OPORD – Initial Performance (Performance Ratings Above 1 on Theme 4)		FRAGO 1 – Performance Gains (Higher Ratings on Theme 4 from OPORD Scores)		FRAGO 1 – Performance Decrements (Lower Ratings on Theme 4 from OPORD Scores)		FRAGO 1 – No Change (No Change from OPORD Scores)	
Direct Instruction (4 / 16)	25%	IBL (2 / 6)	33%	Direct Instruction (0 / 16)	0%	IBL (4 / 6)	67%
IF (2 / 11)	18%	Direct Instruction (5 / 16)	31%	IF (0 / 11)	0%	Direct Instruction (11 / 16)	69%
IBL (0 / 6)	0%	IF (1 / 11)	9%	IBL (0 / 6)	0%	IF (10 / 11)	91%

Appendix O

Acronym List

(Does not include acronyms found in the training or assessment materials.)

AO	Area of Operations
COA	Course of Action
CTA	Cognitive Task Analysis
DI	Direct Instruction
ELO	Enabling Learning Objective
FRAGO	Fragmentary Order
GEL	Guided Experiential Learning
IBL	Inquiry Based Learning
IBOLC	Infantry Basic Officer Leadership Course
JRTC	Joint Readiness Training Center
METT-TC	Mission, Enemy, Terrain & weather, Troops & support, Time, Civil considerations
MOS	Military Occupational Specialty
OAKOC	Observation and Fields of Fire; Avenues of Approach, Key Terrain, Obstacles, Cover and Concealment
OBTE	Outcomes Based Training and Education
OCS	Officer Candidate School
OPORD	Operations Order
RFI	Request for Information
RIP/TOA	Relief in Place/Transfer of Authority
RTB	Ranger Training Brigade
SME	Subject Matter Expert
TLO	Terminal Learning Objective
TLP	Troop Leading Procedures
T/M	Trainer/Mentor
TRADOC	US Army Training and Doctrine Command
WARNO	Warning Order