



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

**Research Report 1736**

**Combined Arms Operations at Brigade Level,  
Realistically Achieved Through Simulation III  
(COBRAS III): Report on Development and Lessons  
Learned**

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**February 1999**

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## FOREWORD

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Despite significant budgetary restraints, the U.S. Army faces the challenges of maintaining combat readiness and preparing for the battlefield of the 21st century. In fiscal year 1994, Congress appropriated funding for the Virtual Brigade Training Program (Department of Defense, October 1993). Shortly thereafter, program development was assumed by the Force XXI Training Program that is addressing the training of the modern force, and the program was renamed *Combined Arms Operations at the Brigade Level, Realistically Achieved Through Simulation* (COBRAS).

Several efforts have been initiated under the COBRAS umbrella, all funded through the Defense Advanced Research Projects Agency, and developed by the U.S. Army Research Institute for the Behavioral and Social Sciences and the U.S. Army Armor Center (Memorandum of Agreement entitled "Force XXI Training Program [i.e., Virtual Brigade Training Program]," June 1994). The first two projects, COBRAS I and II, developed two types of exercises designed for the staffs of inexperienced, conventionally-equipped brigades: (1) vignettes for segments of the staff and (2) a larger Brigade Staff Exercise focusing on the primary staff members plus the staff responsible for combat support (CS) and combat service support (CSS). Both exercise types offer practice and feedback opportunity in combat fundamentals. Additional training for battalion-level CS and CSS personnel in the context of the full operation was also developed in COBRAS II as an expansion of the Virtual Training Program, using virtual simulation.

The third project in the overall effort (COBRAS III), the subject of this report, expanded on the COBRAS I and II training research and development, implementing lessons learned and satisfying training needs (i.e., training for staff personnel linking the brigade and maneuver battalion staffs and additional CS and CSS systems) exposed during those and related, concurrent efforts.

This report discusses the background of the COBRAS III project and documents the design and development of the resulting training program. Also contained are lessons learned for future development efforts, and training issues that will likely demand attention in the near future. Force XXI policy makers and training developers will find this report useful in the course of continuing steady progress toward Force XXI goals in training and readiness.

ZITA M. SIMUTIS  
Technical Director

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This report reflects the efforts of a team of research scientists, military experts, performance analysts, training developers, simulation systems experts, and administrative support personnel. During the course of the 14-month effort to develop the training, some 60 U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) and contractor personnel were involved in design, development, implementation, and evaluation. All contractor personnel were staff from four organizations that form the Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation (COBRAS) Consortium: the Human Resources Research Organization, Raytheon (formerly Hughes Training, Inc.), TRW Systems and Information Technology Group (S&ITG, formerly BDM Federal, Inc.), and Litton PRC.

Additionally, we had support and guidance from a variety of individuals and government organizations, including:

- Force XXI Training Program  
Lieutenant Colonel Emmett Holley, Chief, FXXI Training Program
- U.S. Army Armor Center (USAARMC)  
Major General George H. Harmeyer, Commanding General USAARMC  
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Colonel (COL) Richard P. Geier, Director U.S. Army Armor School
- Directorate of Training and Doctrine Development  
COL William R. Betson, Director  
Dr. Robert Bauer, Deputy Director  
Mr. Gary F. Parvin, Program Manager, Systems Engineering and Technical Assistance Team
- 3 Brigade, 2 Infantry Division, Fort Lewis  
COL Peter W. Chiarelli, Commander

# COMBINED ARMS OPERATIONS AT BRIGADE LEVEL, REALISTICALLY ACHIEVED THROUGH SIMULATION III (COBRAS III): REPORT ON DEVELOPMENT AND LESSONS LEARNED

## EXECUTIVE SUMMARY

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### Research Requirement:

In 1994, the Army Research Institute for the Behavioral and Social Sciences, in coordination with the Force XXI Training Program and the U.S. Army Armor Center, launched a research and development effort designed to help brigade staffs become proficient in the combat fundamentals that will be required on the digital battlefield. This effort, entitled *Combined Arms Operations at Brigade Level Realistically Achieved through Simulation (COBRAS)*, is developing and evaluating structured, simulation-based training programs and strategies to address the training need.

The two prior projects (COBRAS I and II) developed two types of exercises: a Brigade Staff Exercise (BSE) and a set of brigade staff vignettes (Graves, Campbell, Deter, & Quinkert, 1997; C.H. Campbell, Graves, Deter, & Quinkert, 1998). The COBRAS III project was to expand on that work and develop two multiechelon exercises, one using constructive simulation only and the other using the Synthetic Theater of War (STOW) Architecture using both constructive and virtual simulation. The multiechelon exercise for constructive simulation is the subject of this report.

The objectives of this portion of the COBRAS III project were to:

- (a) develop a constructive simulation-based multiechelon Brigade and Battalion Staff Exercise (BBSE) that provides structured training at a Combat Training Center (CTC)-like tempo,
- (b) focus the training on performance involving staffs and staff sections at both echelons,
- (c) formatively evaluate the newly-developed exercise, and
- (d) based on that that evaluation, refine the training support package (TSP) and provide lessons learned and insights into the advancement of the Force XXI training strategy.

### Procedure:

Working from the COBRAS I and II products, developers identified the new training audience members, revised the scenario to provide performance opportunities for the full audience, and revised the exercise architecture based on lessons learned in the initial projects. This foundation was then used to construct the TSP materials for the BBSE.

The comprehensive formative evaluation was integral and continuous, with numerous internal and external reviews of decisions and products. Two implementations of the BSE in COBRAS II and one of the BBSE in COBRAS III supported improvement to the quality and functionality of the training model and TSPs.

### Findings:

The design, development, and evaluation processes described above combined to produce structured exercises and TSPs consistent with project requirements. Products include this report and other documents relating to the development methodologies and the performance requirements (i.e., brigade and battalion performance objectives) produced during the project, in addition to the TSP materials themselves.

The BBSE provides an opportunity for the brigade commander, his staff, one or more maneuver battalion commanders, and their staffs to practice their roles during all phases of a three-mission scenario. The multiechelon training provided for both horizontal (within the staffs) and vertical (between the brigade and maneuver battalion staffs and within battlefield operating systems) integration of staff groups.

Lessons learned during the project and insights into anticipated training needs are presented to assist training developers, including Force XXI policy-makers, as they continue to advance and promote the Force XXI Training Program. The lessons focus on the development and implementation of structured simulation-based training, as well as on the potential value of such programs.

### Utilization of Findings:

This report presents the history of the development of the COBRAS III program and the lessons learned during the project's duration. As continued emphasis is placed on providing low-resource, cost-effective training for U.S. Army staff personnel, this report can lead those training development efforts into the selection of effective design and implementation strategies.

**COMBINED ARMS OPERATIONS AT BRIGADE LEVEL, REALISTICALLY  
ACHIEVED THROUGH SIMULATION III (COBRAS III): REPORT ON  
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# COMBINED ARMS OPERATIONS AT BRIGADE LEVEL, REALISTICALLY ACHIEVED THROUGH SIMULATION III (COBRAS III): REPORT ON DEVELOPMENT AND LESSONS LEARNED

## Introduction

Military forces of today and the 21st century are at a decisive point in how they do business. It is characterized by the transition from mostly analog battlefield systems to operations with the new digital systems. However, before the transition from conventional to digitized systems and organizations can be achieved, Army leaders have forecasted the need to strengthen basic combat skills, with an emphasis on command, control, and communications. In the face of reduced monetary and personnel resources, they are looking to simulation-based training to complement institutional training and live field training exercises in preparing soldiers for the demands of future missions, organizations, and weapon systems.

One of the first such programs was the Virtual Training Program (VTP)<sup>1</sup> developed as a research and development (R&D) product by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) in 1993-1994. The VTP provides Army National Guard and active component units with time-compressed structured training in virtual and constructive environments (Hoffman, Graves, Koger, Flynn, & Sever, 1995). Both offensive and defensive exercises were developed for the battalions, battalion staffs, companies, and platoons.

In 1995, ARI undertook another effort, *Combined Arms Operations at Brigade Level, Realistically Achieved through Simulation (COBRAS)*. The COBRAS project developed structured simulation-based training exercises for the staffs of conventional mounted brigades. The exercises included a Brigade Staff Exercise (BSE) and vignettes for subsets of the brigade staff (Graves, Campbell, Deter, & Quinkert, 1997).

The follow-on project, COBRAS II, expanded on those products. The COBRAS II effort included an expanded BSE with a wider training audience and additional brigade staff vignettes (C.H. Campbell, Graves, Deter, & Quinkert, 1998)<sup>2</sup>.

This project, COBRAS III, further expanded the BSE work through the development of a multiechelon exercise referred to as the Brigade and Battalion Staff Exercise (BBSE), the subject of this report.<sup>3</sup>

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<sup>1</sup> The program was originally known as the Reserve Component Virtual Training Program. As active units and institutional training managers became interested in using the program, the "Reserve Component" designation was dropped.

<sup>2</sup> The COBRAS II project also enhanced the Virtual Training Program (VTP) by adding opportunities for training combat support (CS) and combat service support (CSS) functions. This COBRAS II battalion-level work is described in Hoffman's report, *Combat Support and Combat Service Support Expansion to the Virtual Training Program SIMNET Battalion Exercise: History and Lessons Learned* (1997). The products of that effort reside with the VTP observer/controller (O/C) team of the 16th Cavalry Regiment, Fort Knox.

<sup>3</sup> A second COBRAS III effort used the Synthetic Theater of War (STOW) Architecture linking both constructive and virtual simulation, as the driver for a multiechelon exercise. It is referred to as the COBRAS STOW Exercise and is reported in several ARI reports (COBRAS Team, in preparation; C. H. Campbell et al., in preparation).

### ***Purpose of the Report***

This report documents the development process and lessons learned during the BBSE portion of COBRAS III project. It is addressed to three audiences: the sponsors of training development programs, the developers of the training programs, and those policy-makers who are responsible for Army training today and in the future. In addressing those audiences, the report has three objectives:

1. to detail the history of the development effort, from the initial design activities through the production and delivery of the final training support package (TSP) materials;
2. to describe the resulting training exercises and TSPs, focusing on the unique aspects of the COBRAS III versus the COBRAS I and II program designs; and
3. to present lessons learned from the project, provided to assist Force XXI policy-makers as they continue to advance the program, and to aid developers of other structured simulation-based training programs.

### ***Organization of the Report***

This report is organized in six sections:

- *Section 1: The COBRAS III Project.* This section describes the early stages of the project in terms of project initiating circumstances, the technical objectives, and training program design.
- *Section 2: Brigade and Battalion Staff Exercise Development and Evaluation Plan.* This section describes the basic development methodology and presents the timeline of BBSE development events.
- *Section 3: Development of the Brigade and Battalion Staff Exercise.* This section describes the development of the BBSE in preparation for the trial implementation, highlighting how and why the BSE was modified to achieve the objectives for the BBSE.
- *Section 4: Trial Implementation of the Brigade and Battalion Staff Exercise.* This section describes the BBSE trial implementation and its findings and discusses the actions taken to improve the exercise as a result of the trial.
- *Section 5: Lessons Learned for the Training Developers.* This section summarizes lessons learned that may apply to future training development projects. Most of the lessons relate to the construction and content of TSPs for COBRAS-like programs.
- *Section 6: Future Directions.* This section discusses future development efforts, including the next COBRAS project.

Appendix A provides definitions of the acronyms used in this report.

## **Section 1: The COBRAS III Project**

The planned scope and activities of the COBRAS III project were outlined by ARI, the United States Army Armor Center (USAARMC), and the Force XXI Training Program during the early stages of the project. During this time, the conceptual foundations of the program were solidified as development objectives and requirements. This section describes the early stages of the project, in terms of the project initiating circumstances, the project's technical objectives, and the training program design.

### ***Project Initiation***

In early 1994, with the support of the Senate Appropriations Committee, the U.S. Army was directed to “. . . expand the existing simulation facilities at Fort Knox, develop a training strategy, use it to enhance the readiness of the 194th Separate Armor Brigade, and evaluate the effectiveness of these simulations and this new strategy” (Department of Defense, October 1993). Congressionally-identified funding was provided through the Defense Advanced Research Projects Agency to the ARI - Armored Forces Research Unit at Fort Knox. The resulting program, known as the Force XXI Training Program, was seen as an Army-wide program for integrating virtual, constructive, and live simulation-based training into the Force XXI plan for enhancing combat readiness. The effort, conducted by ARI, was entitled “Force XXI Training Program for the Conventional Mounted Brigade” and began in January 1995. One more name change occurred in the spring of 1995, when the program title Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation, and its acronym, COBRAS, came into common usage.

The first two COBRAS projects (COBRAS I and II) are the products of the congressionally-appropriated funding provided to ARI. The COBRAS II project, the continuation of the original COBRAS project, revised or replaced all the COBRAS I products. The products delivered in the COBRAS II project include: a TSP for a complex staff exercise for the brigade, referred to as the BSE, a series of TSPs for small group brigade staff vignettes, and revised and expanded TSPs for the VTP battalion exercises adding training opportunities to incorporate combat support (CS) and combat service support (CSS) functions. The BSE and VTP battalion expansion are fully described in Appendix B.

The COBRAS III BBSE was derived from lessons learned after observing the ways in which trial units modified the COBRAS II products to meet their needs in preparing for a National Training Center (NTC) rotation. Again, ARI defined the requirement in a statement of work ([SOW] ARI, 1997), and a technical response (Human Resources Research Organization, 1997) was prepared to detail the approach to meeting the requirement.

### ***Project Purpose***

The initial COBRAS I/II work was designed to improve the decision-making processes of the brigade headquarters through the use of simulation, while at the same time reducing the amount of time and number of personnel required to prepare for and support the training. At a more abstract level, however, the program represented a test-bed for training concepts and training technology. That is, it provided an initial architecture for addressing collective training needs for a conventional brigade staff and the linkages to higher and subordinate echelons.

As a training program, the COBRAS I/II BSE provided the conditions for brigade staff members to practice decision-making, communications, synchronization, and integration processes among themselves and with other echelons. As a result of the trials during the development process, three important indicators of additional training needs emerged:

- In the BSE, 16 of the brigade staff leaders were included as the primary training audience. However, during conduct of the exercise, the brigade staff leaders included as much of their staff as possible. This resulted in a focus on the brigade staff sections rather than just the section leaders. Additionally, some of the battalions leaders requested observation and feedback, even though the TSP contained materials for observation and feedback for the brigade staff only.
- Another lesson learned from the BSE trials was that the BSE brigade organization, including four battalions and a cavalry troop, was not acceptable to the trial units. It simply did not replicate their normal brigade structure. As a result, the fourth battalion and the cavalry troop were “written out” of the scenario and the simulation materials. This was accomplished by the trial units and their simulations center personnel, prior to the exercise trials.
- One more lesson learned from the last COBRAS II trial was that units wanted products to help them prepare for NTC rotations. They consistently expressed a need for additional training exercises that would include 24-hour operations instead of the 10-12 hour training days built into the BSE, deployed command posts (CPs), and concurrent missions.

These lessons from the first two exercise trials were pivotal in defining the BBSE requirements. Additional lessons learned were derived from a third trial, conducted in May 1997, at Fort Lewis (3 Brigade [Bde], 2 Infantry Division [ID]). In this implementation, the BSE was being used as an NTC ramp-up exercise. Among the modifications made to suit this purpose were changes in task organization (use of one armor, one mechanized infantry, and one light infantry battalion), schedule (24-hour operations and overlapping missions and concurrent planning and operations, rather than sequential missions), and opposing force (OPFOR) activity and aggressiveness. All of these changes were intended to provide a virtual replication of the anticipated NTC experience.

The BSE had been intended as a “crawl-level” exercise, to help brigade staff members learn about their own jobs within the larger staff process, to allow them to practice interactions and information flow, and to give them experience in using all of their assets – combat, CS, and CSS. The May implementation was an attempt to adapt this exercise as a “graduate-level” exercise, preparatory to their NTC rotation. More than words, these actions expressed the brigade’s need for simulation-based practice opportunities that would help to prepare them for a high-intensity, realistic field exercise and, by extension, for a real world mission-required deployment.

These lessons from various implementations led to the following four characteristics of the BBSE:

- The BBSE focuses on the commanders, staff members, and staff sections at both the brigade and battalion levels.

- The BBSE has three maneuver battalions (two armor and one mechanized infantry) and does not include a cavalry troop in its task organization. All other brigade slice elements are similar to the BSE.
- The BBSE accommodates 24-hour operations and requires concurrent actions of future mission planning and current operations of different, unrelated missions.
- The BBSE enemy force is allowed to be more aggressive and audacious, within limits, imposing a greater challenge on the participating unit.

### ***COBRAS III Program Design Synopsis***

As in the COBRAS I/II BSE, the COBRAS III BBSE was designed according to the principles of structured training. These principles include: (a) a focus on selected performance objectives, (b) standardized exercise control to cue performance, (c) standardized feedback to correct and reinforce performance, and (d) exercise support by means of a comprehensive TSP. The basic methodology for design and development is described briefly in Appendix C.

