Performance Analysis and Training for Digital Command Staff: Training for the Battle Command Reengineering III[1]

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Abstract

The transition to the digital Army of Force XXI and beyond is characterized by challenges to how the Army will train, maintain, and operate as an information age force. In response to the concerns and issues resulting from digitization, the U. S. Army Research Institute for the Behavioral and Social Sciences (ARI), Armored Forces Research Unit, is engaged in the design and development of training and performance evaluation techniques to support Force XXI digital capabilities. This paper summarizes an ARI project that addressed training for leaders and staffs of future digital environments.

Based on learning and performance research on team training and operations in digital environments, a training support package for a future-battlefield experiment was constructed. Coordination between ARI and the Mounted Maneuver Battlespace Laboratory (MMBL) at Fort Knox, Kentucky enabled the two organizations to work together as a team to accomplish multiple goals.

Observations and data collection during implementation of the training led to formulation of a series of lessons learned on training content and training structure. These lessons are addressed to several audiences, including developers of future staff training and researchers conducting future systems experiments and training.

[1] Statements in this paper are those of the authors and do not necessarily reflect the official opinions or policies of the U.S. Department of the Army.

Introduction

The transition to the digital Army of Force XXI and beyond is characterized by challenges to how the Army will train, maintain, and operate as an information age force. The foundation of the future Army includes an increased area of operation; enhancing weapon system capabilities to reduce the number of battlefield systems; non-linear, asymmetrical operations; and information dominance with certainty for situational awareness. The future force will depend on the capabilities of its command, control, communication, computer, and intelligence (C^4I) systems, and on the ability of the commanders and staffs to use the systems.

As digital information systems increase the amount and complexity of information provided to the staff, training must provide the higher-order skills needed on the digital battlefield. "Better education and training, devoted to information processing under stress and in environments characterized by uncertainty, are needed to develop the necessary skills to handle these information-rich situations" (Alberts, 1996, p. 32).

In response to the concerns and issues resulting from digitization, the U. S. Army Research Institute for the Behavioral and Social Sciences (ARI), Armored Forces Research Unit, is engaged in the design and development of training and performance evaluation techniques to support Force XXI digital capabilities. The efforts are performed in support of the ARI Science and Technology Objective (STO) – Force XXI Training Strategies. This report summarizes portions of an ARI project that addressed methods for training leaders and staffs of future digital environments. The work was conducted during 1998-1999. It began with a thorough review of research literature and technical documentation related to team performance and training and operations in digital environments. Based on the literature review, a training program was designed and developed to support a Mounted Maneuver Battlespace Laboratory (MMBL) Battle Command Reengineering (BCR) III experiment in April 1999.

This paper describes the development work and the prototype products, results of their use during the MMBL experiment, and implications for future training, both within MMBL settings and in the larger context of staff training.

Research and Development Method

Researchers focused on two aspects of future staff training: *what* to train, and *how* to train. First, because the focus was on staff training in a digital environment, the literature on various aspects of team performance in information-rich environments was examined. Second, different characteristics of the structures of training, in terms of the order of presentation, pace, and delivery mode, were examined in relation to the content areas. The review led to specific design decisions concerning content and structure of training for future staffs.

Training Content

Analysis of digital environments and operations, as well as results from previous MMBL experiments (e.g., Elliott, 1998; Elliott et al., 1998), indicated that the content of the training for future staffs should cover three training needs: system operations, tactical skills using the

capabilities of the new environment, and team process skills to bring the staff quickly to a high level of proficiency.

- *System operations training*: The initial training requirements is for individual training. Each staff member needs to know how his or her job responsibilities are performed using the digital equipment. This will include not only basic instruction on button-pushing and system capabilities, but some training in techniques and procedures for using the system efficiently.
- *Tactical skills training*: This phase is more advanced than system operations. It requires that staff members begin to use their new capabilities to perform clearly delineated parts of their jobs. Building on the acquired individual skills, this training should be collective, first with small groups of staff members on small segments of tasks. The training would gradually build up to having the full staff performing in an integrated and self-directed way, responding to job situational cues and actually performing the appropriate actions in a realistic environment.
- *Team process skills training*: The team training should include specific information, practice, and feedback addressing decision-making, team skills, situational awareness, and information management. These are not independent in actual performance, and should not be artificially separated in training. Additionally, they should not be separated from the job situation, as generic skills, but rather should be practiced and discussed as an integral part of the mission planning, preparation, and execution cycle.

