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

**Research Report 1856**

# Development of the Reactive Planning Strategies Simulation (REPSS)


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**July 2006**


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14. ABSTRACT *(Maximum 200 words)*:

The present report describes the development of the Reactive Planning Strategies Simulation (REPSS), and the results of initial experimentation comparing the performance of distributed and co-located groups. The REPSS presents a simplified collaborative planning task where a commander and three teams organize relief mission convoys to four towns as part of a stability and reconstruction operation. The research supports the Leader Adaptability Army Training Objective (ATO) which seeks to provide prototype computer-based methods and tools to rapidly train and sustain fundamental leadership and battle command skills required as increasingly complex command and control technologies and networks become operational. With regard to the planning process, the comparison of co-located and distributed groups showed clear differences in verbal and text-messaging communications. Automated measures of team planning synchronization and quantity of goods delivered provided some evidence that the co-located groups were better at achieving the goal of maximizing the delivery of required supplies consistently across the four towns. A majority of participants (93%) indicated that the REPSS planning exercise could be useful in command group training.

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DEVELOPMENT OF THE REACTIVE PLANNING STRATEGIES SIMULATION (REPSS)

## EXECUTIVE SUMMARY


Research Requirement:

The U.S. Army's transformation to the Future Force will require the leveraging of digital communications capabilities to support distributed battle command. The goals for the present research were to develop a collaborative group planning simulation and supporting measures, and to conduct experiments investigating group planning performance. The report documents the development of the Reactive Planning Strategies Simulation (REPSS) collaborative planning simulation, and the results of initial experimentation comparing the performance of distributed and co-located groups. The research supports the Army Training Objective (ATO) titled Leader Adaptability initiated in 2006. The Leader Adaptability ATO seeks to provide prototype computer-based methods and tools to rapidly train and sustain fundamental leadership and battle command skills required to lead and perform adaptively as increasingly complex command and control technologies and networks become operational.

Procedure:

The development of the REPSS proceeded through three phases: a) design and develop a group collaborative planning exercise which presents an iterative series of plan - execute - and adjust decision making cycles, b) develop associated performance process and outcome measures, and c) conduct an experiment to test and refine the REPSS and performance measures. The REPSS was designed to incorporate group collaborative planning processes consistent with the U.S. Army's mission command method for the command and control of forces. Successful mission command rests on the commander's intent, subordinates' initiative, resource allocation, synchronization of plans, and the ability to effectively respond to unforeseen circumstances, opportunities, and threats. A simplified stability and reconstruction operation served as the basis for designing the exercise, with a commander and three two-person teams (seven members total) collaborating to allocate resources in support of a humanitarian support effort. A situational awareness manipulation was incorporated into the exercise requiring the group to gather information and share it in order to make the correct decisions in supplying a specific town.

Measures of individual skills, team skills, the collaborative planning process, and planning performance outcomes were developed to support research investigating the performance associated with collaborative planning success. A primary objective was to develop a single "goodness of performance" metric for planning solution success, which was achieved by consistently applying a dollar value to team assets involved in the planning task. An emphasis was placed on developing automated performance measures, which could also serve as automated feedback if REPSS is used in a training role. The prototype REPSS system was employed in an experiment comparing the performance of two co-located groups and two distributed groups consisting of officers and non-commissioned officers at Fort Knox.

Findings:

The REPSS was successful in stimulating collaborative group planning activities, and providing automated estimates of performance success. From observations and written responses to post-experiment surveys, the pilot test participants accepted the stability and reconstruction humanitarian relief scenario, and actively worked to achieve the best solution possible. The collaborative planning process measures developed for REPSS provided valuable estimates of group planning performance. Findings for the comparison of co-located and distributed group conditions clearly showed differences in verbal and text-messaging communications for the two conditions. One limitation with the process performance measures was that they require labor-intensive communications transcript coding. Automated collaborative planning outcome measures developed in the effort provided useful estimates of team planning synchronization, as well as the desired "goodness of performance" metric. Results from the co-located vs. distributed group comparison provide some evidence that the co-located groups were better at achieving the goal of maximizing the delivery of required humanitarian supply unit (HSU) consistently across all four towns. Most of the participants (93%) indicated that the REPSS planning exercise could be useful in command group training.

Utilization and Dissemination of Findings:

The experiment findings suggest that the REPSS is a viable research tool for exploring Army group collaborative planning. Changes were made to eliminate redundancy in the self-paced training materials, and to incorporate a training self-assessment feature. Three additional situational awareness manipulations were incorporated into the exercise in order to better assess each group's ability to respond to changes in the environment. The automated performance assessment features were enhanced to provide a consolidated report on percentage of required supplies provided, and planning synchronization that is available immediately after each weekly plan is submitted. The REPSS software was successfully hosted on laptop computers which allows the REPSS to be used as a mobile research tool. The rapid train-up, simple interface tools, and automated feedback features make REPSS a likely candidate to support collaborative group planning skills training.

DEVELOPMENT OF THE REACTIVE PLANNING STRATEGIES SIMULATION (REPSS)

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# DEVELOPMENT OF THE REACTIVE PLANNING STRATEGIES SIMULATION (REPSS)

## Introduction

### *Research Goals*

A defining feature of Army transformation will be the leveraging of digital communications to support command and control of forces. While a great deal of attention is typically devoted to providing the communications tools required to support command and control, there is an equally important requirement to investigate the human performance necessary to support successful collaborative planning in the mission command environment through controlled human performance research. The goals for the present research were to develop a collaborative group planning simulation and supporting measures, and to conduct experiments investigating group planning performance. The report documents the development of the Reactive Planning Strategies Simulation (REPSS) collaborative planning task environment, and the results of initial experimentation comparing the performance of distributed and co-located groups.

The present research effort supports the Army Training Objective (ATO) titled Leader Adaptability initiated in 2006 which seeks to "provide prototype computer-based methods and tools to rapidly train and sustain fundamental leadership skills (critical thinking, interpersonal skills, and self-awareness) and the battle command skills (visualize, describe, and direct) required to lead and perform adaptively as increasingly complex command and control technologies and networks become operational" (U.S. Army Research Institute for the Behavioral and Social Sciences [ARI], 2006). The Leader Adaptability ATO presents a number of training issues which can be addressed through experimentation using the REPSS collaborative planning task environment and it's supporting measurement tools.

### *Background*

*Mission command*. In conducting command and control research it is important to capture key collaborative planning processes, and to present these in a realistic and representative experimental exercise. Successful mission command as described in Field Manual (FM) 1, The Army (Department of the Army [DA], 2005) rests on the ability of commanders to convey the intent and concept of operations, provide resources adequate to accomplish the mission, and empower subordinates to make decisions while synchronizing their operations (DA, 2005, 3-33).

*Simulation features overview.* The Leader Adaptability ATO states that the high operational tempo, volatile mission demands, and serious resource constraints present challenges to leaders in the contemporary operational environment (COE), and the future network-enabled environments, which need to be integrated into the way we train our leaders. The REPSS exercise presents a multi-stage resource allocation task, requiring a commander and three functional teams to send weekly relief supply convoys to four separate towns for four weeks in a COE scenario. The REPSS incorporates a number of features which support the Leader Adaptability ATO research goals to include:

- High operational tempo: Planning groups have only 40 minutes to create and execute their plan for the week one, and 20 minutes to adjust and execute a plan for each of the three following weeks.

- Resource constraints: The planning groups are given inadequate funds to fully support the relief effort, so that the task is one of identifying an optimal set of tradeoffs between each of the teams to maximize the group result.

- Future networked environments: REPSS has been configured as both a traditional co-located command group planning environment and as a future network-enabled environment to investigate performance trends and training needs.

- Leader training: REPSS incorporates self-paced automated training embedded within the system to enhance consistency of training delivery, and reduce training overhead costs. An automated performance assessment capability has been designed into the REPSS which could support the use of REPSS in a training role, allowing for immediate feedback on performance early and throughout an exercise.

The REPSS was designed by the authors to stimulate collaborative planning within a group composed of a commander and three interdependent functional teams (supply, transportation, and security). A key design consideration is that command group planning skills involve more than a one-shot effort to develop a static plan. Instead, the command group planning process should foster a shared understanding of competing demands, and support the rapid and flexible adjustment of plans during mission execution in response to feedback gathered from the environment. The single REPSS exercise presents a simplified stability and reconstruction operation collaborative planning task which requires effective group communications, and the ability to adapt to change. With regard to performance outcomes, the REPSS exercise was designed to provide an overall estimate of the "goodness" of the group planning solution in terms of the quantity of humanitarian relief supplies delivered. Additional performance measures provide quantitative estimates of the groups' ability to synchronize the competing requirements of the supply, transportation, and security teams. The REPSS planning tasks were intentionally designed so that they do not require doctrinal knowledge, and can be accomplished using a few simple spread-sheet interface tools. Several experiments have been conducted with the REPSS. Following the first REPSS experiment (REPSS 1) a number of changes were made to the interface design, the planning task was expanded to include multiple routes to each town, and much of the participant training was changed to a self-paced automated format. The report presents the REPSS design and findings from the second experiment (REPSS 2), which are more representative of the ongoing REPSS research than the design and results from the REPSS 1 experiment. For the convenience of the reader, a list of all acronyms is provided as Appendix A.

*Co-located and distributed command groups*. A key issue facing the Future Force is that Army command groups must be capable of transitioning from the traditional face-to-face (co-located group) tactical operations center environment to Future Force collaborative planning across networked communication systems (distributed group). For the present research

"distributed groups" will be defined as groups whose members work as interdependent teams, separated by some degree of physical space, whose interactions are mediated through electronic communications technology. Previous research efforts conducted by the ARI have suggested that significant differences may exist in the pattern of collaborative planning for command group members based on whether they are operating as a co-located group, or as a distributed group. Results from a series of four Future Combat System – Command and Control (FCS C2) experiments conducted by the Defense Advanced Research Projects Agency (DARPA) revealed that the co-located command group engaged in a fast-paced and flexible verbal exchange almost 90% of the time during simulated engagements (Lickteig, Sanders, Durlach, Lussier, & Carnahan, 2003). In sharp contrast, during experimentation with distributed command group members it was noted that communication was less frequent, and took the form of more traditional sequential staff briefings (Holden, Smith, Conzelman, Smith, Lickteig, & Sanders, 2005).

*Considerations Guiding the REPSS Design*

*Conceptual framework.* Research addressing command group wargaming skill requirements has provided a useful conceptual framework for the development of the command group exercise tasks and performance measures based on a detailed task analysis of U.S. Army institutional wargaming (Cianciolo & Sanders, 2006). The work points out the need to consider the contribution of individual knowledge and skills Soldiers bring to the task situation, and the need to identify how well the members of a collaborating group know each other's roles. The assessment of group planning outcomes should include quantitative estimates of the "goodness" of the group solution, and also indicators of group planning synchronization. Another factor to consider in estimating group planning outcome success should be the group's shared visualization of the problem space, or shared situational awareness, which is thought to underlie successful group problem solving (Endsley, Holder, Leibrecht, Garland, Wampler, & Matthews, 2000).

*Doctrinal framework.* Army doctrine prescribes the use of Mission, Enemy, Terrain, Troops, Time, Civilians (METT-TC) Factors in delineating the information essential to command and control, for commanders at all levels. Doctrine states that "All planning, whether it be deliberate, crisis, or campaign, must consider the mission, the enemy, the terrain and weather, the troops and support available, the time available and the civil considerations when planning for an operation." (Field Manual 3.0, Operations, 2002). The METT-TC factors served as a doctrinal framework for creating the REPSS exercise task environment. Specific tasks and functional relationships were incorporated into the REPSS system to exercise the METT-TC factors, making the REPSS exercise applicable across a broad range of current and future command and control (C2) support systems. A summary of how METT-TC factors outlined in FM 3-0 were incorporated into the REPSS design is provided below:

Mission – Commanders determine the mission through analysis of the tasks to be accomplished; who is to do them; and when, where, and why the tasks are to be done. The REPSS design features include:

- Higher commander's guidance to maximize food delivery across towns and weeks. The success of the group's planning effort is assessed against this criteria.

- Reciprocally interdependent tasks for supply, transportation, and security teams which compete for limited funds.

- Requirement for the group to plan, execute, and adjust their plans in response to changing conditions, and available assets.

Enemy – Includes current information about strength, location, activity, and capabilities. In stability operations and support operations, this includes adversaries, potentially hostile parties, and other threats to success. Threats may include regional instabilities, and misinformation. The REPSS design features include:

- A dynamic asymmetric threat to convoy and town operations which decreases in response to successful food deliveries, and increases when shortages occur.

- A requirement for group members to actively "reach out" to access available information sources, to piece together and synthesize information on enemy activities.

Terrain – Terrain considerations include key terrain, obstacles to movement, weather, and manmade features. Planners need to consider the effects of terrain on ground maneuver, and Combat Service Support operations. The REPSS design features that address the METT-TC Terrain factor include:

- A broad range of convoy route terrain conditions, from hills to valleys, with different road trafficability conditions, and potential obstacles (bridges).

- Changing weather conditions which require planners to match convoy equipment decisions to weather-induced road conditions.

Troops and support available – Assess the quantity, training level, and psychological state of friendly forces, which can include contractors. The REPSS design features include:

- Incorporation of both professional and less experienced civilian security guards, so planners must consider both quantity and training level when hiring guards.

- Incorporation of up-armored and regular trucks, and both hardened and regular distribution centers, so that planners must consider both quantity and security level when renting trucks and distribution centers.

Time available – Assess the time available for planning, preparing, and executing the mission. The REPSS design features include:

- Very limited time for group members to share information, synchronize plans, execute, assess results, and adjust plans in a fast paced environment.

Civil considerations – relate to civilian populations, culture, organizations, and leaders within the area of operations. Commanders must factor public opinion into their vision of the battlespace. The choice of a course of action and the allocation of resources impacts the protection and welfare of the local population, and public opinion. In stability operations and support operations, these people are a central feature of the area of operations. The REPSS design features include:

- A requirement to factor public opinion for each town into decisions each week about the amount of food supplied, security of warehouses and transportation provided, as well as the number and experience level of contract security guards required.

*Exercise design features.* The REPSS research environment was developed to provide a collaborative planning task environment in which groups must iteratively develop, execute, and refine their plans over time in response to a dynamic environment. A summary of how the REPSS exercise incorporates a number of design features necessary for the examination of collaborative planning is provided below:

- Employ a non-doctrinal collaborative planning task, and user-friendly interface tools, to reduce the impact of individual skill differences, and minimize the train-up requirement.

- Require participants to frame the problem space as part of their task. Provide a task with high face validity and immediate performance feedback that instills achievement motivation.

- Employ interdependent task roles requiring shared understanding for success.

- Design the exercise to present unforeseen circumstances, opportunities, and threats.

- Employ a single "goodness of planning solution" quantitative metric, and assess adherence to higher commander's guidance.

- Employ measures of staff planning solution synchronization.

- Employ quantitative estimates of group's ability to share information and adapt plans in anticipation of future events.

*Report Organization*

The goals for the present research were to develop a collaborative group planning simulation and supporting measures, and to conduct experiments investigating group planning performance. The report is organized to address these goals as follows:

- The Method section describes the development of the collaborative planning task, the development of measures, and the conduct of an experiment using REPSS.

- The Results section describes the experiment results, with a focus on the comparison of co-located and distributed group collaborative planning performance.

- The Discussion section describes the refinement of the REPSS simulation and supporting measures based on experiment results.

## Method

### *Exercise Overview*

The REPSS exercise was designed to provide a simplified resource allocation task that presents a collaborative planning situation that has face validity for Soldiers. An exercise was developed depicting a hypothetical stability and reconstruction operation being conducted in Azerbaijan, consistent with recently developed FM 1 (The Army) guidelines (DA, 2005, 3-29). The simplified task does not require doctrinal knowledge. The train-up and conduct of the exercise requires approximately three hours to complete. Training includes an introductory briefing, followed by self-paced computer-delivered instruction.