The following synopsis provides a brief overview of the exercises and materials to be developed. It describes the exercise design features, the characteristics of the program's tactical scenario, the program's instructional design characteristics, and the characteristics of the TSPs.

#### ***Exercise Design Features***

The SOW called for development of an exercise with three missions similar to those the BSE created in the COBRAS II effort. However, the new exercise is differentiated by the scope of the focus.

- The BBSE is a large scale, multiechelon training exercise that immerses the key brigade combat team members (i.e., brigade commander, his staff, staff sections, and one or more of the maneuver battalion commanders and their staffs) in a multi-mission scenario covering all phases of the missions (plan, prepare, and execute, including consolidation and reorganization).
- The exercise overlaps the missions, forcing the BCT to plan for one mission while preparing for and executing another mission. This design feature also has the effect of precluding multiple entry points: Training using the BBSE must begin with the deliberate attack (DATK) and then continue with the movement to contact (MTC) and area defense (AD). However, the brigade commander may elect to end the exercise after one, two, or all three missions.
- The exercise requires the brigade combat team (BCT) to conduct 24-hour operations over a 5-6 day period, requiring them to work in shifts.
- The exercise induces flexibility by changing the scope of a mission or selected conditions during the planning or preparation phase. This causes the BCT to reassess its plan, make adjustments, and disseminate the revisions in a timely manner.
- The exercise focuses on performance objectives for the combined audience of commander and staff members rather than on discrete or individual tasks.

### ***Tactical Scenario***

The exercise is based on multiple scenarios that are linked by the results of the brigade's operational status. In the scenario, a conventional mounted brigade is opposed by a Krasnovian enemy operating according to the conventional Soviet-style threat specifications described in the U.S. Army Training and Doctrine Command (TRADOC) Pamphlet (PAM) 350-16 (Department of the Army [DA], 1994).

The brigade faces a new OPFOR for each mission, yet is required to perform the required CSS actions to bring their own forces back to an operational strength needed to defeat the OPFOR in each mission. The scenario is set on NTC terrain and covers the plan, prepare, and execute phases of each mission, with a focus on CS and CSS operations.

### ***Instructional Design***

The instructional design of the BBSE was to be consistent with the design of the initial BSE, while accommodating both the expanded training audience and the lessons learned in COBRAS I/II. Like the BSE, the BBSE was to be exportable and implementable without the benefit of a dedicated observer/controller (O/C) team. This meant that all participants, including O/Cs, would have to come from within the training brigade or its division, or from a sister brigade. It also meant that the TSP would be completely self-contained, requiring no contractor support team to explain how to implement the program.

The greatest change in the BBSE from an instructional standpoint, compared to the BSE, is that the training objectives focus would be on collective or team activities that were multiechelon and that crossed battlefield functional areas (BFAs). These performance objectives were identified and selected through examination of experiences from the CTCs and from review of relevant Army literature. The focus was instrumental in ensuring that the activities and feedback for the full multiechelon BCT training audience were integrated throughout the exercise.

### ***Training Support Packages***

The development of the TSP was to start with the materials developed for the BSE. The model for the BSE included a single TSP that would be flexible enough to be used under different implementation configurations.

The TSP for the BBSE would need to accommodate the five unique exercise design features described above, as follows:

- Because of the expanded training audience, additional observation and feedback materials would be needed. Additionally, the addition of the battalion commander(s) and staff to the training audience meant that they would operate from a deployed CP rather than from a Brigade/Battalion Battle Simulation (BBS) workstation. Therefore, workstation materials would be required for the company/team personnel who would be at the workstation.
- The inclusion of overlapping missions caused developers to devise methods for presenting messages and reports for both missions, while clearly indicating the particular mission to which the information applied. For example, during the DATK mission, there would be reports of enemy activity as they prepared their defense.

Simultaneously, reports of enemy actions, preparatory to their attack, would be arriving to paint the picture for the AD mission. Because the two enemy situations were completely independent, it was necessary to distinguish between the two conflicting sets for reports to avoid confusion in the brigade operations and planning cells.

- The change to a 24-hour training day required forethought and planning for staffing, timing of scenario events, and scheduling of feedback sessions. In almost every element of the support requirement (e.g., roleplayers, interactors), staffing requirements would be almost doubled. The scenario timeline was constructed so as to ensure that most (but not all) of the significant events would occur while the brigade and battalion primary staffs were in their CPs, rather than when the second shift staffs were there. Finally, because the exercise tempo was already intense, the feedback sessions were reduced to one per day, and were structured to be very austere, requiring less time than multimedia after action reviews (AARs) do.
- The introduction of flex missions to the unit's scenario and the provision that the OPFOR could exercise any of several courses of action meant that the TSP materials for controlling the scenario storyline had to be written as guidance, with options and considerations, rather than as pure instruction. Even in the BSE, there was some flexibility given in the different courses that the scenario could follow, but it was relatively slight, compared to the BBSE.
- The focus on multiechelon, multifunction performance objectives led to a variety of changes to the structure of the observation and feedback materials. Observers were to be organized to focus on performance objectives, rather than on individual staff members or single BFAs.

### *Summary*

The COBRAS III BBSE design and development process was a carefully considered extension of COBRAS I/II work. It was never intended to replace the BSE, but rather to provide another exercise and TSP in the arsenal for brigade training. In the following section, the description of the COBRAS III development plan demonstrates clearly the similarities between the projects, in terms of the development methodology employed and the evaluation plan.

## **Section 2: Brigade and Battalion Staff Exercise Development and Evaluation Plan**

Like its predecessors COBRAS III followed the documented procedures for the development of structured simulation-based training (C. H. Campbell & Deter, 1997; C. H. Campbell, Deter, & Quinkert, 1997). Consistent with the procedures and the project SOW, the conduct of a formative evaluation was a vital aspect of the COBRAS III effort. The evaluation strategy required pilot implementations and continual reviews of the exercise throughout the course of its development. The findings from the evaluation were key to improving the program in terms of its performance focus and implementation approach.

This section of the report describes the development method and timeline of the COBRAS III project. The three major topics include:

- *Development Procedures*: This section is an overview of the procedures in exercise development.
- *Formative Evaluation Approach*: This section describes the evaluation approach and provides a brief introduction to the evaluation activities.
- *Development Process*: This section describes the major project events and phases.

### ***Development Procedures***

The development process detailed for the COBRAS I/II work (C. H. Campbell et al., 1998) was to drive the COBRAS III development of the BBSE. This process includes a four-phase set of activities. It begins with complete delineation of all constraints and expectations for the product, including the intended training audience, simulation, missions, and implementation model considerations.

The second and third phases in development are usually performed in concert. One set of procedures involves the specification of the training objectives for the exercise, in terms of specific individual or collective tasks. The other parallel activity is the development of scenario conditions, including task organization and modified table of organization and equipment (MTOE); starting locations, dispositions, and readiness levels; enemy intent and order of battle; higher echelon missions; and a scenario storyline defining how the exercise events will unfold. Activities in both phases are guided and defined by the decisions documented in the first phase.

The fourth phase in development involves the design and development of the TSP itself, incorporating all of the products from the second and third phases. The TSP architecture must answer all of the constraints laid out in the first phase as well.

Because the COBRAS III BBSE represented an expansion of the COBRAS I/II BSE, a modified application of the methodology was employed. This modification enabled developers to use many of the exercise components already developed (e.g., scenario, performance job aids, scripted messages). Each component was reviewed and modified as necessary before being added to the BBSE TSP. The full implementation of the development process is detailed in Section 3 of this report.

### *Formative Evaluation Approach*

An integral and critical aspect of development was the formative evaluation. In the context of structured training development, "formative evaluation" means an ongoing cycle of examine-evaluate-refine. Formative evaluation occurs not after a project's completion, but rather, during the development and initial implementations of the program.

The evaluation method for the COBRAS III program was modeled on the process followed for COBRAS I and COBRAS II (Graves et al., 1997; C. H. Campbell et al., 1998). The examine-evaluate-refine cycle was executed throughout every phase of design and production to ensure that each component of the BBSE and vignettes was functional, doctrinally correct, and consistent with other components.

The BBSE formative evaluation began as the project itself commenced, with assessment of how to implement the initial design decisions, consistent with and in support of the project objectives. For example, with the training audience was now expanded to include both the brigade staff and the battalion staff. The performance objectives were to be primarily, if not totally, multiechelon, addressing both levels within each objective. As additional decisions were made and materials developed, further assessments were made regarding whether these would also support the project objectives. The early evaluation activities were primarily internal to ARI and the development team, with briefings and guidance from the Force XXI Training Program and the USAARMC at critical decision points.

As BBSE development efforts proceeded, evaluation activities became more formal and comprehensive in nature and increasingly significant external support was required. These included both exercise pilot runs and trial implementations. The evaluation activities are described briefly below with details of the evaluation conduct and results in Section 4.

For the BBSE, pilot exercises were conducted with program developers assisted by developers of other structured training programs and simulation site staff. During these pilot tests, the focus was on assessment of the correctness and usability of selected components of the exercises. For example, pilot tests were conducted to ensure that the content and timing of scripted messages from the roleplayed division would be appropriate and that enemy movements would result in engagements as expected.

The trial implementation involved users representative of the intended training participants and was conducted to allow evaluation of all components of the TSP. It provided the forum for obtaining comprehensive user input regarding efficacy of design decisions, material functionality, user acceptability, and perceived training benefit. For the BBSE, a full trial implementation was conducted in the 3 Bde, 2 ID, of Fort Lewis, Washington.

The methods employed to collect information changed between the early informal evaluation processes and the pilots and trials. During early stages of development, the activities were relatively unstructured, and very little systematic data collection and analysis, in a traditional sense, was performed. Developers focused their attention on specific processes that they needed to assess. For example, in early simulation-supported tryouts of the scenario settings, the scenario contained initial conceptions of events that were to occur to drive the activities of the newly added battalion training audience personnel. The evaluations were aimed at determining if the simulation representation of the scenario would function as intended,

providing cues and conditions as designed. A scenario might be tested, revised, and tested again in the same day; consequently, the focus was on obtaining and applying information rapidly.

During the later pilot tests, the data collection was more systematic and specific. Expected outcomes were targeted before each pilot or trial, in the form of specific questions, and evaluation instruments were designed to facilitate the collection of information to address the issues. Generally, pilot results included corrections, clarifications, resolution of inconsistencies, amplifications or elaboration, deletions, and development of new materials and procedures as solutions to specific design problems.

The trial implementation was larger in scope than the pilots and consequently involved more extensive formative evaluation procedures. The formative evaluation instruments for the trial were designed to support both observational and querying methods of data collection. The instruments generally included structured interview guides, evaluator guides, questionnaires, and group discussion guides.<sup>4</sup>

Each evaluation exercise was designed for timely documentation of results so that information could be disseminated quickly among the training developers. Involvement of the training developers in the observation process facilitated the extraction of findings and their translation into steps for modification. The observations and data from each exercise were organized and analyzed rapidly. The findings were then distributed immediately to the training developers and dialog sessions were organized, as necessary, to clarify and prioritize revision actions.

### *Development Process*

As described above, the project followed the procedure for development of structured simulation-based training. It is not a strictly linear procedure, but rather anticipates considerable modifications to design decisions as further development continues.

The development of the BBSE scenario, identification of the performance objectives, and construction of the TSP began just after the COBRAS II BSE was implemented at Fort Lewis (3 Bde, 2 ID) in May 1997. That exercise, as described earlier, was conducted with some significant modifications to the scenario and implementation model in order to provide a virtual replication of the anticipated NTC experience.

The general goal and intent for the BBSE arose out of that trial implementation. As discussed in Section 3, the changes instituted by the unit formed the basis of the initial decisions for the BBSE. The design processes of performance analysis and scenario construction were overlaid with TSP construction in order to meet a BBSE trial implementation set to occur in November 1997.

The trial implementation of the BBSE, described in Section 4, occurred as planned at Fort Lewis, Washington, in November 1997. Participants included members of the 3 Bde, 2 ID and the 181 Brigade Reserve Training Detachment. The trial enabled developers to try out and obtain information on many aspects of the exercise, including the performance objectives and exercise

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<sup>4</sup> Questionnaires were reviewed by ARI prior to the trial to ensure rights of the respondents would be protected. The questionnaires were assigned ARI Personnel Test Number 60-02.

timelines. After the trial, intense internal reviews of the TSP were conducted, and data were analyzed and applied to improve the exercise.

Throughout the project, Force XXI Training Program and USAARMC were kept informed of the progress and obstacles by means of a series of in-progress reviews.

### *Summary*

Within the development and evaluation plan described here, there were various considerations and decisions that shaped the final products. The next two sections of the report describe the design and development events. Section 3 describes the production of the BBSE and Section 4 describes the trial implementation and evaluation findings. Following the development-oriented sections, the report provides lessons learned and a description of the needs that remain to be addressed by future R&D.

### **Section 3: Development of the Brigade and Battalion Staff Exercise**

Because the developmental process for COBRAS III is very similar to the COBRAS I/II process (Graves et al., 1997; C.H. Campbell et al., 1998), this report highlights the aspects of development and the exercise itself that were unique to the COBRAS III effort. It identifies those aspects of the BBSE that were changed during the project, how they were changed, and the outcomes of those changes (i.e., new or revised TSP components).

This section deals with BBSE development in preparation for the trial implementation at Fort Lewis, Washington in December 1997. The topics covered include:

- *Designating the Primary Training Audience:* This section describes how the SOW requirement evolved into designation of the specific training audience members.
- *Designing the Tactical Scenario:* This section explains how the COBRAS I/II scenario was altered to include scenario events that would cue the involvement of the brigade and battalion training audience members, to allow for concurrent planning, and to provide conditions for practicing complex performance objectives.
- *Designating the Performance Objectives:* This section describes the process for identifying performance objectives and constructing the supporting documentation, task identification and selection process and its products.
- *Designing the Exercise Architecture:* This section presents the architecture of the COBRAS III BBSE as it was prepared for the trial, and how it differed from that of the BSE.
- *Developing the Training Support Package:* This section provides a synopsis of the BBSE TSP as it was prepared for the trial. Special focus is placed on describing how the COBRAS III TSP differed from earlier versions.

#### ***Designating the Primary Training Audience***

The first and most consequential decision in designing the BBSE was identifying new training audience members. The initial decision made by ARI and the COBRAS developers to include brigade staff section members and the commander and staff of one or more maneuver battalions in the primary training audience was directive and clear, but not very specific. Attempts to enumerate exactly who would be considered "primary training audience" were largely unsuccessful and, on reflection, unnecessary. Precise specifications of the training audience individuals were important in the BSE, because the exercise objectives were written in terms of the roles of individuals within staff processes. However, for the BBSE, with the focus more broadly on collective skills and performance, the commanders and staff leaders would be expected to determine who, within the staff sections, should participate. Their further decision, concerning who would attend the large group feedback sessions, would operationally define the training audience. The performance objectives would be written to the BCT and the specific activities, rather than to individuals within a group process.

Representatives of the Force XXI Training Program and the USAARMC concurred with the definition of the training audience members as well as the rationale for this decision. This

was an important step in ensuring that the expectations of the proponent agencies and program stakeholders would be met.

### *Designing the Tactical Scenario*

The BBSE scenario was not developed from scratch, but represented a revision of the COBRAS I/II scenario. In the early stages of scenario redesign, efforts were driven by four distinct considerations:

1. to design a storyline that would allow for concurrent planning of a follow-on mission while still preparing for and executing the prior mission,
2. to ensure that storyline would not put the most critical scenario events during the hours when second shift staff members would be operating the CPs,
3. to provide options for alternative plans and execution for the OPFOR activities,
4. to incorporate the task organization changes recommended after the BSE trials (i.e., using only three battalions and no cavalry troop).

The goal of providing for concurrent missions was particularly difficult to achieve. Because the BCT could select any one of a theoretically infinite number of courses of action and could execute its course of action in any number of ways, it was impossible to predict where and in what condition it would be when the transition to the follow-on mission occurred. In order to force CSS activities, developers wanted to allow the brigade to rearm and resupply, and needed to allow time for that to happen. Additionally, the brigade would need to be in a specific starting location for the subsequent mission in order for developers to prepare simulation files for the OPFOR. Therefore the decision was made to construct a storyline that had the brigade return to the assembly area between missions, required the brigade to carry out sustainment activities in order to get to a sufficient level of readiness, and included a "new" OPFOR that was not depleted for each mission. As a result, the storyline is not strictly continuous for the three missions.

The second and third considerations listed above were not particularly difficult to accommodate. They required attention and adjustment, but did not involve any real innovation in design.

Work to integrate the adjusted storyline into the scenario began with the revision of tactical products, starting with the corps and division operations order (OPORD) materials. Other aspects of the scenario, such as products that contained ancillary information (e.g., personnel status, levels of supply and maintenance, intelligence summary information, meteorological and terrain information) that would flow down from division and corps, were also altered to provide performance cues as necessary. Together, these products were the structuring mechanism of the scenario, as they set the situation and conditions under which the BCT would develop its plan.

