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C2 for Complex Endeavors

A SENSEMAKING VISUALIZATION TOOL WITH MILITARY DOCTRINAL ELEMENTS

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Abstract

The Army's Center of Battlefield Excellence in Human-Centric Command & Control Decision Making is exploring how to use information visualization to enable collaborative sensemaking. The goal is to provide a common operating picture with shared situation awareness in the context of dynamic task situations. We have developed a Sensemaking Support System (S3), a prototype sensemaking visualization tool with situation understanding capability and knowledge discovery components. We experimentally validate the utility of the tool through series of experiments from a set of minimally constructed stories (MCS) that contain the saliencies of unstructured battlefield information dynamics. The results show the followings: (a) the perception rating of S3 with respect to sensemaking cognitive measures was highly significant; b) the problem scenarios (MCS) were highly significant; and there were noticeable interaction effects between the cognitive measures and the problem types. Generally, the S3 software needs further improvement in representation fidelity of problems that mimic battle field situations. This is shown by the poor weighted ratings in a more chaotic scenario MCS3.

INTRODUCTION

The Backdrop

Within the Department of Defense (DOD), team decision making, shared situational awareness (SSA), and common operating picture (COP) have become the dominant paradigms or lexicons for Command and Control (C2) decision making process. This is clearly stated in the Army's FM 3.0 doctrine handbook. The FM 3.0, *Operations*, refers to battle space visualization in several ways. Doctrinally, these characteristics generally apply to visualization in any type of operational situation. Hence, they serve to frame any sort of analysis that might be undertaken to identify key training objectives (Leedom, 2006). As noted in the FM 3.0, visualization is a purposeful activity since it enables people to detect the elements of a situation before making any decision. That is, one engages in battle space visualization for the specific purpose of

identifying specific actions that can be taken to influence the present situation and move it toward an intended objective or end state:

> *… Commanders, assisted by the staff, visualize the operation, describe it in terms of intent and guidance, and direct the actions of subordinates within their intent…*
> *… The volume of available information challenges all leaders. They assimilate enormous amounts of information as they visualize the operation, describe their intent, and direct their subordinates' actions. Visualizing the operation is continuous. It requires commanders to understand the current situation, broadly define the future situation, assess the difference between the two, and envision major actions that link them.*

The Challenge

With major combat operations in both Afghanistan and Iraq, coalition forces face a much more complex challenge in the furtherance of its national security objectives –the emergence of what Colonel T.X. Hammes[1] has termed fourth-generation warfare. One of the several problems in this kind of war dimension is managing information equivocality and responding to fast-space changes of battle space dynamics. This leads to the requirement of changes in the current training paradigms to include sensemaking in which individuals and teams of soldiers (platoons, units, etc) are taught to visualize changing and emerging battle field dynamic and develop situation understanding of such situations. A common operating picture (COP) that can provide dynamic situation awareness must be provided.

Research has indicated that group decision making participants have difficulty in sharing their uniquely held information or tacit knowledge and in integrating unique information from other participants. In the military context, or even in the business environment, no single individual can claim to know how to make sense of information from environments that change over time, and for which no one meaning can be assigned to a contextual piece of information. In a typical C2 environment, shared information items might include rules of engagement, order of battle, Commander's Intent, the OPLAN, etc. In a business environment, these might include items such as news report by a television network, newspapers, widely circulated company documents, ticker quotes, etc. The battle staff working in groups will use the shared information in context to develop a sensemaking process so as to derive actionable intelligence or a situation understanding necessary to inform for command decision making.

SENSEMAKING

Asymmetric warfare has some elements of complexity, dynamism, uncertainty, and other characteristics that defy conventional planning. It begs for deeper cognitive analysis that is grounded on both ontological and epistemological reasoning—seeking answers to "why", "when", "where", "how", so on. For example, in the September 11, 1991 terrorist attack report, so many questions have been asked -- What happened? When? Where? Says who? Was it a terrorist act? Did it involve an intelligent failure? Trying to make sense of the situation has, and will continue to hunt human rationality. The process of gaining an insight into- and an understanding of- a situation is known as making sense. When the understanding is translated into actionable intelligence, a

[1] COL T. X. Hammes (2004). Hammes, T.X. (2004). 4th-generation warfare. *Armed Forces Journal*.

situation understanding is said to have occurred (Ntuen, 2006). Sensemaking is then, a process, a design, or a technique of fusing information in context to derive understanding from fragmentary pieces of information.

Sensemaking can be viewed as a paradigm, a tool, a process, or a theory of how people reduce uncertainty or ambiguity; socially negotiate meaning during decision making events. Weick (1995) states that sensemaking refers to how meaning is constructed at both the individual and the group levels. Through the accurate construction of meaning, clarity increases and confusion decreases. Leedom (2002) indicates that battle rhythms can best be understood through the sensemaking process. A poor sensemaking process often leads to poorly understood objectives, missions, and visions. This in turn can lead to poor framing of plans, and consequently, poor decisions. Sensemaking involves the collective application of individual "intuition"—experience-based, sub-consciously processed judgment and imagination—to identify changes in existing patterns or the emergence of new patterns (Weick, 1995). A peruse of literature on sensemaking can be summarized as follows: How are meanings and understanding of situations, events, objects of discourse, or contextual information produced and represented in a collective context?