Previous ARI research with a group resource allocation task (Lussier, 1990, 1992) provided very useful guidance in developing an exercise for the REPSS that requires separate teams competing for resources to collaborate effectively in order to maximize the group-level payoff on a task. The REPSS exercise requires command group members to collaborate in optimizing the allocation of limited resources to acquire food, transportation, and security necessary to provide weekly food shipments to four towns, over a period of four weeks. The seven-member command group is configured as a commander and three two-person supply, transportation, and security teams. Funds for purchasing resources are extremely limited, requiring that the commander and teams synchronize their efforts through iterative collaborative planning to provide the most support possible with available funds. The population size and threat conditions differ for each town. Also, the threat conditions for each town are recalculated each week based on the proportion of required humanitarian relief supplies that were successfully delivered to each town. Estimated costs for food and medical supplies, transportation, and security personnel were derived from consulting Internet supplier sites, and sites providing information regarding the economy of Azerbaijan. It should be noted that food and medical supplies are shipped as a bulk package Humanitarian Supply Unit (HSU) that can meet the needs of one hundred people for one week. An automated performance assessment capability provides the total quantity of HSU delivered by each group, and estimates of plan synchronization. A summary of group member responsibilities is provided below:

Commander

- Identify a strategy for providing supplies to towns across weeks.
- Enforce time management.
- Provide guidance and approve team spending plans.

Supply Team

- Calculate the requirement, and purchase food and medical supplies.
- Calculate the requirement, and rent distribution centers.
- Decide on the type of distribution centers to rent (normal or reinforced).

Transportation Team

- Calculate the requirement, and rent trucks to carry food.
- Calculate the requirement, and rent trucks to carry security guards.
- Decide on the type of trucks to rent (normal or up-armored).

Security Team

- Calculate the requirement, and hire convoy security guards.
- Calculate the requirement, and hire town security guards.
- Decide on the type of guards to hire (civilian or professional).

*Participants*

Four groups of U.S. Army officers and non-commissioned officers (NCOs) served as the seven-member command groups. Participants consisted of 28 U.S. Army officers and NCOs (4 Captains, 3 Lieutenants, and 21 NCOs). All but one of the participants were male. Participants were assigned to their seven-person groups by the Fort Knox troop support office so that members of the same brigade or squadron would be in the same group.

*Apparatus*

*Overview.* The commander and each two-person team have a dual-display networked computer and hand-held voice radio with which to conduct their collaborative planning. The networked computers provide the capability to send and receive text messages, and provide two shared data matrices where the commander and teams can develop a weekly spending plan to support four separate towns across four weeks. The plan is entered via on-screen resource request forms. The reaction of the environment to the allocation of supplies each week comes to the command group members in the form of pre-written text messages indicating losses and damage proportional to the shortfall in supplies delivered.

*Co-located and distributed planning conditions.* A central issue for the present research is the Army's transition from the traditional face-to-face (co-located groups) tactical operations center environment to Future Force collaborative planning across networked communication systems (distributed groups). A "co-located group" condition was created by having all seven members perform their planning tasks within a common room. A "distributed planning group" condition was created by placing the commander, and each of the three two-man teams in separate rooms (four rooms total) which prevents any direct visual or verbal contact between the commander and teams. Figure 1 shows the REPSS command group configured as a co-located group (left) and a single team participating as part of a distributed command group (right).

Figure 1. Participants working in the co-located group condition (left photo), and in the distributed group condition (right photo).

The ease of communication differs for the co-located and distributed groups in several respects. The co-located group can engage in direct verbal communication, and can move about the room to view information and planning decisions presented on each teams' computer monitors. There are also a number of visual cues available to co-located groups that enhance communication, such as facial expressions, and body language, which could convey information about agreement within the group, and workload levels. Also, the co-located group can engage in parallel "sidebar" conversations – while the distributed group must speak one at a time on a single channel radio net which all group members monitor. In contrast to the co-located group, the distributed group has only the radio, text-messaging, and the shared information matrices available to exchange information.

*Interface design.* The REPSS computer interface allows the planning group to gather and share information, create a purchase request, and submit the request to send simulated convoys to four towns. The planning group gathers information by reading text messages and electronic town newspapers, and by clicking on digital map features to bring up information windows. Group members share information by face-to-face verbal communications, hand-held radio communications, text-messaging, and by entering their planning data into a shared collaboration matrix viewable by all members of the group. Each of the three teams create a purchase request using a pre-formatted spread sheet, and submit their request to send out the four convoys each week. The commander supervises the work of the three teams, and does not create a purchase request. The REPSS research environment is based on a software program developed in-house by ARI. The ARI Armored Forces Research Unit (AFRU) mini-lab provided the basic room configuration and hardware setup necessary to conduct both co-located and distributed group planning exercises (see Appendix B).

*Map window.* A dual monitor computer is provided for the commander, and for each of the three teams. The left display provides a map of the exercise area which can be accessed by selecting the "Map" tab on the menu tool bar (see Figure 2). The map depicts a fictional area constructed to provide a variety of terrain, road structures, and weather-related characteristics necessary to support the REPSS exercise goals. The map shows the point of departure for all convoys (Camp Puller), each of the four towns (Alpha, Echo, India, and Oscar) and the two routes for delivery of supplies to each town. The routes differ so that at points in the exercise one route is a better choice than another based on weather, terrain, and threat condition (THREATCON). Bridge icons have been placed on one route for each town to present decision making requirements for the exercise. The map does not include magnification or scrolling features which are not necessary for the REPSS exercise. By mouse clicking on a town, or a route, participants can bring up information windows. In Figure 2 a mouse click on the label "Town India" has pulled up the window displaying "Conditions" information regarding the town and current threat condition. The "Resources" tab on the town information window brings up information describing the food, security, and transportation resources delivered to the town the previous week. The map tool requires participants to "reach out" and pull up information to ascertain the success of each convoy, and the changing conditions in the environment.

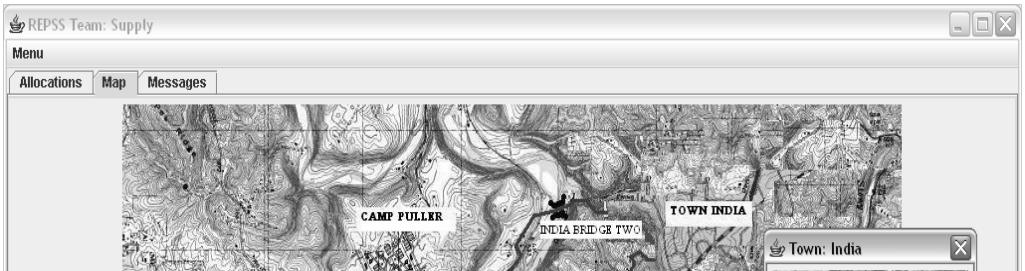

Figure 2. The REPSS map showing a pop-up information window for Town India describing the current threat, population size, weather, and citizen morale level.

*Messages window*. The "Messages" tab on the left display brings up the Messages Window for sending and receiving text messages (see Figure 3). The "Send" field allows the commander and each team to compose and send a message to the commander, a specific team, or to the commander and all teams. The "Receive" field provides a list of all messages received, the time, and the sender. Separate messages are sent automatically to each team that provide information about changing conditions such as threat activities, weather, and important civilian events such as an election in one town. Teams see the threat reaction to each weekly convoy in the form of text messages describing damages incurred in transporting food to each town.

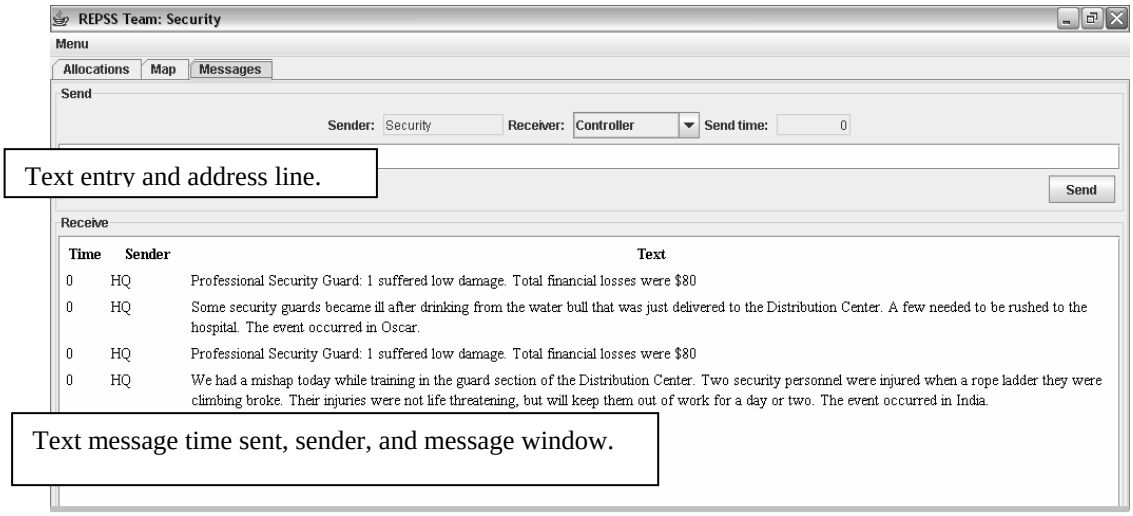


Figure 3. Messages window showing time message sent, sender, and text of message.

*Allocations window.* The "Allocations" tab on the left display brings up a resource request window. The spreadsheet design minimizes calculation requirements by allowing participants to simply type in the quantity of assets they need (either "armored five-ton" trucks, or unarmored "five-ton" trucks) (see Figure 4). The spreadsheet automatically calculates the costs of the assets for each town route and displays them in the "Total" column when the participant presses the "Calculate" button. This feature facilitates the iterative adjustment of plans, and fine tuning, based on group decisions. When a team has finished refining their plan for the week, they select the "Submit" button to enter their plan and start the REPSS reaction process. Resource request spreadsheet screens for all three teams are provided as Appendix C.

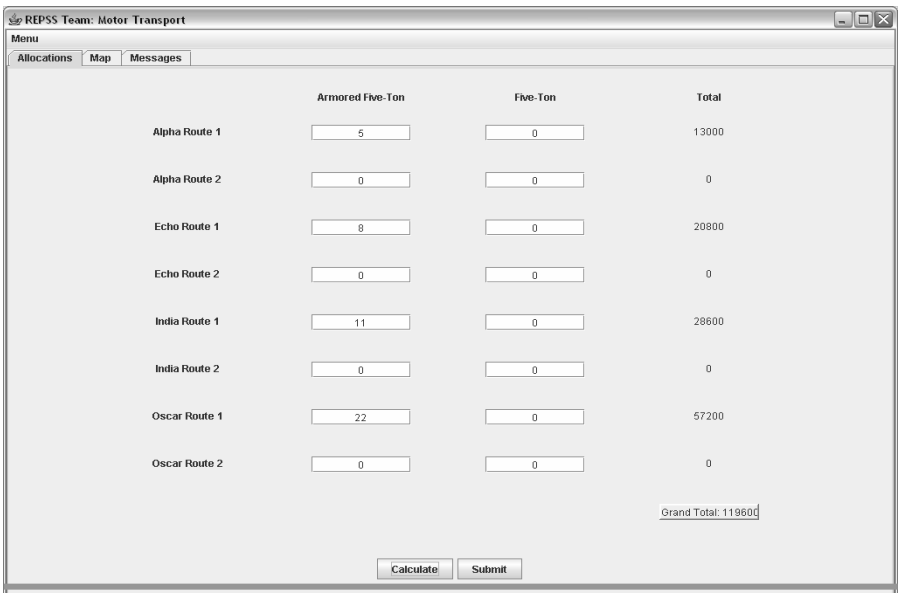


Figure 4. Transportation team resource request tool showing two routes to each town, order blocks for armored and regular five-ton trucks, cost of vehicles for each route, and total cost.

*Collaboration matrices*. The right display provides two blank 14 rows by 11 columns matrices which are accessed by selecting a tab on the screen tool bar. The shared matrices allow the group to create a structured display of information necessary for planning purposes, which can be modified or updated by any member of the group as the plan evolves. In practice the matrices were used to display and organize information entered by the commander and each team to help define the planning problem, share data and team estimates, and document the weekly planning solutions. It should be noted that the REPSS exercise directions to participants specifically stated that they were not required to use the matrices, and that their performance would not be evaluated in terms of their use of the matrices.

*Weekly town newspapers*. The right side display screen also provides important information to participants in the form of a separate electronic weekly newspaper for each of the four towns. An example of the weekly newspaper is provided as Appendix D. The newspapers introduce an important functional requirement into the REPSS system, as participants must actively reach out to access the newspaper information, rather than passively wait for the information to be sent to them. The newspapers are accessed by a tab on the right screen. Newspaper content consists of the name of the town, the week of publication, a weather report, and descriptive accounts indicating citizen morale level. The newspaper information can be combined with text messages sent to the individual teams to create an understanding, or shared situational awareness, within the group that supports specific decisions that must be made. The weekly newspaper was designed as a dynamic document that is created "on-the-fly" to reflect changes in the citizen morale (CITMOR) for each town. Messages are automatically inserted into the newspaper from a data file of messages created to represent nine levels of CITMOR.

*The REPSS reactive plan response*. The "Reactive" feature of the REPSS simulation assesses the adequacy of the food, transportation, and security assets in each weekly convoy to each town, and provides a reaction. Team purchase requests are automatically compared to a best-case solution where 100% of the recommended levels of food supplies, permanent distribution centers, armored trucks, and professional security guards would be provided. Where a team request falls short of the 100% solution, a deficiency score is calculated. The deficiency score is used to adjust CITMOR levels, and THREATCON levels (the likelihood of being attacked) for affected towns. Based on the deficiency score, the REPSS system generates message traffic tailored to each team describing citizen reactions, and humanitarian supply asset losses (HSU, transportation, security personnel). The cost of the asset losses is automatically deducted from the total funds that the group has available. Each message is composed of three elements, an event description, asset damage description, and the total dollar value of the damage. Examples of message traffic are as follows:

- To security team: "Professional security guard: 1 suffered low damage. Total financial losses were $80."

- To transportation team: "Armored 5-ton truck. 1 suffered high damage, 1 suffered medium damage. Total financial losses were $3,062."

*Measures Development*

*Overview.* A variety of measures were developed to support the REPSS research. Estimates of individual characteristics, and knowledge of group roles were gathered through subjective self-report surveys. Planning process measures included the limited transcription of verbal, and text-messaging communications. The REPSS automatically created a record of each group's weekly planning solution, identifying the total amount of HSU provided to the towns, and estimates of the groups ability to synchronize their purchases plans. The measures developed for REPSS, and the order in which they are presented in the report are as follows:

Individual Characteristics

- Demographic Survey.

Group Roles Knowledge

- Group Roles Knowledge Survey.

Planning Processes

- Verbal communications frequency.
- Text-messaging frequency.
- Workload Survey.

Planning Outcomes

- Shared Situational Awareness.
- Quantity of HSU Delivered.
- Plan Synchronization.
- Performance Success (from Workload Survey).
- Formative Evaluation Survey.

*Individual characteristics.* All Soldiers completed a Demographic Survey which addressed: current duty assignment, level of military education, command and staff experience, experience with commercial computer applications, time since last wargaming a course of action (COA) in a command group, and experience in performing planning with the other members of the experimental group. The Demographics Survey is presented in Appendix E.

*Group roles knowledge.* A Group Roles Knowledge Survey was developed to estimate each participant's knowledge of the information requirements of the commander and three

teams, which would support the efficient targeting of information to selected recipients. The survey requires that participants match information statements to the commander or team that would need this information the most (commander, supply, transportation, security). Correct responses were summed and a percentage correct score was recorded. The Group Roles Knowledge Survey is presented in Appendix F.

*Planning processes.* Collaborative planning requires that the separate teams generate estimates of their team requirements, and that the group as a whole generate and iteratively refine a combined group solution. As noted previously, the process of collaborative planning will likely differ across groups in terms of the frequency of their verbal and text communications. It is also likely that the workload associated with collaborative planning will also differ across the commander and teams, and across planning environments.

A transcript of commander and team radio and face-to-face verbal communications was prepared for one distributed and one co-located group exercise from the REPSS 1 experiment. Given labor-intensive nature of verbal recordings transcription the data reduction process was not performed for the REPSS 2 experiment. Each group exercise was approximately 140 minutes in duration. From the transcripts the frequency of individual statements by group members was estimated. For the present research, the frequency of verbal communications was operationalized as the number of statements made by the members of the group, whether over the radio or in a face-to-face exchange.

Text messages can potentially provide a viable alternative to voice channel communications. With REPSS, all text exchanges created in the Messages Screen are captured automatically in a data file which identifies both the sender and recipient of the communication. Transcripts of text message communications were prepared for one distributed and one co-located group exercise from the REPSS 2 experiment. The frequency of text message communications was operationalized as the number of text messages created by the members of the group.