Training Structure

Review of the literature led to identification of four instructional concepts that were expected to aid in both acquisition and retention of skills.[2]

- *Advance organizer*: The initial information presentations to the participants should include multiple instances of advance organizers (Smith et al., 1997; Cannon-Bowers et al., 1992, 1998; West et al., 1991). For whatever is novel within the future environment, the training audience should be specifically instructed on its relation to the "old" way of doing business, and told why the change has been made. If there are elements of the new environment that are unchanged, these should also be pointed out to the training audience. Job aids that graphically show the old, the new, and the linkage should be used where possible.
- *Part-task training*: Incorporating principles of part-task training means that the system training, tactical skills training, and team skills training will each be broken down into simple chunks (Mané et al., 1989; Stammers, 1992; Means et al., 1993). Training participants will receive training on small segments of tasks and may even be clustered into small groups to receive specific system training. As the training proceeds, the task segments will be aggregated and the small groups brought together to allow fully integrated practice of tasks and activities.

[2] The structure described here is very similar to that of the structured simulation-based training that ARI has been developing since 1993 (Campbell et al., 1995; Campbell et al., 1997; Campbell et al., 1998).

- *Deliberate practice*: As the part-tasks are trained, there should be numerous planned opportunities for deliberate practice of the skills just taught (Frederiksen & White, 1989; Ericsson et al., 1993; Means et al., 1993, Jones, 1989). This practice time must be structured to focus on the skills and integration of previously taught skills, and should focus on training to criterion. That is, not only should ample time be provided, but participants should demonstrate their grasp of the skills several times (thus avoiding lucky guesses and allowing for overpractice) before moving on to the next segment. Feedback is a necessary component of deliberate practice; participants should not have to decide for themselves whether or not they have achieved proficiency.
- *Context-based*: Finally, all of the training, from the basic and advanced system training to the fully integrated full staff exercises, should be presented in the context of realistic job requirements (Means et al., 1993; Salisbury, 1990; Cannon-Bowers & Bell, 1997; Cannon-Bowers et al., 1992). This can be accomplished even for the simplest task segments in the system training, by telling or showing the participants how the skill will be used as they perform their jobs. The complex integrated exercises that come toward the end of training can initially have simple scenarios, with later exercises providing greater challenges by means of very high-intensity scenarios (e.g., less time, more enemy, conflicting information, degraded conditions).

Training Conditions

Although the training approach described above is general enough to be used for future staff training under a range of conditions, there are four underlying assumptions.

- First, the training is intended for staffs who are already moderately proficient in their individual skills and who are familiar with basic staff operations. They need not be highly experienced, nor is it necessary that they have worked together as a staff for any great length of time.
- Second, it is assumed that the training participants are not yet familiar with most of the key elements of their “new” environment. That environment may involve, for example, a new type of staff organization, a new command post setup, or new digital capabilities. The training is designed to cover the novel elements and also to help the staff leverage those elements in order to increase their proficiency.
- Third, it is assumed that they are operating in an information-rich environment. The training approach is specifically aimed at operating environments wherein staff members must deal with complex information management and communication issues. This assumption is not a necessary one; the procedures and techniques should also be useful in conventional (analog) environments, but the need for the specific communication and information management skills is not as obvious.
- Fourth, it is assumed that some type of virtual or constructive simulation will be used. Although this is not a necessary condition, simulation is very useful in supporting deliberate practice and providing realistic contexts.

Approach for BCR III Training and Assessment

As presented in the Battle Lab Experiment Plan (BLEP) for the BCR III (MMBL, 1998), the purpose of the experiment was to examine advanced digitization's effects on battle command at brigade and below[3]. The central issue for the experiment was: If the Commander is provided timely, accurate, decision-centered information that allows him to visualize the battlefield, how is the Commander's ability to conduct battle command improved? The BCR III was constructed to allow the MMBL to focus on these issues by putting an intact squadron-level unit into a future digital environment, presenting mission situations, and observing and collecting data on how the unit performed. It was known from the results of the earlier BCRs that participants needed training on operating the digital system and operating within a reengineered staff structure. An intact squadron staff was scheduled to participate in the BCR III, so that there would not be the problem of providing entry-level staff training.