THE CURRENT STATE-OF-THE ART

There is a recent interest in using display and visualization technology to enable the sensemaking process. In describing the overall process of battle command as an art, Army doctrine infers that battle space visualization is frequently an intuitive process –that is, one governed largely by automatic cue recognition and the activation of tacit knowledge:

> …*Using judgment acquired from experience, training, study, and creative thinking, commanders visualize the situation and make decisions. In unclear situations, informed intuition may help commanders make effective decisions by bridging gaps in information. Through the art of command, commanders apply their values, attributes, skills, and actions to lead and motivate their soldiers and units…*

Figure 1 below portrays this doctrinal representation.

The development of the current generation Common Operating Picture (COP) was motivated by the desire to improve situation awareness within a military command organization –thus leading to faster and better synchronized planning and execution decisions. Like many information management systems found in corporate industry, the COP was built on the same philosophy used for managing physical assets: capture information and put it in a place where it can easily accessed. The next generation COP must be built upon a clear understanding of the socio-cognitive processes employed within the military command organizations to translate available information into timely and focused action. This has been the premise of sensemaking support systems; much of which has been developed implicitly into decision support tools.

The major difference between sensemaking support system (S3) tools and decision support systems (DSS) is that S3s support sensemaking activities, while DSS support decision making activities. DSS has matured in its constructs and theories; S3s are relatively nascent and universally lack acceptable theoretical frameworks, and constructs. Nevertheless, attempts to create S3s date back to the late 1980s ("NoteCards"

by Halasz, Moran, & Trigg; “gIBIS” by Conklin & Begeman) in the areas of Human Computer Interaction and Computer Supported Cooperative Work. Other influential early systems are SEPIA (Streitz, Hanneman, & Thuring, 1989) and SIBYL (Lee, 1990). The systems previously mentioned are all based on graphical hypertext and were definitely a force of movement towards what we called S3s. Another influential tool was QuestMap, developed in 1990. It was created to support sensemaking and group activities. QuestMap enjoyed success as a commercial tool, but the success was limited and the system did not

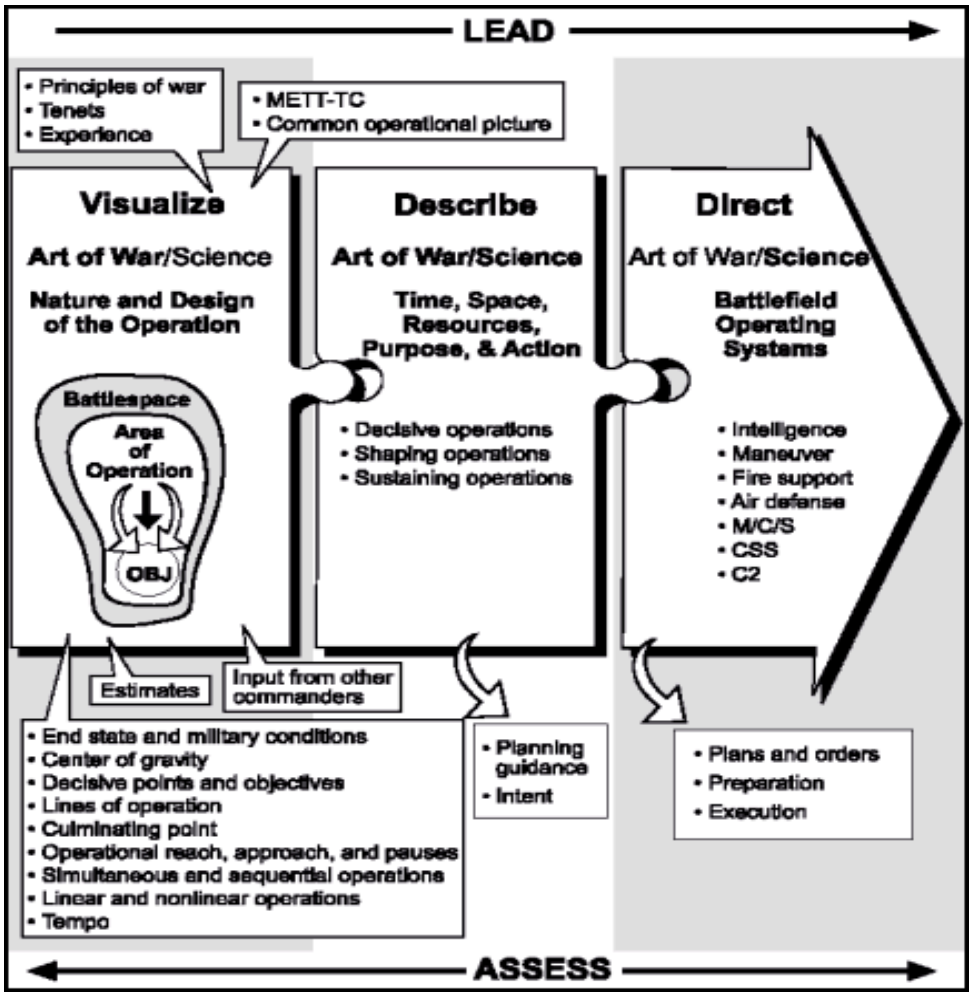

Figure 1. Army’s Doctrinal & Operational Support (FM 3.0, pp. 5-4)