The examination of the collaborative planning process needs to consider the workload placed on the commander and each team, and on the group as a whole. Participants completed a brief survey addressing workload adapted from the Task Load Index (TLX) developed by the National Aeronautics and Space Administration (NASA-Ames Research Center, 1986). An estimate of participant workload was derived from the average of their ratings on five subscales representing workload dimensions: Mental, Physical, Temporal, Effort, and Frustration (1 = Low to 100 = High). The Workload Survey is presented in Appendix G.

*Planning outcomes.* In the REPSS exercise the higher commander's guidance specifically calls for the delivery of as much HSU as possible, delivered consistently across towns and weeks. Given this quantitative guidance, the total quantity of HSU delivered across all four weeks provides a single metric for estimating the "goodness" of each REPSS group's planning. Additional assessments of the consistency of HSU delivery across weeks, and across towns, provide additional quantitative estimates of successful task performance. The REPSS program automatically calculates the amount of HSU delivered to each town each week, and also

provides a total HSU delivered score. The information is available to the experimenter, and can be provided to participants immediately after the experiment as feedback.

The REPSS weekly spending data provide estimates of how well the three teams were able to synchronize their individual plans in terms of purchasing only the assets necessary to transport the HSU purchased and security guards hired. The group's plan is not synchronized when HSU or security guards cannot be transported due to lack of vehicles, or where transportation was rented in excess of that needed. Using data from the weekly request spreadsheet, the number of trucks required to transport HSU, and security guards, can be calculated, and compared to the number of trucks actually rented. A perfect match would yield a score of 100%, while any percentage of trucks under or over the required number represents a waste of assets, and a failure of the teams to synchronize their plans (10% too few, and 10% too many would both yield a synchronization score of 90%). One advantage of the synchronization estimate is that it reflects the ability of the group to coordinate each weekly plan, for each of the four towns, no matter how few resources might remain in the budget. As with the HSU delivery estimates, the synchronization estimate is automatically calculated by the REPSS and can be provided to participants as feedback immediately after each experiment.

Another factor to consider in estimating group planning outcome success should be an assessment of the group's shared visualization of the problem space, or shared situational awareness (SSA), which is thought to underlie successful group problem solving (Endsley et al., 2000). The REPSS exercise incorporated an embedded problem which required the group to share information, and implement measures to adapt their planning to meet changing situation requirements. The embedded problem involved changing the situation for Town Oscar in Week 2 to icy road conditions and a high threat environment. Under the icy road conditions the less expensive unarmored trucks are more effective than the more expensive armored trucks in delivering food and security personnel to the town. Successful planning was estimated as the percentage of unarmored trucks assigned to the Town Oscar in Week 2.

The Workload Survey contains a subscale for perceived Performance Success which asks each participant to rate "How successful were you in accomplishing what you were asked to do? (1 = Failure to 100 = Perfect). The Performance Success sub-scale ratings were used to investigate how accurately participants could assess the success of their planning efforts in terms of delivering HSU to the towns.

A nine-item *formative evaluation* survey was developed to gather Soldier feedback on the adequacy of the REPSS exercise procedures, and to gather suggestions for improvements. Survey topics addressed the pace of the planning exercise, the adequacy of the researcher's briefings and simulation train-up, and ease of using the interface. The Formative Evaluation Survey is presented in Appendix H.

*Procedure*

*Schedule of experiment events.* All Soldiers participated in a single three and one-half hour REPSS exercise. The researchers first provided each participant with a three-ring binder containing an informed consent form, exercise overview briefing, REPSS collaboration tool orientation training materials, general instructions, commander and team instructions, and survey instruments. The researchers presented a short exercise overview briefing, and then had participants work through self-paced training with the REPSS team tasks and collaboration tools. Participants were given 40 minutes to perform the planning for Week 1, and 20 minutes to perform planning for each of the three subsequent weeks. At the conclusion of the REPSS exercise the participants completed the Demographic, Formative Evaluation, Workload, and Group Roles Knowledge Surveys.

*Training for participants.* Training for participants consisted of a 10-minute overview briefing, followed by self-paced training at the commander and team workstations. The self-paced training consisted of Power Point slides which presented general instructions common to all participants for the exercise, and also commander or team-specific instructions. The participant general instructions slides are provided as Appendix I. The commander and team-specific instruction slides included a step-by-step orientation to REPSS interface actions, and an example of a data entry task. For purposes of illustration, the team-specific instruction slides for the supply team are provided as Appendix J. A researcher observed the participant training and provided assistance as needed. Total time required for the overview briefing and self-paced training was approximately one hour. After the train-up the group began the REPSS exercise.

*A typical exercise.* A typical exercise would begin with the commander directing the teams to generate a plan for the Week 1 supply convoy. One way of developing an initial plan is to have the teams develop the 100% solution. The 100% solution is the most expensive option, where 100% of the recommended HSU is transported to each town, fortified distribution sites are rented for the HSU town storage, armored trucks are rented for HSU and security guards, and professional security guards are hired for both convoy security, and town security. The 100% solution is too expensive to sustain over four weeks, but this solution provides the group with an indication of how much they will have to cut back on spending.

Some planning activities need to progress in a sequential fashion. The supply team should first estimate the amount of HSU to transport to each town, and the number of distribution sites that need to be rented. The transportation team takes this information and determine how many trucks are needed for the HSU. The security team would then determine how many guards must be hired for the supply convoy and for town security, and provide this information to the transportation team so that they can determine the number of trucks needed to transport the supply guards and town guards. Each team would calculate the total cost for their contribution and provide this to the commander. The commander would then calculate the total cost of the Week 1 relief effort, and compare this cost to the total funds available for the four-week effort. Where the planned spending level falls above or below the level of funds the commander wishes to expend, the teams will be asked to adjust their spending. A great deal of the collaborative planning process involves having the commander and the three teams develop a solution that matches expensive well-protected convoys to dangerous areas, and less expensive lightly protected convoys to safer areas.

## Results

### *Individual Characteristics*

*Demographic Survey*. All participants completed a six-item Demographic Survey. The survey addressed experience with commercial computer applications, time since last wargaming a COA in a command group, and experience in performing planning with the other members of the experimental group. Table 1 provides selected results from the Demographic Survey which illustrate the types of comparisons that can be made with the measures from the REPSS experiment. The experiment was conducted with mixed groups composed of an officer serving as commander, and teams that could be composed of both officers and NCOs. Soldier responses indicated that on average they had between one to three years of experience with commercial computer applications. Participants in Group1 had the most experience in group planning, with 57% having engaged in group planning in the last year, while Group 4 participants were the least experienced, with only 14% having recent group planning experience. Group 2 had the largest number of members who had experience planning together prior to the experiment, while Group 4 members had the fewest with shared planning experience. The survey data reveal that Group 1 differs from the other three in that the group could assign an officer to lead each team, while the other three groups could not. The analysis and results are limited to descriptive statistics. Inferential statistics were considered inappropriate due to the small (n = 4) sample of groups.

Table 1

Selected Demographic Survey Results

| Experiment Group | Environment Condition | Ranks | Did Group Planning in Last Year | Group Members Planned With Before | Years of Computer Experience |
|---|---|---|---|---|---|
| Group 1 | Distributed | 1 CPT<br>3 2LT<br>3 SSG | 57.14% | 2.1 | 2.93 |
| Group 2 | Distributed | 1 CPT<br>1 MSG<br>5 SSG | 28.57% | 4.0 | 3.29 |
| Group 3 | Co-located | 1 CPT<br>1 SFC<br>5 SSG | 42.86% | 1.8 | 1.43 |
| Group 4 | Co-located | 1 CPT<br>6 SSG | 14.29% | 1.4 | 2.00 |

### *Group Roles Knowledge*

*Group Roles Knowledge Survey.* Participants were asked to indicate who should be the primary, and secondary recipient of each of the eleven messages presented on the Staff Roles Knowledge Survey. After a review of the results three of the eleven items were dropped after it was determined that the messages were relevant for the commander and all teams. The resulting assessment of eight survey items averaged across all members of the group yielded the following group scores: Group 1 = 7.67, Group 2 = 7.20, Group 3 = 7.17, and Group 4 = 7.14. The scores suggest that the members of each of the groups possessed a basic understanding of the roles and information requirements of the commander, and each of the teams. The assessment of each group's knowledge of required commander and team roles is valuable, as it provides an estimate of whether group members possess the knowledge necessary to selectively provide information to the specific teams that needed it, and to request information from teams that have it.

*Planning Processes*

*Frequency of verbal interactions.* A transcript of verbal communications was created for two groups who participated in the REPSS 1 experiment. Figure 5 shows the comparison of commander and team (TM) verbal statements for one distributed group and one co-located group from the REPSS 1 experiment. The distributed group exchanged a total of 262 verbal statements compared to 455 (42% more verbalizations) for the co-located group. The trend for more frequent verbal interactions in the co-located group was consistent across the commander and three teams.

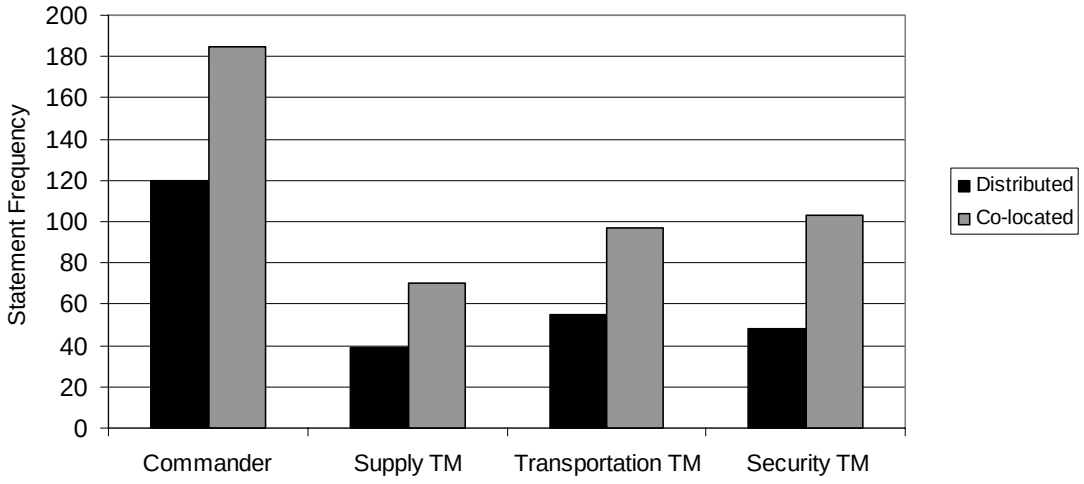


Figure 5. Bar chart comparison of the frequency of verbal statements made by the commander and each of the three teams during planning for distributed and co-located groups.

*Frequency of text communications.* A transcript of text messages was automatically recorded in the REPSS 2 experiment. The average frequency of text messages for the two co-located and two distributed groups are presented here (see Figure 6). Text messaging was not used frequently by either co-located or distributed groups. As might be expected, the co-located groups made almost no use of text messaging, a trend that appears consistent across the commander and team positions.

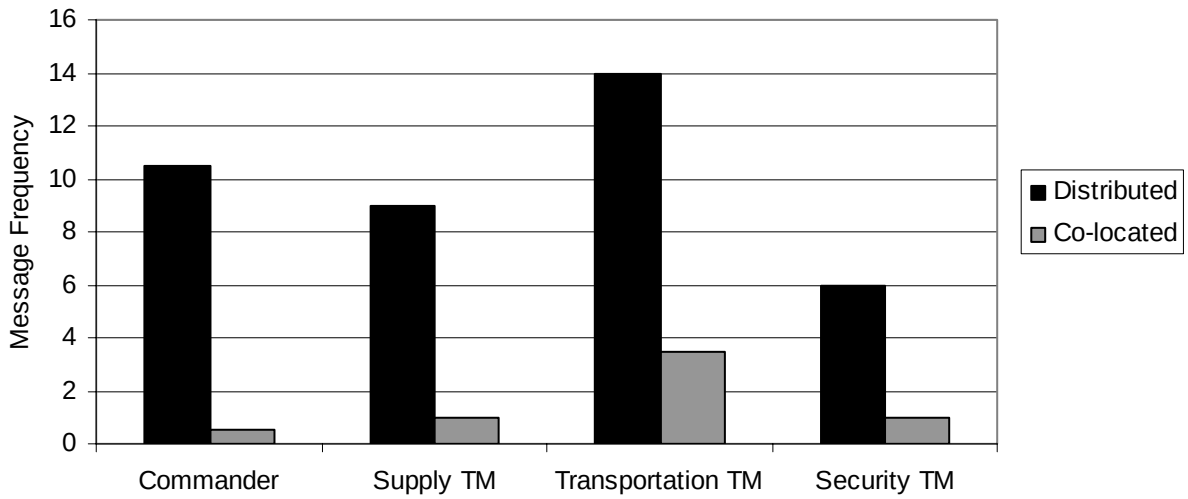


Figure 6. Bar chart comparison of the frequency of text messages sent by the commander and each of the three teams during planning for distributed and co-located groups.

*Collaboration matrix communications.* A screen capture was made to document the collaboration matrix entries when each weekly spending plan was submitted. For purposes of illustration, Table 2 presents the collaboration matrix developed by one co-located group. In future analyses the collaboration matrix data might provide estimates of the accuracy and timeliness of information exchanged within a group, and their ability to accurately form the problem space, laying out the critical relationships between the many variables. For the present research no assessment was conducted for the matrix data.

Table 2

Shared Collaboration Matrix for Display of Current Situation Information and Team Plans

| | A | B | C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Town | Popula-tion | Threat Level | CITMOR | HSU | HSU Trucks | Guard Trucks | Cost HSU | Ware hous e (min) | Cost Ware hous e min | Cost Ware house max |
| 2 | ALPH A | 1600 | Elevated | Low | 16 | 8 | 16 | 192k | 1 | 55k | 130k |
| 3 | ECHO | 2400 | Guarded | Neutral | 24 | 12 | 12 | 288k | 2 | 110k | 260k |
| 4 | INDIA | 4000 | Severe | Very Low | 40 | 20 | 80 | 480k | 2 | 110k | 260k |
| 5 | OSCA R | 6800 | Elevated | Low | 68 | 34 | 68 | 816k | 4 | 220k | 520k |

*Subjective estimates of workload.* Figure 7 presents a comparison of perceived workload levels reported by the commander and teams for two distributed and two co-located groups at the conclusion of each exercise. It was thought that distributed groups might find it harder to

accomplish collaborative planning tasks through computer-mediated communications, compared to the face-to-face collaboration of co-located groups performing the same REPSS exercise. However, this preliminary look at workload does not reveal consistent differences between the distributed and co-located groups. On average, the commander and teams report experiencing workload at or below the mid-level range, suggesting low to moderate levels of workload.

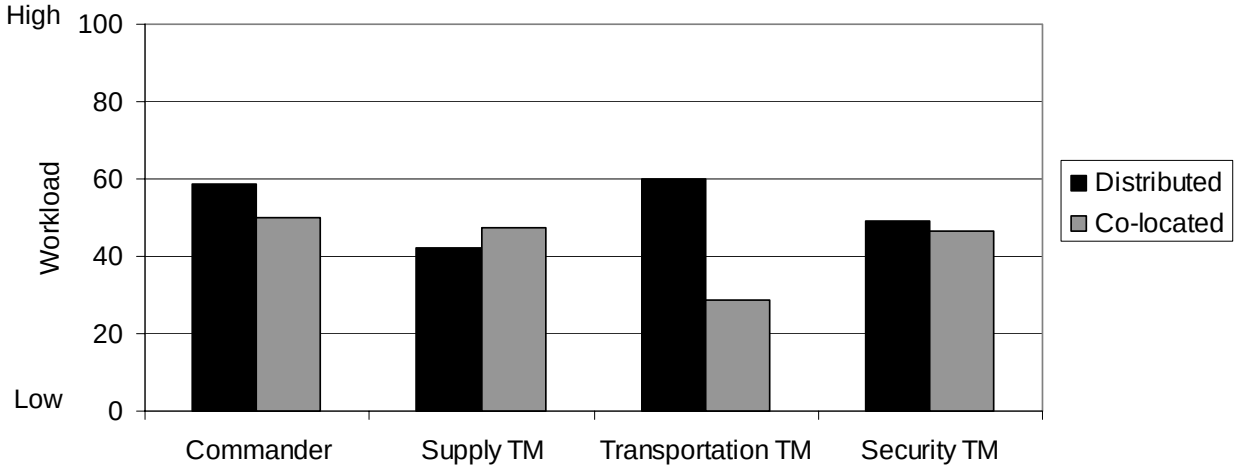


Figure 7. Bar chart comparison of the planning workload levels reported by the commander and each of the three teams for distributed and co-located groups.