BCR Training Environment

An enhanced Modular Semi-Automated Forces (ModSAF) system was used to emulate digital C^4I capabilities at each workstation. The advanced C^4I systems emulated in ModSAF were referred to collectively as the surrogate command, control, communications, and computers (SC^4) system. They replicated a wide range of capabilities, including:

- Battle commander's display, represented by the ModSAF plan view display (PVD). On the PVD, commanders and other staff membersare able to view movements of all of their own systems, as well as any opposing forces (OPFOR) units detected by satellite or other sensors. Overlays can be drawn on the PVD, users can add labels or other notes, and there are tools that show past events and project future movements.
- Stealth display, providing a 360º view of the battlefield and all of the systems that are visible on the PVD (i.e., friendly and detected OPFOR).
- Video teleconference (VTC) linking the Commander and his staff.
- Collaborative whiteboard capability, to allow the Commander to present his intent and guidance to the staff visually and quickly. Whiteboard conference participants can upload images from their own PVDs, draw in different colors on those images, add clipart-style labels and icons, and type words onto the whiteboard.

Vehicles and weapon systems were represented in either constructive or virtual simulation. Constructive simulation (ModSAF) was used to generate and control the OPFOR, friendly forces below the company level, and unmanned vehicles replicating both aerial and ground sensors (referred to as UAVs and UGVs, respectively). Constructive simulation workstations were used by the fire support element commander, forward support company commander, two of the maneuver company commanders, and the three platoon leaders of another maneuver company.

In the virtual environment, simulators were used to represent several vehicles. These included the Commander and deputy commander vehicles, represented by reconfigurable simulators; staff operations vehicles (SOVs), represented by command and control vehicle (C^2V) mockups; and

[3] Information for this section of the report has been adapted from the BLEP (MMBL, 1998).

scout vehicles, represented by Future Scout/Cavalry System mockups. The virtual and constructive environments were linked by means of distributed interactive simulation (DIS) to form the seamless battlefield environment for the participants.

Experiment Participants and Organization

The primary training audience (14 members) comprised the Commander and selected staff of an active Army cavalry squadron. The primary training audience was augmented by an extended training audience (21 members), which included three maneuver company commanders and their deputies, three maneuver platoon leaders and one mortar platoon leader for one of the companies, a battery commander and his deputy, a forward support company commander with his deputy, and the scout platoon leader and platoon sergeant. A total of 35 soldiers from the squadron participated in the experiment as members of the primary training audience and extended training audience.

One major experimental feature for the BCR III was the reengineered battalion[4] command group structure for the primary training audience, depicted in Figure 1. It comprised four staff nodes: the command group node (Command 1), the deputy commander node (Command 2), the current operations node (Control 1), and the future operations node (Control 2). Each node was staffed by 3 or 4 primary staff members.

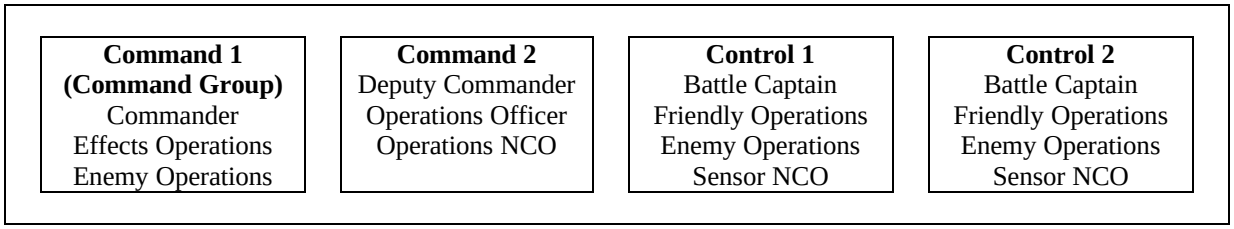

Figure 1. Reengineered battalion command group structure.

The BCR III training audience began with this structure, and was given a minimum of information about the roles and responsibilities of each staff member in each node. As the experiment progressed, the Commander was encouraged to realign roles and responsibilities in order to explore different structures.

MMBL personnel served as research assistants (RAs) who conducted the training and mentored the training audience as they operated the SC4 system. Other MMBL personnel staffed the higher headquarters response cell (roleplaying the brigade staff) as well as the constructive simulation workstations for combat support, combat service support, and the OPFOR.