The initial testing of the scenario occurred in map exercises conducted to ensure that the scenario was tactically sound and that the actions required of the BCT were consistent with current doctrine as well as internally consistent. The scripted messages received special scrutiny to ensure that the BCT would be able to distinguish the messages for the current mission from those for the subsequent mission.

Following the initial map exercises, and when the tactical products were judged as being sufficiently complete, simulation-based tryouts were conducted, much like those conducted during the BSE development. The tryouts required the development of BBS electronic files, which contained the details of the task organization, readiness levels, and operational graphics. Their purpose was to ensure that the scenario would unfold as designed, producing the desired events and cues.

Mission by mission, the scenario was evaluated for its capacity to logically and realistically contain the events that would cue the intended performance requirements. The resulting scenario and tactical products were judged to be appropriate to support continuing development.

Table 1 contains a brief description of the COBRAS III BBSE scenario storyline.

**Table 1**  
**Summary of COBRAS III Scenario Storyline**

**The Road to War**

The scenario storyline begins with the brigade in a field training exercise (FTX), having been deployed to the country of Mojave because of an increasing threat from the Krasnovians. The FTX, which creates decrements in personnel and equipment status, ends as intelligence indicates that the Krasnovians are preparing to cross the international border.

**The Area Defense (AD)**

The brigade staff then issue an order for an AD mission and must simultaneously conduct its consolidation and reorganization activities and plan for the AD. The Krasnovians conduct their attack, which fails after inflicting some losses to the brigade. The brigade then conducts a rearward passage of lines to a rear assembly area ([AA]; the passage of lines is not performed in the exercise).

**The Deliberate Attack (DATK)**

Three days later (these three days are not represented in the exercise; in fact, the division order is issued before the AD is executed), the brigade receives a subsequent order to conduct a DATK mission against the remnants of the Krasnovians. The three days in the scenario provide a realistic time for the brigade to return its forces to a level of combat readiness, which will make the DATK mission feasible. Again, the brigade staff develops its plan, briefs the plan, monitors preparation activities, and conducts the attack. The storyline ends with the defeat of the Krasnovians and return to the AA.

**The Movement to Contact (MTC)**

While the brigade is in its AA, conducting medical, repair, and replacement activities, it receives an order to conduct a MTC mission (in the exercise, the division order is issued before the DATK is executed). The brigade staff prepares their order, while subordinate units continue their logistics efforts. The MTC is conducted against the Krasnovians' meeting battle. After the brigade has met and defeated the Advance Guard Main Body, circumstances require the brigade and the enemy to stop their advances and take up hasty defenses. The Krasnovian lead elements retreat to hasty defensive positions awaiting the arrival of second echelon forces to conduct an attack.

### *Designating the Performance Objectives*

Discussions with the 3 Bde, 2 ID during the May 1997 implementation and subsequent discussions following the brigade's NTC rotation led to the conceptualization of performance objectives that were more inclusive and less procedural than tasks, even collective tasks. An especially clear example of the needed objectives came during one of the AARs at the NTC, when the O/C was reviewing a broad sweep of fire support issues with the commander and the brigade and battalion members. Not only was it clear that this multi-battlefield operating system (BOS) approach could be applied for a variety of brigade requirements, but it was also apparent that a simulation-based exercise could provide opportunities to practice techniques and procedures that would give the staff an edge in performing key high-payoff functions.

For example, one such focus could be on how the brigade and battalion CPs manage information flow throughout all phases of a mission. Another focus could be on the planning and management of the reconnaissance and surveillance (R&S) for the brigade. Yet another could concern how the brigade and battalions manage their parallel planning efforts. By practicing these objectives prior to their CTC rotation, the BCT would be better ready to take advantage of the O/C expertise, challenging scenarios, and live conditions.

Because of the multiechelon emphasis for the BBSE, multiechelon performance objectives were required. Early development included both multiechelon performance objectives and single-level objectives, as shown in Figure 1.<sup>5</sup> These were the objectives that were used during the trial implementation of the BBSE in November 1997.

Plan and Implement Brigade Air Defense Early Warning
Plan and Execute Engagement Areas
Parallel Planning within the Brigade
Manage Information within the Brigade Command Posts
Manage Information within the Task Force Command Posts
Plan and Manage Reconnaissance within the Brigade
Integrate CSS Estimates in Decision-Making
Conduct Clearance of Indirect Fires Procedures

**Figure 1.** Brigade and Battalion Staff Exercise performance objectives for Fort Lewis trial in November 1997.

The materials for the training audience and the observers were derived from a combination of subject matter expertise within the COBRAS team and Army personnel, and

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<sup>5</sup> A complete description of the development process for performance objectives is provided in Jenkins, Graves, Deter, & Quinkert (in preparation). This ARI Research Product also contains the performance objectives materials developed for the BBSE.

experiences of combat veterans and CTC observers (especially as documented by the Center for Army Lessons Learned [CALL] at Fort Leavenworth).

Each performance objective description had five key elements:

- Persuasive statement of the pressing need for expert performance
- Statement of the objective in terms of the consequences of proficient performance or flawed performance
- Overview of the performance requirements
- Detailed techniques and procedures
- Considerations for assessment for the commander or the observer
- References and related Mission Training Plan (MTP) tasks.

The techniques and procedures constitute the greatest part of each objective description. They were not written to be prescriptive, but rather to provide performance guidance for the unit's consideration. They expanded on available Army Training and Evaluation Program (ARTEP)-MTP descriptions by adding suggestions concerning who would perform what essential parts of the function, what products could be useful, or how the staff could provide more timely support for the commander's decision-making.

The assessment guidance did not require that the unit perform as laid out in the techniques and procedures section. Rather, the assessment questions and considerations addressed the objective statement. The unit could use its own procedure or the given procedure; the important thing was that the objective be accomplished. Thus the techniques and procedures might serve as guidance for one unit, but as a checklist of considerations for another unit. The three key questions in assessment were "Does the unit have a procedure?", "Did the procedure accomplish the objective?", and, "Is the unit happy with its procedure, or what should be changed?"

The observer materials contained additional guidance. Information was provided on where to observe, what to look for, and what BBS-generated data to obtain in order to provide feedback to the unit on their processes and the battlefield effects of their actions. This was not to be exhaustive guidance about all aspects of the performance objective; the considerations for assessment would provide most of the observation guidance. Rather, the observer guides would detail BBS-specific or BBSE scenario-specific suggestions.

Altogether, eight performance objectives were prepared for the November 1997 trial. This was intended to serve only as an initial set to test the concept and approach to delineating the objectives. The goal was to eventually include between 12 and 20 such objectives. It seemed obvious that this would be too many for the unit to focus on during a 5-day exercise; even one AAR per objective, at 1-2 hours per AAR, would use up a significant portion of the training time. Instead, the implementation model called for the brigade commander to select no more than six objectives for focus. Observers would pay particular attention to those selected objectives in formal and informal feedback sessions. All objectives would be cued, and performance of all of them would (or should) occur, but the focus for any given implementation would be on a selected set.

### *Designing the Exercise Architecture*

Every aspect of the original (COBRAS I) BSE was precisely designed to support the intent of the exercise, which was driven by the specific training audience and the scenario. Participants had well defined and purposeful roles, simulation layout and usage were described in specific terms, the scenario was highly structured, and the TSP was thorough and direct. Because the exercise was not intended to train all aspects of brigade functioning, the model specified 8-10 hour workdays and operations out of administrative CP locations in or near the simulation center. Thus, all components of the design and the TSP itself were created to represent a tightly linked group of products that, when put together, would support the functioning of all participants.

In the COBRAS III effort, a very different exercise model was to be employed. The differences were most apparent in three areas:

- Structure for observation and feedback
- Implementation conditions
- Participant types and numbers.

#### *Structure for Observation and Feedback*

Significant modifications were made for the BBSE design in the area of performance observation and the provision of feedback. The role of the observers in the COBRAS III BBSE was essentially the same as in COBRAS I/II: to serve as mentors, coaches, and providers of feedback, both in informal discussions and in more formal AARs with brigade and battalion staff members. But wherein the BSE observers were assigned to shadow one or two members of the training audience, in the BBSE, observers were instructed to follow particular performance objectives. Thus a group of two or three observers might be tracking different aspects of R&S planning, and another observer might be focused on information flow in the brigade main CP. The type and number of observers required would depend on the particular performance objectives selected by the commander. Although professional observers, such as those found in the regional training units, would be best able to learn and apply the procedures, the materials were designed for use by untrained observers.

In the BSE, frequent AARs (one or two per day) were used instead of the more common training model of a single AAR upon mission completion. The BBSE compromised these two approaches. The model called for an AAR period of time each evening, at about the time that CP shift changes would occur. During any given AAR, only two or three performance objectives would be discussed; each objective should be the topic of at least two AARs, so that progress and development could be discussed.

Feedback would occur in one-on-one sessions, small group sessions, or formal AARs. However, even the most formal AARs would not require audiovisual aids or high technology graphics. Instead, the focus would be on the discussion, with the observer leading the brigade and battalion training audience members to decide whether they had a satisfactory and acceptable procedure for the objective. The intent was to keep time expenditures down and to target the unit's performance and battlefield effects as efficiently as possible.

In any given group feedback session, representatives from all BOS and both echelons would be involved. The multiechelon focus for the full BCT was to be maintained throughout the exercise.

### ***Implementation Conditions***

The conditions for implementation of the exercise were deliberately more challenging than they had been for the BSE, in keeping with the intent to provide a training setting that would begin to approximate NTC conditions. There were four conditions that were noticeably more difficult for the unit:

- The training schedule called for a 24-hour 5-day exercise. From the time of the division order being provided to the brigade, all participants were fully involved with a real-time simulation clock running continuously. Real world considerations of shifts and shift change briefings had to be worked out by the units.
- The brigade and battalion CPs were deployed adjacent to or close to the BBS simulation facility. This increased the demands on the unit to maintain their communications equipment and procedures, while still allowing feedback sessions to be conducted without undue interruptions.
- The scenario timeline presented the three missions in an overlapping scenario, rather than sequentially. This required the units to work on their procedures for concurrently executing one mission while planning the follow-on mission.
- The OPFOR was allowed more flexibility than in the BSE, and was allowed to be more aggressive. Rules of engagement for the OPFOR provided alternative courses of action that the Exercise Director could select in order to provide the appropriate level of challenge for the unit.

### ***Participant Types and Numbers***

Because of the inclusion of one or more battalions in the training audience, and because of the more intense implementation conditions described above, the training audience and requirements for additional participants increased greatly. Specifically:

- In the BSE, the primary training audience was the brigade commander and staff – a total of 16 persons. It also required an austere number of supporting participants for the brigade staff members, 12 altogether. For the BBSE, even with only one battalion participating fully, the primary training audience for two shifts, including minimal numbers of staff section members, was 169.
- Roleplayers for the BSE portrayed the brigade assets, and numbered 32. Another 44 individuals acted as interactors at the workstations. For the BBSE, roleplayers portrayed the battalion's line companies and other assets for each fully participating battalion. Additionally, brigade asset roleplayers had to be sufficient in number to task organize the participating battalion's companies, as appropriate. The roleplayers and interactors together numbered 96.
- The number of observers in the BBSE depended on the particular performance objectives selected, but it was estimated that at least 20 would be required for any implementation. Observers would not need to be double shifted. Rather, they were

expected to adjust their schedules so as to be on site for critical events in the unit's timeline or in the scenario timeline.

- The division response cell (known as exercise control or EXCON) and OPFOR changed, primarily because of the double shift requirement: a total of 14 for the BSE and 32 for the BBSE.

In summary, the personnel requirements increased from 127 to 317. Of this group, 169 were members of the primary training audience. The remaining 148 constituted the supporting training audience or observer team, all of whom would derive significant training value from the exercise.

### *Developing the Training Support Package*

As the changes in the participants and other aspects of the BBSE design were incorporated, the BBSE TSP also began to be clearly different from its predecessor. The major modifications apparent in the TSP prior to the trial implementation, compared to the BSE model, included:

- The tactical materials were designed to be overlapping, as described earlier. This required developers to devise methods for clearly distinguishing between the scripted messages pertinent to the current mission and those that applied to the future mission.
- Training audience preparation materials included the performance objective descriptions, along with guidance that the unit should use the techniques and procedures to review and refine their existing procedures, or could choose to adopt the procedures provided.
- Observer materials and training audience materials contained fuller descriptions of possible types of AARs. The emphasis was on maintaining the low-intrusion aspect of all feedback sessions.
- The roleplayer and interactor guides were combined to produce workstation team guides containing information for both types of workstation team member. This was to be the third model tested: The COBRAS I provided guides for interactors for offense and defense, and a separate guide for each type of roleplayer; COBRAS II provided combat, CS, and CSS interactor guides for blue forces workstations, and combat and CS for the OPFOR interactors, as well as separate roleplayer guides. Developers continued their search for a format that would encourage use by workstation team members and Contracted Logistics Support (CLS) staff.

Table 2 provides a description of the overall COBRAS II BSE TSP structure, as it existed going into the trial implementation.

**Table 2**  
**Structure of the COBRAS III Brigade and Battalion Staff Exercise Training Support Package at the Time of the Trial Implementation**

TSP Category	TSP Item		
Exercise Management	<ul style="list-style-type: none"> <li>• Exercise Guide for the Exercise Director, COBRAS Coordinator, and Blue Forces Controller, with Appendixes</li> <li>• Brigade and Battalion Orientation Guide</li> </ul>		
Tactical Materials	<ul style="list-style-type: none"> <li>• Corps Concept (MTC, AD, DATK)</li> <li>• Division Orders and Tactical Materials (including overlays)</li> <li>• Scripted and hard-copy messages</li> </ul>		
Participant Guides and Materials	<p>Training Audience:</p> <ul style="list-style-type: none"> <li>• Training Audience Guide (generic, for all training audience elements at brigade and battalion levels)</li> <li>• XO Guide to Unit Preparation and Materials Distribution</li> <li>• Initial Situation Packages and start of exercise (STARTEX) Position Overlays (per staff member, per mission)</li> </ul> <p>Observers:</p> <ul style="list-style-type: none"> <li>• Observer Guide (generic, for all Observers)</li> <li>• Performance Objectives</li> </ul> <p>Workstation Team Guides for:</p> <table border="0" style="width: 100%;"> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li>• Exercise Control (EXCON)</li> <li>• Task Force (TF) 1-5</li> <li>• TF 1-7</li> <li>• TF 3-5</li> <li>• Air Defense Artillery (ADA)</li> </ul> </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li>• Opposing Forces</li> <li>• Field Artillery</li> <li>• Engineer</li> <li>• Forward Support Battalion (FSB)</li> <li>• Brigade Troops</li> </ul> </td> </tr> </table> <ul style="list-style-type: none"> <li>• Initial Situation Packages and STARTEX Position Overlays (per workstation team)</li> </ul>	<ul style="list-style-type: none"> <li>• Exercise Control (EXCON)</li> <li>• Task Force (TF) 1-5</li> <li>• TF 1-7</li> <li>• TF 3-5</li> <li>• Air Defense Artillery (ADA)</li> </ul>	<ul style="list-style-type: none"> <li>• Opposing Forces</li> <li>• Field Artillery</li> <li>• Engineer</li> <li>• Forward Support Battalion (FSB)</li> <li>• Brigade Troops</li> </ul>
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Simulation Materials	<p>Tools for initializing BBS and making changes or corrections:</p> <ul style="list-style-type: none"> <li>• Simulation Site Manager's Guide</li> <li>• BBS TOE and Initialization Book</li> <li>• BBS Archive Book</li> <li>• BBS System Tapes</li> </ul>		

*Summary*

Even with the COBRAS I/II experience and materials, development of the COBRAS III BBSE was a complex process. The initial development described here resulted in preparation of TSPs ready for trial implementation. The next section (Section 4) describes the BBSE trial implementation and evaluation plan, the findings, and the results of that trial, including the revisions made to the exercise and TSP

#### **Section 4: Trial Implementation of the Brigade and Battalion Staff Exercise**

The key evaluation event during the development of the COBRAS III BBSE was the trial implementation conducted at Fort Lewis, Washington, with 3 Bde, 2 ID. This trial involved personnel representative of the target multiechelon training audience using the TSP as designed in a full implementation.

This section describes that trial and the trial results. Three topics are discussed:

- **Trial Implementation:** This part describes the specifics of the formative evaluation in terms of the purpose of the trial, the evaluation methods and restrictions/constraints, and the evaluation staffing plan.
- **Trial Implementation Results:** This part summarizes feedback provided by participating unit members and observations made by COBRAS developers.
- **Program Revisions:** This part describes the extent of revisions that were made to the TSP as a result of the trial.