*Planning Outcomes*

*Percentage of HSU delivered.* The percentage of each town's HSU requirement that was actually delivered by each group provides a single estimate of the "goodness" of the group's planning solutions. Results from the present experiment do not provide evidence that any one of the four groups was more successful than another in delivering HSU to the towns (see Figure 8). Group 3 provided the most HSU (55.43%), while Group 2 provided a nearly identical quantity (54.98%). The results do not provide evidence of a difference in performance when comparing the performance of distributed and co-located groups.

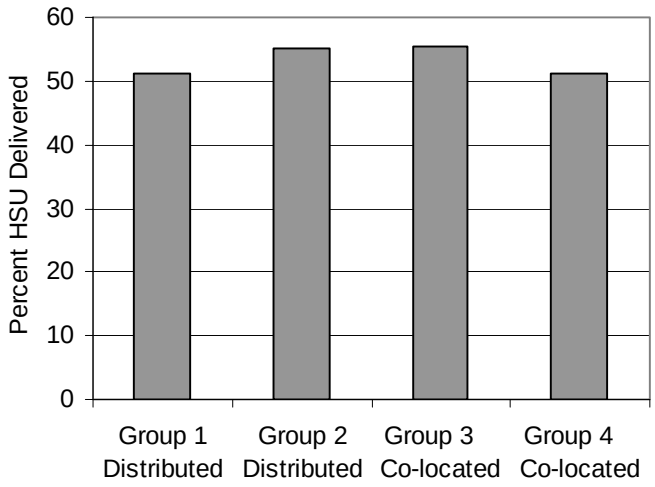


Figure 8. Percent of total required HSU delivered by each group.

*Consistency of HSU delivery across weeks*. Participants were instructed to try to achieve a balanced distribution of food across the four towns, and the four weeks. The percentage of required HSU delivered to each town across the four weeks provides an additional estimate of how well each group was able to achieve the goal of balanced distribution of food. Figure 9 shows the percentage of required HSU supplied each week by the groups. In general, it can be seen that the groups had difficulty providing a consistent rate of food distribution across weeks. None of the four groups were able to provide any HSU to the four towns by Week 4. Group 1 was able to provide nearly 100% of the required HSU for the first week, failed to send any HSU to the towns in the second week, and provided more than enough HSU to the towns in Week 3, and failed to provide any support to the towns in Week 4. Group 2 provided HSU above the recommended levels in Week 1, succeeded in providing about half the required amount for Weeks 2 and 3, and was unable to deliver any HSU to the towns in Week 4.

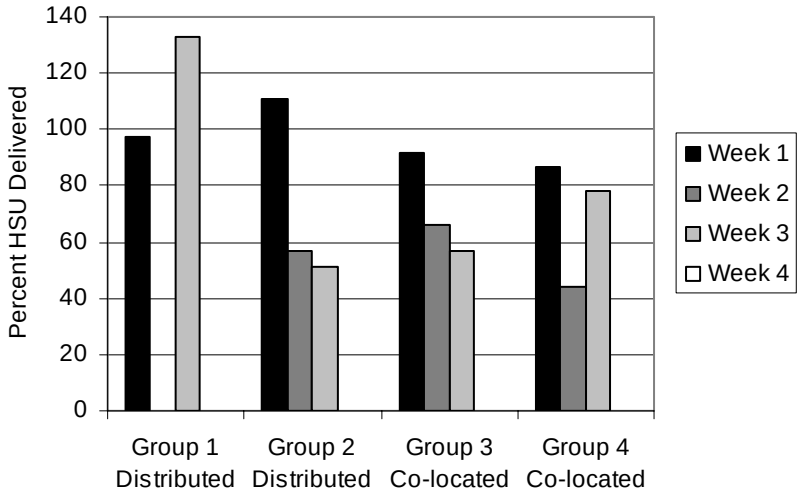


Figure 9. Percentage of required HSU delivered each week, for each group.

*Consistency of HSU delivery across towns.* The delivery of HSU should also be examined for consistency across each town. Figure 10 presents the percentage of recommended HSU actually delivered (undamaged) to each town across all four weeks. These results suggest how well the group was able to achieve the commander's goal of providing supplies consistently across towns. The data suggest that Group 1 showed a great deal of inconsistency in allocating HSU to towns, providing a much greater percentage of HSU to Town Oscar, the largest town, compared to the other three towns. Group 2 was fairly consistent in the percentage of required HSU it was able to deliver to the four towns. Group 3 was able to deliver a high percentage of required HSU to three out of four towns, providing proportionally less HSU to the largest town, Oscar. Group 4 was also fairly consistent in its delivery of required HSU across the four towns. These results provide evidence that co-located groups were better at achieving the goal of maximizing the delivery of required HSU consistently across all four towns.

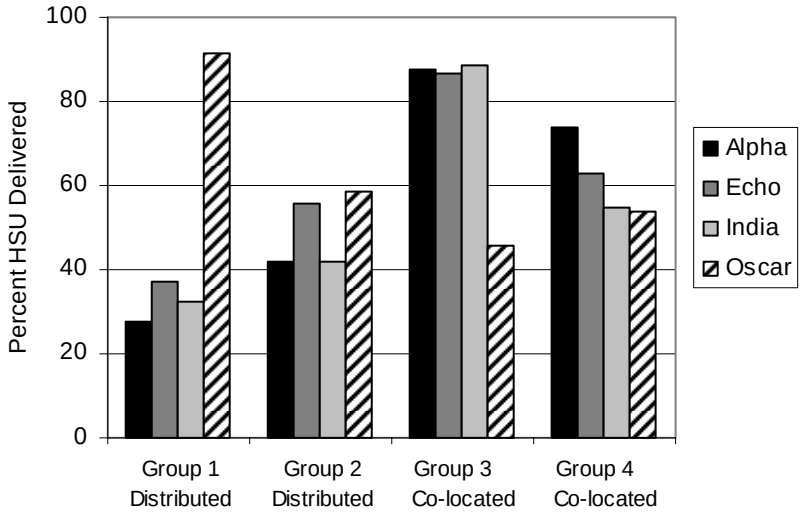


Figure 10. Comparison of percentage of required HSU delivered to towns by each group.

*Spending synchronization.* As previously noted, The REPSS weekly spending data can provide estimates of how well the three teams were able to synchronize their individual plans in terms of purchasing only the assets necessary to transport the HSU purchased and security guards hired. Any percentage of trucks under or over the required number represents a waste of assets, and a failure of the teams to synchronize their plans. Figure 11 presents the estimates of team plan synchronization for the four groups. The synchronization estimate is useful in revealing how well each group can create an efficient plan each week that does not waste assets. One advantage of the synchronization score is that it yields an estimate of planning efficiency for each week that is not influenced by performance in previous weeks. Each week the group begins with some level of funds to work with, and the synchronization score reflects how well the group can create an efficient plan with these resources.

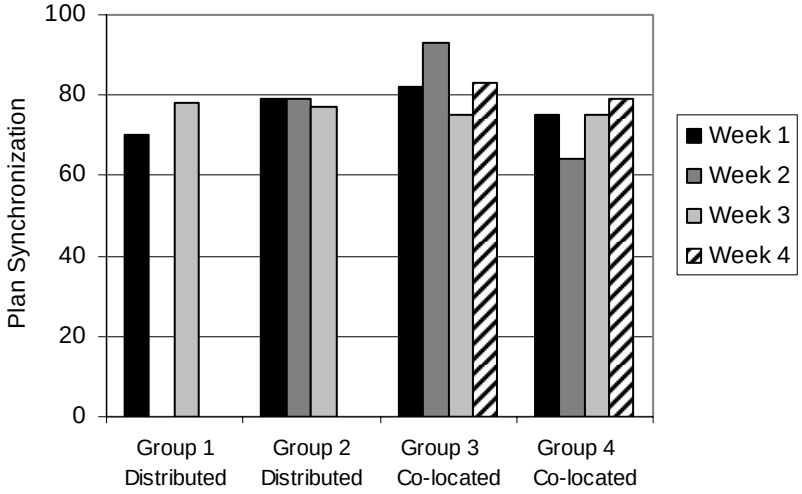


Figure 11. Level of plan synchronization for each group and each week.

*Shared situational awareness.* The REPSS exercise incorporated an embedded SSA problem where icy road conditions created the situation where the less expensive unarmored trucks would be more successful than expensive up-armored trucks in transporting supplies to Town Oscar in Week 2. Information identifying this situation was provided in text message statements sent to each team, and in the Town Oscar newspaper. A group recognizing and responding to this situation would send 100% unarmored trucks to Town Oscar. The percentage of unarmored trucks sent in the Town Oscar convoys for each of the four experimental groups were: Group 1 (distributed) 26%, Group 2 (distributed) 67%, Group 3 (co-located) 100%, and Group 4 (co-located) 53%. These results provide evidence that Group 1 failed to attend to available information stating that unarmored vehicles should be assigned to the Town Oscar route. It is unclear whether Groups 2 and 4 modified their plans in response to the icy road conditions information, or whether their allocation of unarmored trucks to the Town Oscar route might reflect a 50/50 allocation strategy for up-armored and unarmored vehicles. The actions of co-located Group 3 are consistent with having shared information and made the correct choice in assigning 100% unarmored trucks to the Town Oscar route.

*Subjective estimates of performance success.* The TLX survey Performance Success sub-scale scores can be compared to the actual percentage of required HSU delivered by each group to explore how accurately groups can assess the success of their planning efforts (see Figure 12). In Figure 12 both subjective performance success ratings and percentage of HSU delivered are described on a 0 – 100% scale. The results show a fairly close relationship between the actual percentage of HSU delivered and each group's subjective rating of their performance. The data show a slight difference between co-located and distributed groups, where distributed groups perceive a higher level of success in their subjective ratings compared to the distributed groups for similar levels of actual percentage of HSU delivered.

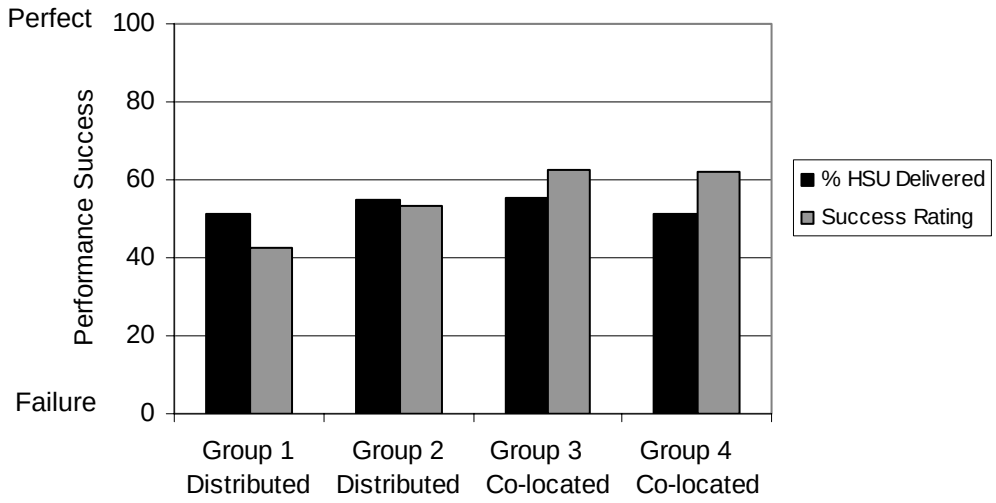


Figure 12. Comparison of average performance success ratings and actual percentage of HSU delivered for distributed and co-located groups.

*Contributors to collaborative planning success.* The overall percentage of HSU delivered score can be compared to estimates of group characteristics, process performance, and additional performances success estimates to explore potential contributors to collaborative planning success. Cianciolo and Sanders (2006) have provided a rank-ordering approach for comparing group characteristics and planning process measures to estimates of planning success. The approach is particularly useful for presenting small sample data in an effort to identify trends. Applying the rank-ordering technique to the REPSS measures, an example of a framework for organizing and presenting REPSS data can be provided (See Table 3). The four groups are ranked in order of the percentage of HSU they delivered over the four week exercise, where Group 3 provided the most HSU (55.43%), and Group 4 delivered the least HSU (51.16%).

Table 3

Rank Ordering of Group Characteristics, Planning Process, and Planning Outcome Measures Relative to HSU Delivered (Groups are ranked in descending order by amount of HSU delivered)

| Group | % HSU Delivered | Group Characteristics | | Planning Process | Planning Outcomes | | | Experimental Condition |
|---|---|---|---|---|---|---|---|---|
| | | % Planned In Last 12 Months | Group Roles Score | Group Perceived Workload | SSA % Correct Trucks | % Plan Synchron-ization | Group Perceived Success | |
| 3 | 55.43 | 42.86 | 7.17 | 37.25 | 100 | 53.01 | 62.75 | Co-located |
| 2 | 54.98 | 28.57 | 7.20 | 56.93 | 26 | 77.64 | 53.20 | Distributed |
| 1 | 51.25 | 57.14 | 7.67 | 47.95 | 53 | 71.90 | 42.75 | Distributed |
| 4 | 51.16 | 14.29 | 7.14 | 49.03 | 67 | 65.30 | 62.25 | Co-located |

The results presented in Table 3 show that for this particular experiment the four groups performed about the same with regard to HSU delivery. With regard to group characteristics, the groups differ considerably in terms or their recent experience in group planning, with three out of the seven members (42.86%) in the highest performing group (Group 3) indicating that they had performed group planning within the last year. The groups were very similar in their knowledge of group roles and information requirements. Looking at the planning process, the highest performing group reported experiencing a lower level of workload during the exercise compared to the other three groups. With regard to planning outcome indicators, the highest performing group was also the only group to successfully identify the "icy road conditions" manipulation in Week 2 of the experiment and correctly assign 100% unarmored trucks to the route. The highest performing group scored lowest on the plan synchronization estimate, and highest in their subjective assessment of their groups success. Group 3 assigned to the co-located condition scored slightly higher on the overall measure of performance, the total percentage of required HSU delivered across all four towns and all four weeks.

*Co-located versus distributed group comparison summary.* The key manipulation for the REPSS experiment was the comparison of performance for groups working under distributed versus co-located conditions. With regard to the collaborative planning process, in the comparison of one co-located and one distributed group, the co-located group demonstrated a greater frequency of verbal communications (see Table 5). In the comparison of two co-located and two distributed groups , the distributed groups exchanged a greater number of text messages compared to the co-located groups (see Table 6). With regard to performance outcomes, the results show no consistent performance trends that would indicate a difference between the distributed and co-located groups. Under both conditions the groups appear to have performed at roughly the same levels with regard to HSU delivery, and plan synchronization. The four groups report roughly equivalent levels of perceived workload, and perceived success in completing the planning tasks.

*The REPSS formative evaluation survey.* Results provided useful guidance identifying where changes needed to be made, and confirming the adequacy of written instructions, interface training, and interface tools. Twenty five of the 28 participants (89%) indicated that the general instructions, and commander and team instructions adequately described the planning exercise, and all participants indicated that the data screen training adequately prepared them for their tasks. Likewise, 27 of the participants indicated that they were able to use the REPSS screens to complete tasks in a timely manner. One design goal for REPSS was to present a task that placed difficult but achievable time demands on participants. Participants rated the pace of the REPSS exercise as Too Fast (1), About Right (2), or Too Slow (3). With regard to time demands, 39% of the participants responded that the pace of the exercise was "Too Fast," while 57% reported that the pace was "About Right," and one indicated that the pace was "Too Slow." The average rating for the distributed groups was 1.43, compared to 1.86 for the co-located groups, suggesting that the distributed groups experienced more time pressure than the co-located groups. One potential application for the REPSS is as a training tool for building command group skills. When asked about the training potential of REPSS, 26 of the 28 participants reported that the planning exercise could be useful in command group training (two participants did not respond to the question).

## Discussion

*Summary*

The goals for the present research were to develop a collaborative group planning simulation and supporting measures, and to conduct experiments investigating group planning performance. The REPSS was successful in stimulating collaborative group planning activities, and providing automated estimates of performance success. From observations and written responses to post-experiment surveys, the pilot test participants accepted the stability and reconstruction humanitarian relief scenario, and actively worked to achieve the best solution possible. The collaborative planning process measures developed for REPSS provided valuable estimates of group planning performance. Findings for the comparison of co-located and distributed group conditions clearly showed differences in verbal and text-messaging communications for the two conditions. One limitation with the process performance measures is that they require labor-intensive communications transcript coding. Automated collaborative planning outcome measures developed in this effort provide useful estimates of team planning synchronization, as well as the desired "goodness of performance" metric. Results from the co-located vs. distributed group comparison did not reveal differences in terms of percentage of required supplies delivered, and the synchronization of group plans. Most of the participants (93%) indicated that the REPSS planning exercise could be useful in command group training.

