



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

Research Report 1860

What Squad Leaders Want to Know in Battle

Kenneth L. Evans
U.S. Army Research Institute

20061115246

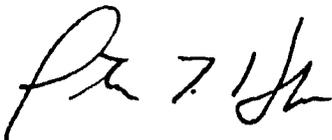
August 2006

Approved for public release; distribution is unlimited.

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

**A Directorate of the Department of the Army
Deputy Chief of Staff, G1**

Authorized and approved for distribution:



**STANLEY M. HALPIN
Acting Technical Director**



**MICHELLE SAMS
Acting Director**

Technical review by

Scott A. Beal, U.S. Army Research Institute
Scott Shadrick, U.S. Army Research Institute

NOTICES

DISTRIBUTION: Primary distribution of this Research Report has been made by ARI. Please address correspondence concerning distribution of reports to: U.S. Army Research Institute for the Behavioral and Social Sciences, Attn: DAPE-ARI-MS, 2511 Jefferson Davis Highway, Arlington, Virginia 22202-3926

FINAL DISPOSITION: This Research Report may be destroyed when it is no longer needed. Please do not return it to the U.S. Army Research Institute for the Behavioral and Social Sciences.

NOTE: The findings in this Research Report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

REPORT DOCUMENTATION PAGE

1. REPORT DATE (dd-mm-yy) August 2006		2. REPORT TYPE Final		3. DATES COVERED (from. . . to) November 2004 - June 2006	
4. TITLE AND SUBTITLE What Squad Leaders Want to Know in Battle				5a. CONTRACT OR GRANT NUMBER	
				5b. PROGRAM ELEMENT NUMBER 622785	
6. AUTHOR(S) Kenneth L. Evans (U.S. Army Research Institute)				5c. PROJECT NUMBER A790	
				5d. TASK NUMBER 215	
				5e. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Research Institute Infantry Forces Research Unit P.O. Box 52086 Fort Benning, GA 31995-2086				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences 2511 Jefferson Davis Highway Arlington, VA 22202-3926				10. MONITOR ACRONYM ARI	
				11. MONITOR REPORT NUMBER Research Report 1860	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.					
13. SUPPLEMENTARY NOTES Subject Matter POC: Kenneth L. Evans					
14. ABSTRACT (<i>Maximum 200 words</i>): The Battlefield Information Questionnaire was developed to measure the relative importance of 88 different types of battlefield information to squad leaders in four combat situations: planning, assaulting an objective, consolidating and reorganizing on the objective, and defending the objective from counterattack. This questionnaire was then administered to a group of 106 non-commissioned officers, each having combat experience as a squad leader. The types of information they most wanted to know, and least wanted to know, were highly consistent across combat situations. Averaged across situations, the ten types of information most important to squad leaders in battle were: location of threat personnel, vehicles, and weaponry; casualty collection point location; ammunition remaining; location of personnel in their squad; location of units in contact with the enemy; personnel location in adjacent friendly units; their own location relative to other personnel; location of mines, obstacles, booby traps, and improvised explosive devices; availability of supporting fires; and direction of movement for enemy personnel.					
15. SUBJECT TERMS combat information requirements information systems design Future Force Warrior					
SECURITY CLASSIFICATION OF			19. LIMITATION OF ABSTRACT	20. NUMBER OF PAGES	21. RESPONSIBLE PERSON
16. REPORT	17. ABSTRACT	18. THIS PAGE			
Unclassified	Unclassified	Unclassified	Unlimited	39	Ellen Kinzer Technical Publication Specialist (703) 602-8047

Research Report 1860

What Squad Leaders Want to Know in Battle

Kenneth L. Evans
U.S. Army Research Institute

Infantry Forces Research Unit
Scott E. Graham, Chief

U.S. Army Research Institute for the Behavioral and Social Sciences
2511 Jefferson Davis Highway, Arlington, Virginia 22202-3926

August 2006

Army Project Number
622785A790

Personnel Performance
and Training Technology

Approved for public release; distribution is unlimited.

