Using Distributed Training Simulations to Prepare Soldiers for Peacekeeping Operations

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ABSTRACT

With the military becoming increasingly involved in Stability and Support Operations (SASO), preparing personnel for challenges pre-deployment is critical. In 2000, we attended peacekeeping training sessions for the 3rd Infantry Division (3ID) as it prepared for rotation into Bosnia, and we traveled to Bosnia to observe their rotation with the outgoing unit. We found that while their training prepared them to fight and protect their safety, it did not prepare them for the geopolitical environment, decisions they would make, an understanding of available resources, or how information flows between team members. Sponsored by the Army Research Laboratory, we developed a distributed training simulation to prepare future units to contend with these challenges in peacekeeping missions. The tool, an electronic decision exercise, provides an overview of the political and cultural climate in the region, maps of the region, and a simulation exercise based on actual events during the 3ID tour. Based on real-world experiences, the simulation provides a richer understanding of in-country conditions. A secondary focus of this tool was the development of adaptive teams: gaining shared situation awareness, problem solving, and selecting courses of action. Since soldiers are often deployed with people they've never met, this tool allows individuals to work online simultaneously to "get to know" their team members before deployment. As they work through the simulation exercise, they trade information and calibrate their expectations regarding information sharing, decision making, and resource allocation. Finally, this tool provides an opportunity for incoming units to learn from incumbents. The Command and General Staff College at Ft. Leavenworth evaluated the tool and found it to improve knowledge of resources, skills in applying resources, and the ability to act more quickly and efficiently when faced with real life problems. The tool is now part of the CGSC tactics course.

ABOUT THE AUTHORS

David W. Klinger is a Senior Research Associate at Klein Associates. Mr. Klinger has led or participated in many projects concerned with team interaction. Mr. Klinger was a member of the technical teams that developed the Advanced Team Decision Making model and the model for distributed team performance. He is an experienced observer of teams in both natural settings and simulated environments. He has worked with control room crews at various nuclear power plants and has led projects to improve team performance for the Emergency Response Organizations within nuclear plants. His team research and training efforts also include work with Uninhabited Combat Air Vehicle operators, U. S. Army peacekeeping efforts in the Balkans, SONAR submarine teams, U.S. Air Force Weapons Directors onboard AWACS aircraft, and U.S. Marine Corps command posts. Mr. Klinger holds a B.S. in Psychology from Wright State University, Dayton, OH.

Danyele Harris-Thompson is a Research Analyst at Klein Associates. Her research interests include organizational development and training, theories of individual and team performance, the nature of expertise in teams and individuals, and training sensemaking and situation awareness. Ms. Harris-Thompson is currently involved in an effort to develop an electronic-based tool that will support content developers in authoring training scenarios for classroom and online delivery. She has worked on projects to develop tools for scenario-based decision skills training for geographically distributed teams, and web-based training focused on cultivating productive multinational teams within the SFOR environment. Ms. Harris-Thompson holds a B.A. in Psychology from Wheeling Jesuit University and an M.S. in Organization Development from Bowling Green State University.

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INTRODUCTION

News reports regarding peacekeeping missions around the globe fill our nightly news programs and newspapers. These stories often center on events that don't sound like peace at all. We hear of car bombings, sniper shootings, and ambushes. Soldiers today are being asked to take part in a very different type of mission. These peacekeeping missions contain vague goals and vague measures of success. A recent goal statement from the White House was "a free and democratic Middle East" (Newsmax.com Wires, 2004). What does this look like to the soldier on the ground, faced with violent civilian activity, young children running in the streets, and hungry parents trying to understand the world around them?

One way to help these soldiers prepare for these missions is through more realistic training. Certainly, physical fidelity may be an avenue to pursue, but we believe that cognitive fidelity of the training is more important. That is, trainees must be placed into cognitively realistic settings, where the decisions, uncertainty, information, cues, and time pressures realistically mimic those they will face in the real world.

In a recent project, we were able to develop such a training tool for use by the U.S. Army to train soldiers as they prepare for a peacekeeping mission in Bosnia-Herzegovina. This paper documents the methods and training tools developed during that effort.