##### ***Trial Implementation***

The purpose of the trial implementation was to evaluate the effect of training program design decisions on perceptions of training benefits. The design characteristics of interest were: the multiechelon focus, 24-hour operations, deployed CPs, and in-stream observation and feedback approach.

During the trial implementation, exercise developers observed the planning, preparation, and conduct of the exercise and performed various data collection activities. Although developers were prepared to assist in implementation as necessary in order to ensure that the exercise could be conducted, the intent was to operate in a "hands-off" mode as much as possible.

In general, the exercise was implemented according to the guidance provided in the TSP. The BCT participated with one battalion being observed; the other two battalions were roleplayed in CPs at BBS workstations. The CPs for the brigade and the observed battalion were emplaced in an area adjacent to the simulations center. The exercise operated on a full 24-hour schedule, with a continuously running scenario timeline.

The only significant ways in which the trial did not fully test the TSP were:

- As had been the case for previous trials, the observers were trained professional observers from a training support brigade. Thus their experience with live and constructive simulation based training was extensive.
- Although copying and assembly of the TSP materials went more smoothly than ever before, distribution of the materials was somewhat uneven. Simulation site personnel received the BBS materials well in advance of the exercise, as did the brigade commander and staff. Observers received their guides and materials 1-2 days before the exercise. Few of the members of the observed battalion actually received their guides at all.

- The Forward Support Battalion (FSB) commander participated from a CP located some 15 kilometers from the exercise area. In part, this was because the FSB had already planned to conduct their own training during the trial period, and wanted to take advantage of the planned opportunity to fully set up and use their CP.
- The model called for a senior officer, preferably from the brigade's higher headquarters, to serve as the Exercise Director. However, because there was no one of that level available, the individual who was soon to become the brigade's executive officer (XO) filled the role, with some assistance from the Senior Observer, the officer in charge (OIC) of the simulation center, and the COBRAS team members on site. This actually worked very well, because it gave both the commander and the future XO a chance to begin synchronization of their abilities and expectations.
- Because the performance objective approach was new, only eight complete performance objectives were used in the exercise. This was somewhat more than should be included in a single implementation, and stretched the limits of the abilities of the observer team and the BCT to focus on the full complement of objectives. Nonetheless, it meant that only half of the projected performance objectives could be tested.

COBRAS staff involvement in controlling the implementation was less extensive than it had been for previous trials, in part because two of those trials had also occurred in 3 Bde, 2 ID. Only one pre-implementation trip was conducted to coordinate the exercise. The visit was supplemented by telephone conversations to ensure that the TSP materials were being correctly assembled.

For the conduct of the trial implementation itself, 14 of the COBRAS staff were on site before the interactor and roleplayer training began, two days prior to the exercise start. All requests for assistance were noted for later incorporation into the materials.

Trial implementation data were collected by means of four general methods, as described in Section 2:

- Structured interviews were conducted with key participants, including all three members of the exercise administrators (the simulation center OIC, COBRAS Coordinator, and Blue Forces Controller), all observers, the commanders and staffs of the brigade and the observed battalion, the individual representing the Division Assistant Chief of Staff, Operations (G3) at EXCON, and the OPFOR Controller. The interview protocols had been prepared before the trial began in order to ensure that attention was paid to critical evaluation issues.
- COBRAS developers observed each phase of the implementation process and noted problems and areas for improvement.
- Questionnaires were prepared and distributed to the training audience members, observers, roleplayers, and interactors. The questionnaires contained a mixture of two types of items: 5-point scale response items (e.g., disagree-agree) and open ended items (e.g., what additional initialization instructions were needed?).

- Group discussions at the conclusion of the exercise were used to obtain more in-depth information and perceptions of the training quality and value, and ideas about exercise features that should be strengthened, modified, or dropped.

### ***Trial Implementation Results***

The results from the participant interviews and questionnaires at the trial implementation of the COBRAS III BBSE are described below. The main topic of interest – perceived training benefit – is discussed first, and is then examined specifically in terms of the performance objectives approach and the observation and feedback system.

#### ***Perceived Training Benefit***

Perceptions of training benefit from the brigade and battalion training audience members were of particular interest. There were several questions addressed to the training audience concerning global perceptions of training benefit, as shown in Table 3. The exercise was perceived as beneficial for individuals and for the brigade and battalion overall. Even an experienced brigade or battalion staff, they felt, would find the exercise effective.

**Table 3**  
**Training Audience Perceptions of Exercise Utility**

<b>Echelon</b>	<b>Not At All or Slight Extent</b>	<b>Moderate Extent</b>	<b>Great or Very Great Extent</b>	<b>N</b>
<b>To what extent was your participation worth the time spent?</b>				
Brigade	0 (0%)	3 (16%)	16 (84%)	19
Battalion	1 (4%)	8 (33%)	15 (63%)	24
<b>To what extent are you more prepared for a CTC-like experience than before the exercise?</b>				
Brigade	2 (11%)	1 (5%)	16 (84%)	19
Battalion	1 (4%)	10 (42%)	13 (54%)	24
<b>To what extent is the brigade as a whole more prepared for a CTC-like experience than before the exercise?</b>				
Brigade	0 (0%)	4 (21%)	15 (79%)	19
Battalion	2 (8%)	10 (42%)	12 (50%)	24
<b>To what extent is the exercise effective for experienced brigade or task force staffs?</b>				
Brigade	1 (5%)	3 (16%)	15 (79%)	19
Battalion	3 (12%)	9 (38%)	12 (50%)	24

Observers were also asked about the overall benefits of the exercise, both for the training audience and for themselves as observers (Table 4). They were mostly positive about the benefits they derived from participating in the exercise. Brigade-level observers were positive about the value to the training audience; battalion observers were positive but not overwhelmingly so. Two specific comments bear repeating:

- “BBSE has great potential. But all personnel need to be proficient as individuals before the collective part begins.”

- “I think that BBSE has good potential/promise to train staffs at all levels.”

**Table 4**  
**Observer Perceptions of Exercise Utility**

Echelon	Not At All <i>or</i> Slight Extent	Moderate Extent	Great <i>or</i> Very Great Extent	N
To what extent did <i>you</i> benefit from participating in the exercise as an observer?				
Brigade Observers	2 (18%)	2 (18%)	7 (64%)	11
Battalion Observers	2 (22%)	4 (44%)	3 (33%)	9
To what extent do you feel that this type of training is useful <i>for the training audience</i> ?				
Brigade Observers	0	1 (9%)	10 (91%)	11
Battalion Observers	2 (22%)	2 (22%)	5 (56%)	9

The Exercise Director indicated that the brigade was more prepared for a CTC rotation than they had been before the exercise. He also felt that his participation was worth the time and effort, and stated that his review of OPFOR doctrine, brigade-level decision-making, and battle staff command and control were particularly beneficial.

Finally, there were many comments from the training audience members about the positive aspects of the exercise. These are presented in Table 5. Respondents saw benefits in a wide variety of areas, from practicing staff processes in planning and information management to understanding of their assets and relationships with other elements of the division, to opportunities to work with and assess sections and subordinates.

#### ***Perceptions of the Performance Objectives Approach***

Training audience members and observers were asked about the unit's ability to perform each performance objective before the exercise, and about their ability to perform after the exercise was completed (both questions were asked after the exercise). The results are shown in Table 6.

The number of respondents commenting on each objective varied across the performance objectives. In many cases, members of the training audience did not feel qualified to offer a judgment of the unit's proficiency on the objective. This was particularly true for objectives that seemed to focus on a relatively narrow slice of the training audience (e.g., performance objective 8 Integrate CSS Estimates in Decision-Making). Similarly, for the objectives that were directed specifically toward the brigade staff (performance objectives 3 and 8) or toward the battalion staff (performance objectives 4 and 7), members at the other echelon were reluctant to respond.

**Table 5**  
**Training Audience Comments on Exercise Benefits (Number of Respondents Making Comment)**

<b>Staff Planning Processes</b>	
Learned a great deal about planning process (9)	Learned extent of knowledge on mission analysis procedures (2)
Learned some new techniques on R&S planning and execution (3)	Battle tracking (2)
Doctrinal procedures for parallel planning (3)	Learning brigade's order process rhythm (6)
<b>Information Management</b>	
Streamlined the information flow within the TOC (3)	Information systems glimpse at future training
Learned about TOC OPS (7)	The Bde TOC learned to crosstalk better
Information management for Bn S3 shop	Must have a detailed tracking system in case TOC is destroyed
<b>Use of Assets</b>	
Better understanding of synching Corps assets	Better understanding of how to coordinate with DIVARTY
Learned more about DS MI company type assets that usually don't have access to	Working knowledge of how TF integrates its branches
Synchronization of critical information requirements, collection and decision support	Increased knowledge in synchronization of fires
<b>Specific Section or Task Training</b>	
How important ADA EW is, educate at all levels	Troop leading procedures at company level.
Trained the 296 FSB LNO	Rehearsal preparation
I have better trained TF FSNCOs	Duty positions/responsibilities within S3 shop
My enlisted personnel in the FSE are now trained to where I'm confident	S4 can't plan and run a CTCF at the same time; needs help from S1.
More experience in job position	Must use forecasting staff guide
More face time with maneuver	Integrated w/ FSE & CSS at Bde level
Continue to develop better ways to track CSS (2)	FASCAM planning
RTO procedures (improvement)	Build teamwork within the battle staff, increased staff integration (23)
Tested & refined Engineer annex	
<b>National Training Center Preparation</b>	
Understand accelerated NTC battle rhythm (5)	The need for organization to make maximum use of the time available
Familiarization with Bde TACSOP, refine new TACSOP (4)	Got to watch my soldiers (new) work under stress without any sleep
Got to work with the new Bde staff under stress	
<b>Opportunity for Assessment</b>	
Good outside look	Trained in a good no distraction environment
Provided an excellent assessment opportunity	A chance to assess the strengths and weaknesses of the S2 shop
Identified weaknesses and strengths, will guide future training (5)	Experience in my job (4)
<b>General</b>	
Better understanding of doctrine	Net higher entry-level skills for all participants

**Table 6**  
**Training Audience Perceptions of Performance Objective Proficiency**

Echelon	Number Reporting			N
	Increase	No Change	Decrease	
1. Conduct Clearance of Indirect Fires Procedures				
Brigade	7 (41%)	9 (53%)	1 (6%)	17
Battalion	12 (57%)	9 (43%)	0	21
2. Plan and Implement Brigade Air Defense Early Warning				
Brigade	10 (56%)	8 (44%)	0	18
Battalion	11 (55%)	9 (45%)	0	20
3. Manage Information Within the Brigade Command Posts				
Brigade	17 (90%)	2 (10%)	0	19
Battalion	7 (70%)	3 (30%)	0	10
4. Manage Information Within the Task Force Command Posts				
Brigade	5 (100%)	0	0	5
Battalion	18 (86%)	2 (9%)	1 (5%)	21
5. Plan and Manage Reconnaissance Within the Brigade				
Brigade	14 (74%)	5 (26%)	0	19
Battalion	17 (74%)	5 (22%)	1 (4%)	23
6. Conduct Parallel Planning Within the Brigade				
Brigade	13 (68%)	6 (32%)	0	19
Battalion	17 (71%)	6 (25%)	1 (4%)	24
7. Plan and Execute Engagement Areas				
Brigade	2 (50%)	2 (50%)	0	4
Battalion	14 (64%)	7 (32%)	1 (4%)	22
8. Integrate Combat Service Support Estimates in Decision-Making				
Brigade	11 (69%)	5 (31%)	0	16
Battalion	5 (71%)	2 (29%)	0	7

In general, respondents indicated that their unit was more proficient and better prepared on the performance objectives after the exercise than they had been before the exercise. Comments recorded during interviews or provided on the questionnaires also indicated that the exercise was instrumental in improving performance.

The Brigade Commander indicated that the flexible approach of tailoring the training emphasis through selection of performance objectives was viable. With input from the brigade XO and operations and training officer (S3), he felt that he was able to select topics and focus training. At the same time, the entire battle staff was involved and receiving training even if not the focus of an observed performance objective. He stated that the performance objectives allow commanders to “lay the groundwork for a shared vision for tactical operations and commander’s

intent,” and that the approach is “especially viable for fostering a command environment within the brigade and developing the inter-staff relationships vital for operations.”

The Battalion Commander felt that the parallel planning performance objective was sufficient to involve the battalion’s training of decision-making. The focus allowed the battalion to validate their CP and tactical standing operating procedures (TACSOP), and contributed to training for the entire battle staff in all areas of decision-making, coordination with the brigade staff, and information flow. However, because the missions were not linked, the staff needed to start planning from the beginning each time. He felt that this approach does not facilitate the staff being able to use their shared situational awareness in planning the next mission. Additionally, significant training value for the battalion will be lost if the battle staff is deployed at workstations as opposed to a CP.

The Senior Observer was very positive about the performance objective approach as a means of describing exercise behavior and performance. He compared the performance objectives to other existing doctrinal performance measures, specifically mentioning ARTEP tasks, and stated that he knew of nothing “comparable or as good out there.” The performance objectives caused both the observers and training audience to look at issues in a unified way. He liked the techniques and procedures and the assessment guide, noting that the instructions were clear and easy to follow; it was “really great to have everything in one package.” He stated that “the whole Army needs this badly and quickly” and that it would especially benefit the National Guard: “There is not a Guard staff out there that would not benefit from the [performance objective] approach.”

At the battalion level, the battle staff and observers recommended avoiding performance objectives that require the battle staff to be “on the ground.” Because of the limitations of the simulation, units are unable to fully perform those activities. For example, although the unit could gain some value through planning and coordination of an engagement area, they were not able to “construct” one. Other comments about the performance objectives included:

- The recon [performance objective] is a good product as written. Recommend S3 observer also has input and tasks identified for maneuver.
- Parallel planning [performance objective] good. It is a good guide for observer and unit evaluated.
- The information management [performance objective] could be more specific to include some of the information in the reference MTP. Had I not spent time in TOCs, providing a good evaluation would have been difficult using the [performance objectives].
- I like the technique of using [performance objectives] for observing a unit, rather than the traditional method of “looking at everything.” I recommend we use this technique in all training events at all echelons.

When interviewed, the Exercise Director commented that the performance objectives “... provide a great resource of how specific battle staff functions should be executed. The information found in the [performance objectives] is invaluable to both the O/Cs and to the commander/staff. Clearly, other [performance objectives] should be developed.”

### ***Observation and Feedback System***

According to the Brigade Commander, the feedback system was appropriate. It allowed the observer to focus on his area in detail, minimizing the “broad-based general-type” comments. It resulted in minimal interference with the brigade battle staff during the conduct of the exercise.

Small group informal feedback sessions are most “beneficial” as they place soldiers more at ease and encourage more participation by noncommissioned officers and enlisted personnel. Generally a single observer for a performance objective is sufficient. However, that means they may not possess the expertise across the BOS involved with the objective. The observers should provide comments from their observations to drive the battalion discussion during the feedback sessions.

The S3 of the observed battalion stated that the system allows the staff to revise and refine its procedures as opposed to a traditional “checklist” AAR. Observers should refrain from coaching if it interferes with the interaction of the staff. They should also have a working knowledge of the unit’s standing operating procedures, so that all coaching is in relation to those procedures. Feedback sessions should be restricted to breaks in the process or action.

The Brigade Senior Observer noted that the training audience generally did not respond to one method of feedback versus another, but that he liked the flexibility within the system that enables a unit to conduct its own feedback. He believed that multiple feedback sessions are a must, encouraging the unit to conduct their own discussions using the assessment guide. He preferred “informal” feedback sessions, and stated that the assessment guides “did an excellent job of modeling this type of [feedback session].” He also indicated that observers that come from a “sister” brigade would be perfectly capable of performing the duties of observers with this TSP; a dedicated observer team was not required.

The observers used the assessment questions provided in the materials as the basis for all the feedback sessions, although they modified some to meet specific situations. They believed them to be complete and easy to use in preparing for a feedback session. None of the 25 assigned observers expressed any problem understanding the performance objective approach. The observers felt that the joint introduction to the system given by the COBRAS staff was invaluable in orienting everyone to the system. They recommended that something similar in content be developed as a future introduction.

All participants in the trial agreed that if anything should be dropped from the system, it was the “execution AAR.” This session was not a part of the TSP design, but had been added by the observer team as an exercise closure mechanism. It focused more on the execution itself, rather than on the performance objectives.

### ***Program Revisions***

The exercise design features – 24 hour operations, deployed CPs, and multiechelon and staff section focus – were expected to have noticeable effects on the perceptions of realism and exercise benefits. To gauge the effect, we looked for comments about the exercise realism or benefits attributable to those features. Surprisingly, we found few comments directly for or against any of the features. Comments about the realism of the exercise tended to be phrased as suggestions concerning ways to improve the exercise realism (Table 7). However, as noted

earlier, several participants stated that they learned how to operate better within their sections because of the CP setup and the 24-hour operations.