ACKNOWLEDGMENTS

Many thanks go to Rich Wampler and Norm Blankenbeckler of Northrop Grumman Mission Systems for lending their considerable military expertise to the development of the Battlefield Information Questionnaire. I also want to thank Dr. Greg Goodwin of ARI's Infantry Forces Research Unit and SMA (R) Bill Gates, ARI's Liaison Officer to the Joint Readiness Training Center, for their outstanding assistance in data collection.

WHAT SQUAD LEADERS WANT TO KNOW IN BATTLE

EXECUTIVE SUMMARY

Research Requirement:

Soldiers and leaders are likely to encounter a much higher volume and a greater variety of information on future battlefields. As new technology and systems to collect, package, and deliver this information are developed and fielded, we must insure our leaders do not become overloaded by the sheer volume of information at their fingertips. Squad leaders, in particular, may be less able to manage a high volume of information when they are actively engaged with the enemy. In designing information systems for these leaders, one should know what they consider to be the most important types of information in different tactical situations. Finding out what squad leaders most want to know in battle was the primary goal of this research project.

Procedure:

A panel of five retired military subject matter experts identified 88 different types of battlefield information of potential interest to squad leaders. They attempted to define the universe of potential information, without regard to particular combat situations and without regard to whether or not it was technologically possible to deliver that information to Soldiers on current battlefields.

Next, the Battlefield Information Questionnaire was developed to gauge the relative importance of these different types of information to squad leaders in four tactical situations: planning before an operation, assaulting an objective, consolidating and reorganizing on the objective, and defending the objective from counterattack. The questionnaire was administered to a group of 106 non-commissioned officers (NCOs) with combat experience as squad leaders. The questionnaire asked the NCOs to select the 10 types of information they thought were most important and the 10 types of information they thought were least important in each of the four situations identified. Importance was defined by how much the information contributed to mission success, by how frequently it was needed, and by how readily available it needed to be.

Findings:

Many of the same types of information were found to be important to squad leaders across combat situations. In fact, five types of information made the top ten list for all four of the combat situations investigated (i.e., location of threat personnel, vehicles, & weaponry; casualty collection point location; ammunition remaining; personnel location in adjacent friendly units; & the squad leader's location relative to other personnel). Two other types of information made the top ten list for three of the

combat situations (i.e., location of personnel in the squad & location of units in contact with the enemy).

Likewise, many of the same types of information were found to be less important to squad leaders across combat situations. In fact, six types of information made the bottom ten list for all four of the combat situations investigated (i.e., guidance for interacting with media, current time of day, cultural norms of civilians in their area of operation, elapsed mission time, mission-oriented protective posture level, & notes on specialty skills of each squad member). Three other types of information made the bottom ten list for three of the combat situations (i.e., civilian leaders in their area of operation, current weather conditions, & weather forecasts).

Utilization and Dissemination of Findings:

Knowing what experienced squad leaders want to know in various tactical situations should be a guiding force behind the design and development of future information delivery systems for those leaders, especially as it relates to the user interfaces of such systems. For those hardware and software developers who lack a military background, and may be unaware of the information preferences of their target audience, the findings of the present investigation should help to eliminate that knowledge gap. As a guide to the information preferences of experienced squad leaders, the results of the present investigation have been provided to those responsible for manpower and personnel integration (MANPRINT) issues on the Future Force Warrior project.

Ideally, future information delivery systems should present what is considered to be the most important types of combat information in a clear and timely manner, such that leaders can understand the tactical situation almost immediately (e.g., by quickly glancing at a graphic display). In contrast, information of lesser importance does not need to be automatically presented and updated in real time, and can usually wait until a leader asks for it (e.g., by using an input device or making a menu selection). These are some of the design issues that challenge system developers on a continual basis. Having an informed understanding of the information needs of intended users should promote the development and fielding of systems that are more effective, easier to use, and less costly to train.