stay in the market too long. Taking advantage of the lessons learned through QuestMap, the Compendium (Selvin et al., 2001) methodology was initially developed by Verizon research labs, and it was first released as a computer technology in 2003. Compendium seeks to improve the knowledge management and sensemaking ability of groups and individuals. These systems are representative of some of the most influential developments in the area of S3. Table 1 shows some selected S3 related tools over the past years. It should be noted that most of the systems listed above are purely theoretical, and addressed well designed problems in context. The last five rows of the table only

provide paradigms for design. Therefore, we need a support system that can handle the characteristics of modern battlefield information management.

Table 1. Some selected related S3 software tool and paradigms

Name/Year	**Developer/s**
NoteCards (1987)	*Halasz F, Moran T, Trigg R*
gIBIS (1987)	*Conklin, J., and Begeman, M.L.*
Working by Wire SM (1996)	*Gundry & Metes*
Sensemaker (1997)	*Baldonado and Winograd*
KnowledgeX - KORE (1998)	*IBM*
VxInsight (1998)	*Davidson, Hendrickson, Johnson, Meyers, & Wylie*
KIE Sensemaker Tool (1998)	*Bell, P*
PowerBookmarks (1999)	*Li,W.,Vu Q., Agrawal ,D., Hara,Y., Takano,H.*
Raven (1994)	*Finkelstein et al.*
ClaimSpotter (2004)	*Sereno, Shum, & Motta*
Mission Mate (2004)	*Cheah, Chew, and Tan*
eKnowledge Suite (2004)	*NewHyperG*
Confrontation Manager (2005)	*Crannell, Howard, Norwood, Tait*
Joint Battle space Infosphere (2005)	*Milligan and Ahmed*
ClaiMaker, ClaiMapper, & ClaimFinder (2005)	*Uren, Buckingham Shum, Bachler, & Li*
KnowledgeMiner (2006)	*Knowledge Miner*
VantagePoint CommonKADS Methodology (1999)	*Search Technology* *Schreiber et al.*
Compendium (2001)	*Selvin et al.*
Cynefin Framework (2003)	*Kurtz & Snowden*
SSIGS: Sensemaking-supporting Information	*Qu, Yan*
Data/Frame Model (2004)	*Klein et al.*
Issue-Hypothesis-Evidence framework (2004)	*Leedom, D.K.*
Three-part Workspace Awareness framework	*Gutwin and Greenberg*
COLAB (2005)	*Morrison and Cohen*

SENSEMAKING SUPPORT SYSTEM (S3) DESIGN

Foundation Cognitive Theory

According to the Army's FM 3.0, *"Commander's visualization is the mental process of achieving a clear understanding of the force's current state with relation to the enemy and environment."* This alludes to the fact that sensemaking is a cognitive task (Ntuen, 2006). To design S3, we capture this doctrinal statement in terms of cognitive abstraction hierarchy that consists of four macro level cognitive elements. These are: 1) the operator's experience as retrospective knowledge, 2) a situation awareness model that enables spatial knowledge and affordance for noticing information, 3) a knowledge

discovery model build around a network of human visualization and pattern recognition mental models, and 4) a situation understanding model to enable the process of translating information in context to actionable intelligence. This cognitive hierarchy is portrayed in Figure 2.

Supporting sensemaking tasks requires that we consider both team (shared) and individual situation awareness and critical thinking skills. As shown in Figure 2, a critical thinking skill set consists of the requirements needed to frame an understanding of a situation from the stand point of contextually changing goals with reference to the knowledge elements shown on the right hand side boxes of Figure 2. It also includes the ability to use retrospective knowledge to discover new knowledge elements from evolving situations; and making meanings out of a situation in order to supports dynamic decision making. In the battlefield C2 situations such decisions must be cognizant of the distributed information networks which are used to create common operational pictures (COPs) of the battle space. A COP facilitates collaborative planning and assists all command echelons in achieving consistent situation awareness, both notionally and practically in a parallel and converging manner. In this context, the term "picture" refers not so much to a graphical representation, but rather the knowledge used to define an operational situation.