[4] A note on terminology: The BCR was intended to address staff organization and C^4I use in the context of an armor divisional battalion. The unit supporting the BCR was a squadron drawn from a cavalry regiment. The echelons are roughly equivalent within their respective structures.

Training Design and Development Process

The process for development of the training followed the Army's systems approach to training (Department of the Army [DA], 1999) and the procedures outlined in Campbell et al. (1997). The development process always begins with a thorough front-end analysis of what is known and what needs to be learned about the training needs, training conditions, and training audience. Analysis then leads into design and development, resulting in products that should be appropriate for the conditions imposed by the environment and that should satisfy the training requirement. The design and development work incorporates the training content and structure decisions described above, and includes attention to measurement for feedback and program evaluation.

Throughout the analysis, design, and development activities, training products are under constant review and are revised as necessary. During initial implementation, formative evaluation of the training products and process is conducted to assess success in meeting the training requirements. Measurement should continue for additional implementations of the training, so that developers can track performance deficiencies that should be addressed in the training.

BCR III Training Analysis

The analysis process underlying design of the BCR III train-up included:

- defining the battalion staff processes in terms of responsibilities for nodes and for individuals within nodes;
- defining how the battalion staff processes should (or could) be performed within the nodes;
- defining what the SC^4 tools are and what they can do; and
- defining individual functions and tasks using the SC^4 tools.

The analysis served as the foundation for design of the training that focused on staff performance. The design work on the project included making recommendations for basic and advanced SC^4 training, as well as staff process training.

Staff Training Program

The approach was hierarchical, outlining a 5-level training sequence. It assumed (in accordance with the assumptions described earlier) that participants would have some experience working together as a team. The training structure proceeded through orientation, individual training, small group training, and a series of tactical decision-making exercises (TDXs). The purpose of each level is described below.

Level 1: Initial Orientation. In Level 1, the training participants began with an introduction and orientation to the train-up and the experiment itself. The Level 1 session was designed to serve as an advance organizer, in accordance with research indicating that learners do better if they are told what they will be learning, how they will receive it, and how it relates to current knowledge and processes. The orientation introduced several novel aspects of how they would operate: the

4-node staff structure, the SC^4 system capabilities, their own combat and combat support resources, and the OPFOR capabilities.

Level 2: Fundamentals. The fundamentals training, Level 2, was designed to provide SC^4 equipment familiarity combined with general system operations. At this stage of training, the information was basic and focused on the individual with a limited context. Each participant received both instruction and guided practice.

Level 3: Functions. The Level 3 training was then designed to provide the context-based training by clustering the system tools into functional groups (e.g., create overlays, conduct a whiteboard teleconference). The groupings for the Level 3 training were a result of the task, tool, and functions analysis discussed in the previous section. Though this training still focused primarily on the individual, it grouped together individuals from different nodes who performed similar tasks. This arrangement provided unit members the opportunity to discuss how they planned to use the system in the context of their jobs in the different nodes. Level 3 training was expected to be lengthy, requiring 4-6 hours. In order to provide deliberate practice opportunities, Levels 2 and 3 training included structured practice exercises that tracked directly with the material covered in the training and could serve as checks on whether the staff had acquired the skills taught.

Level 4: Tasks Training and Practice. The Level 4 training was a series of small group structured exercises that provided the first opportunity to practice the new skills in the context of brief scenarios. It was designed and developed to provide the transition from system training to staff process training. The focus of the Level 4 exercises was carried another step beyond the Level 3 training, by prompting the unit members to think about how they were to work together within their node. No new system tools or functions were introduced during this training.

The exercises were structured so that each node would train independently on the same collective function. This structure allowed the unit members to further explore and understand their roles and functions within each node, free of outside distractions. It also reinforced the multi-functionality aspect required to operate in the experimental staff structure. These exercises were to prepare the unit members to participate in the Level 5 TDXs, which focused on collective training.

Level 5: Collective Training. Finally, Level 5 training consisted of four TDXs and embedded team training sessions. The TDXs brought together all BCR III training participants (e.g., primary training audience, company commanders, scouts) to conduct collective structured exercises using the full capabilities of the SC^4 system. The exercises provided the opportunity to practice new skills in a tactical scenario similar to the type of mission used during the pilot and experiment trials. These exercises not only allowed practice on the system, but provided the context for introduction of training sessions addressing decision-making and team process skills.
Design of the TDXs was based on the performance analysis of the full BCR II mission flow described earlier, from planning and preparation through execution and sustainment activities. This analysis led to the delineation of four distinct segments that, together, required the participants to practice a wide range of staff processes and SC^4 functions. The four segments

were: a) mission analysis with wargaming; b) mission rehearsal; c) execution of a squadron branch; and d) execution of a brigade sequel.