**Table 7**  
**Training Audience Suggestions for Improving Exercise Realism**

<b>Roleplayers and scripted messages</b>	
More detailed information for providing cues and responses from Division (4)	Need experienced people at EXCON to provide realistic Division responses.
<b>Simulation</b>	
Update terrain in computer so that what is go/ no-go on map and in reality is what computer allows.	Less reliance on computerisms (e.g., straight line distances for maneuver) in shaping/ conducting battle (2).
Division early warning and ADA systems [should be] functioning properly & doctrinally (2).	The BBS log algorithm uses too much fuel (2).
<b>Combat Service Support</b>	
Make the game so CO's/ISGs are forced to report status to the CTCF like they would at a CTC rotation.	Allow use of my log reports. They are much more detailed than the generic Division log reports (2).
Develop the concept of the DISCOM HQ.	
Better CSS interaction to involve Bn staff (2).	Make the exercise more realistic for CSS (4).
<b>Scenario</b>	
Make weather more significant in at least one battle, i.e., a 5-7000' cloud deck.	Take out full day lull in fighting between defense & offense.
Develop more variety of flex missions.	Develop the OPORDs for other terrain.
Use continuous storyline where the impact (success/loss) of one carries over into the next (9)	Choose terrain for defense that would support Bde EA.
<b>Tactical presentation, situation, and materials</b>	
Update TOE in game w/ current force structure (3).	Don't put things in the OB if you never intend to use it all, or if you don't have the capability to use it correctly via BBS.
More NBC.	
Use more combat multipliers.	
<b>Deployed Command Posts, Training Audience</b>	
Better comms assets (MERT, TACFAX) (3)	Make the staffs play "full up" (3).
Make it longer. Force them to live like they are at a CTC (2).	More branch reps at the cell as operators
Move the BSA closer to [simulation center]. I spent too much time on the road collecting reports.	Place Bde/Bn TOCs more than walking distance away from each other. It will enforce LNOs & radio TOC procedures better (3).

All in all, the evaluation results from the trial implementation were encouraging. The BBSE design decisions were supported (or at least not contraindicated), and the BBSE was seen as providing training benefit, both for newly-formed brigade staffs and for more experienced staffs.

Developers both observed use of the TSP and asked questions about the TSP structure. These were aimed primarily at the components that were not already tested in earlier programs –

the performance objectives and the observation and feedback system. The TSP was perceived as adequate in content and structure. Various minor errors were caught (or pointed out by participants), all of which were noted and corrected. But no serious design or content flaws were discovered.

The performance objective set used in the trial implementation was expanded after the trial. Of the original eight, only one (Develop Engagement Areas) was dropped. Participants and developers alike found that the most important aspects of that objective required participants to be “on the ground,” a condition that could not be replicated with the BBSE. Additionally, eight new performance objectives were developed to provide the commander with a wider variety of options. The final set of 15 performance objectives is listed in Figure 2.

- Parallel Planning within the Brigade
- Conduct Clearance of Indirect Fires Procedures
- Plan and Manage Reconnaissance within the Brigade
- Integrate Logistics Estimates in Decision-Making
- Manage Information within the Brigade Command Posts
- Plan and Implement Brigade Air Defense Early Warning
- Develop and Execute the Brigade and Battalion Plan for Fires
- Conduct a Combat Health Support Rehearsal
- Decision-making in a Time Constrained Environment
- Plan and Execute a Decision Point
- Develop and Execute the Brigade Concept of Mobility/Survivability
- Plan for and Commit a Company-Size Reserve
- Plan, Integrate, and Manage Smoke Assets
- Manage Information Within the Task Force Command Posts
- Military Decision-Making Process in the Battalion

**Figure 2.** Final set of performance objectives for the Brigade and Battalion Staff Exercise.

There were many indicators for future development, however. While the BBSE was observed to be a useful training tool for brigade staffs (especially more mature staffs preparing for a CTC rotation or deployment), other areas of concern in brigade operations were discussed. Some of these areas are discussed in Section 6.

### *Summary*

The trial implementation of the BBSE was part of an ongoing evaluation effort that required considerable time and effort. However, it was necessary in order to obtain the information from both users and observers concerning the performance objectives approach, the observation and feedback system, the TSP materials relating to those components, and the perceptions of overall exercise benefits.

## Section 5: Lessons Learned for the Training Developers

With every training development program, we add to the lessons learned base of information. Over the past 9 years, ARI and its contractor teams have accomplished a number of R&D efforts to incorporate structure into battalion- and brigade-level training programs. The preliminary work in development of structured training scenarios was focused on the definition of threat conditions (C. H. Campbell & Hoffman, 1990; R. C. Campbell & Campbell, 1990; Doyle, 1990). This work was vastly expanded in the initial development and expansions to the VTP (Graves & Myers, 1997; Hoffman et al., 1995; Hoffman, 1997; Koger et al., 1996). Similar work was performed for exercises using the Close Combat Tactical Trainer (CCTT) for platoon, company, and battalion training (Deatz et al., 1998; Flynn, Campbell, Myers, & Burnside, 1998). Both COBRAS I (Graves et al., 1997) and COBRAS II (C. H. Campbell et al., 1998), focusing on brigade staff training, used the same general approach. Initial evaluations of such programs have indicated that, with a well-developed training structure, simulation can contribute substantially to the value of training (Shlechter, Bessemer, Nesselroade, & Anthony, 1995). Therefore, the lessons learned do not address instructional features any further.

Program developers and sponsors, however, are well aware that the structured approach and development methodologies can always be improved. To that end, each of the ARI projects has produced a report, documenting "lessons learned" that may be useful in future development efforts. The lessons learned during the COBRAS III project are described below.

The lessons were drawn from experience throughout the project period. They focus on:

- needs analysis and training development,
- data collection in trial implementations, and
- the nature of lessons learned.

These lessons should be of use to program developers, whether they are design scientists who are responsible for delineating project objectives and design alternatives, or military and instructional specialists who construct TSPs.

### *Needs Analysis and Training Development*

Because this program was the third in a series of development efforts, and because three of the trial implementations were conducted with the same unit, the BBSE was based on some clearly identified training needs. In the May 1997 trial, the Brigade Commander was already attempting to modify the COBRAS II BSE in preparation for an NTC rotation. His highest priority changes included: 24-hour operations, deployed CPs, a robust and challenging OPFOR, multiechelon focus, and concurrent planning and execution. The decision in COBRAS III was to design precisely that kind of exercise, and to make it rigorous enough for a unit that is approaching its CTC rotation. As a result, the BBSE was welcomed and was used with few modifications.

*LESSON: Design a program for which there is an identified need, and it will be used.*

### ***Data Collection in Trial Implementations***

This lesson was one that was learned, yet again, the hard way. The questionnaires and structured interviews addressed the performance objectives approach and the observation and feedback system, but did not ask detailed questions about the design features. The questions were asked during interviews and group discussions, but only because the developers happened to notice the omission.

At the same time, the questionnaires asked a number of detailed questions about the TSP structure and utility. The TSP structure has been essentially unchanged over the past four years, so there is little information gained by asking about preparation activities or reading time. The information needed concerns only new features within the TSP (e.g., the performance objectives materials).

*LESSON: Data collection in trial implementations should address all of the essential questions and none of the non-essential questions. The proposed use for the data should be specified before the data are collected.*

### ***The Nature of Lessons Learned***

As the number of "lessons learned" continues to grow, we are continually reminded to learn old lessons better, even as we amass new ones. There is a need to review and analyze those lessons in the course of development projects. While all of the information is available in the separate reports, it would be a benefit to developers to have a single compendium or database containing lessons and even the larger lessons that emerge from content analysis of the individual lessons.

*LESSON: Developers need to review and heed lessons learned in previous work.*

### ***Summary***

This section has presented and discussed some of the lessons learned from the COBRAS III development and trial implementation effort. Lessons were noted during all phases of the project, from the initial design through implementations.

The final section in this report describes some issues that remain to be addressed. Some are underway already. Others will be likely to demand attention in the near (5-year) future, if the U.S. Army is to continue with steady progress toward its Force XXI goals in training and readiness.

## Section 6: Future Directions

Even as the COBRAS III development and refinement was being completed, additional training R&D programs had begun. They are designed to address training needs for brigade and below that were been pointed out by users, observed by the COBRAS developers, or suggested by the Force XXI Training Program personnel and other stakeholders.

The list of training needs presented in the COBRAS II report included two needs addressed in COBRAS III: an expanded multiechelon version of the BSE, still in BBS, with 24-hour operations, deployed CPs, more intense battle rhythms, and more robust and aggressive OPFOR activity; and a multiechelon BSE incorporating linked virtual (Simulation Networking [SIMNET] and reconfigurable simulations) and constructive (BBS and Modular Semi-Automated Forces [ModSAF]) simulation environments. Another identified need is being addressed in ARI's project entitled *Implementation and Support for the Assessment of Force XXI Training Program Products (ISAT)*. Exercises for use by platoons, companies, and battalions in CCTT were developed in two ARI programs entitled *Structured Training for Units in the Close Combat Tactical Trainer (STRUCCTT) (I and II)*. The ARI's *Commander's Integrated Training Tool (CITT) development* project is focused on design and prototype development of an automated tool to help commanders and unit trainers access TSPs, modify existing scenarios and TSPs, or create their own scenarios and TSPs.

The most pressing needs that have been identified for development, and that are still not being addressed, are listed below. The list is shorter than it was a year ago, but is still formidable, and only a few of these identified needs are likely to be addressed anytime soon.

- Additional BSEs and BBSEs on Korean and European terrains
- Parallel versions of the BSE and BBSE for light-heavy units
- A maneuver battalion version of the BSE, incorporating CSS emphasis and the full planning and preparation phases
- Additional vignettes focused on maneuver battalion training needs
- Digital environment parallels for the programs already developed and for those listed above.

### ***The Next Step: Force XXI Training Program - Digital***

The COBRAS III work represented an expansion to the COBRAS II BSE in several areas, including the training audience, implementation model, and simulation environment. COBRAS III comprised two major components: a constructive simulation Brigade and Battalion Staff Exercise and a linked constructive and virtual simulation exercise known as the Synthetic Theater of War Exercise.

In one current effort, developers are squarely in the digital environment. The project is entitled *Force XXI Training Program - Digital (FXXITP-D)*, and it will require developers to analyze performance in the digital environment of Force XXI Battle Command Brigade and Below (FBCB2) and Army Tactical Command and Control System (ATCCS). The analysis will yield not only a description of "digital" performance for brigade and battalion staffs, but will form the basis of a plan for converting the Battle Staff Training System (BSTS), vignettes, BSE,

and BBSE to digital-appropriate training. The plan will be evaluated by means of a small-scale conversion: a single set of computer-based individual training modules and two vignettes for digitized units will be developed.

### *The Future of Training Research*

The purpose of this report was to describe the development of the COBRAS III multiechelon brigade and battalion training exercises and to report on lessons learned for training developers. The COBRAS III project resulted in design and development of the most complex of the structured simulation-based training programs developed by the ARI Armored Forces Research Unit at Fort Knox.

As detailed in Section 5, there have been numerous developments of structured simulation-based training. The various TSPs, along with the formative evaluation results and lessons learned detailed in the final reports, serve as both guides and models for future development. Three method guides for development have also been published by ARI (C.H. Campbell, Deter, & Quinkert, 1997; C.H. Campbell, Ford, Campbell, & Quinkert, 1998; C.H. Campbell, Campbell, Sanders, Flynn, & Myers, 1995). While more development is needed to address additional training needs, the *research* on how the training should be developed and what the TSPs should include should not be a high priority. For most applications, the work should be transitioned over to emphasize development, rather than research.

Instead, the research community should be focusing on ways to make the training more adaptable and more accessible. Each user finds ways to "improve" the exercise for his own situation, and tools must be found that will help them to make the modifications without destroying the intricate structure that makes the training so valuable. Additionally, ways must be devised for conveying the TSPs to the users. At the time of this writing, the COBRAS II and III TSPs for the BSE, BBSE, and vignettes are still not available to most units.

The research community should also be addressing different modes for training delivery. Current approaches that use paper-based TSPs might be better served by CD-ROM based or even video-assisted guidance. Embedded training methods may be more available now that computers themselves are embedded in most soldiering systems.

Because summative evaluation of training effectiveness at the brigade and battalion levels is very difficult, we often find ourselves assessing acceptability and drawing conclusions about skill acquisition and transfer of skills to field settings. One ARI project (ISAT) is looking more closely at the issue of effectiveness. Another ARI study will begin shortly to examine the coordination efforts that could facilitate training development between TRADOC proponent schools and user units. More such research efforts are needed.

At no point will we be able to say that we have learned everything about training that can be learned. Even the most routine and mundane training development efforts and training implementations will yield valuable lessons learned. But the research efforts need to be forcefully and purposefully leading the way in discovering ways to improve training design, delivery, and evaluation.

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## Appendix A. Acronym and Abbreviation List

1SG	first sergeant
AA	assembly area
AAR	after action review
AD	area defense
ADA	air defense artillery
ADCOORD	air defense coordinator
ARI	U.S. Army Research Institute for the Behavioral and Social Sciences
ARTEP	Army Training and Evaluation Program
ATCCS	Army Tactical Command and Control System
AVN	aviation
BBS	Brigade/Battalion Battle Simulation
BBSE	Brigade and Battalion Staff Exercise
BCT	Brigade Combat Team
Bde	brigade
BFA	battlefield functional area
Bn	battalion
BOS	battlefield operating system
BSE	Brigade Staff Exercise
BSTS	Battle Staff Training System
CALL	Center for Army Lessons Learned
CCTT	Close Combat Tactical Trainer
Cdr	commander
CHEMO	chemical officer
CIIT	Commander's Integrated Training Tool
CLS	contracted logistics support
COA	course of action
COBRAS	Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation
COL	colonel
CP	command post
CS	combat support
CSS	combat service support
CTC	Combat Training Center
CTCP	combat trains command post
DA	Department of the Army
DATK	deliberate attack
DDMP	deliberate decision-making process
DISCOM	Division Support Command
DIVARTY	Division Artillery

DS	direct support
EA	engagement area
ENG	engineer
EXCON	exercise control
EW	electronic warfare
FA	field artillery
FBCB2	Force XXI Battle Command Brigade and Below
FDC	fire direction center
FM	field manual
FRAGO	fragmentary order
FSB	forward support battalion
FSCOORD	fire support coordinator
FSO	fire support officer
FTX	field training exercise
FXXITP-D	Force XXI Training Program - Digital
G1	assistant chief of staff, personnel
G2	assistant chief of staff, intelligence
G3	assistant chief of staff, operations
G4	assistant chief of staff, logistics
HICON	higher control
HQ	headquarters
ID	infantry division
ISAT	Implementation and Support Team for the Assessment of the Force XXI Training Program
ldr	leader
LNO	liaison officer
MDMP	modified decision-making process
METT-TC	mission, enemy, terrain, troops, time, and civilian considerations
MI	military intelligence
ModSAF	Modular Semi-Automated Forces
MP	military police
MTC	movement to contact
MTOE	modified table of organization and equipment
MTP	Mission Training Plan
MWSTC	Mounted Warfare Simulations Training Center
NBC	nuclear, biological and chemical
NCO	noncommissioned officer

NTC	National Training Center
OB	order of battle
OIC	officer in charge
O/C	observer/controller
OPFOR	opposing forces
OPORD	operations order
OPS	operations
PAM	pamphlet
plt	platoon
R&D	research and development
R&S	reconnaissance and surveillance
RTO	radio/telephone operator
S1	personnel officer (adjutant)
S2	intelligence officer
S3	operations and training officer
S4	logistics officer
SIGO	signal officer
SIMNET	Simulation Networking
SIMUTA	Simulation-Based Multiechelon Training for Armor Units
SOP	standing operating procedures
SOW	statement of work
SPA	Staff Performance Analysis
STARTEX	start of exercise
STOW	Synthetic Theater of War
STRUCCTT	Structured Training for Units in Close Combat Tactical Trainer
TAC	tactical command post
TACFAX	tactical facsimile
TACSOP	tactical standing operating procedure
TF	task force
TOC	tactical operations center
TOE	table of organization and equipment
TRADOC	U.S. Army Training and Doctrine Command
TSP	training support package
USAARMC	U.S. Army Armor Center
VTP	Virtual Training Program
XO	executive officer

## **Appendix B. Foundations: Overview of the COBRAS I AND II Programs**

The original *Combined Arms Operations at Brigade Level, Realistically Achieved Through Simulation* (COBRAS) projects (COBRAS I and COBRAS II) resulted in development of the Brigade Staff Exercise (BSE) and the Battalion Virtual Training Program (VTP) COBRAS Expansion. These exercises were developed at Fort Knox, Kentucky by the U.S. Army Research Institute for the Behavioral and Social Sciences' (ARI) Armored Forces Research Unit, with the assistance of a consortium of contractors. The COBRAS I/II exercises provided the models from which the COBRAS III Brigade and Battalion Staff Exercise was to be designed.

