Operationalizing the AIAA COBP for Joint C2 Experimentation

John Kirzl
Diana Buck
Jonathan Sander
Evidence Based Research, Inc.
1595 Spring Hill Road, Suite 250
Vienna, VA 22182

Abstract

The AIAA has produced a Code of Best Practice (COBP) for Joint Command and Control Experimentation that codifies the procedures and processes for conducting experiments in the Joint arena. As with all such efforts, the proof of the principle is in the doing. In other words, how does the code hold up when it is put into practice? This paper describes the conduct and results of an experimentation program designed in accordance with the procedures and principles espoused in the AIAA COBP.

Introduction

The Aerospace Institute of Aeronautics and Astronautics, Inc (AIAA) formed a task force in May 1998 to develop a Code of Best Practice (COBP) (unpublished) for Joint Experimentation, with a focus on information superiority. The COBP codifies the procedures and processes for conducting experiments in the Joint arena. However, as with all such efforts, the proof of the principle is in the doing. This paper describes the conduct and results of an experimentation program designed in accordance with the procedures and principles espoused in the AIAA COBP.

The focus of the DARPA Command Post of the Future (CPOF) program is experimentation dealing with visualization and human-computer interface issues in the area of Joint Task Force command and control decision making. Although developed concurrently with the AIAA COBP, the CPOF experimental program was designed in accordance with the guidelines contained in the COBP. The first experiment, Limited Objective Experiment-1 (LOE-1), was designed and conducted based on the principles delineated in the code.

This paper briefly describes the AIAA COBP, its intended purpose, and the experimental framework. The rest of the paper illustrates how the CPOF experimentation program designed and conducted LOE-1, mapping to the steps delineated in the COBP and the lessons learned from this effort.

AIAA COPB for Joint C2 Experimentation

The thrust of the AIAA COBP is that the best practice for joint experimentation requires an experimental campaign plan that enables the exploration and maturation of concepts from idea to mission capability packages. The AIAA COBP defines experiments and experimental campaigns as follows:

> Experiment - To determine the efficacy of something previously untried (hypotheses generation), to examine the validity of a hypothesis (hypotheses testing), or to demonstrate a known truth (demonstration). Experiments are always empirical, involving systematic observation and measurement. Experiments involve three phases: Pre-Experimentation, Conduct, and Post-Experimentation.
>
> Experimental Campaign - A series of related activities that explore and mature knowledge about a concept of interest (*voyage of discovery).*

In developing the experimental campaign plan, the concept being investigated generally will consist of several linked activities designed to transit the experimental space. It is likely that some concept explorations will share experimental events, and also thematic experimental activities may generate concepts for specific exploration.

The key concept then needs to be broken down into meaningful parts and placed into a framework that allows generalization of results across time and events. The campaign plan framework is divided into three major segments: Discovery experiments (concept development), Hypothesis testing (concept refinement), and Confirming experiments (concept implementation).

Having laid the groundwork for the experimental campaign, the AIAA COBP describes the best practice for the conduct of an individual experiment. An experiment can be seen as comprising three phases: the pre-experiment phase determines the potential for success; the experiment phase enables success; and the post-experiment phase explores success and consolidates gains.

Pre-Experiment Phase

The pre-experiment phase is the planning segment of the experimental activity. This phase includes a feasibility analysis, development of hypotheses, a context (scenario) for the hypotheses, and an experiment plan. The feasibility analysis looks at the anticipated costs, the expected outcomes (benefits), resources required such as, personnel and facilities, and risks. Hypotheses are developed that test the concept under consideration and how the technology enables that concept. The scenarios are developed to test the hypotheses in the context of the technologies to be examined.

The experiment plan provides the objectives of the experiment (which should be coupled to the campaign plan objectives), the experimental structure, the data collection and analysis plans, training requirements, infrastructure requirements, and the mechanics of conducting the experiment.

The experimental structure describes the main attributes of the experiment. It includes the hypotheses to be tested, the dependent and independent variables, the associated measures of merit, and other observables of interest. The dependent variables are the objective functions, while the independent variables are used to define the experimental focus and to provide the experimental context and conditions. The measures of merit are classified in accordance with the MORS construct - Measures of Performance, Measures of C2 effectiveness, Measures of Force Effectiveness, and Measures of Policy Effectiveness.

The data collection and analysis plans describe the data that needs to be collected in support of the measures, the source of the data, how it will be collected (e.g., observed, automated data capture, logs) and what measures it supports. The analysis plan describes the analytical procedures to be followed, the scoring procedures for the measures, the ground truth key, queries to be used, etc.

The training requirements section describes the training procedures for the participants and the data collectors and/or observers.

The infrastructure requirements section describes the required facilities, models, simulations and tools, as well as the period of time required to conduct the experiment.