Several performance problems were identified which could be the subject of future assessments, or lead to changes in the REPSS exercise:

- Groups developed well synchronized plans, only to realize late in the planning process that the combined cost of the team plans was too high. Commanders would then impose an across-the-board percentage reduction in spending that lowered team plan synchronization. Future research will investigate the benefits of training for early decisions in the planning process.

- Groups would often run out of funds during the third week of the four week exercise. Future research should incorporate an assessment based on patterns of spending as a performance outcome measure.

- Groups would try to introduce a different way of performing the task to gain efficiencies. In response, the introductory briefing was changed to include a drawing that illustrated the requirements of the humanitarian relief task.

- While the higher commander's guidance was to provide as much food as possible to the towns, one group chose to adopt a contradictory strategy which focused on protecting the guards at the expense of not delivering food. The introductory briefing was revised to include a story line that emphasizes the need to focus on food delivery.

- Occasionally one team within a group would fail to submit a purchase request, or request goods for only a single town. The introductory briefing was revised to stress that purchase requests must be for all four towns. The experimenter's display was modified to indicate whether each team had submitted their request.

*The REPSS Refinements*

A number of enhancements were incorporated into the simulation following the REPSS 2 experiment. Three additional situational Awareness (SA) manipulations were developed for the humanitarian relief scenario, so that one change to the operating environment is presented each week. An additional route was added for each town so that the group would have to choose the better of two routes in sending convoys to each town. The Power Point self-paced training program was revised to reduce the repetition of material. The REPSS program was installed in networked laptop computers providing a portable data collection capability. The portable lab arrangement supports data collection utilizing troop support at various posts.

*Future REPSS Research*

As additional data are gathered with the REPSS an effort will be made to investigate the relationship between demographic characteristics of participant groups and performance outcomes, such as the impact of rank and previous deployment experience on the quality and timeliness of planning solutions. Likewise, as additional data are gathered there will be an opportunity to correlate subjective measures such as perceived workload and performance success with an empirical metric of planning quality, such as plan synchronization and quantity of HSU successfully delivered.

Future experiments will investigate the utility of specific collaborative planning techniques. Time management appears to be a critical, and difficult task for planning groups. Experiment observations suggest that the REPSS groups often failed to adequately monitor the time available for their planning, and allocated insufficient time to synchronize the separate team requirements. Future experiments will examine whether the imposition of the Early Decision strategy planning method identified by Lussier (1992) can result in a significant improvement in planning performance outcomes. Future experiments might also investigate the utility of the sharing information using the synchronization matrix. Experimenter observations suggest that when groups did not use the matrix, they devoted considerable time to verbally exchanging the types of information that would likely be in the matrix. This appeared to be true for both distributed and co-located groups.

A future enhancement desired for the REPSS is the development of equivalent forms of the task vignette. The development of an equivalent version of the REPSS task could greatly facilitate research efforts. Having each participant group perform two separate exercises under differing conditions would allow the employment of within-group comparisons. This could be very advantageous, given the increasing difficulties faced in obtaining troop support for group task research, and the desire to control for individual differences in analyses.

*The REPSS Training Potential*

Command group planning exercises can be time consuming, expensive, and infrequently performed. The REPSS exercise might be employed as a three hour long, inexpensive training event, that could be conducted as frequently as required to maintain basic skills in collaborative planning, and as a means to convey unit-specific tactics, techniques, and procedures for collaborative planning. The REPSS exercise address key skills that should be a prerequisite for success in any planning task. Time management, critical thinking, and communication skills should be essential to all planning tasks, and these skills might be developed with a simplified resource allocation task, rather than requiring a full fidelity exercise requiring extensive doctrinal and subject matter knowledge. On the other hand, mastery of doctrinal and subject matter knowledge would not guarantee success in collaborative planning if time management, critical thinking, and interpersonal communication skills have not been mastered.

As noted earlier, the REPSS system was designed to incorporate underlying processes associated with mission command, as outlined in FM 1, The Army (DA, 2005, 3-33). The processes include sharing commander's intent, resource allocation, and synchronization of plans. The REPSS exercise incorporates features that can reinforce the importance of gathering, exchanging, and integrating METT-TC information as a condition for mission success. The ability to host REPSS on standard desktop and laptop computers would facilitate the implementation of REPSS as a training tool for Army units. The built-in self-paced training, and short train-up time requirement, also supports the implementation of REPSS as a training tool. The performance assessment features built into the REPSS provides the basis for automated feedback reports which could be accessed by an instructor to pause an exercise and interject training points.

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Appendix A

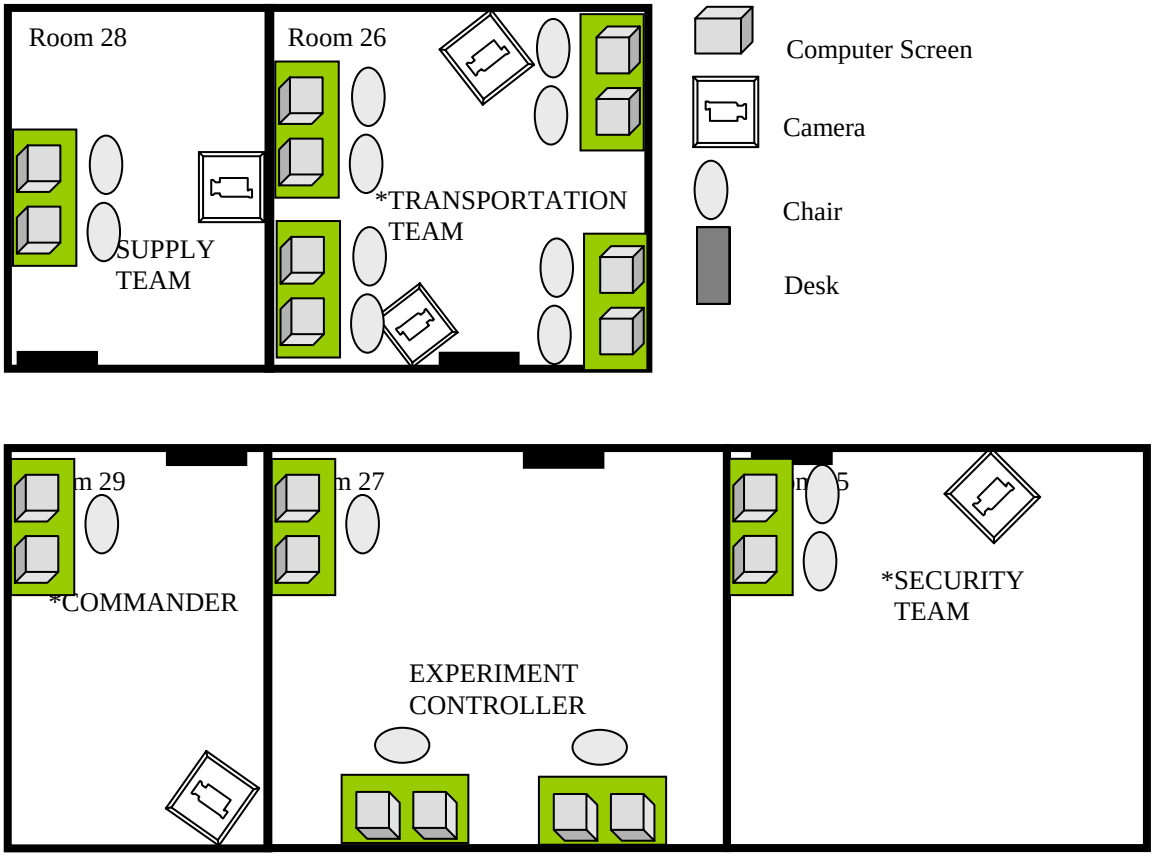
Acronyms

| | |
|---|---|
| AFRU | Armored Forces Research Unit |
| ARI | U.S. Army Research Institute for the Behavioral and Social Sciences |
| ATO | Army Training Objective |
| C2 | Command and Control |
| CITMOR | Citizen Morale |
| COA | Course Of Action |
| COE | Contemporary Operational Environment |
| DA | Department of the Army |
| DARPA | Defense Advanced Research Projects Agency |
| FCS C2 | Future Combat System – Command and Control |
| FM | Field Manual |
| HSU | Humanitarian Supply Unit |
| METT-TC | Mission, Enemy, Terrain, Troops, Time, Civilian |
| NASA | National Aeronautics and Space Administration |
| NCO | Non-Commissioned Officer |
| REPSS | Reactive Planning Strategies Simulation |
| SA | Situational Awareness |
| SSA | Shared Situational Awareness |
| THREATCON | Threat Condition |
| TLX | Task Load Index |
| TM | Team |

Appendix B

REPSS Mini Lab Room Configuration

# REPSS Mini Lab Room Configuration

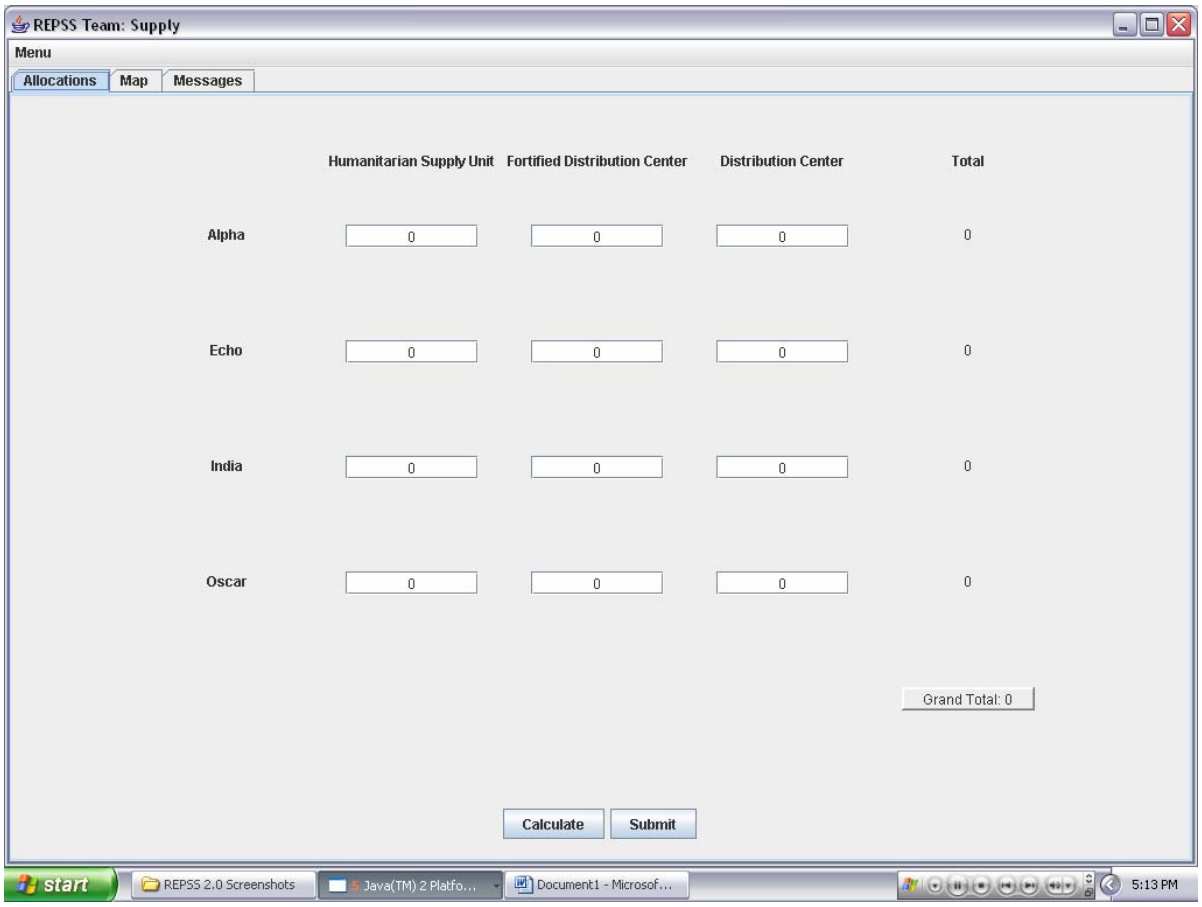



* Distributed Command Positions

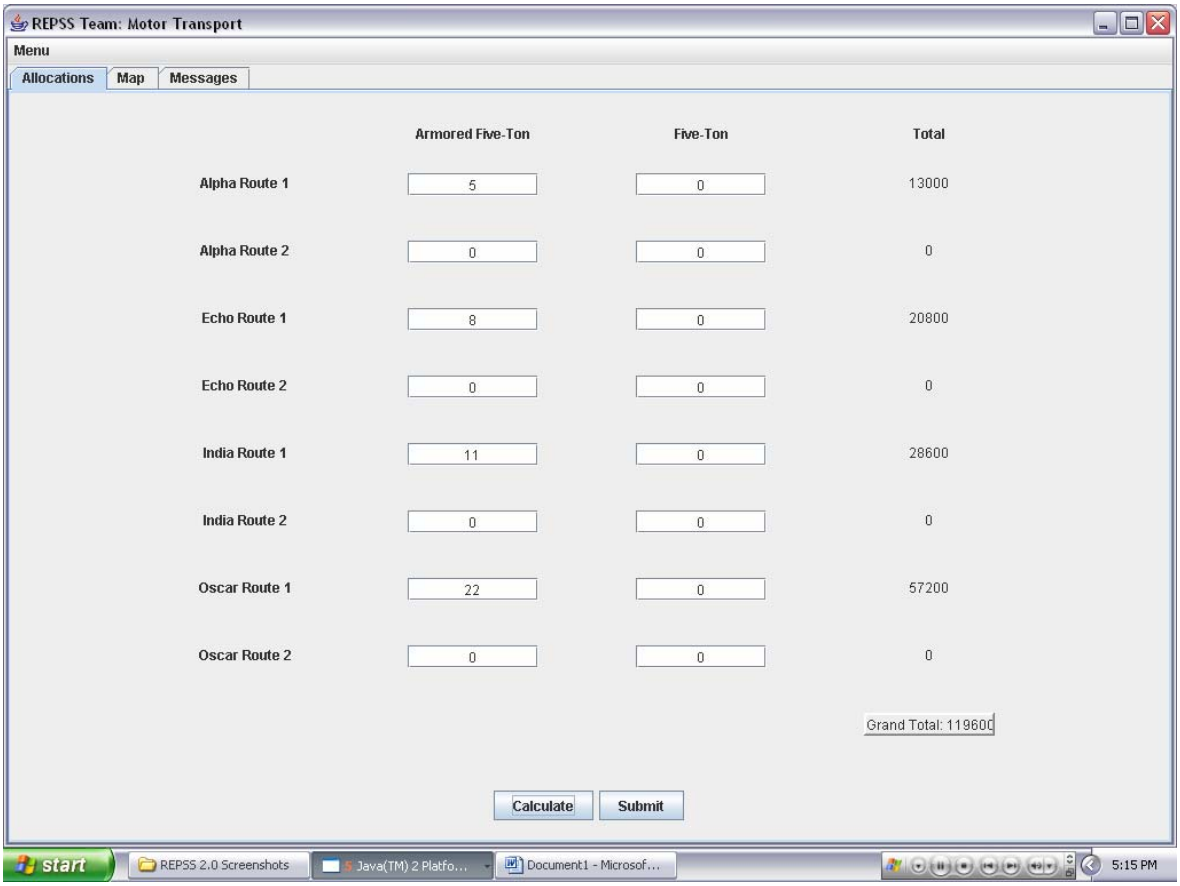
Collocated Teams were all located in RM 26