INITIAL TRAINING RECEIVED BY SOLDIERS FOR SASO MISSIONS TO BOSNIA

In the fall of 2000, Klein Associates researchers (including David Klinger) attended the peacekeeping training sessions for the 3rd Infantry Division (3ID) as it prepared for rotation into Bosnia. During the three-week exercise at Ft. Polk, those researchers were on the ground observing first-hand the exercises, scenarios, and events associated with this training. As time allowed, the researchers conducted interviews with the participants and the exercise controllers in an attempt to understand exactly what was going on, what the participants thought about the training, and what the controllers thought about how the trainees were handling the various exercises. In short, we asked a lot of questions in an attempt to understand the training goals and how well the exercise was achieving those goals.

This training event was clearly a hands-on training exercise. The U.S. Army employed numerous native Bosniacs to serve as civilians within the training grounds. These Bosniacs actually lived within the training area during the exercise. On given days, they would receive instructions as to the training goals of the day and how they were to act when confronted by the trainees. These training events, or scenarios, were based on previous events that have occurred in Bosnia. The goal was clearly to present these soldiers with difficult situations (i.e., a pregnant mother arriving at the gate of the base, late at night, and apparently in severe pain) and provide them with instruction regarding proper procedures. One could certainly say that this training had high physical fidelity. The villages within the training grounds had the same names as their counterparts did in Bosnia. The markets where goods were bought and sold also had the same names. These markets also mimicked their real counterparts in that some were known for violence, others not. The U.S. Army spent a great deal of time getting this right.

Later in 2000, David Klinger traveled to Bosnia to observe the handoff between the outgoing unit and the 3ID. This handoff, often called "right seat/left seat rides" consisted of the outgoing unit spending some time "doing the job" while the incoming soldier watched and then the incoming soldier "did the job" while the outgoing soldier observed. Following an unspecified amount of time, the two would decide that the incoming soldier was adequately prepared to conduct the mission and the outgoing soldier would be relieved of duty. At this point, the outgoing soldier might have a few more days in-country before returning to the U.S. The goal of the data collection

was to make some assessments of the utility of these right seat/left seat rides and to generate recommendations for more effective methods for the transfer of expertise during this period.

METHOD

As stated earlier, during the Mission Readiness Exercise (MRE), Klein Associates' researchers observed the exercises and asked questions as often as possible. These questions were driven by the Team Audit, one of several Team Cognitive Task Analysis methods developed at Klein Associates. Our goal was to utilize the Team Audit and, as is discussed later in this paper, the Critical Decision Method to identify training objectives for use in the development of a training tool. We wanted that training tool to have cognitive fidelity without the expense of physical fidelity. We wanted to place future trainees into situations where they would make decisions and judgments based on realistic levels of uncertainty, information overload, distracting information, and time pressure.

The Team Audit is typically utilized to elicit aspects of a team member's knowledge and skill that pertain to a specific task or set of tasks, and elicit appropriate examples from actual incidents. The goal is not simply to find the knowledge and skills that are present, but to determine the nature of these skills, specific events where they are required, team strategies that have been used, and so forth. A list of probes is the starting point for conducting the Team Audit interview. The probes enable real-life examples to be elicited. Then, the interviewer asks for specifics about the examples in terms of information requirements, critical cues, and strategies of team decision making. This is followed by a discussion of potential errors that a novice, less-experienced person might have made in the situation. This method was selected due to the uncertain nature of the timing of our interviews and our goal to quickly uncover the critical cognitive factors associated with various team tasks.

For the observations, the team of data collectors (not all were Klein Associates' employees) worked hard to document decisions, activities, and information flow and provide time stamps that were as accurate as possible. The team met each evening to compare notes, attempt to track information flow (i.e., who knew what and when), and try to piece together the order of events of the day. These sessions often included long discussions of what people knew, how they gained that knowledge, and the errors they made. We were there to understand the training received during this MRE as well as the right seat/left seat rides that were upcoming once this unit arrived in Bosnia. It was critical that we understood the mindset of the soldiers as they arrived for their mission.