WHAT SQUAD LEADERS WANT TO KNOW IN BATTLE

CONTENTS

	Page
Introduction	1
Research Approach	2
Battlefield Information Questionnaire.....	2
Sample and Procedure.....	3
Results.....	3
What Squad Leaders Most Wanted to Know.....	3
What Squad Leaders Least Wanted to Know.....	6
Discussion	8
References	11
Appendix A. Battlefield Information Questionnaire	A-1
Appendix B. Percentage of Squad Leaders Selecting 88 Types of Battlefield Information as Most Important in Four Combat Situations	B-1
Appendix C. Percentage of Squad Leaders Selecting 88 Types of Battlefield Information as Least Important in Four Combat Situations	C-1
Appendix D. List of Acronyms and Abbreviations	D-1

List of Tables

Table 1. The 10 Types of Information Most Important in Planning	4
Table 2. The 10 Types of Information Most Important in Assaulting.....	4
Table 3. The 10 Types of Information Most Important in Consolidating.....	5
Table 4. The 10 Types of Information Most Important in Defending.....	5
Table 5. The 10 Types of Information Least Important in Planning	6
Table 6. The 10 Types of Information Least Important in Assaulting.....	6
Table 7. The 10 Types of Information Least Important in Consolidating.....	7
Table 8. The 10 Types of Information Least Important in Defending	7

Introduction

Soldiers and leaders are likely to encounter a much higher volume and a greater variety of information on future battlefields. As new technology and systems to collect, package, and deliver this information are developed and fielded, we must insure our leaders do not become overloaded by the sheer volume of information available at their fingertips. Those responsible for future systems planning in the U.S. Army have noted the importance of providing relevant information to Soldiers without overwhelming them with too much information (Department of the Army, 2002). Jason Denno, Deputy Director of the Battle Command Battle Lab at Fort Huachuca, has described this technological challenge as:

. . . a massive glut of information to be sorted. . . The amount of data generated by sensors on the modern battlefield is rapidly outpacing the ability of the human to understand. The problem is hard enough when sensing only enemy forces, but it gets completely unmanageable when you add the presence of coalition forces, non-combatants and even domestic or wild animals. To truly understand what's going on, all of these things must be identified and tracked (Donnelly, 2005, p. 1).

The ability to manage information effectively is expected to be an increasingly important dimension of successful Soldier performance in the future, even for first-term Soldiers (Human Resources Research Organization, 2005).

Glumm, Pillalamarri, and Brundick (2002) found that increasing the availability of information can actually decrease local battlefield awareness. Squad leaders, in particular, may be less able to manage a high volume of information when they are actively engaged with the enemy. In designing information systems for these leaders, it behooves us to know what they consider to be the most important types of information to have in different tactical situations. Finding out what squad leaders most want to know in battle was the primary goal of this research project.

Previous research has provided some insights about what kinds of information Soldiers consider important in battle. In an experimental investigation of the critical information requirements of platoon leaders, squad leaders, team leaders, and squad members engaged in urban operations, Redden (2002) found squad members were most interested in their immediate objective and were somewhat interested in the location of threat personnel within 50 m of the objective. In contrast, she found team, squad, and platoon leaders were interested in the location of threat personnel all the way out to 1 km, because of the importance of that knowledge in planning. In order to reduce the clutter in information displays, Redden (2002) recommended only information considered to be critical for immediate decisions and actions be pushed down to Soldiers from higher echelons. Further, she recommended Soldiers be able to pull down information that is less critical or less frequently needed.

At least two factors, leader experience and type of mission, have been shown to influence the types of information that are most wanted in battle. Shattuck, Talcott, Matthews, Clark, and Swiergosz (2002) have investigated both of these factors in a series of simulated battle scenarios. They found novice leaders typically wanted a greater amount of information than experienced leaders prior to making tactical decisions, with novices focused more on friendly personnel and experienced leaders focused more on the threat. They also found differences in information requirements as a function of mission type. Among experienced leaders, location information was most important in the offense, while equipment information was most important in the defense. In a field investigation involving U.S. Army Ranger squads, Christ and Evans (2002) found squad leader communications were more often related to the threat in defensive missions than in offensive missions.