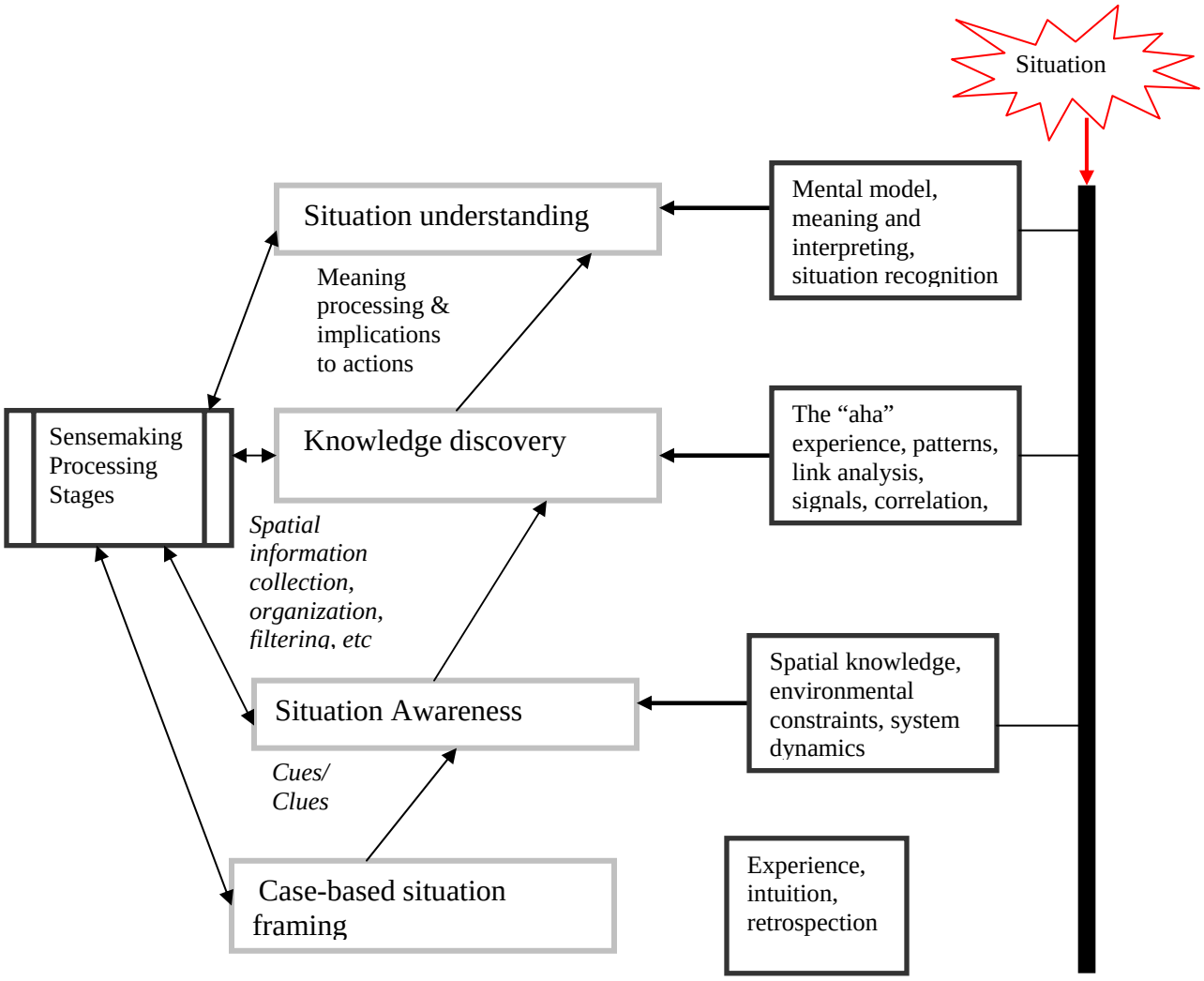

Figure 2. Cognitive information hierarch in S3

THE SENSEMAKING VISUALIZATION MODEL

According to Leedom (2006), visualization is structurally framed by doctrine and intuition (*i.e.*, tacit knowledge) plays an important role in framing the battle space visualization process. These visualization models should be able to capture the commanders' experience as well as the doctrinal guidance. S3 attempts to capture these knowledge elements in three ways: (a) The Commanders' perspective and the things they emphasize when trying to understand a situation; (b) The elements or features of battlefield knowledge as visualized by the commanders and the battle staff. This could take various forms that include the explication of commander's intent, Commander's critical information requirements (CCIRs), and priority intelligence requirement (PIR); and (c) the operational resource requirements, time, purpose, and perceived actions as defined by such doctrinal elements as METT-TC (Mission, Enemy, Time, Terrain; Tactics and Civil affairs). These requirements may differ from contexts to contexts and in operational echelons; e.g., a context may be urban warfare in which pursuit tracking display elements are used to identify the adversary, a stability operation in which behaviors of local insurgents are to be monitored; at the tactical level, display and visualization elements may be designed to support a real-time understanding of the battlefield dynamics and the requirements to map actionable intelligence to bring the desired effects; at the operational level, such visualization elements may be designed to allow the commanders to conduct "what if" and "what next" simulation exercises to assess task and resource requirements, and the levels of effects likely to result from the simulation.