This appendix provides a concise description of the BSE and the Battalion VTP Expansion and some discussion of key development processes. The intent is to provide the background necessary for understanding the COBRAS III project's development processes and outcomes, given that most of these processes and outcomes were based on activities of the COBRAS I/II projects. The two major topics of the section are:

- *The COBRAS Brigade Staff Exercise*: This section provides a description of the BSE and key development processes, including the development of training objectives.
- *The Battalion VTP COBRAS Expansion*: This section provides a description of the expanded VTP exercise that incorporated combat support (CS) and combat service support (CSS) activities, and presents the key development processes.

### ***The COBRAS Brigade Staff Exercise***

The BSE is a multi-mission, large-scope practice exercise that focuses on the interactions among the brigade commander and his staff as they conduct planning and employ brigade assets. This focus was selected due to indications that the brigade commander and his staff need structured practice opportunities to achieve proficiency in basic brigade operations of planning and synchronizing assets. The program, as designed, gives the commander and his staff a chance to practice the tasks they should perform as they fight the brigade in the particular battles of a structured scenario. Within a simulated (Brigade/Battalion Battle Simulation [BBS]) combat situation, they must determine what has to be done on the battlefield, who does it, and how their actions are linked to actions of other units and battlefield operating systems.

This description of the BSE describes four key aspects of the exercise:

- the training audience,
- the training objectives and their development,
- the exercise implementation model, and
- the structure and composition of the training support package (TSP) that includes all the information required to implement the exercise.

### ***Training Audience***

The core training audience members included the brigade commander and his primary staff (i.e., Executive Officer [XO], Adjutant [S1], Intelligence Officer [S2], Operations and Training Officer [S3], Supply Officer [S4], and Fire Support Officer [FSO]). During COBRAS I, training audience members also included the special staff who serve as links between the brigade and four of its systems (i.e., fire support, air defense, engineering, and logistics). These linking personnel were determined to be the following:

- the air defense coordinator (ADCOORD, the air defense artillery battery commander),
- the engineer (ENG, the engineer battalion commander),
- the forward support battalion commander (FSB commander), and
- the fire support coordinator (FSCOORD, the direct support (DS) artillery battalion commander).

For COBRAS II, the training audience was expanded to include five more brigade responsibilities:

- the signal officer,
- the assistant S3 chemical officer,
- the military police platoon leader,
- the Army aviation brigade liaison officer, and
- the DS military intelligence company commander.

This group of 16 constitutes the primary training audience for the BSE. The primary training audience was operationally defined as those participants for whom training objective task lists would be generated, observers would be assigned, and after action review (AAR) sessions would be provided.

### ***Training Objectives and Tasks***

One of the most definitive features of the COBRAS BSE is its set of exercise training objectives and tasks. With a focus on the planning and synchronization of brigade assets, as well as a special emphasis on CSS functions, the BSE performance objectives cover a wide range of staff activities. These activities are summarized in four general staff performance objectives:

1. Performance of the full mission requirements of planning, preparation, and execution (including consolidation, reorganization, and planning for follow-on missions)
2. Performance of both the deliberate decision-making process (DDMP<sup>6</sup>), performed

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<sup>6</sup> During the period of time in which COBRAS I development proceeded, the decision-making process was titled "Deliberate Decision-Making Process" (DDMP). Later, during the COBRAS II project, the name was officially changed to the "Military Decision-Making Process".

without time pressure, and a modified decision-making process (MDMP<sup>7</sup>), performed under time constrained conditions

3. Complete production of planning and preparation products, including interim products and inputs.
4. Integration of selected CS and CSS functions into the staff processes of planning, preparation, and execution.

These objectives are supported by arrays of brigade staff tasks that are specified for each of the 16 members of the target training audience for each of the three missions -- a total of 48 task lists. The tasks are consistent with current doctrine, as defined by Army manuals such as Army Training and Evaluation Program-Mission Training Plan (ARTEP-MTP) and Field Manual publications, but are not constrained to the contents of these documents. Rather, the tasks include living, innovative, and adaptive tasks, which are descriptions of behaviors that underlie successful and exemplary performance. During the project, the cumulative domain of these behaviors was termed "undocumented tasks" to differentiate them from the mainstream, primarily ARTEP-based, documented tasks.

The methodology used to identify the COBRAS tasks was entitled the Staff Performance Analysis, or SPA. The methodology employed roleplay enactments of the BSE's missions and subsequent probing activities to determine the activities of the commander and staff during the BSE's particular missions. Tasks identified during the SPA met certain criteria based on project objectives. These criteria included the following:

- Content relevance: Performance was defined by the mission, enemy, terrain, troops, time, and civilian considerations (METT-TC) of three specific missions. Unlike existing generalizable performance descriptions, the SPA and its outcomes (i.e., tasks) were to be specific to COBRAS METT-TC.
- Functional emphasis: Developers documented the processes during each mission phase (planning, preparing, executing the mission, and conducting consolidation and reorganization) in specific functional areas: command and control, CSS, fire support, air defense, mobility/countermobility/survivability, intelligence, and maneuver. The cells in the matrix formed by the overlay of these two domains (mission phase X functional area) were to serve as a structure for identifying tasks.
- Interactive criticality: Special emphasis was placed on identifying activities which require interactions between pairs or groups of training audience members.
- Observability: Tasks were to have observable processes, products, or outcomes. Because the training process emphasized the contributions of observers who would coach and provide feedback, it was necessary that observable task indicators be identified. Important as they are, performance requirements such as reasoning,

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<sup>7</sup> The process called "Modified Decision-Making" in the COBRAS I work was referred to variously as the abbreviated or accelerated decision-making process in Field Manual (FM) 71-3 (Department of the Army [DA], 1995) and the combat decision-making process in FM 101-5 (DA, 1997).

thought processes, and knowledge cannot be readily coached and evaluated during performance unless there are observable outcomes.

- **Brigade staff process focus:** The focus of performance for the training participants is only on their roles within the conduct of staff processes. This is especially significant in the situations of those individuals who have command responsibilities in addition to brigade staff responsibilities. For example, the brigade ENG is also the commander of the engineer battalion, but tasks involving the command of his battalion were not to be addressed.

### ***The Exercise Implementation Model***

The implementation model can be defined in terms of four exercise aspects: participants, simulation site layout, preparation for the exercise, and conduct of the exercise. The discussion below describes these aspects to depict how the BSE is implemented.

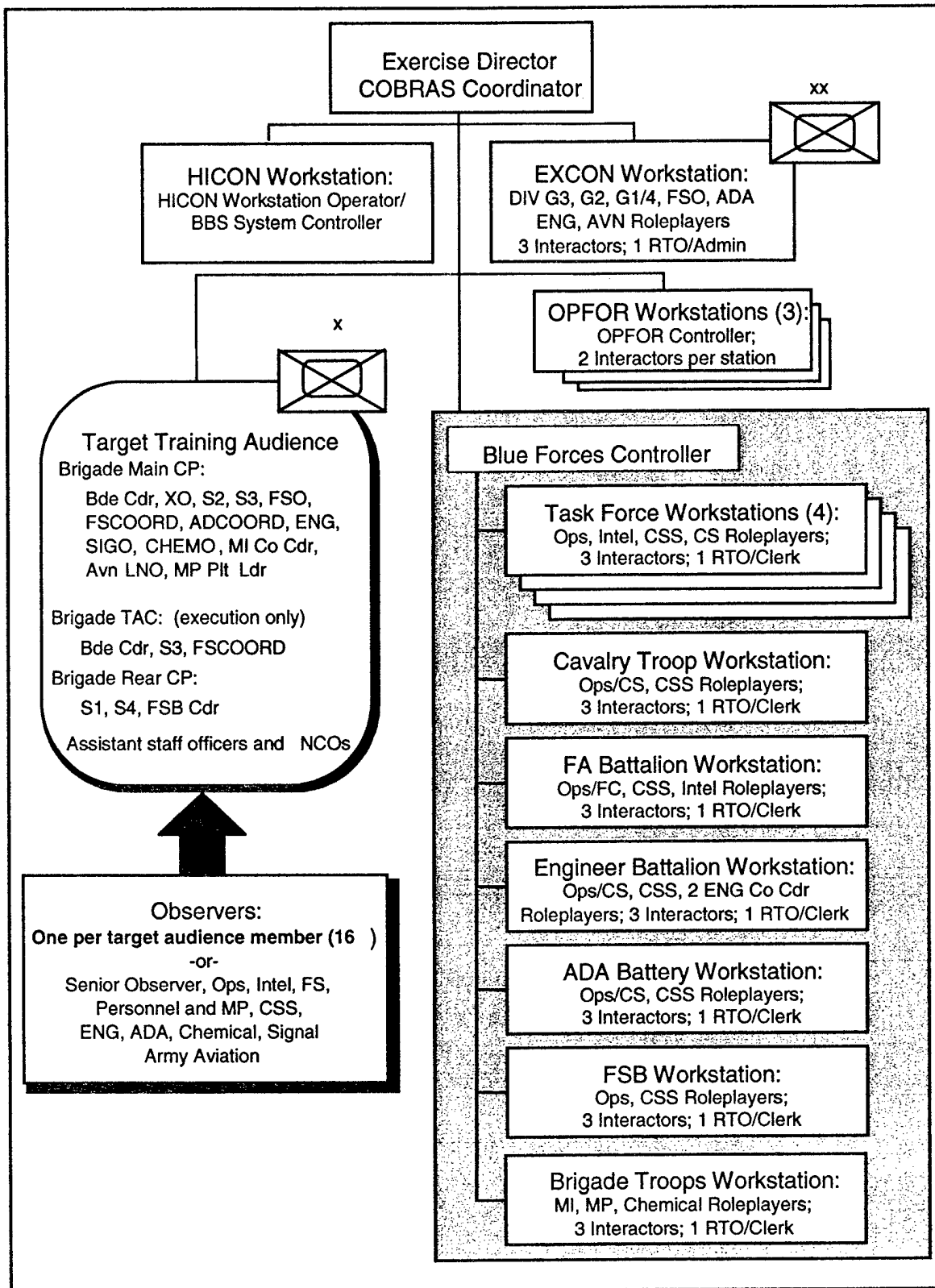
**Exercise participants.** The BSE, as designed, requires a total of 111 participants, in addition to the 16 included in the primary training audience. These participants fill roles ranging from high-level exercise management, to the roleplaying of subordinate unit staffs, to operating BBS. Additional participants could be inserted into any of the role types, but decreasing the exercise staff would reduce the training benefit of the brigade staff. The types and positions of the participants prescribed for implementation are provided in Figure B-1. Figure B-2 presents brief descriptions of each participant type.

**Simulation site layout.** As stated above, the BSE is implemented within the confines of the BBS.<sup>8</sup> The training is conducted using three simulated command post (CP) locations (the tactical [TAC] CP, the main CP, and the rear CP) for the brigade staff and either 10 or 14 BBS workstations. Radio communications represent the basic eight brigade nets.

During BSE execution, the participants, including the primary training audience, are located according to their functions in the exercise, and as required by the simulation layout. Their placement was dependent upon satisfying the notion that they should be in the location that best facilitates the performance of their roles. Figure B-3 portrays a typical simulation center setup and layout of work areas for the BSE, and indicates the locations of the participant types. Note that the exercise management personnel do not have designated locations from which to work. The Exercise Director usually spends the majority of his/her time in the CPs or Exercise Control (EXCON) workstation, and the Blue Forces Controller spends most of his/her time in and around the subordinate and supporting unit workstations.

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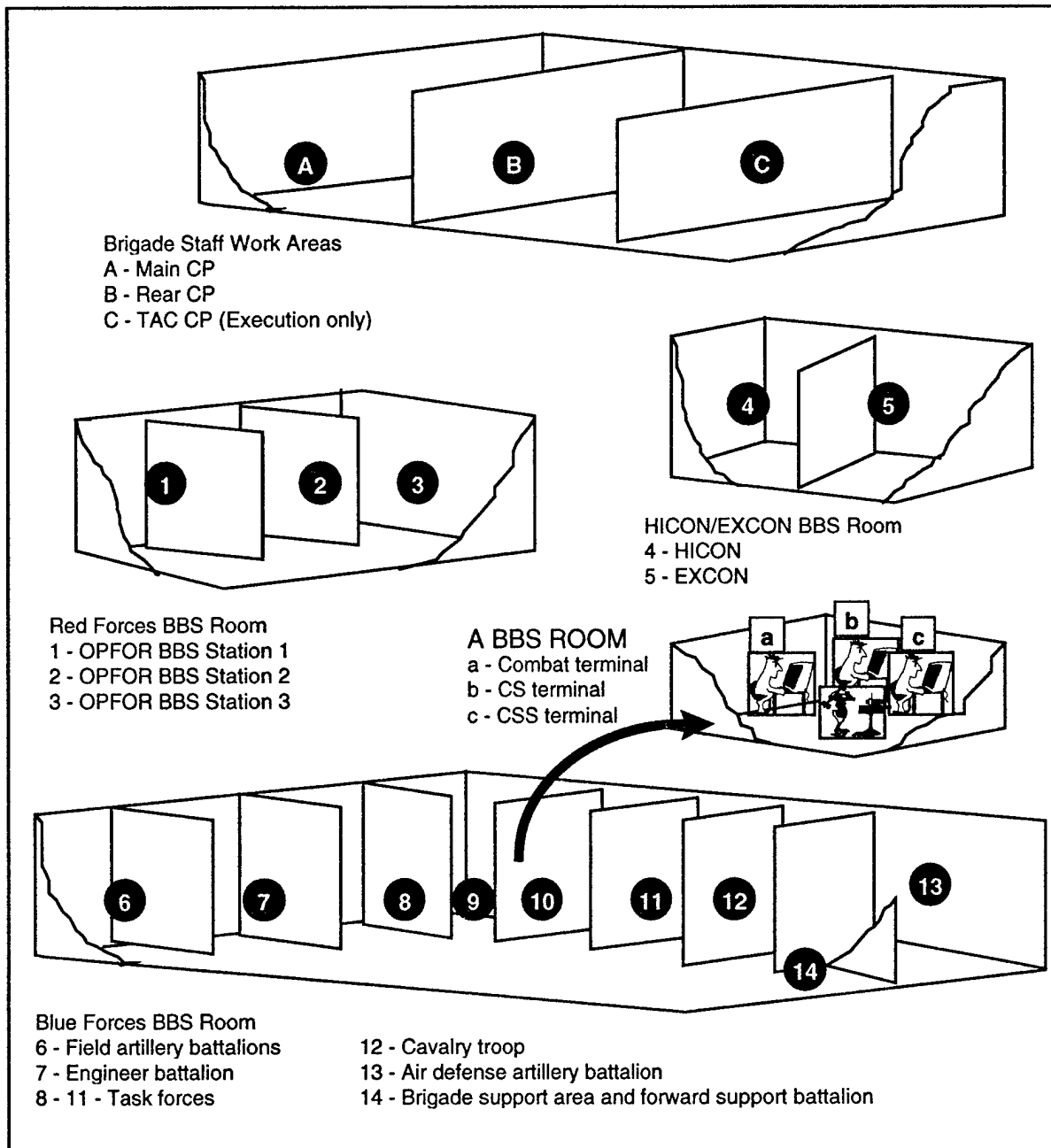
<sup>8</sup> This simulation was chosen over Janus, Simulation Networking (SIMNET), and distributed interactive simulations (i.e., an environment in which either Janus or BBS is linked electronically to SIMNET) because of its capabilities to satisfy five criteria: functional representation, the size of the terrain database, the ability to generate combat report information, operator requirements, and brigade asset representation.