Appendix C

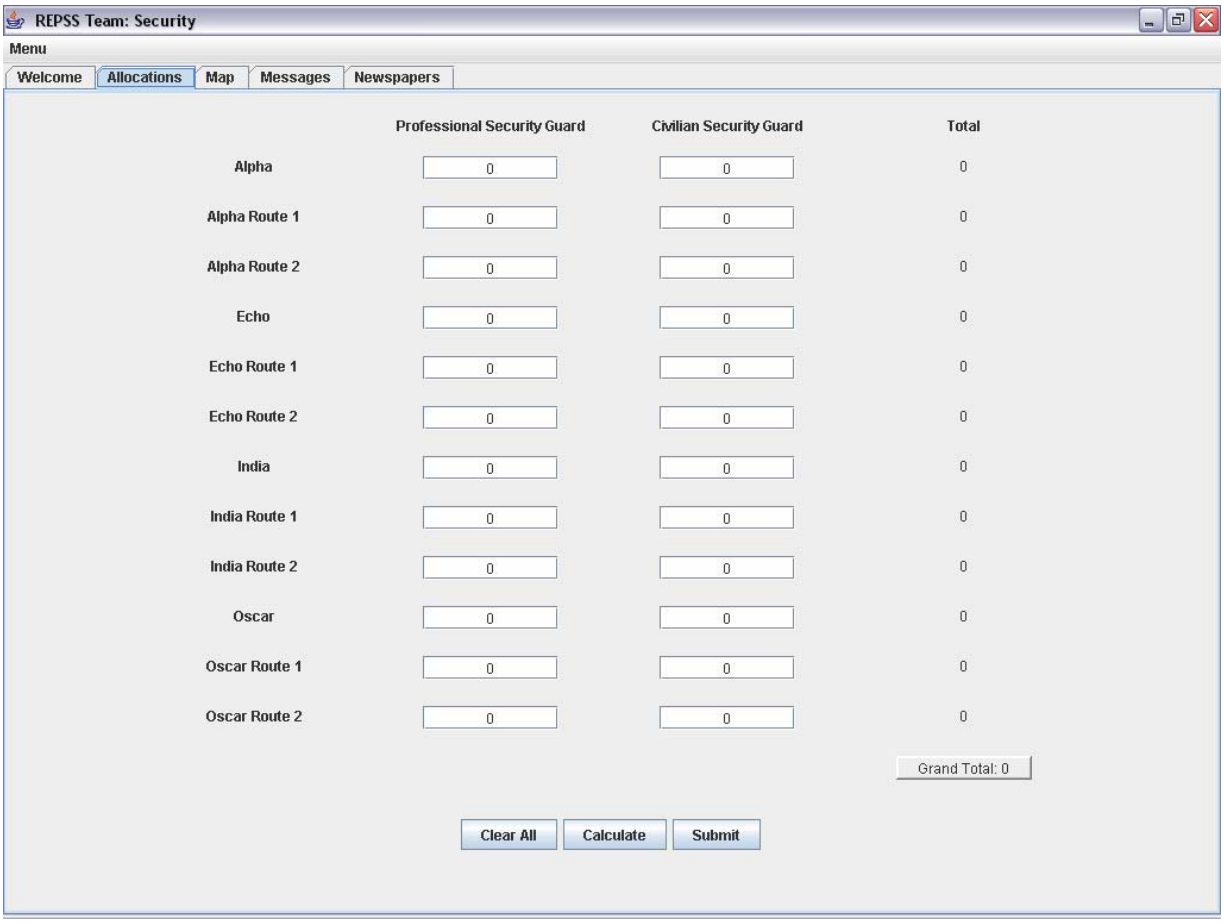
Data Entry Screens for REPSS Teams




Data entry screen for supply team.




Data entry screen for transportation team.




Data entry screen for security team.

Appendix D

Weekly Newspaper

WEEK ONE

# The India Ink

Hazardous blizzard conditions are a possibility by the end of this week. Be extremely careful if traveling and try to bundle up!

*Local woman fears troubles are not over.* Aziza Ustinov, 61, told sources that she fears that winter is not over just yet and the worst is yet to come. She states that Red Feather Grass, a species of plant that grows only at higher altitudes, always blooms in accordance with the weather. “The first buds appear when the winter is over.” However, if they begin to sprout, and then the buds fall off, it is due to a continuation of the winter season, as the self-described “superstitious old woman” stated. Aziza claims that this is the case and this warns that more snowfall and bitterly cold weather is just around the corner.

*Crime rates fall.* Local police have issued a statement that this past week there was a significant decrease in insurgent organized or suspected crimes. Levels are nearing what they were before the war began, nearly one year ago this month.

# Appendix E

## Demographic Survey

Name _____ Experiment Duty Position _____

Date _____ Branch/MOS _____

Current Rank _____

1. Current Duty Position (Months in Position) _____

2. Years of Regular Army Experience _____

3. Highest Enlisted Rank Achieved (or N/A if not applicable) _____

4. Prior Leader/Staff Experience (and time in position) _____

_____

5. Have you been deployed? _____

_____

6. How long has it been since you last participated in a group planning session? (Describe)

_____

7. How much experience do you have in group planning tasks such as the REPSS exercise? (Circle a number please.)

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| No Experience | | | | Very Experienced |

8. How much experience do you have with commercial computer applications? (Circle a number please.)

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| No Experience | Less Than 1 year | More Than 1 year | More Than 3 years | 5 Years or More |

9. Have you used computer systems to conduct military planning? Yes _____No _____

10. How many members of your experiment group have you worked with before on planning tasks?
_____

Appendix F

Group Roles Knowledge Survey

# Group Roles Knowledge Survey

Team _____ Date _____

For each message below please indicate who should be the primary recipient by putting a “1” in their column. Indicate who should be the next recipient, if any, by placing a “2” in the appropriate box. Even if you think a message should go to more than two teams, only provide two answers, one “1” and one “2.”

| Check box to indicate all who the information should be forwarded to. | | | | |
|---|---|---|---|---|
| MESSAGE | Commander | Supply | Trans | Security |
| Coalition allies have donated an extra ten million dollars in efforts to assist you in your mission. | | | | |
| The price of HSU has gone up by 10%. | | | | |
| A safer, although longer, route is now available to transport HSU. | | | | |
| S2 has reported that there may be insurgents intending to sneak into town due to the lack of security. | | | | |
| Town Oscar has not been receiving the expected minimum amount of HSU for nearly three weeks now! Re-check your calculations. | | | | |
| Security Guards will no longer be receiving food and water from headquarters battalion. You will now have to purchase additional HSU for the Security Guards you employ. | | | | |
| We observed a group of young men behaving suspiciously around the warehouse since early yesterday. They run away into the crowd when they see that we have noticed them. The Town Security Guards on hand informed us they could use extra hands if they wanted to make a good town-wide search for the men. | | | | |
| Due to security concerns an extra 30 Town Security Guards will be needed to be allocated in Alpha. | | | | |
| The money <u>your Team</u> requested has been allocated by the Commander. | | | | |
| An attack in Town Alpha during the unloading of HSU has left many Security Guards, Five-Tons and Distribution Warehouses either destroyed or severely damaged. | | | | |
| Locals are not talking to coalition forces much. | | | | |

Appendix G

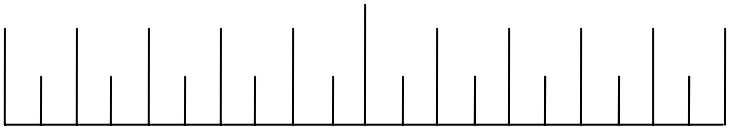
Workload Survey

Team _____ Date _____

# Task Load Index Rating Scales

Please rate the exercise by putting a mark on each of the six scales at the point which matches your experience.

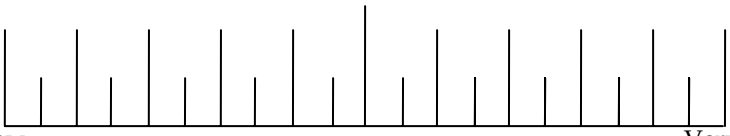
**Mental Demand**



Very Low Very High

(HOW MENTALLY DEMANDING WAS THE EXERCISE?)

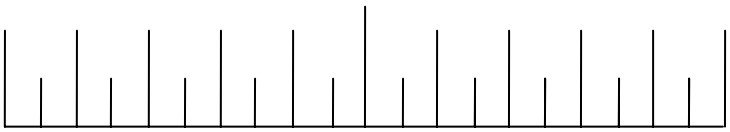
**Physical Demand**



Very Low Very High

(HOW PHYSICALLY DEMANDING WAS THE EXERCISE?)

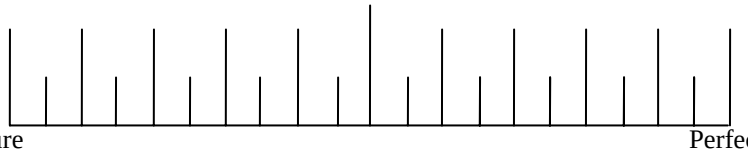
**Temporal Demand**



Very Low Very High

(HOW HURRIED OR RUSHED WAS THE PACE OF THE EXERCISE?)

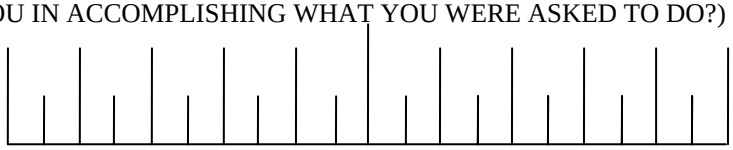
**Performance**



Failure Perfect

(HOW SUCCESSFUL WERE YOU IN ACCOMPLISHING WHAT YOU WERE ASKED TO DO?)

**Effort**



Very Low Very High

(HOW HARD DID YOU HAVE TO WORK TO ACCOMPLISH YOUR LEVEL OF PERFORMANCE?)

**Frustration**

Very Low Very High

(HOW DISCOURAGED, IRRITATED OR ANNOYED WERE YOU

Appendix H

Formative Evaluation Survey

REPSS Formative Evaluation Survey Team _____ Date _____

1. How was the 20 minutes per week pace of the exercise for your Team
   _____ Too Fast _____ About Right _____ Too Slow
   Comments: _____
   _____

2. The General and Team written instructions adequately described the planning exercise
   _____ True _____ False
   Comments : _____
   _____

3. The introduction to the data screens and tools adequately prepared me for my team tasks
   _____ True _____ False
   Comments : _____
   _____

4. I was able to use the workstation data screens to complete tasks in a timely manner
   _____ True _____ False
   Comments : _____
   _____

5. Please describe how you divided tasks within your team:
   _____
   _____

6. This planning exercise could be useful in command group training
   _____ True _____ False
   Comments : _____
   _____

7. Describe any tools that could be included to help you perform your tasks
   _____
   _____

8. What worked best about this planning exercise is _____
   _____
   _____

9. What I would change in this exercise is _____
   _____
   _____

# Appendix I

## REPSS Exercise General Instructions

# REACTIVE PLANNING STRATEGY SIMULATION (REPSS) TUTORIAL

DEVELOPED BY:

CHRISTOPHER FULTZ, WILLIAM SANDERS, AND KELLY SHARP

## TUTORIAL OBJECTIVES

- ✓ INTRODUCTION
- ✓ GENERAL INSTRUCTIONS
- ✓ TEAM-SPECIFIC INSTRUCTIONS
- ✓ KEYS TO SUCCESS IN YOUR MISSION
- ✓ REPSS COMPUTER TRAIN-UP

## INTRODUCTION

Why are you here?

- To be role players in an exercise designed to support research in collaborative, distributed planning and plan execution
- Support the development of simulation tools and performance measures for command group research

What is expected of you?

- A positive attitude and a willingness to work hard are at a premium here
- To get organized quickly, share information, develop a plan, execute and revise that plan as needed
- To step into the roles as a Commander and his staff planning and executing a one-month humanitarian support relief effort in Azerbaijan

## INTRODUCTION

HUMANITARIAN RELIEF OPERATION

- Your group is part of a multi-national operation to assist in the reconstruction of Azerbaijan after a violent civil war.
- The operation objective is to provide a consistent supply of humanitarian support to war torn towns
- Your group will plan and execute a humanitarian relief campaign, and will consist of a:
  - Commander
  - Supply Team
  - Motor Transport Team
  - Security Team

## INTRODUCTION (CONT.)

HUMANITARIAN RELIEF OPERATION

- Your role in this operation is to assemble four weekly humanitarian support shipments to citizens in four towns. The towns are code named:
  - Alpha
  - Echo
  - India
  - Oscar
- The towns are dynamic and distinctive in many respects. This includes:
  - Population
  - Citizen Morale (CITMOR)
  - Threat Level for routes and towns (THREATCON)
  - Terrain
  - Weather

## GENERAL INSTRUCTIONS

- You will have forty minutes to develop and execute your plan for Week 1. This will consist of allocating limited funds to each team to develop a synchronized plan that will maximize the amount of humanitarian supplies reaching towns. You will execute the plan by purchasing goods and services necessary to send a separate relief convoy to each town, and then monitor the results. You will have twenty minutes to develop each of the follow-on plans for the next three weeks of the operation.
- The REPSS program will simulate the reaction from citizens and insurgents to your weekly relief convoys in the form of text messages. You will need to adjust your plan to improve citizen morale, limit insurgent attacks, and maximize humanitarian supply delivery.
- The goods and services used for each humanitarian relief convoy will be obtained from contractors. All non-perishable products, such as vehicles and personnel, will be hired on a week-to-week basis.
- No convoy personnel (drivers, security guards, town guards) are United States military personnel.
- Further instructions are provided to each respective team later in this tutorial.

## KEYS TO SUCCESS (Experimental Group)

Due to the time constraints you will need to develop your plans quickly. Plans need to be synchronized between the three teams to ensure that all food purchased, and guards hired, can be transported, with no excess transportation capacity.

- **Produce a mid-point estimate to be delivered to Higher**
  At the twenty-minute mark of the first week and at the ten-minute mark of the following weeks, you are **REQUIRED** to provide
  to Higher (Controller) a text message indicating the total amount of money that each team would need.

  - **Start with a ball-park estimate:**
    "Cadillac" solution – Provide 100% of recommended resources, **or**
    "50/50" approach – Start with a "Cadillac" solution, but make half of the team resources the cheaper alternative

  - **Establish weekly budgets**
    Early on, establish a maximum total weekly spending limit and convey this to the teams.

- Critical thinking: Don't believe everything you read.
- You have to accept some risk, anticipate that you will take losses

# Appendix J

## REPSS Exercise Team Instructions (Supply Team)

# Reactive Planning Strategy Simulation (REPSS) Program Tutorial

Developed by:

Christopher Van Fultz, William Sanders, and Kelly Sharp

## Tutorial Objectives

- Introduce you to your mission
- Provide command group and team-specific instructions and information
- Train you on how to use the REPSS Program
- Test your knowledge and abilities before proceeding with the exercise

# Your Mission

Why are you here?

- To be role players in an exercise designed to support research in collaborative, distributed planning and plan execution.
- Support the development of simulation tools and performance measures for command group research

What is expected of you?

- A positive attitude and a willingness to work are at a premium here
- To get organized, share information, develop a plan, execute, develop fixes
- To step into the roles as a Commander and his staff planning and executing a one-month humanitarian support relief effort in Azerbaijan

What is Reactive Planning Strategy Simulation (REPSS)?

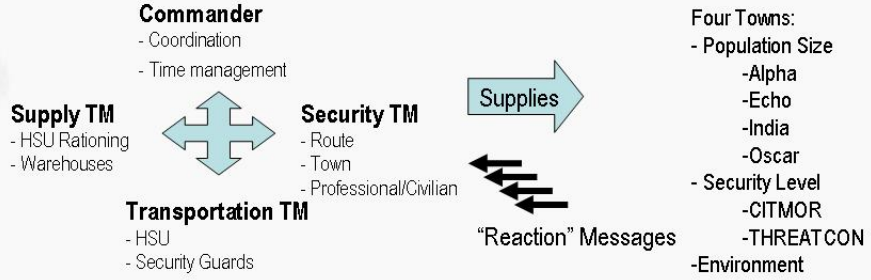
- REPSS is "reactive" because the threat will react to your actions, you will see this in message traffic.