S3 is aimed primarily at the team sensemaking exercises. The S3 design is to enable information sharing in a community of battle staffs. As noted by Eppler and Burkhard (2004), knowledge visualization allows visual representations to improve the creation and transfer of knowledge between people by sharing what they know and what they need to know through perspective making and sharing. This collaborative knowledge sharing is crucial to the battle staff that must collectively connect their experiences and share their perspectives on how the battlefield information is related to the mission and the commander's intent. Visualization is then used to encourage these shared beliefs, values, experiences, individual intentions, and the meanings that each battle staff gives to context information. On this note, visualization can be constructed as a social interaction model in which group cultural cognition can emerge. As a community, the battle staff can use visualization aids to create and reproduce knowledge through social relationships and interactions defined by common standard operating pictures, doctrines, and tactics, techniques, and procedures (TTP). However, notes Novak and Wurst (2004), *"in order to make sense out of information and construct knowledge, one need to contextualize it within one's own existing knowledge and thought world."*

Our S3 architecture is constructed around the above mentioned collaborative cognitive requirements of the commanders and the battle staffs. The visualization model is driven by task contexts defined at different strata of operational doctrines. Figure 3

illustrates the theoretical hierarchy of information flow and their model elements. As shown in Figure 3, S3 uses situation stories to trigger the sensemaking process. We use minimally constructed story (MCS) for each exercise because we want to represent

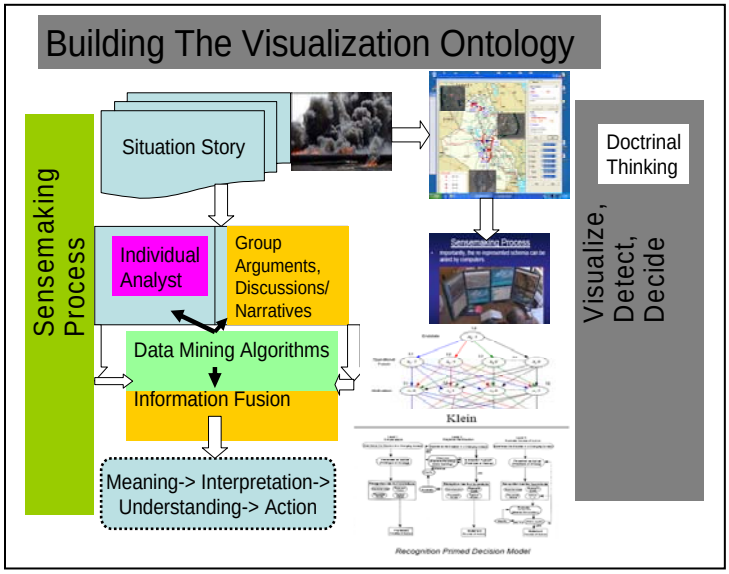

Figure 3. The information model components of S3

different levels of complexity to simulate battlefield dynamics and their evolving information contexts. We use the Cynefin model of complexity (Kurtz & Snowden, 2003) as a paradigm for this purpose. Like the Cynefin model, S3 structures problems into four quadrants: (1) ordered domain with known causes and effects, (2) ordered domain with knowable causes and effects, (3) un-ordered domain with complex relationships, and (4) un-ordered domain with chaotic situations. Exhibit 1 shows examples of MCS used in S3. As shown in Exhibit 1, the cases are minimal in terms of the description (completely open-ended) and vagueness (no specificity). The battle staffs and the intelligent analysts usually encounter these kinds of situations. In reality, the stories may be more detailed and comprehensive, and can be obtained from the descriptions of the commander's intent or operation plan. In any case, the sensemaking process requires a collaboration between the battle staffs as each individual knowledge are processed to obtain a global situation understanding of the courses of actions and their execution orders.

MCS 1: A battalion XO in his TOC just r*eceived an intelligence report on possible attacks on critical infrastructures including kidnapping key political and religious leaders in Basra, Iraq.*

MCS 2: A group of terrorists has been arrested in node K of the battle network. Intel shows that they have spread to other cells in the network, but are not identifiable.

Exhibit 1. Sample MCS cases

S3 Software Tool

Objective: The purpose of S3 is to create display and visualization capabilities for use in collaborative sensemaking process. The intent is to allow a team of sensemakers to (1) share their tacit knowledge; (2) perform critical thinking on unstructured problems; (3) have a common operating picture or situation awareness of the problem situation; (4) allow teams to propose and negotiate solutions through a convergence of shared mental models; and (5) allow teams to visualize alternatives perspectives from other team members so as to reach a common understanding of the battle situation. These objectives support many of the core C2 functions stated by Alberts & Hayes (2006)[2].

The current features in S3 allows up to three users to conduct sensemaking based on an MCS (See left window, upper hand corner of Exhibit 2). Each user logs into S3 with a protected password and first completes team dynamic survey (TDS). The right side of Exhibit 2 allows the team leader to show maps, and by using a white board capability, can illustrate possible locations of the enemies (red bar), possible plans of engagement (blue), and avenues of approach. S3 also allows the user to search for information using text browsing on the web. Other decision information can be displayed through use of statistical analysis tools on Excel spreadsheet (See Exhibit 3). For example, the user may want to look for doctrinal information on the Army's web page or CNN news report on a terrorist bombing in Iraq. S3 has both text and voice capability. The user may decide to turn off the voice part. During a session, the users go through the sensemaking process of framing the context of discourse, selecting issues, agreeing on a position of discourse, and presenting arguments to validate their claims. The user can use maps, annotations, and graphics to illustrate facts or clarify arguments as in Exhibit 3.