In November, 2000, researchers conducted 83 interviews (see Table 1 for rank distribution of those interviewed).

Table 1. Ranks of Individuals Interviewed in November

Rank of Individuals Interviewed	
Sergeants	13
Lieutenants	23
Majors	21
Captains	12
Lt. Colonels	10
Colonels	2
Generals	2

All of these interviews were conducted with soldiers who were near the end of their Bosnia rotation and preparing to return home. The focus of these interviews was to uncover what they had learned during their time in-country, how well they believed their training had prepared them for the mission, and what they planned to do during the right seat/left seat rides with the incoming unit. A standard questionnaire was developed to help the team best use the short amount of time each interviewee had available.

The unit provided us the opportunity to visit their battalion-level units as well. We traveled to Camp McGovern and Camp Dobol. The interviewee breakdown in Table 1 includes the 16 interviews we did at these camps. We also accompanied a squad as they conducted their presence patrols in the northern villages and towns of Bosnia.

In January 2001, another KA researcher traveled to Bosnia to interview 3ID personnel. These soldiers had now been in-country for two months and had likely learned a great deal. We conducted a total of 97 interviews with individuals from the 3ID. During those interviews we focused on the applicability of their training—how well the training represented the tasks and situations they were seeing once they had been deployed. (Additionally, we participated in one discussion session with 16 members of the Plans Working Group). A breakdown of these interviews appears in Table 2.

Table 2. Ranks of Individuals Interviewed in January

Rank of Individuals Interviewed	
Sergeants	6
Lieutenants	14
Majors	35
Captains	27
Lt. Colonels	9
Colonels	4
Generals	2

As was also the case in November, shorter data collection trips were made to Camp Dobol, Camp McGovern, and the city of Tuzla. Again, we went on presence patrols at both base camps, which gave us the opportunity to observe the battalion patrols as they performed their routine operations while interacting with the Bosnian population.

By the time Klein Associates' researchers made their third trip to Bosnia, it had become clear that there was a serious training need that was not adequately covered during previous training opportunities. The soldiers within the country had little understanding of the resources available to them, nor did they understand the current state of the problems in Bosnia. That is, their training had provided the soldiers with a worst-case scenario viewpoint of the conditions within the country. The training did not provide them with the necessary knowledge for dealing with the current, peacekeeping activities. Their training had given them the necessary tools and skills to protect themselves, but not the required skills to conduct a mission in which the goals are vague, the enemy is difficult to identify, and the situations faced on a daily basis have more to do with improving the living conditions of the citizens than they do with fighting a battle against a known enemy.

For this third trip, we sought to identify these necessary peacekeeping skills by conducting interviews using the Critical Decision Method (CDM) (Hoffman, Crandall, & Shadbolt, 1998). CDM is a technique for learning from specific, non-routine events that challenge a person's expertise, and has proven to be the most effective of our methods for identifying the more specific details of a cognitive task. CDM has benefited a variety of functions, including knowledge engineering for expert system development, identifying training requirements and developing training materials, and evaluating the task performance impact of expert systems and decision support systems (Klein, Calderwood, & MacGregor, 1989).

The CDM interview uses recollection of a specific event as its starting point and employs a semi-structured interview format with specific, focused probes to elicit particular types of information such as options that were generated, situation assessment factors, and cue utilization. The four steps (often called sweeps) in the CDM interview include:

Step 1: Prompting the SME to identify a relevant incident and articulate it. This usually takes the form of a free-flow session in which the interviewee thinks aloud as he or she recalls the incident.

Step 2: Filling in gaps in the incident. To accomplish this, the researcher restates the incident and asks the interviewee to mark the events on a timeline. This helps to pinpoint gaps, both in time and events, and typically aids in recall of missing portions.

Step 3: Deepening on the incident to look for cues and factors affecting the decisions. This involves questioning the decision events, looking for cues, factors affecting the decision, and alternative courses of action which were considered but not chosen.