**Slide 1 of 5**

# Your Mission (continued)

## HUMANITARIAN RELIEF EFFORT

•Simplified resource allocation task where limited funds must be allocated across teams. must be distributed across interdependent teams.
•Command group teams must assemble four weekly food shipment convoys to four separate towns differing in size and threat

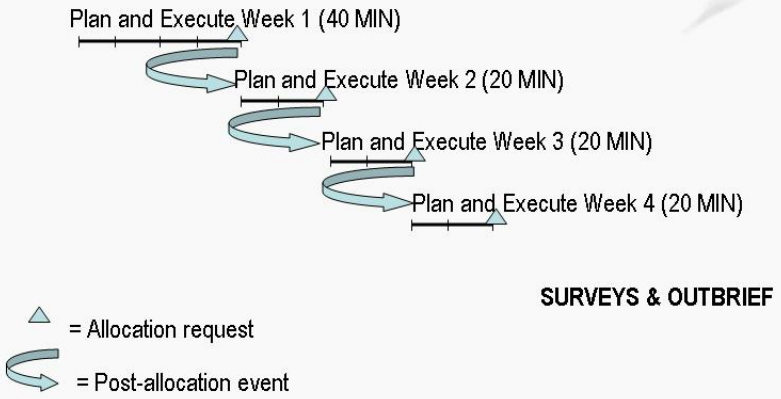



Four Towns:
- Population Size
  - -Alpha
  - -Echo
  - -India
  - -Oscar
- Security Level
  - -CITMOR
  - -THREATCON
- Environment
  - -Routes
  - -Weather conditions

**Slide 2 of 5**

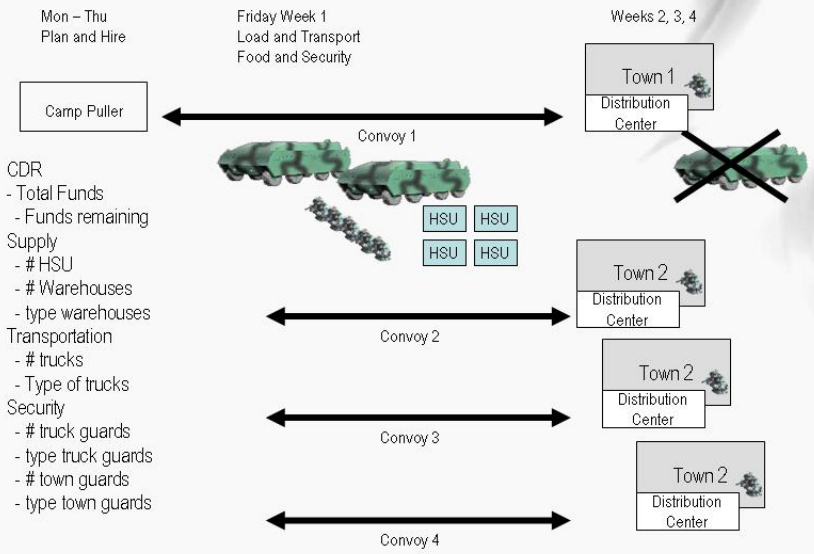
# Your Mission (continued)

## EXERCISE EVENT SCHEDULE




**Slide 3 of 5**

# Your Mission (continued)




**Slide 4 of 5**

# Your Mission (continued)

## KEY POINTS

PLAN, EXECUTE, MONITOR THE MESSAGE TRAFFIC, ADJUST YOUR PLAN ACCORDING TO THE CHANGING ENVIRONMENT

Use only the materials provided (do not open other programs)

Collaboration Tools:
- One computer per Team, radio, email, REPSS Program
- Collaboration matrices (two) for shared view

No requirement to produce a briefing, synch matrix, or worksheets

Next:
- Identify Commander and Teams (Supply, Transportation, Security)
- Read the instructions, Team information, worksheets (10 minutes)
- Hands-on practice / walk through a sample of task procedures

Note: Exercise performance in each room is videotaped

**Slide 5 of 5**

# General Instructions

You are participating in a staff collaboration exercise that requires group planning and problem solving. The exercise is called the Reactive Planning Strategies Simulation (REPSS) because the environment will "react" to your plan. The exercise involves allocating limited resources to supply, transportation, and security activities to support a humanitarian relief effort. The outcome of the exercise depends on how well you work within your team as well as how well teams work together. There are many ways to achieve your goals, with there being no single "right" choice. Achieving a good score requires that the separate teams identify their needs, share information, and adjust to the changing environment.

Your group is part of a multinational coalition to address a recent civil war and subsequent social upheaval in the country of Azerbaijan. Your mission is to plan and execute a one-month effort to provide humanitarian support to citizens of four towns within Azerbaijan from your base, Camp Puller. Your group will consist of a Commander and three two-man teams.

Your group will consist of a Commander and three two-man teams, the Supply Team, Motor Transport Team, and finally, the Security Team. Details of the specific tasks and the required products needed to complete this mission are provided in individual team instructions.

**Slide 1 of 3**

# General Instructions (continued)

The four-towns that your forces will be providing humanitarian supplies (HSU) to are dynamic and distinct in many respects. This includes population size, Citizen Morale (CITMOR), Regional Threat Level (THREATCON) for the town and routes leading to town, terrain, and weather. These variables will affect the decisions you make so be prepared to plan accordingly. Information is included in the individual team packages describing these variables in detail.

You will have forty minutes to develop your initial plan and resource allocation. After the teams enter their resource allocation request into their data entry screen the course of this one-month project will begin, indicated by the timer on the computer screen, which displays the time in the game. Every twenty minutes of real-time will equate to one-week in the virtual environment. Use the time to read messages, share information, and adjust your plans in response to the changing environment.

**Slide 2 of 3**

# General Instructions (continued)

You must enter any desired changes to your weekly resource allocation request and order supplies (HSU, security personnel, supply trucks, etc.) before the twenty-minute mark in order to have your revised request implemented the following week.

During the planning phase and throughout the exercise you will receive text messages containing pieces of information from members of the local population regarding your operating environment. The choices that each team makes will have a direct impact on the operating environment, which will be reflected in the content of the messages that you receive as a reaction. The messages can originate from warehouse workers, supply truck drivers, dockworkers and security personnel who are all natives of Azerbaijan, as well as S2, HQ Battalion and others. The messages may provide too much information, too little, or be irrelevant for your tasks. In some cases, messages will contain information that would benefit other teams as well.

**Slide 3 of 3**

# Supply Team's Instructions

Your primary role as the Supply Team is to purchase Humanitarian Supply Units (HSU) and rent Distribution Centers for four towns in Azerbaijan. The pricing guide is provided in your team packet on the ServCo Products and Services sheet.

Each unit of HSU provides food, non-food necessities, and basic medical supplies to meet the needs for one hundred people for one week. . The civilians of the four towns that your group is providing HSU to do not have the resources needed to support themselves. Your shipments of HSU are the only source they have for the necessary supplies they need to survive.

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# Supply Team's Instructions (cont.)

Distribution Centers are preexisting structures within each town that ServCo Products and Services have secured as rental sites to use for your mission. Distribution Centers have two purposes. First, they provide storage for units of HSU once they are delivered to that town. Your group needs to ensure that the number of units of HSU delivered does not exceed the listed capacity for the Distribution Centers in that town. HSU left unsecured outside of a Distribution Center have an increased chance of being pilfered and vandalized. Second, Distribution Centers provide protection for HSU, Town Security Guards, and support personnel who are working in the area in the event of an attack by enemy forces.

Two types of Distribution Centers are offered, Fortified Distribution Centers and Distribution Centers (non-fortified), with each providing different levels of protection. Fortified Distribution Centers have upgraded security wire, anti-vehicle barricades, and protective materials on structures. The standard Distribution Centers are the buildings as is, with no extra security measures provided.

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# Supply Team's Instructions (cont.)

Distribution Center support employees include, but are not limited to; a supervisor, assistants, maintenance workers, and dockworkers. HQ Battalion of Camp Puller, as per contract agreement with ServCo Products and Services, will cover the basic cost of employment for these personnel. However, any injuries or loss of life and damaged property will be the financial responsibility of your team.

Your team needs to be aware of the Citizen Morale (CITMOR) status of each town, which is likely to change over time. The CITMOR code is provided by S2 to indicate the current morale of the native population for a particular region (town). This takes into account how well the population's HSU needs are being met, their faith in the operation currently being conducted by coalition forces, and in addition, the threat of violence from insurgents.

The coding system for CITMOR is provided on the following page.

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# Supply Team's Instructions (cont.)

CITMOR Levels:

- VERY LOW – At this level, citizens of this region will exhibit hostile behaviors towards coalition forces and will attempt to undermine coalition objectives.
- LOW – At this level, citizens will display apathetic, unfriendly behaviors towards coalition forces, but will stop short of violent, hostile displays. Many will not offer their assistance to coalition forces, unless it directly benefits the people of their town.
- NEUTRAL – At this level, citizens of the particular region are indifferent towards coalition forces and their goals. They do not consider them as helpful or as harmful, but rather as witnesses to the plight of their people.
- HIGH – At this level, citizens see coalition forces as benefactors and will assist coalition forces in daily chores they perform, such as unloading supply trucks, constructing roads, buildings, and similar type behaviors.
- VERY HIGH – At this level, citizens revere coalition forces and consider them friends. They will perform duties such as ferreting out enemy forces within town and will do what they can to promote peace within their region between the enemy and coalition forces.

**Slide 4 of 4**

## SERVCO PRODUCTS AND SERVICES

We at ServCo thank you for allowing our company to meet your supply needs. We offer high quality humanitarian supplies (HSU) as well as provide Distribution Centers for rental. We guarantee the best service in the business.

**HSU** - Our prepackaged, environmentally sealed units of HSU provide food, non-food necessities, and basic medical supplies to meet the needs for one hundred people for one week. **HSU COST $4,100.00 PER UNIT.**

**DISTRIBUTION CENTERS** - We at ServCo understand that your mission keeps your units busy. Our mission is to provide you with top-grade HSU, as well as provide Distribution Centers for rent. The Distribution Centers we offer are the best available. Our professional contractors will survey each area then carefully assess each site to ensure that they meet a minimal level of security and convenience for you. You have the option of renting the site, as is, which we classify as a Distribution Center or pay a small fee to upgrade to a Fortified Distribution Center. Our Fortified Distribution Centers include upgraded security wire, anti-vehicle barricades, and fortified structures. All Distribution Centers available for rent include an onsite team for routine maintenance, utilities and basic maintenance cost, and an unloading crew in your low weekly rental costs. However, any damage incurred that is beyond the scope of "routine maintenance" you will be held financially responsible for cost of repair and replacement.

Both types of Distribution Centers are selected to ensure that they can store up to twenty (20) units of HSU.

**DISTRIBUTION SITE TYPES/WEEKLY COST**

| | |
|---|---|
| Distribution Center | $3,750 |
| Fortified Distribution Center | $5,500 |

## How to use the REPSS Program

This section of the tutorial is designed to simulate the REPSS Program. You will be asked to navigate around the simulated REPSS Program in the exact manner you will when you start the exercise.

You will be instructed at times to click on tabs, enter information, just as you would during the exercise. This is to familiarize you with the REPSS Program, your role in the group, and the provide you with hands-on practice. If there are no questions, please click on the ▷ button to start the training. If you are unsure what to do, have more questions concerning the sections of the tutorial you have already completed, you click on the ◁ button to review the information again. If there are any other concerns please contact the Controller now by walkie-talkie.

**Slide 1 of 2**

## How to use the REPSS Program: Introduction

Provided below is the main screen of the REPSS Program. As you can see, there are multiple tabs available to you. They include Welcome, Messages, Map, Allocations, and Newspapers. The Welcome Tab is the screen you will see when you begin the REPSS exercise. It serves only as a introduction and has no working purpose for the exercise. To proceed right-click with your mouse on the Map tab.

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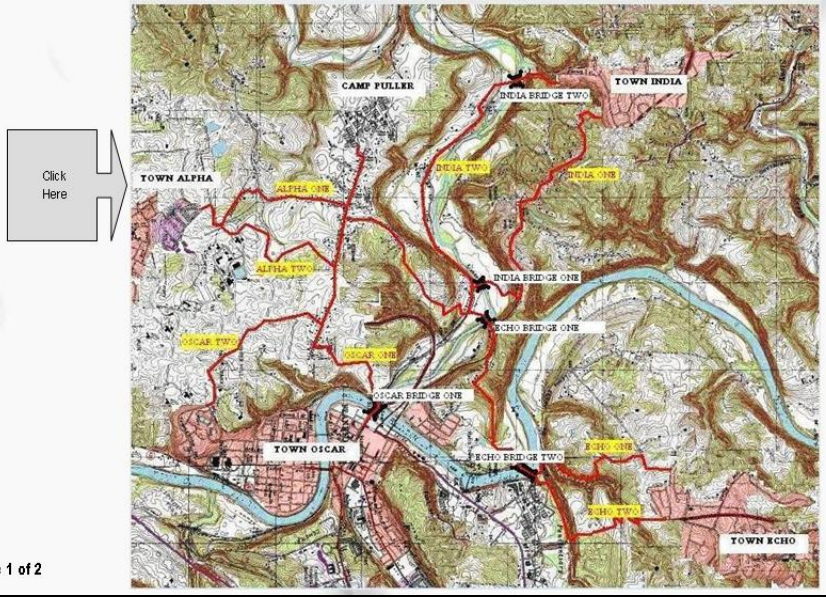
## How to use the REPSS Program: Map Tab

For the Supply Team the information that you can access through the Map is a town's population and current CITMOR level. Let's practice accessing town information and understanding this information. Please click with your mouse on the TOWN ALPHA name on the map below.

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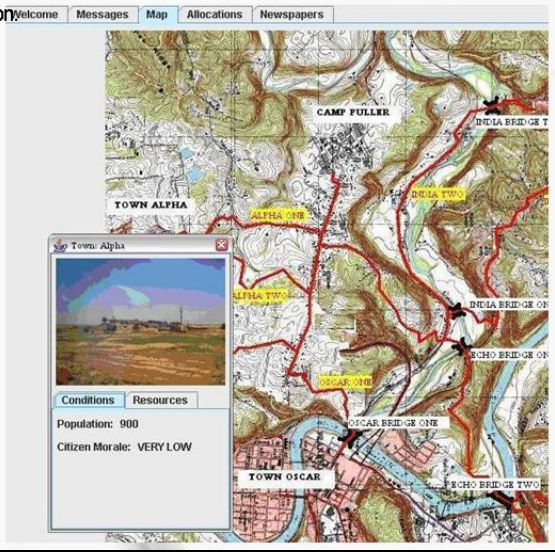
## How to use the REPSS Program: Map Tab (cont.)

For Town Alpha, the Conditions Tab lets you see that the population is 900 civilians and the CITMOR is VERY LOW. You can not open the Resources Tab in this training, but this tab would allow you to see the number of HSU purchased and Distribution Centers you rented for this town the previous week.

You must close a Town Window before you can allocate, send messages, or check other towns. To close you click on the red **X** in the upper right hand corner of the Town Window. Click on the red **X** on the Town Alpha Window now to proceed to the next section.

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## How to use the REPSS Program: Newspaper Tab

The Newspaper provides a weekly weather report and two reports on current events. Critical information may be provided to the group with the Newspapers, so check them at the beginning of each week. To proceed right-click with your mouse on the Messages Tab.

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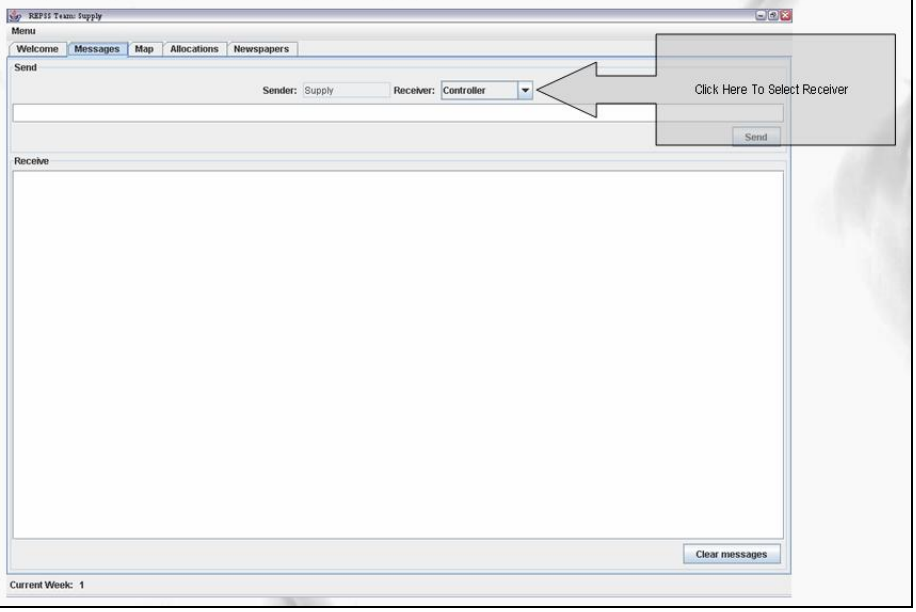
## How to use the REPSS Program: Messages Tab

The Messages Tab provides text-messaging capabilities. Messages can be received from teams, the Controller, or other sources. This is the central hub for the exchange of information from the REPSS Program. We will practice sending and receiving messages. To practice sending a message, click on the drop down arrow in the Receiver window.