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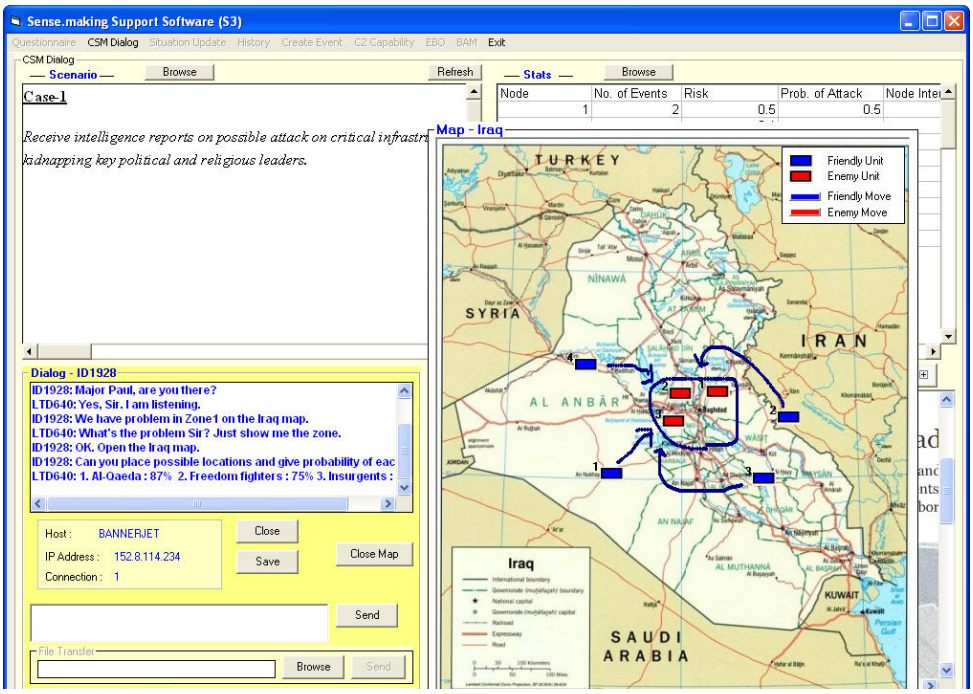

2 David S. Alberts and Richard E. Hayes (2006). Understanding Command and Control. CCRP Publication Series (http://www.dodccrp

Exhibit 2. S3 Screen capture

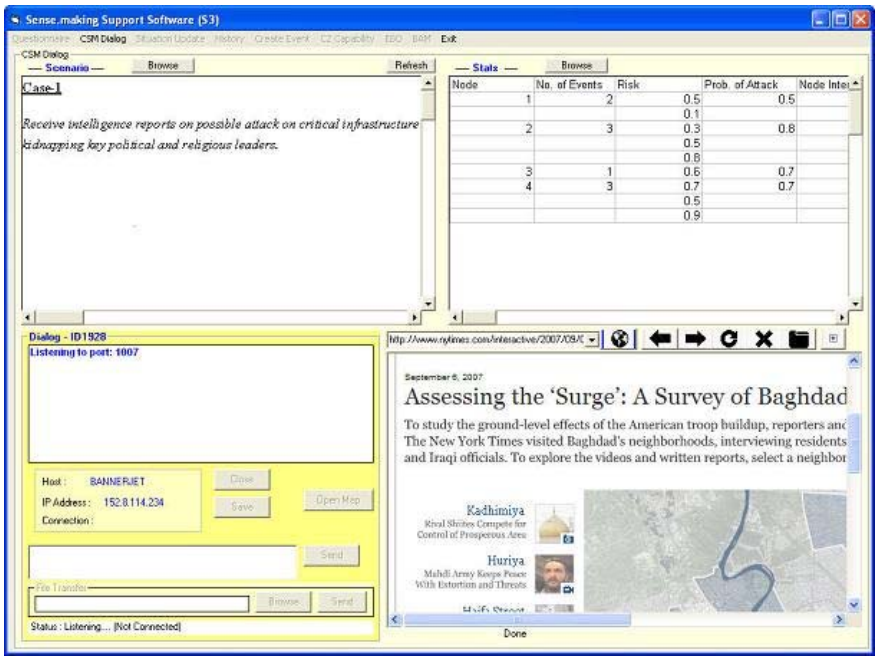

Exhibit 3. S3 screen with information search (file and web browsing)

In the left hand side of the figures below (Exhibit 4), the user can visualize areas of interests and likely IED routes. The risk levels are classified using data fusion using coded symbols. On the right hand side, the user can visualize situation updates by browsing through daily events, including link analysis to other C2 centers (or cities), and specific areas of interest that were targeted (e.g., mosques). The last screen shot in Exhibit 5 is an example of information link network processed through likehood relationship metric..