Experiment Phase
The experiment phase is concerned with the actual conduct of the experiment. Of primary importance is the conduct of a pilot test to determine if the experimental procedures are sound and executable. The pilot test should conform as close as possible to the actual experiment and should be conducted well enough in advance to allow any required changes to the experiment plan to be made.

For the experiment the scenario is run with simulations (which are used, if necessary, for non-live effects), the data collection plan is executed, quality control is maintained through the sampling of representative observations, and ensuring that collection is continuous (e.g., shift overlap if more than one shift is needed). Discipline needs to be maintained throughout so that the subjects and the scenario do not go off in unwanted directions, and interim assessments should be conducted and mid-course corrections made if necessary.

It is essential that a prompt hot-wash be conducted to identify experimental process insights and lessons learned, and also to develop major findings based on available data and preliminary observations. Finally, post-experimental issues are identified and the team organizes for the final report.

Post-Experiment Phase
The post experiment phase comprises execution of the data analysis plan, to include the conduct of sensitivity analyses, extrapolation beyond observed ranges and conditions, and exploration of anomalies and insights.

This basic framework was implemented during the development and experimentation process for the CPOF project for DARPA.

Implementation of the AIAA COBP in CPOF LOE-1 Experiment

The goal of the CPOF program is to increase the speed and quality of command decisions and to reduce the size of a Joint Task Force (JTF) command staff by one half. The thrust of the analysis effort is to understand how technology can be employed to best influence the cognitive processes of a decision maker, thereby leading to improved situation awareness and higher quality, faster decisions. The types of technologies to be investigated include visualization, multi-model, context tracking and dialog management. Visualization deals with the visual presentation of situations, while context tracking monitors the situation in respect to the context of a particular situation and dialog management regulates verbal and gestural communication.

As part of a one-year jump start program, focus groups were used to determine in which areas of the decision process the CPOF program should focus its energies. The overriding consensus was that the greatest single determinant of the quality of decisions was accurate and timely situation awareness, and that the commander's understanding of the situation be shared by superior, subordinate and lateral elements. The focus groups also pointed out that the decision process can best be observed by examining course of action development and selection. Also identified was the importance of all participating elements being able to comprehend the course of action in the same manner as the commander who developed it.

Therefore, the CPOF program focused on situation awareness as a major component of decision making and will examine how situation awareness affects course of action development and selection. It will also examine the impact of a common understanding (shared situation awareness) on the Course of Action development (COA) process, including the ability of all elements to share the same comprehension of the COA.

Information technologies will affect not only command and control and operational capabilities, but will also impact doctrine, organizational structures, concepts of operation and tactics, techniques and procedures. To make maximum use of the new technological capabilities requires the co-evolution of changes in doctrine, organization, etc. with the introduction of technology. Accordingly, the CPOF experimental program will include investigations into the impact of technology on these functions.

To find a more effective experimentation method, CPOF is adapting the "double helix" experimentation process to help technology and doctrine/Concept of Operations (CONOPS) to merge. This process seeks to create an environment where new CONOPS and new technologies will interplay, so that new technologies can suggest new CONOPS and new CONOPS can generate requirements for new technologies.

This "double helix" development model (one part of the helix is CONOPS evolution, the other part is technology evolution) fits very well with the experimental campaign process enunciated in the AIAA COBP. It follows the same experimentation process, while the tasks regarding technology and CONOPS are layered within particular research elements.

In developing the CPOF experimental campaign plan, the concept being investigated generally will consist of several linked activities designed to transit the experimental space. It is likely that some concept explorations will share experimental events (constituting "threads" in CPOF parlance) and that thematic experimental activities may generate concepts for specific exploration ("filaments" in the CPOF construct).

An experimentation campaign will be developed for each thread. These will include three levels of experimentation. The first level, technology development and concept exploration experiments, are those used to assess specific aspects of a technology and/or operational concept during early planning and development stages. The second level, Limited Objective Experiments (LOEs), are conducted to test hypotheses about individual systems or a small group of systems and associated operational concepts in a limited context. The third level comprises full comprehensive experiments used to assess sets of related technologies and operational concepts in a full military context and evaluate the overall contribution of the system(s) and concepts under evaluation to military capabilities.

Technology Developer Experiments
Specifically, these experiments are technology oriented. They focus on demonstrating that the technology will operate and provide some insights on how the technology will help with the problem at hand. The thrust of these experiments is to determine why the technology is predicted to aid in a particular area and what cognitive processes are involved

Limited Objective Experiments
These experiments are designed to tease out specific contributions of a technology, or small group of technologies. They examine these effects on the ability of a subject to comprehend the situation, recognize the inherent patterns in the situation, and retain in memory specific elements that made up the situation.