Step 4: Exploring expert/novice differences. When speaking with an expert in the field, a typical question might be, "How would you have handled this event differently during your first six months of duty as opposed to how you actually handled it?" The probes center on the learning cycle.

CDM protocols provide detailed records of the information gathering, judgments, interventions, and outcomes that surround problem solving and decision making in a particular task or domain.

This method provided us with a wealth of incidents to provide a solid foundation for a scenario-based training tool.

TRAINING TOOL DEVELOPMENT

Our goal for this effort was not just to identify the weaknesses in existing training, but to provide a resource that could serve to give Army units additional training to support the challenges they encountered in-country. To achieve this, we developed an electronic decision game (eDG). The goal was to provide soldiers with an Internet-accessible training tool that would allow multiple players to participate in events that mimicked the situations that the soldiers were encountering in Bosnia. The eDG is designed to provide a forum for

players to become engaged in problem solving, situation awareness development, and course of action selections. To accomplish this, the eDG utilizes a scenario-based game platform that provides each user with the same central point of reference—in this case a map—and situation reports that mimic the look and content of actual reports they will receive once deployed. (A screen shot is found in Figure 1.)

As the game proceeds, a facilitator can determine the complexity of the scenarios and the results of selected courses of action.

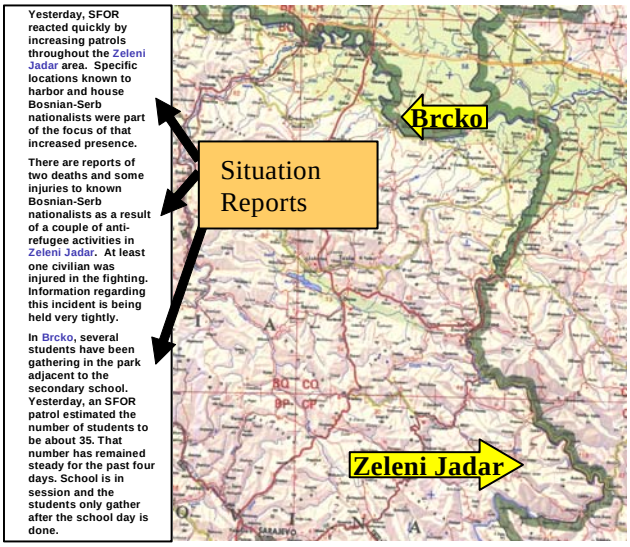

Figure 1. SASO tool screen shot.

Many of the benefits of this strategy are obvious. Providing soldiers with real-world scenarios provides a richer understanding of the conditions in-country. There are, however, many subtle benefits to this training platform.

First, the soldiers must work as a team to gain a shared situation awareness, to problem solve, and to select courses of action. These are important team skills that must be practiced. Second, we found that soldiers are often deployed with people they have never met and never spoken with. Yet they are expected to act as a team immediately upon arrival. The eDG provides these team members with an opportunity to "get to know" their team members. As they work through the scenarios of the eDG they trade information and calibrate their expectations regarding data flow and information processing. Third, individuals with expertise can pass on their knowledge to those who are just coming in. There is a great deal of variance from unit to unit regarding the handoff procedures as one unit replaces another. The eDG provides an opportunity for the incoming unit to learn from the incumbent. This can be done long before the incoming unit arrives in country. Using the eDG to facilitate distance learning provides for a far more ready set of soldiers to go into Bosnia and take over a difficult mission.

Evaluation

Klein Associates developed a beta version of the eDG and took it back to Eagle Base, Tuzla, for feedback. We found that soldiers currently deployed in Bosnia quickly became engaged in the exercise and identified multiple areas in the training cycle where they thought it should be applied.

A formal evaluation of the product was performed at the Command General Staff College (CGSC) at Fort Leavenworth, KS.