Level 4 and 5: Team Training Sessions. Team training sessions were included before and after Level 4 training and as an integral part of the Level 5 TDXs. These sessions were designed to help the staff to focus on various aspects of performance in digital environments, and also to provide them with techniques for continuing to examine and improve their performance. Five types of sessions were presented:

- *Information Management (Level 4):* Information session to focus attention on the increased information management load imposed by the digital environment. Included a generic "information management" exercise to highlight difficulties; presentation of required knowledge for information management, model of information management, and common errors in information management; and discussion of low level strategies and solutions (e.g., e-mail formatting protocols) and high level strategies and solutions (e.g., understanding Commander's intent).
- *Roles and Functions (Level 4):* Information session to encourage the staff to work out their individual and node roles. Included a short presentation on the importance of roles and functions; description of the connections between roles and functions and decision-making, coordination, and information management; discussion of how the unit members perceive their roles and functions for the upcoming BCR III. Also presented a format for the unit to use to self-correct during the exercise as needed.
- *Pre-Action Analysis (Level 5):* Conducted before each TDX to focus staff attention on shared understandings of roles and functions, information management, workload, and situational awareness. The purpose is to anticipate potential problem areas and help generate how they will solve problems should they arise. These sessions will also allow time to review those action items identified in previous debriefs for sustainment or improvement.
- *Commander's Timeout (Level 5):* Recalibrate the staff to the Commander's situational awareness, at least once during each TDX. The benefits of performing a Commander's Timeout are that it causes the Commander to stop and think about his situational awareness and to communicate that to the staff. It allows the Commander to gain information to questions he may have and help the team to focus on keeping the Commander aware of the ground truth.
- *Team Decision-Making Debrief (Level 5):* Focus on issues related to team processes, decision-making, roles and functions, and information management. Conducted at the end of each TDX. The Commander and staff will also identify action items for sustainment and improvement.

The training products developed for the basic and advanced SC^4 training included training plan outlines, which were turned over to the MMBL for completion of the structured practice exercises. For staff process training, researchers developed and produced the TSPs that included tactical materials, observation and feedback mechanisms and aids, and simulation files (as prescribed in the U.S. Army Training and Doctrine Command [TRADOC] Regulation 350-70 [DA, 1999]). The major research products associated with the prototype training for the BCR III

implementation are described in the project final report (Throne et al., 1999) and presented in the set of materials entitled *Training and Measurement Support Package for Battle Command Reengineering III* (MMBL, 1999).

The period of time provided for "train up" was five days. Level 2 and 3 training focused on the individual, Level 4 progressed to a small group (node) focus, and the Level 5 TDXs and team training sessions brought all elements together for collective training.

Formative Evaluation

The effectiveness of the training was evaluated during implementation in the BCR III, mostly through the use of surveys and interviews. The issues addressed during the training evaluation were the training program structure, support materials, and content. The training surveys were filled out by all the training participants at the end of each level of training and on the last day of the experiment. Interviews were conducted on the last day of training with the Commander and certain RAs and observers, and on the last day of the experiment with selected primary training audience members and observers.

Results and Discussion

Results pertaining to the training structure, the support materials, and the content of the training are discussed below. While the training and experiment phases were generally implemented as outlined in the BLEP, there were some conditions of the experiment environment and staffing that impacted on the training program and on data collection efforts. These implementation conditions and their impact on training are identified in the discussion below.

Participant reaction to Training Structure

Structure includes the training flow, implementation model, training scenarios, and support materials. Overall, the participants found the training to be adequate in terms of sequencing and amount of instruction, coaching, and practice. However, their comments on the surveys and interviews identified many areas for improvement.

The progression from individual to small group to collective training appears to be acceptable. Respondents who recognized the progression affirmed it; those who did not recognize it requested such a progression. In particular, they indicated that the orientation could have been more useful in preparing them for the train-up that followed. It should be noted that the orientation session was not conducted as planned, using advance organizer principles. Instead, a general overview of the many SC^4 capabilities was presented. Additionally, the Level 3 plan for staff groupings to reinforce position-specific procedures was disrupted by other system training unrelated to the intended functional training.