The overall plan calls for a walk before you run process. The initial experiments are single subject, static experiments using single technologies. This proves both the experimental concept and provides initial insights on where technologies can have an impact and where they have lesser or no influence. Because visualization technologies are the most mature the initial experiments focus on those technologies. As the technologies mature, and more experience is gained with the experimental process, the LOEs will involve groups in a controlled, simulated command post environment. They will still be rather limited in scope in that the experiments will be designed to investigate specific areas.

Comprehensive Experiments
These experiments will be designed to investigate the impact of technology in an actual command post setting. The design of the experiments will be based on inputs from the results of the technology developer experiments and LOEs. They will use a Command Post Exercise (CPX) format, and may be actual command post exercises conducted by operational units or simulations at a battle laboratory using integrated technologies with operational teams in a realistic command post environment.

CPOF Limited Objective Experiment – 1 (LOE-1)

The conduct and results of the first Limited Objective Experiment (LOE – 1) will now be discussed. The experimental objective was to determine the effects of visualization technologies on the ability of the subjects to comprehend a situation, recognize the inherent patterns and remember the important elements. Prior to running LOE-1, a Pilot Study was conducted to test the experimental run procedures, data collection materials, and the analysis process. This resulted in minor changes in the debrief.

Experiment Plan

LOE - 1 was conducted from 15-19 November 1999 at the Battle Command Battle Laboratory, Fort Leavenworth, Kansas. Subjects consisted of 38 Army field grade officers and 2 civilian employees drawn from the Battle Lab and Command & General Staff College staffs. The objective of this experiment was to determine the ability of three selected visualization techniques to enhance situation awareness as perceived by experienced military officers.

The subjects were randomly assigned to situations and were exposed to three experimental visualizations and one baseline. The baseline consisted of the standard Army map display that would be used for the particular scenario. Displays were visual only (no concurrent briefing was provided) and interaction between the subjects and the displays, training brief and scenario brief was not permitted.

Scenario Controls – Situations were introduced by video tape ensuring that all subjects were provided the same information. Randomization occurred across types of scenarios (combat, Insurgency, etc.) to ensure that each subject was exposed to only one type of situation. The subjects received training on the visualizations using two different situations. The use of different situations and scenario types for each experiment trial mitigated the learning effects posed by multiple trials.

Hypothesis
The basic hypothesis was that the selected visualizations would enhance the ability of an experienced military officer to comprehend a situation. The null hypotheses were:

1. The selected visualizations would not improve the quality of the overall comprehension of the situation.
2. The selected visualizations would not improve the quality of the understanding of the key elements and patterns that dominated the situation.

Conduct of the Experiment

The techniques investigated were presented in the form of static displays. The experiment was similar in character to a “flash card” experiment. That is, the subjects were exposed to different displays in different scenarios for three distinct time intervals.

Procedure
Event sequence - Prior to the commencement of the tasks, the subjects for each session were first asked to complete the experience questionnaire, and then given an overview of the program, test and questions that would be asked. Each subject then proceeded to the assigned work area which consisted of a computer terminal, military map board, video recorder, audio recorder, and timer. The subject was presented with a thirty minute training presentation on the visualization technique being used for the particular trial. The subject was then presented a video briefing on the general military situation for the trial. Following this briefing the subject was exposed to the visualization for a period of one, three, or five minutes.

After viewing the display, the subjects were asked to respond to a set of questions to determine how well they were able to comprehend the situation, discern patterns, and retain factual and spatial information about major entities on the battlefield. The subject was first asked to provide a situation assessment as would be provided to a superior officer. After providing this assessment, the subject was asked to answer a set of specific questions about the battlefield situation. Finally, the subject was asked to provide a sketch of the general situation showing those elements that lead to the situation assessment. The questions were the same for all runs – the observers could, however, ask questions to elicit a more detailed response when warranted. These questions were general in nature and not leading. Each subject underwent four trials. Subjects' answers were compared to those provided in advance by retired senior military officers and other experts selected by the Military advocates and DARPA.

Analysis plan

Test Administrator Tools
Questionnaire- Collected experiment data was in the form of subject's answers to a pre-determined set of questions. The subjects were provided prior knowledge of the questions and were required to answer them immediately after viewing each display. The questions covered three broad categories of perception: comprehension, pattern recognition, and entity retention. Debriefing of observers also included provisions for ascertaining observer insights concerning the visualizations and the procedures. A draft questionnaire is provided at Appendix A.

Video/audio recorders- The debriefing sessions were captured both by audio and video recorders for later transcription and analysis.