**Figure B-1.** Locations of exercise participants in the COBRAS Brigade Staff Exercise.

Role	Responsibility
Exercise Management	<p>Senior military personnel fill the exercise management positions.</p> <ul style="list-style-type: none"> <li>• The Exercise Director provides overall leadership and is involved in every decision that may affect the ability of the training exercise to meet the training objectives.</li> <li>• The Exercise Director's primary assistant, the COBRAS Coordinator, coordinates and arranges for personnel, supplies, and equipment in preparation for the training. The COBRAS Coordinator is also available during training to assist the Exercise Director and to keep him informed of the course the training is taking.</li> <li>• The Blue Forces Controller monitors all activities regarding the operation of the simulation for Blue Force units.</li> </ul>
Observers	<p>The observers provide feedback to the target training audience regarding their performance. Feedback is provided in a series of AAR sessions and during execution in the form of the coaching of individual training audience members. The Senior Observer is the leader of the observer team. His responsibilities include facilitating AARs, adjusting observer assignments, and serving as an advisor to the Exercise Director on how the exercise is going and implementing solutions.</p>
Roleplayers	<p>Subordinate and Supporting Units: The major elements of the brigade are portrayed by personnel of the brigade's subordinate and supporting units, performing the duties of the functions and units to which they are normally assigned.</p> <ul style="list-style-type: none"> <li>• Exercise Control (EXCON): EXCON roleplayers play the roles of key division staff positions. They dispense scripted and hard copy messages intended to maintain the integrity and flow of the scenario to support the training objectives. In doing so, the EXCON roleplayers cause the occurrence of significant events that cue staff actions. In addition, the EXCON roleplayers respond to questions and requests from the brigade staff using prepared guidelines.</li> <li>• Opposing Force (OPFOR): The OPFOR Controller is the roleplayer who directs the actions of the OPFOR following the intent of the exercise and situation-specific guidelines. His purpose is to provide the cues to stimulate performance of the training objectives by the brigade staff. He works with BBS interactors at three workstations.</li> </ul>
BBS Interactors	<p>Interactors operate the computer terminals that control BBS. Their role is to translate the tactically-oriented instructions provided by roleplayers into BBS computer commands. Interactors also construct and print out tactical, logistical, and status reports of the units.</p>
Brigade Staff Support	<p>These personnel fill the positions they normally occupy to support brigade staff functions. They include staff assistants, radiotelephone operators, etc.</p>
HICON	<p>The Higher Control (HICON) Operator, who operates the HICON workstation, performs certain simulation operations that are not executable by roleplayers and interactors located at other workstations. The HICON Operator is a member of the simulation site staff. He/she designates other members of the staff to conduct interactor and roleplayer training on BBS and to oversee and facilitate overall operation of the simulation.</p>

**Figure B-2.** Role descriptions of COBRAS I Brigade Staff Exercise participant types.



**Figure B-3.** Layout of work areas for the Brigade Staff Exercise.

**Preparation for the Exercise.** The planning and preparation for an implementation of the BSE begins with the brigade learning about and deciding to conduct the exercise, entering the exercise in their training calendar, and scheduling the BBS facility for the exercise. All subsequent activities in this phase should begin approximately 18 weeks prior to the exercise conduct. The planning and preparation process timeline shown in Figure B-4 is extracted from the *Exercise Guide*, a key portion of the TSP described below. It indicates the primary decision and coordination activities that should occur during the weeks prior to actual implementation.

**Conduct of the Exercise.** Conduct of the BSE requires the brigade staff, exercise management personnel, and roleplayers to be familiar with the tactical situation of the first mission to be conducted, and the simulation and its operators (i.e., interactors) to be prepared for their functions. The initial event in the exercise is the delivery of a division order by the EXCON roleplayers and Exercise Director. This event sets the brigade's planning process in motion.

The activities of the exercise conduct include the planning, preparation and execution phases of the mission(s), and a series of AARs that are organized to address, in a sequential manner, the segments of the mission(s) conducted. Thus, the prime determinant of the content of the exercise is the mission(s) selected for the exercise. Depending on the mission(s) selected, the brigade will train either on the DDMP, the MDMP, or both. The scenario allows for six viable<sup>9</sup> mission implementation options, catering to the training needs of individual brigades. The six viable options are portrayed in Figure B-5.

When option 1 (from Figure B-5) is selected, the BSE requires fourteen 8-hour days. The other options will decrease the length of the exercise, but will also decrease the extent to which the staff can practice their decision-making process.

The BSE AARs are designed to be conducted by the Senior Observer throughout the exercise, with an AAR for each segment of the mission, as defined in Figure B-6. After each segment, one hour is set aside for an AAR involving the brigade commander and his staff as the primary audience. The AAR discussions focus on the strengths and weaknesses of the staff process. During the AARs, observers guide the staff to recognize their weaknesses and direct them toward the "discovery" of alternative, more correct actions as outlined by the DDMP, the MDMP, and the COBRAS tasks. The AAR materials help establish the link between staff performance in the just-completed exercise segment, and the outcomes of the prior segment(s).

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<sup>9</sup> Other performance sequences are illogical because they do not support the concepts in which the program is grounded, including leveraged use of simulation and a focus on designated training objectives.

Timing	Activity
T-18 weeks	Division Operations (G3) designates personnel to serve as Exercise Director and COBRAS Coordinator. Exercise Director and Brigade Commander meet to discuss roles and expectations.
T-14 weeks	Exercise Director and Brigade Commander select option for mission(s) to conduct. Exercise Director develops preliminary exercise schedule.
T-12 weeks	COBRAS Coordinator prepares taskings for personnel; released to units. COBRAS Coordinator confirms facilities schedule.
T-4 weeks	COBRAS Coordinator issues participant guides and read-ahead materials to: <ul style="list-style-type: none"> <li>• Training audience (through brigade XO)</li> <li>• EXCON G3 Roleplayer</li> <li>• OPFOR Controller</li> <li>• Observers</li> </ul>
T-2 weeks	COBRAS Coordinator issues guides and read-ahead materials to Blue Forces roleplayers. Simulation site personnel load and try out BBS tapes. Orientation briefing for all participants. Brigade commander and staff study readahead materials and references and get familiar with the tactical situation. Brigade commander and XO decide on support staffing. Brigade XO arranges for copies of the overlays to be made. Brigade Intelligence Officer uses readahead materials to begin Intelligence Preparation of the Battlefield.
T-3 days	Simulation site personnel and Blue Forces Controller train and rehearse interactors and roleplayers. Roleplayers and training audience set up their CPs in the exercise area. Division (EXCON) roleplayers rehearse division order with observers. Exercise Director and COBRAS Coordinator conduct final readiness check of exercise support. Brigade commander and XO conduct final readiness check of brigade staff.

**Figure B-4.** Planning and preparation timeline for COBRAS I Brigade Staff Exercise implementation.

Option	Description
1: MTC → AD → DATK	Permits the brigade's planning process to begin before hostilities and continue throughout the three missions, and requires the brigade to use both the DDMP and the MDMP. This option provides the most robust opportunity to practice CSS tasks. The CSS activity influences the operation from the time the brigade begins its transition from the field training exercise to combat, and continues through the completion of the deliberate attack (DATK).
2: MTC → AD	Starts with the movement to contact (MTC), transitions to the area defense (AD), and ends when the brigade has completed its defenses, consolidated its forces, and knows the status of its units. Both the DDMP and the MDMP will be practiced, and CSS activities are ongoing. The brigade's posture at the beginning of the AD depends on its losses in the MTC and on the resupply and replenishment that take place during the transition.
3: MTC	Provides a logical entry into the exercise, with brigade units performing reorganization activities and reporting their status as the staff plans the mission using the DDMP. The exercise ends when the enemy advance guard main body breaks contact and assumes a temporary defense.
4: AD → DATK	The AD starts with the brigade still in limited contact with the enemy following the MTC. The brigade's readiness posture represents what a brigade could expect following a MTC. This condition will require the brigade to rapidly assess its combat capability and conduct the resupply, replenishment, and other CSS activities to prepare for the AD mission. The time available demands that the brigade use the MDMP to plan the AD.  This option is useful when the brigade does not wish to train on the MTC. It is a difficult starting point, however. The participants must be fully read into the scenario and be ready to take control at a point when the brigade is very active.
5: AD	The initial conditions are the same as for option 4, with the brigade just completing the MTC. As with option 4, the entry point for this option will offer a considerable challenge to the brigade staff. The MDMP must be used to plan the AD. The mission continues, terminating as the brigade consolidates its forces as in option 2.
6: DATK	The brigade has (notionally) completed the MTC and AD missions and is located in an assembly area. Its readiness posture is representative of a unit that has fought the previous two missions. The CSS activities are ongoing as the brigade continues planning (using the DDMP) and preparations for the attack and replenishes and improves its combat readiness. The exercise terminates as the brigade seizes its objective and consolidates, before replenishment and repair, which would precede the next mission.

**Figure B-5.** The six implementation options for the Brigade Staff Exercise.

Movement to Contact Segments	Area Defense Segments	Deliberate Attack Segments
Mission Analysis		Mission Analysis
Course of Action (COA) Development	Modified Decision-Making Process Planning	COA Development
Wargaming		Wargaming
COA Comparison		COA Comparison
Orders Preparation	Orders Preparation	Orders Preparation
Rehearsal	Rehearsal	Rehearsal
Mission Execution	Mission Execution	Mission Execution
Consolidate/Reorganize		

**Figure B-6.** Exercise segments corresponding to scheduled after action reviews.

Every aspect of the exercise conduct phase, as well as the preparation phase, is documented in the BSE's TSP. That is, the TSP contains all the information and instructions needed to conduct the exercise. Below, the BSE TSP is described in terms of its organization and contents.

***The Brigade Staff Exercise Training Support Package***

The basic structure or organization of the BSE TSP was designed to account for all six implementation options described in Figure B-5. That is, there is not a separate TSP for each option. Rather, the TSP consists of a single set of guides, books, and simulation system tapes that contain both instructions and materials required for all implementation options. Upon the selection of any implementation option, a brigade can select, assemble, and distribute those materials needed for that option. The TSP provides the guides and materials for each training participant, appropriate for his/her role in the exercise.

A detailed description of the contents of the TSP can be found in Graves, Campbell, Deter, and Quinkert (1997). A broad overview of the organization of the TSP, however, is provided in Figure B-7, and a brief outline of the contents, is presented in Figure B-8.

TSP Category	TSP Item		
Exercise Management	<ul style="list-style-type: none"> <li>• Exercise Guide for the Exercise Director, COBRAS Coordinator, and Blue Forces Controller, with Appendixes</li> </ul>		
Tactical Materials	<ul style="list-style-type: none"> <li>• Corps Concept (MTC, AD, and DATK)</li> <li>• Division Order and Tactical Materials (including overlays)</li> <li>• Scripted and hard-copy messages</li> </ul>		
Participant Guides and Materials	<p>Training Audience:</p> <ul style="list-style-type: none"> <li>• Training Audience Guide (generic, for all 16 Primary Training Audience members)</li> <li>• Initial Situation Packages and start of exercise (STARTEX) Position Overlays (per staff member, per mission)</li> <li>• Task Lists (per staff member, per mission)</li> </ul> <p>Observers:</p> <ul style="list-style-type: none"> <li>• Observer Guide (generic, for all Observers)</li> <li>• Task Lists (per Observer, per mission)</li> <li>• Observer AAR Briefing Materials</li> </ul> <p>Roleplayer Teams:</p> <table border="0" style="width: 100%;"> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li>• EXCON Roleplayer Guide</li> <li>• Task Force 1-5 Roleplayer Guide</li> <li>• Task Force 1-7 Roleplayer Guide</li> <li>• Task Force 3-5 Roleplayer Guide</li> <li>• Task Force 1-80 Roleplayer Guide</li> <li>• Brigade Support Area Roleplayer Guide</li> </ul> </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li>• OPFOR Controller Guide</li> <li>• Cavalry Troop Roleplayer Guide</li> <li>• Fire Support Roleplayer Guide</li> <li>• Engineer Battalion Roleplayer Guide</li> <li>• Air Defense Artillery Roleplayer Guide</li> </ul> </td> </tr> </table> <ul style="list-style-type: none"> <li>• Initial Situation Packages and STARTEX Position Overlays (per roleplayer team, per mission)</li> </ul> <p>BBS Interactors:</p> <ul style="list-style-type: none"> <li>• Blue Interactor Guide</li> <li>• Red Interactor Guide</li> <li>• HICON/EXCON Interactor Guide</li> </ul>	<ul style="list-style-type: none"> <li>• EXCON Roleplayer Guide</li> <li>• Task Force 1-5 Roleplayer Guide</li> <li>• Task Force 1-7 Roleplayer Guide</li> <li>• Task Force 3-5 Roleplayer Guide</li> <li>• Task Force 1-80 Roleplayer Guide</li> <li>• Brigade Support Area Roleplayer Guide</li> </ul>	<ul style="list-style-type: none"> <li>• OPFOR Controller Guide</li> <li>• Cavalry Troop Roleplayer Guide</li> <li>• Fire Support Roleplayer Guide</li> <li>• Engineer Battalion Roleplayer Guide</li> <li>• Air Defense Artillery Roleplayer Guide</li> </ul>
<ul style="list-style-type: none"> <li>• EXCON Roleplayer Guide</li> <li>• Task Force 1-5 Roleplayer Guide</li> <li>• Task Force 1-7 Roleplayer Guide</li> <li>• Task Force 3-5 Roleplayer Guide</li> <li>• Task Force 1-80 Roleplayer Guide</li> <li>• Brigade Support Area Roleplayer Guide</li> </ul>	<ul style="list-style-type: none"> <li>• OPFOR Controller Guide</li> <li>• Cavalry Troop Roleplayer Guide</li> <li>• Fire Support Roleplayer Guide</li> <li>• Engineer Battalion Roleplayer Guide</li> <li>• Air Defense Artillery Roleplayer Guide</li> </ul>		
Simulation Materials	<p>Tools for initializing BBS and making changes or corrections:</p> <ul style="list-style-type: none"> <li>• BBS TOE and Initialization Book</li> <li>• BBS Archive Book</li> <li>• BBS System Tapes</li> </ul>		

**Figure B-7.** Organization of the Brigade Staff Exercise training support package.

Material for...	Includes...	
Exercise Managers	A planning and preparation timeline Guidance on selecting missions Guidance on long-term planning and preparation Guidance on near-term preparation	Guidance on controlling the training Mission-specific exercise information Information on implementation model Division orders
Training Audience	Preview of exercise and its intent Information on audience composition Performance objectives Description of observers and AARs	Guidance on exercise preparation Road to war Initial situation materials Task lists
Roleplayers (Subordinate and Supporting Units, EXCON, OPFOR)	Preview of exercise and its intent Guidance on exercise preparation Guidance on exercise conduct Workstation task lists Simulation operating procedures Information on communications Road to war <i>Subordinate and supporting units:</i> Planning guidance and job aids Initial situation materials	<i>EXCON:</i> Information on distribution of tactical materials Scripted messages Response guidelines Information on division and higher assets Division orders <i>OPFOR:</i> Exercise and role overview OPFOR story line and training plan Mission-specific scenario descriptions OPFOR Controller tasks
Observers	Exercise and role overview Information on exercise preparation Information on exercise conduct	Senior Observer responsibilities Division orders Task lists
Interactors (Blue and Red)	COBRAS rules of engagement Information on naming units/icons Information on operational states Job aid for reporting CSS information Information on BBS menus	Addendum to the BBS 4.0 Warfighter's Guide (National Simulation Center et al., 1994) Force description materials Initialization instructions Execution materials ( <i>Red only</i> )
Simulation Site Staff	Modified table of organization and equipment Information on initializing the BSE Instruction on archive tapes	Information on assigning units to workstations Information on graphic control measures Information on roleplayer and interactor training for the BSE

**Figure B-8.** Description of the Brigade Staff Exercise training support package contents.

### ***The Battalion Virtual Training Program Expansion***

The Battalion VTP Expansion work focused on the addition of CS and CSS training to an existing battalion maneuver training program. The existing program was the VTP, which included battalion exercises conducted with the simulations networking (SIMNET) facilities of the Mounted Warfare Simulations Training Center (MWSTC) at Fort Knox, Kentucky. Three exercises were included: movement to contact, defense in sector, and deliberate attack. Each exercise included only the execution phase of the battle. TSPs provided participating battalions with all of the background needed to step into the simulation and begin executing, including prepared battalion orders.

The additional training for the mortar, medical, maintenance, and support platoons was intended to enhance the overall training value of these exercises. Simulation facilities shaped the addition of mortar, medical, maintenance, and support platoon activities in two major ways. First, the MWSTC includes a limited number of manned virtual training simulators. These include only M1 tank and M2 Bradley versions. When all maneuver personnel are present for training, all of the manned simulators are used. Manned simulators for vehicles typical of mortar, medical, maintenance, and support operators are not available. On the other hand, the MWSTC includes Modular Semi-Automated Forces (ModSAF) workstations, which can produce computer-generated presentations of these vehicles and their actions. Therefore, CS and CSS actions can be synthetically generated, with their actions integrated with those of the manned combat simulators. Given these facilities, training benefits are available to the leadership of these platoons. They can read the battlefield through typical report channels, track the battle, and coordinate the actions of their platoon's assets. ModSAF operators then enact the actions directed by the mortar, medical, maintenance, and support platoon leaders.

Mortar actions were readily synchronized with the execution of the battalion battle. CSS actions, however, intensify before and after the battle. Nevertheless, sufficient losses occur for the medical and maintenance platoon leaders to begin coordinating the actions of their platoon. Actions for the support platoon develop more slowly. However, they do have a mortar resupply mission, and the platoon leader has the opportunity to practice tracking the battle and positioning his assets for use during consolidation and reorganization. Because of these CSS additions, opportunities are significantly enhanced for company first sergeants (ISGs) and combat trains command post (CTCP) personnel to practice coordinating company and battalion CSS activities.

#### ***Modifications to the Virtual Training Program Tactical Scenario and Training Concepts***

Several interrelated design features were significant for the expansion for mortar, maintenance, medical, and support platoon activities. First, although the VTP battalion-level exercise provides multiechelon practice down to the crews of the tanks and Bradley fighting vehicles, O/C monitoring and feedback is only down to the company level. The emphasis of the training is on coordination of the battalion as a whole. Additional CS and CSS activities must be added within this perspective. Second, the VTP exercise is focused on battalion coordination during the execution phase of the battle. Mortar actions easily fit within this scope. The additional CSS actions, however, needed to be more critically reviewed because much of the battalion's CSS work occurs before and after the battle.