The goal of the test and evaluation was to determine whether or not using the eDG in training would be effective. The basic design included both a control group and pre- and post-tests. Scenarios for the pre- and post-tests were based on information obtained from the Night Owl database. This database was updated regularly with actual events as they were experienced by U.S. personnel. For each of the scenarios developed, a specific event was identified (e.g., pre-election rally in Prnjavor or mosque demonstrations and attacks in Brcko) and a minimum of four stories were collected. These stories were reviewed and summarized in vignette form for use in the tests. Ten sessions were conducted. All participants were of the rank of Major and were students at the CGSC. Eight of the sessions had 4 participants and two had 3, for a total of 38 subjects. The data for one of the 3-person sessions could not be used as one of the participants contaminated the session. Therefore, we had a total of 35 participants. Average SASO experience was 8.5 months (SD = 11.3). Table 3 shows a detailed breakdown of the participants' SASO experiences.

Four predetermined roles were established for the participants: Operations, Information Operations, Intelligence, and Civil-Military Cooperation (CIMIC) center. As individuals arrived for the session they were asked on a first-come, first-serve basis to fill these roles.

The majority of the measures centered on the participants' answers to six questions in the pre- and post-tests. For both the pre- and post-tests each individual was given a one- to two-page SASO scenario to read, following which they answered

questions within the context of the scenario. The questions were identical for both tests.

Table 3. Breakdown of Participants' SASO Experience

SASO Experience (months)	Number
0	14
1-3	3
4-6	4
7-12	5
13-18	3
19-24	3
Over 24	3

The six questions were designed to elicit different types of information. These were the knowledge types and learning/training objectives around which the eDG was designed.

Four scenarios were used for the pre- and post-test vignettes. These were counterbalanced between pre- and post-test to offset any effects the scenarios themselves might introduce. Three military subject-matter experts (SMEs) were asked to blindly score the pre- and post-test answers. The answer sheets were coded so they could later be matched by participant and pre- and post-test. Each was given identical instructions regarding how to code the data.

The SME ratings of the participants' responses to the six questions were analyzed. Since the scores were expected to improve, a one-tailed t-test was conducted on the data to determine whether there was an overall effect from the training intervention. In addition to analyzing their overall scores (across all six questions), we also examined the scores for each of the six questions individually to see if there were differences in performance for the six areas the questions addressed.

The overall t-test for the SASO SMEs' ratings was $t(34) = -2.14$, $p < .05$, indicating that the overall training had a positive, significant effect.

The results indicated that three areas, information needs and requirements, recognition of uncertainty, ambiguity, and missing information, and understanding SFOR responsibilities and roles, showed improvement at the $p < .05$ level of significance. Two other areas, understanding resources within your immediate team and understanding resources outside your immediate team, showed improvement only at the $p < .1$ level of significance.

Each participant was also surveyed regarding various aspects of the eDG. The surveys contained a total of 14 questions, of which 12 were based on a five-point Likert scale. Of the remaining two survey questions, one question asked the participants *when* during their training cycle they believed the eDG would have the most utility. The other question asked the individuals to select from nine possible ways (all that applied) to improve the SASO eDG.

The strongest ratings for the eDGs value were on the overall rating (3.94), the scenario's realism (4.42), the usefulness of the scenario setting (3.97), and the eDG's usefulness for training SASO knowledge and skills (3.96).

Table 4 represents the results of Question 11, which queried the subjects regarding where they believed the tool would best be applied within the current SASO training cycle.

Table 4. Training Cycle Milestone

Training Cycle Milestone				
Pre-MRE	**MRE**	**Post-MRE**	**RS/LS Rides**	**Deployment**
28	5	3	6	1
* Multiple responses were permitted				

The responses to the question "How would you improve the SASO eDG?" were taken into account for future modifications. The participants had little to suggest regarding improvement. One request of nearly half of the participants was to have "more time to take part in this training."

CONCLUSIONS

The application of Cognitive Task Analysis (CTA) tools in the development of training objectives for the goal of achieving cognitive fidelity is a success in this case. There is much work to be done. Questions remain regarding how to transform CTA data into training objectives and training requirements.

The tool developed in this project is currently used in the tactics course at CGSC and has been utilized in the training of several National Guard units as they prepare for their mission in Bosnia. Our goal is that to continue this work to help train soldiers as they

prepare for other peacekeeping missions around the globe.

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