Experimental Design
Independent Variables: Situation, Time, Treatment

Situations:	Force on Force - Complex
	Force on Force - Less Complex
	Insurgency - Complex
	Insurgency - Less Complex

Time: 1, 3 and 5 minute exposure to treatment

Treatment: 2 new visualization techniques
1 currently used technique

Control Variables: Background data was collected on the experience and training of the subjects (see issues at Appendix B)

Dependent Measures

The overall measures are listed in tabular form below. They are divided into comprehension (the ability to understand the overall situation), pattern recognition (can the subject recognize those patterns that make up the situation assessment), and entity retention which is the ability of the subject to retain in memory the most important elements of the situation.

Measures of C2 Effectiveness (Comprehension)

Comprehension Correctness	For the different time frames - Correct if answer matches actual situation; Not incorrect if answer has actual situation as a contingency. Incorrect if answer does not contain correct situation

Measures of C2 Performance (Pattern Recognition)

Comprehension Completeness	Knowledge of all elements required to describe the situation, including potential alternative futures
Comprehension of Temporal Relationships	Time into the future that subject projected the situation
Risk and Opportunities Completeness	Knowledge of all friendly force opportunities and risks inherent in the situation

Measures of C2 Performance (Entity Retention)

Retention Accuracy	Accuracy of placement of entities on a map
Retention Completeness	Completeness of all entities retained
Resource Correctness	Percentage of key resources properly identified

The actual metrics were based on the ability of the subjects to correctly answer a set of questions (Appendix A) upon completion of viewing each visualization. The metrics are the answers to the questions and are provided in Appendix C.

Results

Data Scoring

Situation Assessment (question 1)
Each item on the scoring sheet was scored as follows:
Correct; 2 points
Partial or not incorrect; 1 point
Item not addressed by subject; 0 points
Incorrect; noted and flagged, but not assigned a value
Section Score: Number of points divided by number of possible points normalized on a scale of 1 - 100

Own opportunities and risks (question 1a)
Each item on the scoring sheet will be scored as follows:
Correct; 2 points
Partial or not incorrect; 1 point
Item not addressed by subject; 0 points
Incorrect; noted and flagged, but not assigned a value
Section Score: Number of points divided by number of possible points normalized on a scale of 1 – 100

Enemy capabilities, vulnerabilities and intentions, and friendly vulnerabilities (questions 1b and 1c)
Each item on the scoring sheet will be scored as follows:
Correct; 2 points
Partial or not incorrect; 1 point
Item not addressed by subject; 0 points
Incorrect; noted and flagged, but not assigned a value
Section Score: Number of points divided by number of possible points normalized on a scale of 1 - 100

Alternate possibilities (question 2a)
Number of possibilities were counted and compared with "book solution" possibilities. Those possibilities mentioned by the subject and considered supported by the data were included in the "book solution" column. Those possibilities that are considered incorrect were noted and flagged.

Information required, elements (questions 2b, 3a)
Each item on the scoring sheet will be scored as follows:
Correct; 2 points
Partial or not incorrect; 1 point

Item not addressed by subject; 0 points

Section Score: Number of points divided by number of possible points normalized on a scale of 1 - 100

Data Reduction

Upon completion of all runs, the observers transcribed their notes using the audio tapes to verify the information content.

Following the transcription of the notes each observer arranged the responses in accordance with the questions and scored the trial. Experience has shown that military officers tend to include topics of interest for other questions when answering a particular question, especially when describing the situation. The observers were careful to ensure that these answers were accounted for. Question 1 was coded twice. First it was coded based on the answer provided when the question was initially posed (Q1alone). Second, when coding the other questions, credit was given where answers to Question 1 were provided as part of a response to the other questions (Q1 ALL). During the coding process, intercoder reliability meetings were held to minimize possible differences of interpretation between coders.

Performance Results and Insights

The overarching result is that, in the aggregate, the CPOF technologies significantly out performed the control technique in providing situation awareness. Figure 1 depicts the overall situation awareness scores for the combined CPOF technologies vs. the control depiction across all situations, where t= 2.77 (69), p=.007. The numbers represent the percentage of the set of required elements included in the subjects' answers to the question "You have three minutes to brief your commander on your assessment of the situation; what do you tell him?"

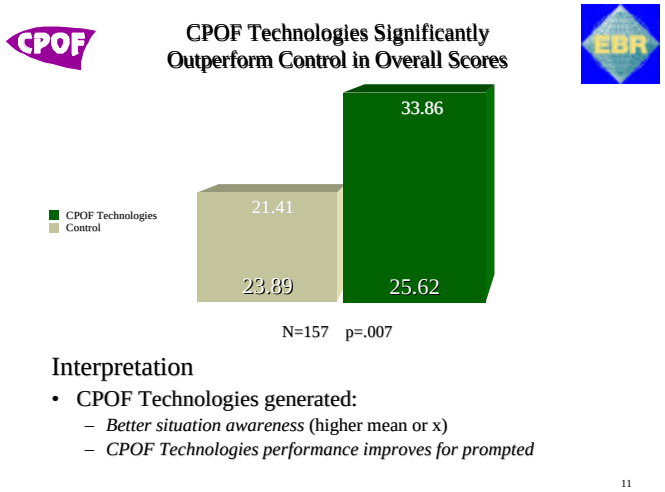

Figure 1

The results were averaged over the four situations, two force-on-force and two insurgency situations with each having one complex scenario and one simpler scenario. Each of the two technology developers provided one technique for the force-on-force situations and

one technique for the insurgency situations. In addition, one of the technology developers provided two variations of its technique for the force-on-force situations.