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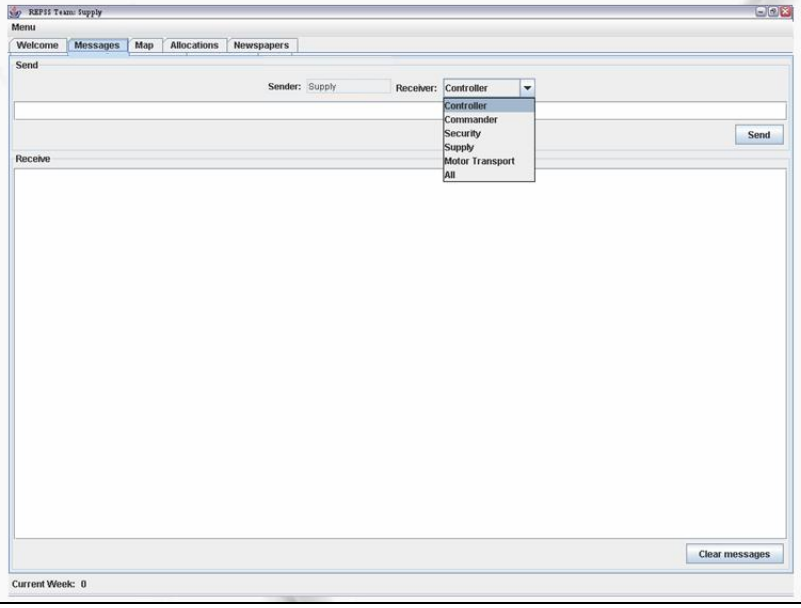
## How to use the REPSS Program: Messages Tab (cont.)

From the drop down list provided, select **All**.

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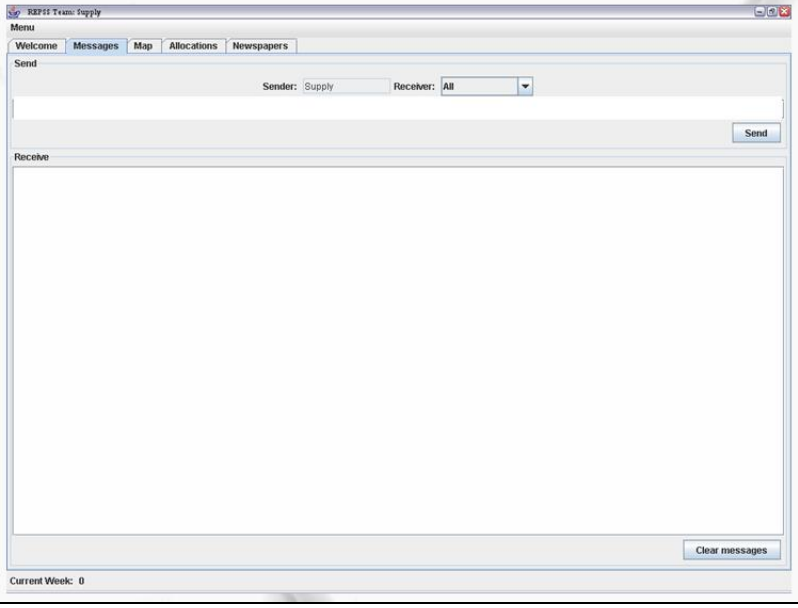
## How to use the REPSS Program: Messages Tab (cont.)

In the text box below the **Sender:** and **Receiver:** drop down boxes enter the command, "How much time do we have?" Once you have entered this command, click on the **Send** button below the text box.

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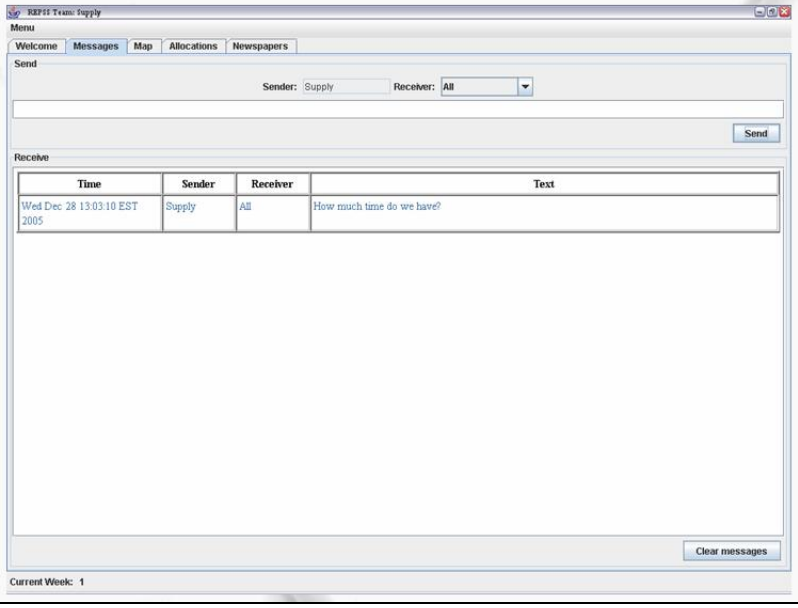
## How to use the REPSS Program: Messages Tab (cont.)

Below is what your messages will look like. Messages are color-coded by sender to assist you in keeping track of messages. New messages will appear at the top of the message queue. Click on the **Clear messages** button in the lower right-hand corner now to clear the message queue.

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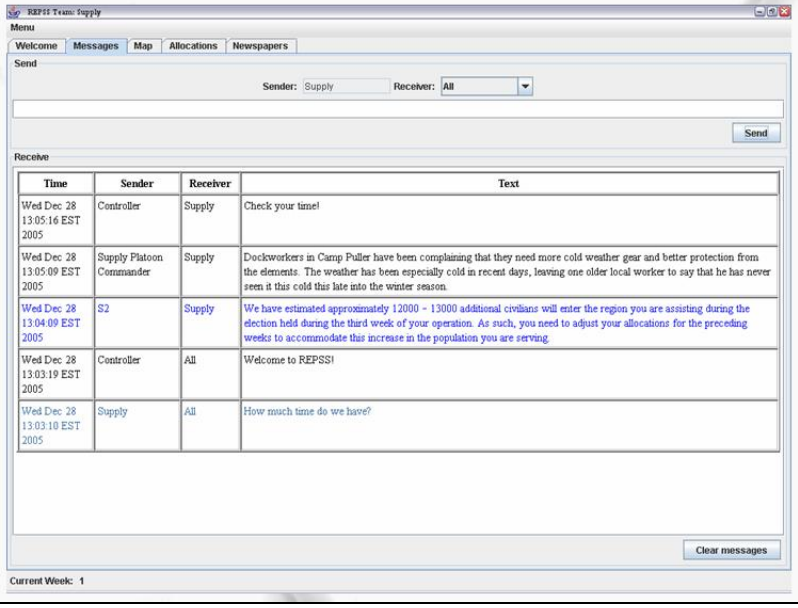
## How to use the REPSS Program: Messages Tab (cont.)

Below is an example of what a full message queue would look like. Click anywhere on the screen below to proceed to the next part of the REPSS tutorial.

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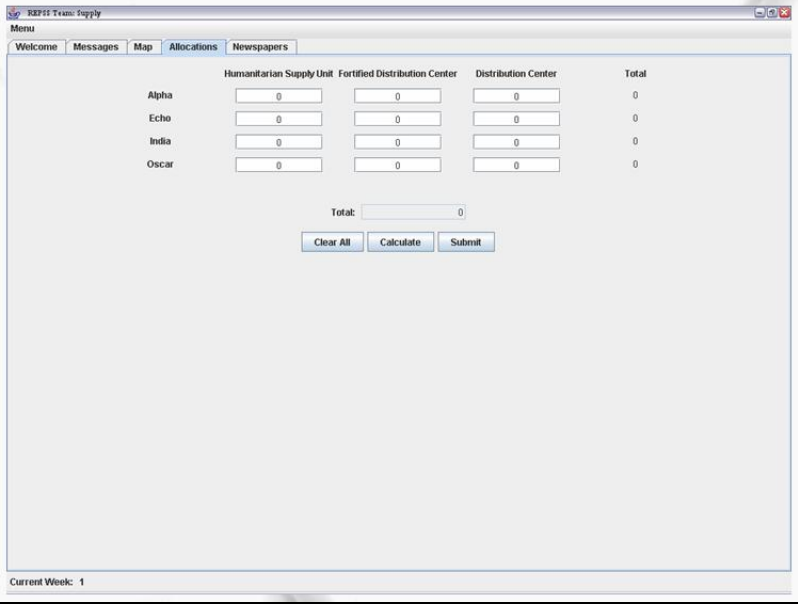
## How to use the REPSS Program: Allocations Tab

The previous tabs in the REPSS Program interface provided access to information. The Supply Team Allocation Tab is where you enter the number of HSU to purchase, Distribution Centers to rent, view the total cost, and submit your purchase request. Click anywhere on the screen below to proceed to an explanation of each feature.

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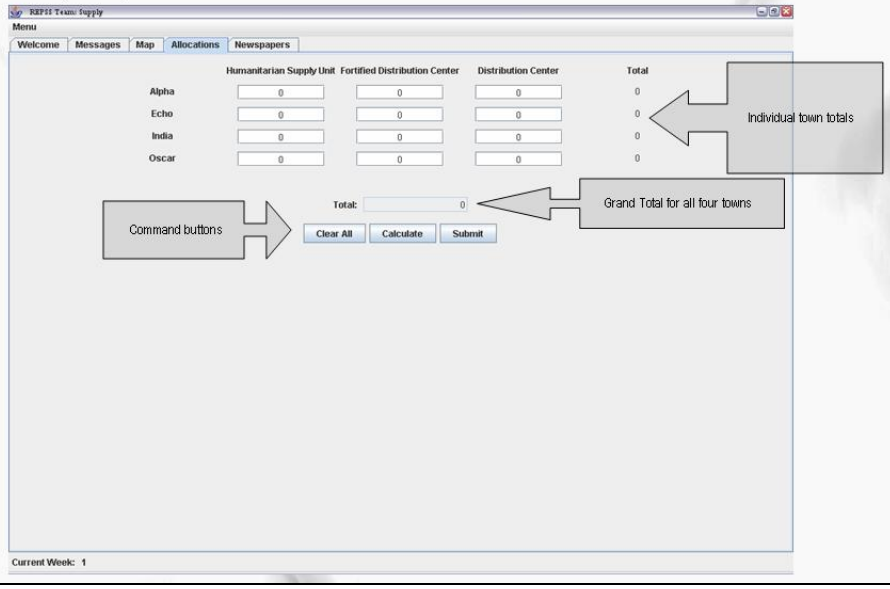
## How to use the REPSS Program: Allocations Tab (cont.)

The **Clear All** button erases ALL entered data in the Allocation window and sets the values back to zero. **Calculate** sums the cost of all HSU and Distribution Centers by town and provides a grand total for all towns. **Submit** submits the data you entered for the week. Click anywhere on the screen below to proceed to the next page where you will practice making weekly allocations.




Slide 2 of 6

## How to use the REPSS Program: Allocations Tab (cont.)

When you looked at Town Echo on the Map Tab earlier it had a population of 900. You previously learned that one unit of HSU will feed 100 people for one week. To feed all the civilians in Echo enter "9" (900/100 = 9) into the space in the Echo row and Humanitarian Supply Unit column. Click on **Calculate** when done to see that 9 units of HSU cost a total of $36,900.

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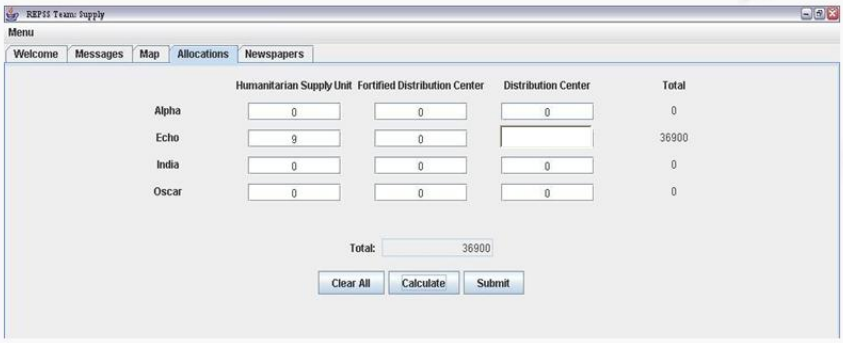
## How to use the REPSS Program: Allocations Tab (cont.)

Either type of Distribution Center will hold up to 20 units of HSU, so we will only need to rent 1 to hold the 9 units of HSU. The THREATCON of the Town Echo will help you determine what type of Distribution Center to rent, but this information is only available from the Security Team. For this example rent 1 Distribution Center for Echo by entering "1" into the space in the Echo row and Distribution Center column. Click on **Calculate** when done.

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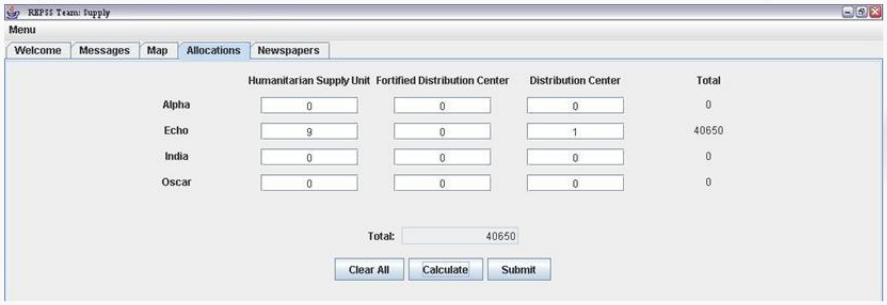
## How to use the REPSS Program: Allocations Tab (cont.)

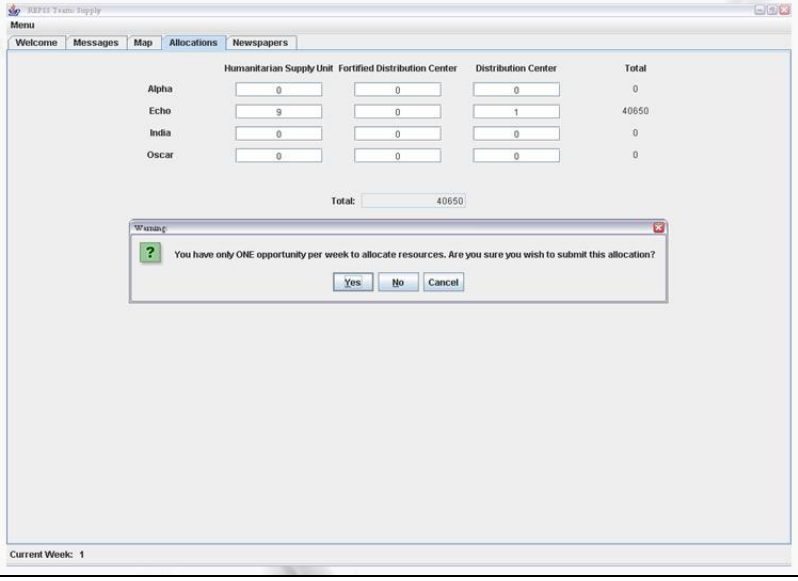
When conducting the exercise, you will need to inform the Commander of your planned spending total before submitting your purchase order. You must enter your purchase information for all four towns before clicking Submit. When approved, click on Submit to make the purchase. In this example click on **Submit** to make your purchase.




Slide 5 of 6

## How to use the REPSS Program: Allocations Tab (cont.)

A Warning pop-up window appears when you click **Submit**. **IMPORTANT!!!. Remember that after you have clicked Yes on the warning pop-up you cannot make any other purchases for any towns for this week. If you make a mistake or fail to fill in purchases for a town there is no way to undo the mistake.** Click on Yes to continue with the tutorial.

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## Congratulations!

You have successfully completed your REPSS Program tutorial! If you would like to review the entire tutorial over again or just sections of it, please click on the links below. If you feel like you are adequately prepared for the exercise, please contact the Controller now by walkie-talkie.

**Entire Tutorial**

**Map**

**Newspapers**

**Messages**

**Allocations**