Exhibit 4. Visualized area of interest

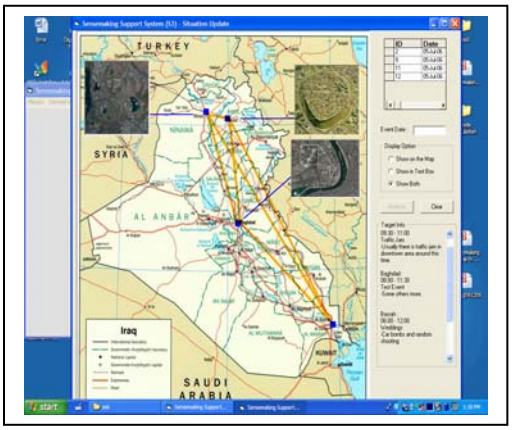

Exhibit 5. Information linkage network

EXPERIMENT

Subjects:

Six experienced military commanders participated in the study. The participants consisted of four Lt. Colonels and two Majors. The subject population had one female with the rank of Lt. Colonel in the Air Force and also the commander of North Carolina A&T State University (NCA&T)'s ROTC Air Force Regiment. There were 5 males: 4 of the male participants are retired (3. COL and 1 Major). The retired Major is on a reserve. The female officer had command experience with Special Air Force Command, and all the male participants with the rank of Lt. Colonel had experience commanding either field artillery or infantry battalions. All participants had a combined military experience of 116 man years.

Apparatus:

The apparatus consisted of S3 software, a personal computer, and 18" TV monitor

Procedure:

Each officer participated as team of two "battle staffs" sequenced in a permutation of 6 objects taken 2 at a time to yield 15 trials with 3 repetitions per trial. Each team received each of the cases shown in Exhibit 1 in a random order that precludes learning effect. Each person serves in a different team during a trial. The study took five days of one hour per session per team. The participant was told to use the S3 software to communicate their sensemaking thoughts and situation analysis with each other. Each team was given sufficient time as needed to complete the task. An example transcript is shown in Exhibit 6. Each transaction between team members was saved to S3 spread sheet and Excel files for future analysis. At the end of a scenario, the participants were asked to subjectively rate the effectiveness of S3 as a sensemaking tool. This is the analysis presented in this report. The sample questionnaire measures sensemaking (SM) capability, situation awareness (SA), and situation understanding (SU). A sample given below:

How would you rate the sensemaking software (S3) on the following (use a scale of 1-7: 1 = absolutely very poor and 7 = absolutely very good and useful):

1. **Sensemaking:**
    a. Information presentation allows for concept mapping:
    b. Promotes contextual reasoning for sharing ideas and concepts:
    c. Allow users to see different interpretation of situation:
    d. Promotes retrospective information search:
    e. Promotes prospective sensemaking through predictive analysis:
2. **Situation awareness:**
    f. Can see common operating pictures of the situation:
    g. Allows me to see area of interest:
    h. Allows me to see information changes over time:
    i. Encourages team information sharing and dialogs:
    j. Captures how our team view the same situation in different ways:
3. Situation understanding:

k. I can explain situation based on my experience and the information displayed:
l. I can describe the situation in terms of expectations
m. I can visualize the courses of action more rapidly.

Result of Experiment

The experimental data was stratified into three categories of cognitive measures; namely, sensemaking, situation awareness, and situation understanding, respectively. Basic statics for each cognitive measure was summarized in terms of average scores across 45 trials (15 grouping * 3 replicates). Tables 2-4 show the results for minimal constructed scenario (MCS) number 2 shown in Exhibit 1. For each cognitive measure, a factor loading in terms of percentage variance contribution of each element within the measure was obtained using Statistical Analysis Software (Dobson, 2003); the result was then used to obtain a weighted score of each measure as a linear relationship.

Table 2. Statistical Analysis for Sensemaking Score (rating: 1= min; 7=max)

Elements	Min score	Average	Max score	Standard deviation	% variance contribution (factor loading)[a]
Allows for concept mapping	2.6	3.2	5.1	1.5	0.12
Contextual reasoning for ideas sharing	1.1	2.8	4.7	0.8	0.1
Interpretation of situation	2.4	4.3	6.5	1.3	0.32
Retrospective information search	2.0	4.5	6.8	0.67	0.26
Predictive analysis	1.9	3.1	4.3	0.96	0.2

[a]This gives the weighted linear composite score for sensemaking of 3.84 and a standard deviation of 1.04 (linear weighted product column 6 and column 3 (for average) and column 5 (for standard deviation)).

Table 3. Statistical Analysis for Situation Awareness Score (rating: 1= min; 7=max)

Elements	Min score	Average	Max score	Standard deviation	% variance contribution (factor loading)[b]
Common operating picture	4.2	6.6	7.0	0.6	0.27
See area of interest	3.3	4.8	6.5	0.91	0.16
See information changes over time	2.0	3.5	5.8	1.2	0.07

Team information sharing and dialog	4.6	6.8	7.0	0.2	0.38
Team situation awareness	3.1	3.9	5.4	1.3	0.12

[b]This gives the weighted linear composite score for sensemaking of 5.85 and a standard deviation of 0.46 (linear weighted product column 6 and column 3 (for average) and column 5 (for standard deviation)).