This same general pattern of scores for situation awareness scores holds true for the CPOF technologies in the complex force on force (t=2.878 (37), p=.000) and in the complex insurgency situations (t=2.488 (37), p=.035) (Figures 2 and 3).

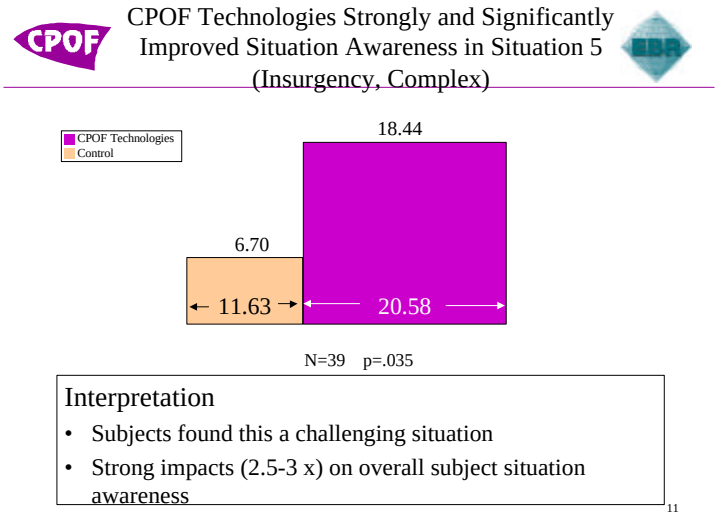

Figure 2

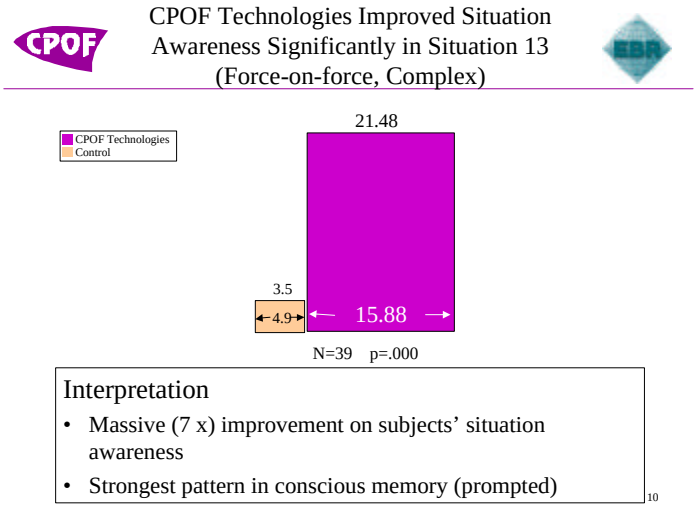

Figure 3

The individual treatments exhibited different strengths. In the force-on-force situations one treatment was very strong in the situation where relative force strength and position was a determining factor, while the other treatment showed strength where movement over terrain was a determining factor.

In the insurgency situations, both treatments showed that techniques for displaying events across time and space produced beneficial effects. The display of "drill down" information was also a significant advantage.

Situation analysis (Insurgency)

In **Situation 4**, subjects who viewed CPOF Treatments performed significantly better in a majority of categories than did those viewing the Control Treatment. This was largely due to the Control Treatment's inability to clearly and effectively illustrate various rebel activities over time, population centers, and to a certain extent the terrain and road system.

Subjects who viewed the Treatment A did significantly better than those who viewed both Control and Treatment B in overall situation awareness. Much of this may be explained by Treatment A's high scores in identifying recruiting, propaganda and logistics activities. Treatment A chose to display these preparatory activities on a separate frequency chart while Treatment B and Control did not. Surprisingly, the subjects viewing the Treatment B scored higher in identifying leadership activities, which was also on Treatment A's separate chart, but scored lower than Control in the other three preparatory activities. Beyond these, the scores for threat level were fairly constant across treatments, while both CPOF treatments scored higher in recognizing the locations of insurgent activities.

In **Situation 5**, subjects who viewed CPOF Treatments performed significantly better overall than those who viewed the Control Treatment. CPOF strengths lay in city representation and links with local insurgent activity, and the organization of events by time, category and location.