Less significant conceptually, but just as important for simulation of the battalion, the task organization of the battalion describes its assets and is, therefore, a significant guide to the

preparation of ModSAF instructions. All assets, other than those represented by the manned tank and Bradley simulations, must be generated and controlled by ModSAF workstations. Adding CS and CSS to the training exercise requires the addition of simulated entities to enact new CS and CSS functions. Similarly, the tactical laydown of the battalion dictates locations of battalion assets. Locations for new assets must fit tactically and must be feasible in the simulation. This latter comment may be of little significance unless one is aware of the terrain limitations of simulations. That is, the SIMNET world is finite and operations can only be conducted within its boundaries. The addition of CSS adds considerably to terrain requirements.

### ***Training Audience***

The above conditions narrow the options for the addition of mortar, medical, maintenance, and support platoon functions. Training design spiraled toward greater elaboration as the project progressed. At the most general level, one of the early decisions was that the exercise should be limited to incorporating platoon leadership positions that practice the command and control of their units within the context of the battalion operations. Training for these platoons, therefore, would focus on the coordination of their actions with the actions of the rest of the battalion. Elaboration of this decision led to consideration of the scope of each new platoon's activities within the VTP exercises and the specific allocation of these activities to new training audience members or to simulation. Consideration of training member activities also entailed consideration of the location of the new participants during the exercise.

**Fire support.** Mortar platoon activities include the maneuver and firing of mortars and the operation of the fire direction center (FDC) which controls those fires. These activities occur during the execution phase of the battle. The actions of the mortar platoon gun sections can only be simulated via ModSAF. On the other hand, decisions about movement of the mortar sections and processing of the battalion's calls for fire are activities that can be performed by the platoon leader and FDC personnel. These soldiers can respond to radio calls and transmit their orders to the ModSAF operators who replicate the maneuver and fires of the mortar platoon's gun sections. Therefore, the mortar platoon leader, mortar platoon sergeant, the FDC section sergeants and the FDC section specialist can all participate. An FDC can be co-located at a ModSAF workstation or in one of the four MWSTC CPs. If available, the platoon leader and platoon sergeant could "ride" in a manned simulator with their weapons systems turned off. Members of the O/C team would have to maneuver and fire the ModSAF generated mortars.

**Combat service support.** Medical, maintenance, and support functions are the second echelon of CSS actions within the battalion. Each company has its own services in these areas. The battalion-level assets (the medical, maintenance, and support platoons) operate in conjunction with the company's assets to provide services that the company cannot handle internally. The companies, therefore, represent one of the more significant coordination linkages for these platoons. The company ISGs become key players because they are the primary upward linkage between the companies to the battalion. Given that the focus of training is on coordination of battalion assets, the inclusion of company ISGs became a vital piece of the CSS expansion.

Also because the additional platoons are the second line of CSS action, much of their work follows the battle during consolidation and reorganization. On the other hand, the VTP exercises do not continue much beyond the resolution of the battle. Little, if any, consolidation

and reorganization is played out despite design efforts to include these activities in order to give more meaningful work to the CTCP (Hoffman et al., 1995). The exercise simply tends to end shortly after the conclusion of the fighting. As a consequence, the identification of maintenance, medical, and support platoon actions that would reliably occur during the battle was important for the training design.

From the maintenance platoon, the Battalion Maintenance Officer, the Battalion Maintenance Technician, and the Battalion Maintenance Sergeant could participate. To replicate their location in the battalion trains, these persons could be placed in the CTCP.

Four possible positions were identified as candidates for medical platoon training: the Medical Platoon Leader, Medical Platoon Sergeant, the Medical Operations Officer, and the Physician's Assistant. Because of the tendency for some of these persons to be unavailable for training because they are actually providing medical care, the medical platoon sergeant may be the more likely training participants.

Finally, the Support Platoon Leader and the Support Platoon Sergeant represent the support platoon's leadership. These personnel from the medical and support platoons can be located in available manned simulators or at the CSS ModSAF workstations. Figure B-9 summarizes the training participants representing the four additional platoons.

<u>Mortar Platoon</u>	<u>Medical Platoon</u>
Mortar Platoon Leader	Medical Platoon Leader
Mortar Platoon Sergeant	Medical Platoon Sergeant
FDC Section Sergeant	Medical Operations Officer
FDC Section Specialist	Physician's Assistant
<u>Support Platoon</u>	<u>Maintenance Platoon</u>
Support Platoon Leader	Battalion Maintenance Officer
Support Platoon Sergeant	Battalion Maintenance Technician
	Battalion Maintenance Sergeant
Company First Sergeants	

**Figure B-9.** Training participants for combat support and combat service support addition to the Virtual Training Program battalion SIMNET exercise.

### *Training Support Package Modifications*

A major feature of the original SIMUTA [Simulation-Based Multiechelon Training for Armor Units] design was to create "turn-key" exercises which would free the unit from the intense labor of setting up an exercise. The VTP TSPs described the actions needed on the part of the O/Cs and the unit participants. In addition, ModSAF files set up the simulation. These files included graphic overlays for the plan view display, computer instructions for representation of the enemy including initial locations, preplanned routes, formations, and march speeds for

enemy vehicle, and computer instructions for representation of friendly CS units. Initial locations, routes, and speeds are critical for creating desired combat events. Although ModSAF operators can override any preplanned actions (and often have to do so in order to adjust to the units actions), the initial plan was carefully created to facilitate orchestration of training events.

Implementation of the VTP Battalion SIMNET training program was documented in five TSP volumes, graphics overlays, and ModSAF data files:

- Volume I of the TSP contains general information for the O/C team, including information on
  - (a) background and management of battalion task force training,
  - (b) O/C team organization and training,
  - (c) controlling the exercise, and
  - (d) training objective task lists for the exercises.
- Volume II provides training participants with the general information they need to staff and prepare for the exercise, including information on the background of the exercise, information on managing battalion task force training in SIMNET, and training objective task lists.
- Volumes III, IV, and V provide more detailed information about each of the three missions. These volumes include orders and execution instructions, SIMNET Plan Sheets, O/C team duties and responsibilities, and AAR and take home package forms.

One option for TSP design was to prepare an addendum to the existing TSP. In a variety of places, the existing TSP described the scope of the training, manning, scheduling, and so on. These descriptions as they existed did not, of course, reference the new options. Although the O/C team, from experience, would know about the new options, the training audience on first receipt of their Volume II unit information might find the omission confusing. An addendum that contradicts the basic volume would not be particularly helpful. In addition, the O/C team would need to pull material from an extra source (the addendum) in order to implement the exercise. This is not a robust system, particularly when the main source (the existing volumes) gives no clue about what should be pulled from the supplemental source. Therefore, the decision was made to document the CS and CSS options by modifying the TSP volumes.

### ***Training Tasks for New Participants***

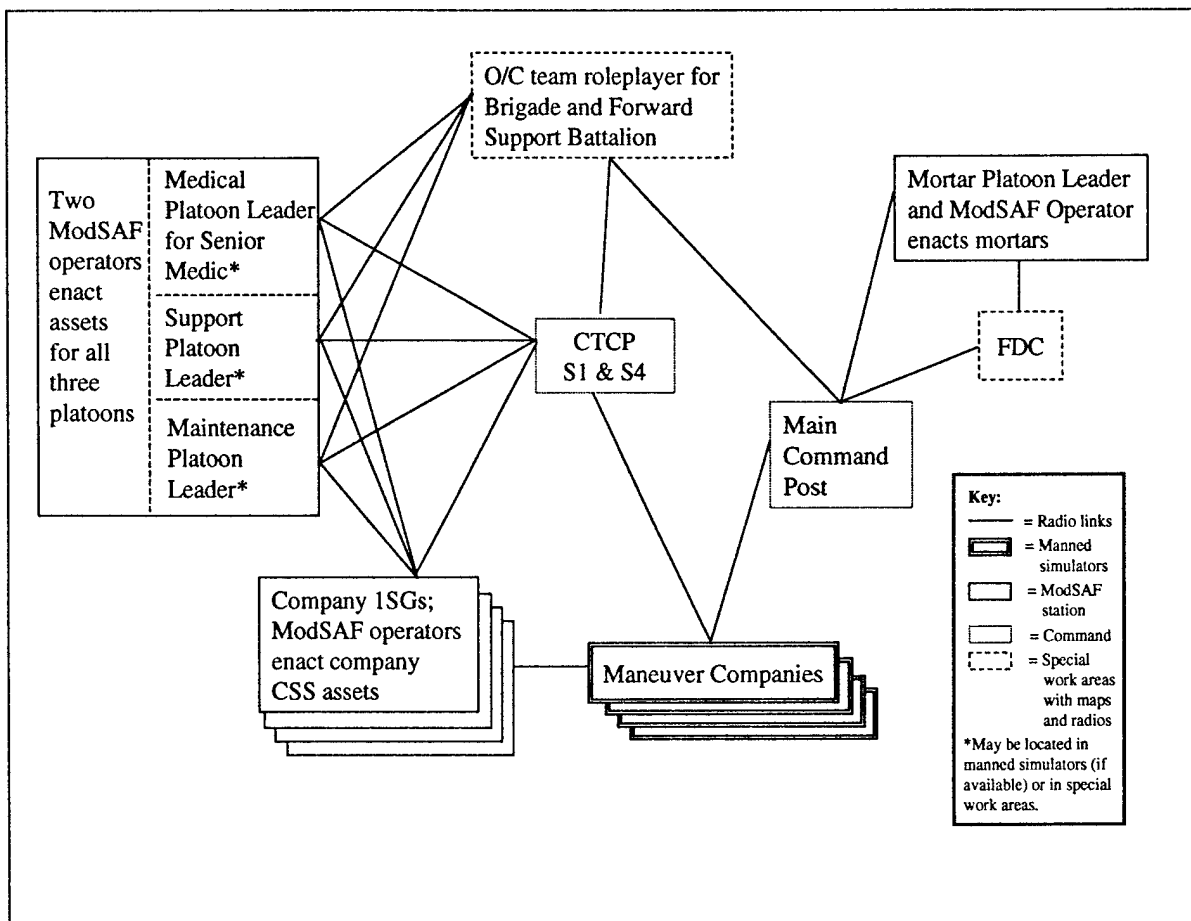
The above considerations clearly indicated that the general scope of the CS and CSS expansion must be for the platoon leadership positions to practice coordinating their platoon's activities with the rest of the battalion. The development team reviewed doctrinal materials to determine which tasks were required of the four new platoons within the context of the three battalion missions.

In order for the training to remain focused on execution, orders were prepared for each of the four additional platoons, for each of the three battalion missions. Like the battalion orders, these orders are to be distributed to the training participants in advance of the exercise for them to become familiar with the scenario and their missions. The orders needed to meet two objectives: (1) be tactically consistent with the battalion orders, and (2) support the training tasks.

In some cases, these two objectives conflicted because the original battalion orders were not written to support the training of the mortar and CSS platoons. For example, the VTP battalion order placed the mortar platoon too far behind the lead company for it to support the scouts during the movement to contact. Instead of adjusting the battalion order per se, supplementary fragmentary orders (FRAGOs) were prepared for each mission. Use of these FRAGOs could be optional, depending on whether the CS and CSS training options were being used. Through the course of pilot and trials, several modifications were accomplished with the FRAGOs.

**Implementation Model**

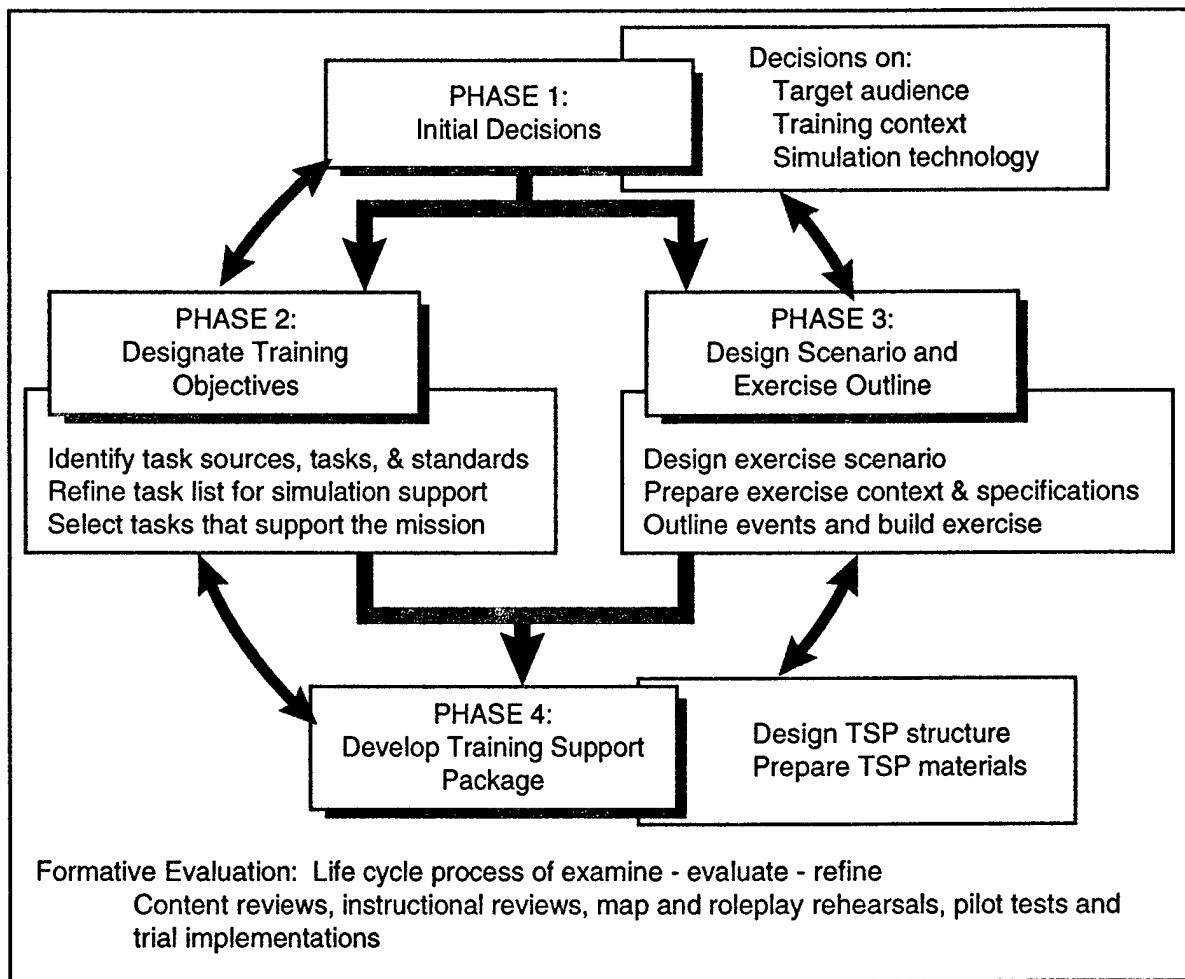
Figure B-10 depicts the layout of CS and CSS participants for the exercise. It also indicates what functions ModSAF performs and shows the communication linkage among the participants and ModSAF operators.



**Figure B-10.** Layout for VTP battalion SIMNET exercise with mortar, maintenance, medical, and support platoon additions.

## Appendix C. Summary of the Methodology for Development of Structured Simulation-Based Training

Structured training is a term applied to training programs that are deliberately and purposefully constructed so as to focus on specific training objectives (C.H. Campbell, Campbell, Sanders, Flynn, & Myers, 1995; C.H. Campbell & Deter, 1997; C.H. Campbell, Deter, & Quinkert, 1997). Development requires that attention be paid to the focus of the training, standardization of training events, and the construction of a training support package (TSP) that supports the focus and standardization. Attention to each of these aspects is incorporated in the methodology described in the above-referenced ARI-published guides. There are four phases to the development methodology, as shown in Figure C-1.



**Figure C-1.** The methodology for development of structured simulation-based training.

In Phase 1, developers specify the training requirement in terms of the content (e.g., mission and enemy type, terrain, time constraints, number of exercise start points, difficulty level), training audience (e.g., unit type or echelon, personnel within unit), and appropriate training environment (i.e., specific simulator/simulation).

Phase 2 and Phase 3 are usually concurrent activities, with a great deal of interaction between specifying the training objectives for the stipulated mission, and designing the scenario to prompt performance of the training objectives.

In Phase 4, developers construct and try out all of the written and simulator/ simulation-based components of the training program, including materials for the trainers and for the participating unit. These materials are referred to as the TSP, which is critical to ensuring standardized implementation.

The entire design and development process is supported by formative evaluation activities. These include, but are not limited to, trial implementations of the emerging program and TSP. Formative evaluation is considered to be a continuous product improvement process that extends throughout the life of the development effort.