The training sequence and time allocation requires some examination. The initial tools training (Levels 2 and 3) did not contain enough formal instruction, practice, or skill assurance. In fact, most of the designed structured practice exercises were not implemented. As a result, during small group training (Level 4), individuals were still attempting to learn individual skills, and the

planned multiechelon training was frustrating for participants at both the squadron and company levels.

The TDXs were seen as an important component of preparation. While the mission segments (planning, rehearsal, and execution) were acceptable, the scenarios may have been both too slow-paced and too deliberate. By incorporating more high-stress situations, the staff would have had more incentive to conduct situational awareness recalibrations and intensive decision-making debriefs. Some participants also suggested including more TDXs so they would have had more opportunities to practice and refine their tactics, techniques, and procedures (TTPs).

Implementation of the Level 4 and Level 5 staff process training was intended to be conducted initially by the MMBL Training Director and later transitioned to the Commander. Because the Training Director's time was limited during the week prior to the experiment, efforts to prepare him for that role were similarly limited. Time with the Commander was even more constrained, with the result that he was unable to fully implement the requirements.

Utility of Training Support Materials

The support materials for the TDXs (e.g., intelligence summaries [INTSUMs] and fragmentary orders [FRAGOs]) were seen as adequate. The single item most often noted as "missing" or incomplete during the train-up period was a clear statement of the training objectives. Revisions to the delivery of the training materials must include this simple (and embarrassingly obvious) but critical feature. Other suggestions pertaining to materials focused on training checklists for the RAs, job aids showing SC^4 operations, charts of blue forces (BLUFOR) and OPFOR systems and capabilities, and roadmaps of objectives and topics for the training week.

Participant Acceptance of Training Content

Results concerning the training content centered on SC^4 topics, battlefield environment information, and staff process training. In general, participants found their initial training to be only adequate in terms of what they learned about the SC^4 system. Suggested fixes ranged from more time for structured practice, to better-trained RAs, to detailed job aids. In addition, inclusion of combat service support (CSS) functions was generally judged inadequate.

One of the assumptions for the training was that the staff members would be familiar with their duties and responsibilities in a conventional staff configuration. Due to normal turbulence within the unit, however, many of the staff members were relative novices in staff operations. This meant that some of the training was too intensive, attempting to build on skills that the individuals were lacking.

Reactions to the team training sessions were mixed. Most of the respondents indicated that this staff did not need information management training as provided, although there was no argument that it was an important topic. Nonetheless, they continued to have information management difficulties throughout the TDXs and into the experiment. The timing of the information management session, coming as it did prior to any significant information flow, may have been the problem.

Likewise, most participants agreed that the Pre-Action Analysis, Commander's Timeout, and Team Decision-Making Debrief were valuable in concept but not particularly useful as implemented. Whether this is due to the way in which they were conducted, or to the way they were designed is unknown. However, the concepts should be considered for future use.

Lessons Learned for Future Research

These lessons are addressed to several audiences, including developers of future staff training and researchers conducting future systems experiments. The lessons fall into three categories:

- Training structure
- Training support materials
- Training content (specifically, team and decision skills training).

Lessons Learned on Training Structure

The training prototype was designed as a hierarchical progression from an initial orientation through individual and small group training to collective training including team process training sessions. It incorporated features recommended in the training literature, including an advance organizer, a realistic underlying context, and both formal instruction and hands-on practice opportunities. All of these features should be retained.

However, the features must be explicitly implemented in accordance with the design plan. Some of the ways of ensuring that these features are advantageously used include:

- Unit preparation plan: In advance of the training, preparation materials for the unit could help the unit to derive greater benefit from the training itself. A combination of listening (e.g., a briefing or videotape), reading (e.g., background materials, explanations), showing (e.g., what the systems look like, how to use them, what they can do for the user), and doing (e.g., preparing tactical products, refining the unit standing operating procedure [SOP] and TTPs) should be incorporated.
- Organization and content of the initial orientation: The advance organizer, as a way of introducing a novel situation, holds great promise. The initial orientation should be as concise and direct as possible, providing necessary information to get participants into their first day of training with an understanding of what they will be doing.
- Time allotted to different phases of the training: Training on new systems should include generous amounts of time for hands-on practice and exploration. If sufficient time is allowed for individual practice during the initial learning phase, then the time set aside for small group and collective practice on more advanced skills can be used more productively, and overall time may even be reduced.
- Sequence of the different phases of the training: In learning a novel and complex system, a series of training cycles, each focused on a subset of tools and functions and each including the individual to small group to collective progression, will serve to provide the big picture context more often and more effectively.