Subjects viewing the CPOF Treatments scored significantly higher than those viewing the Control Treatment in only one area within situation awareness. The threat of imminent attack, with primary risk to the cities, was recognized roughly twice as often by subjects viewing the CPOF Treatments than by those viewing the Control Treatment. This may be explained by the ability of the CPOF Treatments to quickly quantify events through the use of graphics representing actions by type, location, and over time. Additionally, Treatment A used separate charts to convey a breakdown of insurgent incidents by number and time, which gave a clear indication of a general rise in activity.

There was no significant difference between CPOF and Control scores in the remaining two questions in the situation awareness section; the scores for secondary risk in the northeastern areas, and the fact that the insurgency situation had been going on for several years, were uniformly poor across all treatments. That latter may be explained by noting that none of the treatments conveyed this information anywhere. Also, the close proximity of the secondary risk areas (Quanamint & Ft Liberte) to Cap Haitien may have resulted in the subjects' grouping them together with the primary risks.

Situation analysis (Force on force)

For the force on force situations one treatment used a technique that aggregated various factors into a force strength number, and displayed units in the aggregate as part of a blob who's outer ring represented both the range and combat power of the unit. This treatment worked well in the situation where force strength and location were the dominant factors. However, in the situation where movement over restricted terrain dominated, the aggregation provided misleading information.

The other treatment relied on animation of standard icons on a terrain map. This worked well in the situation where movement over terrain was the major feature. However, in the situation dominated by strength and location this treatment used an unfamiliar color scheme to identify units. This tended to confuse the subjects as to which units were friendly and enemy. This, coupled with animated movement, was confusing to the subjects.

In **Situation 10**, both relative movement over terrain and relative combat power were important. Subjects who saw Treatment A performed best overall. Particularly strong were Treatment A subjects' understanding that the terrain canalized the movement of Red through Death Valley, suggesting that this representation of terrain features was strongest of the three. Almost all Treatment A subjects observed that Blue had the opportunity to block Red at the northern end of the valley, and that the relative speed of movement of Red and Blue units was important. Treatment A's use of virtual animation to show the recent movement of Blue and Red forces was probably the key factor in both of these categories.

Treatment A subjects did not perform best in all categories, however. The depiction of many subordinate Red units, without indicating their command relationships or task organization, varying unit icon size to indicate echelon, and choosing not aggregate units or display estimates of relative combat power probably are what caused Treatment A to score poorest of the three in conveying the size and disposition of Red's forces.

In **Situation 13**, the balance of localized combat power was paramount. While there was significant movement of Red forces from west to east, neither the speed of that movement nor the relative movement of Red and Blue forces ultimately presented the issue it did in Situation 10.

By using a system of color coding units by function instead of by allegiance, Treatment A apparently obfuscated the relative positioning of "Red" and "Blue" forces, also making it more difficult for subjects to get a quick appreciation of the rough balance of combat power. The effectiveness of this treatment's use of different sized conventional unit icons to help the subjects gain an appreciation of force balance by graphically indicating unit echelon is hard to judge. Its benefit seemingly was overpowered by the disorienting effect of functional color coding.

Subjects who saw Treatment B scored best for situation awareness and recorded best scores in more than half of the answer key categories. Aggregating the combat power of

Blue and Red units into just a few “Blobs” seems to have given subjects quick and effective appreciation of the localized force balances.

Overall, the CPOF treatments were able to outperform the visualization techniques currently employed. Using the AIAA COBP, in conjunction with the Double Helix model, allowed experimenters and technology developers to use experimentation in an effective manner to discern these effects.

Summary

The Limited Objective Experiment – 1 was the initial experiment for the Command Post of the Future program. It had a limited focus: to determine the effects of certain visualization techniques on the ability of a subject to comprehend a given situation. Although narrow in scope, this experiment generated some valuable insights for the program and continued execution of the campaign plan.

Visualizations are powerful tools when appropriately applied to the types of .situations represented in the scenarios (insurgency and force-on-force). Consequently, a “one size fits all” approach is probably not appropriate.

Further significant contributions will be demonstrated as other technologies are integrated with the visualization tools, such as context tracking and dialog management, which will enable the commander to tailor the displays to the situation and to “drill down” as necessary.

In a continuation of the campaign plan, future experiments will investigate the use of these techniques. The experiments will also venture beyond situation awareness into the decision domain.

The LOE – 1 also demonstrated the strengths of the experimental approach:

- The effects of CPOF technologies on performance can be measured
- The technique of combining statistical analysis with observations garnered from subject debriefs allows the analysts to explore the “whys” behind the scores
- The CPOF experimental approach captures the strengths and weaknesses of the treatments

Appendix A

1.You have three minutes to brief your commander on your assessment of the situation, what do you tell him?

1a. In this situation what are the friendly:

Opportunities?

Risks?