Table 3. Statistical Analysis for Situation Understanding Score (rating: 1= min; 7=max)

Elements	Min score	Average	Max score	Standard deviation	% variance contribution (factor loading)[c]
Explain situation	1.5	3.2	4.9	1.6	0.3
Describe situation	2.0	3.4	4.7	1.3	0.22
Visualize courses of action	4.8	6.1	7.0	0.08	0.48

[c]This gives the weighted linear composite score for sensemaking of 4.64 and a standard deviation of 0.8 (linear weighted product column 6 and column 3 (for average) and column 5 (for standard deviation)).

Data was analyzed for all three scenarios—simple, complex, and chaos problems, respectively. Analysis of variance (ANOVA) was used to investigate any interaction effect between problem scenarios and the three cognitive measures. An ANOVA with 3 by 3 randomized block design was used to evaluate any different in average scores across cognitive levels and problem types. The results show the followings: (a) the perception rating of S3 with respect to the cognitive measures was highly significant, F (2, 37 =2.4 < 5.8 compute value; (b) the problem scenarios were highly significant, F (2, 37) = 2.4< 3.23; and there was noticeable interaction effect between the cognitive measures and the problem types, F (4, 37) = 2.09 < 11.3 computer value. All tests were conducted with 5% level of significant. Figure 4 shows the weighted average scores for each cognitive score across the three problem types (MCS1, MCS2, and MCS3).

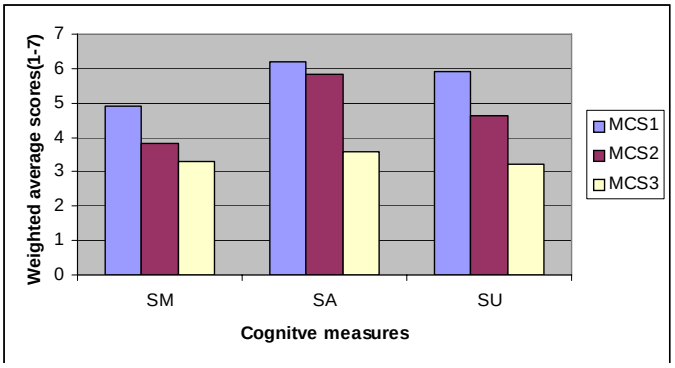

Figure 3. Weighted mean scores for cognitive measures by problem type.

SUMMARY

This paper has described an on-going effort to develop operational visualization concepts and their technical implementations to support sensemaking skills based on the Army's FM3.0 doctrinal information on "Visualization, Detection, and Decide" requirements. First, visualization is our attempt to allow the sensemakers to "see the same thing" in place and time so as to gain real-time situation awareness. Through visualization, the team members can share their mental models, present their perspectives either textually or graphically. S3 also satisfies the doctrinal requirement by using signs, symbols, and signals to invoke informational cues, which through display, allows real-time noticing emerging information features for enhancement of decision clues to the sensemaker. Finally, the S3 software provides the decision maker with macro-level cognition useful for building situation understanding relevance to tasks, doctrines, and the requirements for a mission or goals. We have started the validation of S3 using Army cadets from Fort Leavenworth. The results show the followings: (a) the perception rating of S3 with respect to sensemaking cognitive measures was highly significant; b) the problem scenarios (MCS) were highly significant; and there were noticeable interaction effects between the cognitive measures and the problem types. Generally, the S3 software needs further improvement in representation fidelity of problems that mimic battle field situations. This is shown by the poor weighted ratings in a more chaotic scenario MCS3.

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APPENDIX

Sample text transaction between two intended uses of S3

Listening to port: 1007

Connection request id 780 from 152.8.96.23

Gwang is Logged on.

ntuen: Major Gwang, we have a problem

Gwang: What is the problem...?

ntuen: Najaf attacked. 100 killed. new group claim responsibility

Gwang: What should we do....?

ntuen: Sensemaking. major, find this people, their name, affiliation, sponsor, let's go after them

Gwang: Do you know that location?

ntuen: See the marked area of interest in the mark. And direction of their movement

Gwang: I am by Kuwait border. See my marking with rectangle.

ntuen: I can see you major. get your men. What is the best way to get there?

Gwang: See map with the red arrows....

ntuen: Bad choice, IED and AlQ group are everywhere

Gwang: I look for alternative way...

ntuen: I am checking with Alpha 3. I have sent the map with your routes 1 & 2 to him

Gwang: How long can I wait....?

ntuen: Start at 1400 hours. That is 4 hours from now to get your men

Gwang: What is the probability of attack in Najaf?

ntuen: My intel and record up till 3 days ago is about 65%

Gwang: Can you tell me more about attack statistics on IED, Mortar, VIED?

ntuen: OK, Alpha has it right in the TOC: IED is 90%, Mortar is daily and about 90%, VIED is about 55%

Gwang: OK, I will run my Sensemaking program...

ntuen: Good, get your COAs in order and be prepared to encounter trouble on the way

Gwang: OK, three other locations marked in red from south of Turkey, Al Anbar province, and Baghdad.

ntuen: Good major, I will notify the commanders over there. So now we have to involve 5 commands, including mine. right?

Gwang: Yes, Sir.

ntuen: Ok, get back to me at 1 hour before your men leave to Najaf

Gwang: Talk to you then...