- Training audience members: Training does not just happen as a result of putting people in front of systems, even with knowledgeable assistants on hand. For any new system training, providing training for all segments of the training audience is essential.

Lessons Learned on Training Support Materials

The lessons learned concerning the prototype materials are generalizable for other future staff training. Lessons pertaining specifically to the team training sessions are reserved to the next section.

- Creating training scenario materials: In constructive simulations, much of the scenario information must be presented by the simulation. Developers must begin working in their target environment quite early, in order to ensure that capabilities are understood and used. For the BCR, changes to the SC4 systems were still being made several days prior to the training period, making inclusion of appropriate features and creation of simulation files difficult at best.
- Use of job aids: For large amounts of relatively simple information, or small bytes of obscure information, job aids should be provided.
- Training audience and train-the-trainer materials: Without complete training support packages, information concerning the training objectives, sequence and structure, and methods for implementation may be possible by means of memos and discussions, but it will be unreliable at best. This lesson serves in a small way to validate the guidance contained in TRADOC Regulation 350-70 (DA, 1999) and in ARI development methodologies (Campbell et al., 1995; Campbell et al., 1997; Campbell et al., 1998).
- Pilot testing: Full pilot testing of materials prior to use, in the form of a dress rehearsal, is essential (and was not possible for the BCR). Otherwise, the first operational use is the pilot test, and there are no opportunities to refine materials before use.

Lessons Learned on Training Content –Team and Decision Skills Training

The prototype training served as a very rough pilot implementation for five types of team training: Information Management, Roles and Functions, Pre-Action Analysis, Commander's Timeout, and Tactical Decision-Making Debrief. But because the actual implementation of the team training sessions did not represent the designed process, assessment of the outcome of the team training sessions is not appropriate.

Nonetheless, a great deal about the potential for incorporating this type of session in future staff training (future training as well as training for future staffs) has been learned. Comments received from the training audience members indicate that the content of the sessions had potential for being useful, and that sessions conducted as part of collective training exercises would be valuable. Specific suggestions for future training are discussed below.

- Unit leadership preparation: This issue is closely related to one discussed earlier on unit preparation, but is specifically targeted to preparation of the unit leader. This individual is the single most important influence on the success of a training program. If the leader is educated in advance as to the purposes and processes in the training, and is persuaded to

wholeheartedly support those purposes and processes, then the training program has every opportunity for success.

- Information management training: Given the increased amounts of information available to all staff members, information management should be a ripe topic for training. Developers still need to research the current information management training that is provided, the specific difficulties presented in the environment for the training, and the techniques and procedures that will be useful in that environment.
- Presentation of roles and functions session: The roles and functions session has potential to be one of the most easily implemented and directly beneficial sessions for team training. These sessions need to be conducted frequently, with discussions specific to the current activity or mission plan (rather than generic "Who am I?" and "What do I do?" discussions).
- Facilitation of the pre-action analysis, timeout, and debrief: In order for the Commander to be a part of the training audience, the role of training must be taken by someone outside: an observer/controller (O/C), Training Director, or representative of the higher headquarters. This individual needs subject matter expertise and credibility, training materials, instruction and ongoing guidance, and the authority to lead such sessions.

Summary

The BCR III experiment provided a unique opportunity to implement prototype staff training methods for future forces. The prototype's topics and structure and the methodology for development are grounded in the research literature. Development of the prototype training system followed a tried and proven procedure laid out by TRADOC and in previous ARI projects. Difficulties in implementation generally occurred where the procedures had not been strictly followed. However, the formative evaluation provided valuable information for program revisions in preparation for other experimentation.

Additional trials of the prototype training and evaluation systems are required to validate its efficacy and utility. As capabilities of advanced C^4I systems are enhanced, future experimentation should lead to further development of a prototype training method (particularly in staff training strategies) that targets higher-order cognitive skills needed on the digital battlefield. Advances in training need to parallel technological advances in the information age before the digital Army of Force XXI can maintain battlefield dominance.

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