1b. What are the adversary's:

Offensive capabilities?

Defensive capabilities?

Vulnerabilities?

Intentions?

1c. What are the vulnerabilities for own forces?

2a. If you are not certain about adversary intentions and capabilities, what are the different possibilities?

2b. If you are not certain, what information would you require to resolve this uncertainty?

3a. What specific elements or element combinations lead you to your situation assessment?

3b. Please make a sketch of the situation, including the specific elements or element combinations cited in your previous answer.

3c. Was any information you would find valuable missing from the presentation of the situation?

4. What was good and or bad about this display? What would you like to see added, removed or changed?

Appendix B

Subject No. _____ Name: _____ Date: _____

Biographical Information

The purpose of this questionnaire is to obtain some information about your military background and experiences. This information will be used to better understand your responses. All information collected will remain confidential and will not be released to third parties. We appreciate your cooperation in completing this form.

1. Rank _____ 2. Service _____ 3. Years on Active Duty _____

4. Current Position _____

5. Military Schools Attended

6. Have you received training that included training in situation awareness?
Yes _____ No _____

7. Assignments in Command Centers: (answer for each command center assignment)

Assignment_____ Level of Command Center_____

Length of Service _____ Role in Command Center _____

Combat? Yes No

If yes, campaign_____ Duration _____

*****

Assignment_____ Level of Command Center_____

Length of Service _____ Role in Command Center _____

Combat? Yes No

If yes, campaign_____ Duration _____

*****

Assignment_____ Level of Command Center_____

Length of Service _____ Role in Command Center _____

Combat? Yes No

If yes, campaign_____ Duration _____

8. Command Assignments (answer for each command assignment)

Assignment_____ Level of Command _____

Length of Command Tour _____

Combat Yes_____ No_____

If yes, which campaign _____ and duration _____

Field Exercises Yes_____ No_____

If yes, which Field Exercises _____ and duration _____

*****

Assignment_____ Level of Command _____

Length of Command Tour _____

Combat Yes_____ No_____

If yes, which campaign _____ and duration _____

Field Exercises Yes_____ No_____

If yes, which Field Exercises _____ and duration _____

*****

Assignment_____ Level of Command _____

Length of Command Tour _____

Combat Yes_____ No_____

If yes, which campaign _____ and duration _____

Field Exercises Yes_____ No_____

If yes, which Field Exercises _____ and duration _____

9. Approximately how many CPX's have you participated in? _____

(From most recent)

At what levels of command: _____

Your roles in CPX's : _____

10. On which, if any, systems supporting command, control, communications, computers, and intelligence (C4I) do you consider yourself trained? (list all that apply)

Appendix C

Situation 4

Answer Key
1 Situation
Low level threat situation
Insurgent activities North, urban areas and borders
leadership
recruiting
propaganda
Logistics events with arms shipments
1a
Opportunities
Cut off arms coming in to country
Increase democratic process to cut off insurgents
Risks
Small scale terrorist raids especially in urban areas
1b
Offensive capabilities
Demos in urban area
Attack in platoon size throughout country
Low scale terrorism vs govt targets/political actors
Defensive capabilities
Armed groups
Capable of disappearing
Vulnerabilities
Activities tied to road system
Intentions
Small scale terrorism
Make a point through demonstrations
1c
Own force vulnerabilities
Static and in cities vulnerable to terrorist attacks
Attacks on off-duty personel
Lots of small, dispersed, weak garrisons
2a alternate possibilities
Attempt to seize a main city for propaganda purposes
Largescale brief attack on Cap Haitian or Quanamint
Pick off isolated garrisons
2b Info required
Activity Border, Mid, S and SW areas
HUMINT about specific intentions
Situation in neighboring country - close bases & recruiting
Location of enemy leadership
3a Elements
Location and timing of events
Terrain patterns - urban/rural/roads
Relative location of forces
Pattern of events over time

Situation 5
Answer Key

1
Situation
Insurgency situation for several years
Attack imminent primary risk Cap Haitian Port au Prince
Secondary risk - NE Quantamint and Fort Liberte
1a
Opportunities
Atk HQ in Quantamint
Raids for important documents/maps/plans
Risks
Size of force & arms - could have trouble defending
US forces at risk
Democratic system at risk
Attack at any time
1b
Offensive Capabilities
Attacks in Cap haitian & Port au Prince
Company size forces
Defensive Capabilities
Limited defensive capabilities (can't defend against military force)

Meld into the population
Vulnerabilities
HQ in Quantaminto
Focused in urban areas
Their assembling time
Supply depends on main roads
Intentions
Attack to disrupt elections primary risk Cap Haitian Port au Prince

1c
Own force vulnerabilities
Static
Small & lightly armed
Located in cities
Inside cantonments
Need better intel
Isolated forces (esp in Mirebalais)
Terrorism
2a alternate possibilities
Intimidate, by presence, citizens not to vote in election
Secondary attack in NE
If heavily armed, could be big danger
2b Info required
Travel activity on roads to cap Haitian and Port au Prince
When they are planning to attack relevant to election

Info on non activity sites
Info on off road movement
Info on center of country activity

3a Elements

Timing of events Cap Haitian, Port au Prince, Quantamint (events coming closer together with less time between events)

Rebel actions
Date of election
Dated reports of movements from border areas to cities

Situation 10
Answer Key

1

Situation

Beatty Junction is key terrain
Zapwich forces over extended
Terrain canalizes movement of forces N/S through Death Valley
Mech forces can only use roads to move between valleys

!a

Opportunities

Block Red at choke point
Attrit Red Forces in DV w/ air and arty
Coalition can cut off 1st & 2nd divs from reserves
Move SW and over mountains atk enemy flank

Risks

Coalition will not be quick enough to complete envelopment and trap enemy

Coalition will not be strong enough to trap enemy divisions

Assigning enough strength to envelopment may leave force defending Beatty Junction too weak to block enemy Nward advance

Coalition forces could become trapped into fighting both 5th division and 1st & 2nd divisions in the South

1b

Offensive Capabilities

Zapwich has 3 mech divs two of which are involved in the attack with 3rd in reserve

Defensive Capabilities

Zapwich doesn't have air power in theater to contest Coalition's use of air power

Vulnerabilities

Enemy forces canalized and strung out in DV
Gap opened between 2nd & 5th divisions
Enemy right flank exposed via RT 190 from DV junction and via rt 178 from Shosone
Enemy pinned at Death Valley or proceeds thru at great loss

Intentions

Seize Beatty junction and prevent westward movement of coalition

1c
Own Force Vulnerabilities
TF Nevada less than 1/2 enemy IV Corps
Bulk of coalition forces East of enemy salient - armored recon Bns may not be able to hold Beatty junction
TF Nevada threatened from South thru Silurian Valley and Shosone by 5th div
Logistics restrict maneuver South
2a Alternate Possibilities
Enemy continues to exploit advance by moving further into Orkluk and take control of more of Western Orkluk
Enemy 5th div could move n through Silurian valley to capture Shosone
2b Info required
Are Enemy forces moving N or E
Capabilities and intentions of 5th (Reserve) division
3a Elements
Enemy force size and location
Terrain features
Relative speed of movement of units

Situation 13
Answer Key

1 Situation
Northland shifts weight of forces East
Northland leaves pinning force in west
Terrain limits both sides to two avenues of approach
Blue has sufficient combat power for defense
Choke points in east vulnerable to air and indirect fire
Blue forces separated by difficult terrain, cannot support
Air situation roughly equal
1a
Opportunities
Coalition can interdict Northland thrust south from Shosone by using air or artillery on choke points along rt 127
Cut lengthy red lines of communication (by air)
Take advantage of terrain east of Ft Irwin for defense
Risks
Red can defeat small units along eastern flank
Blue units at Ft Irwin concentrated (attractive target)
Western blue force can be flanked (east)
Red can bypass Blue in east and cut lines of communication
1b
Offensive capabilities
Conduct limited attack in west
Can force blue onto defense in east
Can turn flank at Baker
Inflict casualties with SCUD strikes (Ft Irwin)

Defensive capabilities
Can hold border area in west
Can occupy and defend in east
Has sufficient air to assist defense
Vulnerabilities
Northland forces must use a single road to move south from Shosone (can be interdicted)
Weak logistically (Long MSRs, lengthy recent movements)
Lacks force ratios for attack (over extension)
Intentions
Northland intends to attack South from Shosone.
Pinning atack in the west
1c Own force vulnerabilities
Forces cannot easily support each other
Small units isolated on eastern flank
Western blue force can be flanked (east)
SCUD attack on Ft Irwin
Light forces facing heavy mechanized forces
2a alternate possibilities
Northland bypasses Ft Irwin, swings behind and attacks
Conduct limited objective attacks across border on East and West (negotiation strategy)
Attack to split two Blue forces, force Blue eastern force to fight on two fronts
2b Info required
How fast can Red move
What is Red's readiness (fuel, ammo, etc.) status
Location of SCUDs
Whether SCUDs are WMD capable
Sensor coverage of masked terrain
3a Elements
Force ratios
Size of Northland's forces
Movement of Northland's forces
Location of Northland's forces
Avenues of approach
Extended Northland MSRs
Parity of theater air
Separation of Blue forces
Presence of Red SCUDs
Composition of Northlands forces (defensive in West, offensive in East)
Composition of Blue forces (light)
Existance of Blue naval task force
Terrain (avenues of approach)
Terrain (choke points)