Due to practical resource constraints, *in situ* experimentation, whether conducted in the field or in a simulated combat environment, invariably must limit its scope to a sample of the different types of battlefield information that could potentially be available to future leaders. One way to overcome this constraint would be to attempt to define the universe of potential types of battlefield information and then use a survey instrument to ask experienced leaders what they thought were the most important types of information to have in different combat situations. That was the methodological approach used in the present investigation.

Research Approach

Initially, a questionnaire to measure the relative importance of different types of battlefield information was developed, pilot tested, and revised. This questionnaire was then administered to a sample of non-commissioned officers with combat experience as squad leaders. The sample was intentionally limited to combat-experienced personnel in an attempt to maximize the potential accuracy and usefulness of the findings.

Battlefield Information Questionnaire

A panel of five retired military subject matter experts (SMEs) identified 88 different types of battlefield information of potential interest to squad leaders. This list of 88 items was developed without regard to mission type or to the technological feasibility of providing this information to either current or future squad leaders. Although items were phrased for presentation to squad leaders only (e.g., the location of personnel in my squad), they also were suitable for presentation to team leaders or platoon leaders with minor changes in wording.

A preliminary questionnaire was developed that asked squad leaders to rate the importance of the 88 different types of information in each of four different combat situations: planning before an operation, assaulting an objective, consolidating and reorganizing on the objective, and defending the objective from counterattack. A small sample of experienced squad leaders assigned to the Joint Readiness Training Center ($n = 4$) was asked to rate each of the resulting 352 items (88×4) on a three-point scale

ranging from "Unimportant" to "Highly Important". Unfortunately, the results from this small sample indicated the presence of a strong response set, whereby almost all items were rated as being highly important by all squad leaders.

In an attempt to elicit more variability among the questionnaire responses, the Battlefield Information Questionnaire (PT No. 60-73) was developed. It contained the same 88 types of information as the preliminary questionnaire, as well as the same four combat situations. However, instead of asking squad leaders to rate each item separately, it asked squad leaders to circle the 10 types of information they thought were most important and to line through the 10 types of information they thought were least important in each combat situation. Importance was defined by how much the information contributed to mission success, by how frequently it was needed, and by how readily available it needed to be. The Battlefield Information Questionnaire is shown in Appendix A.

The Battlefield Information Questionnaire consisted of seven pages, two of which were devoted to an introductory description of the general tactical situation. In this description the year was 2012 and the squad leader wore a prototype Future Force Warrior Leader's Ensemble (as envisioned in 2005). The capabilities of the prototype system were then outlined. This futuristic description was created in an attempt to have questionnaire respondents suspend their existing beliefs about the technological feasibility of delivering particular types of information to squad leaders in battle.

Sample and Procedure

During 2005 and 2006, the Battlefield Information Questionnaire was administered to a total of 106 NCOs from the Basic and Advanced NCO Courses at Fort Benning ($n = 38$ and $n = 64$, respectively), as well as from the Joint Readiness Training Center at Fort Polk ($n = 4$). On average, each had over 32 months of total squad leading experience, including more than 11 months of experience as a squad leader in combat. Almost all NCOs were able to complete the questionnaire in 30 minutes or less.

Results

Complete results are shown in Appendixes B and C. The percentage of squad leaders who found each of the 88 types of battlefield information to be most important in each of the four combat situations is shown in Appendix B. The percentage who found each type of information to be least important in each situation is shown in Appendix C. Both Appendixes also include overall squad leader percentages for each type of information, averaged across situations.

What Squad Leaders Most Wanted to Know

The 10 types of information most important to squad leaders when planning for an operation are shown in Table 1. Similarly, the 10 types of information most important

to squad leaders when assaulting an objective, when consolidating and reorganizing on the objective, and when defending the objective from counterattack are shown in Tables 2 through 4, respectively.

Table 1
The 10 Types of Information Most Important in Planning

Type of Battlefield Information	Percentage of Squad Leaders
Location of threat personnel, vehicles, & weaponry	60.4
Location of mines, obstacles, booby traps, & improvised explosive devices (IEDs)	59.4
Casualty collection point (CCP) location	46.2
My location relative to other personnel	40.6
Ammunition remaining	38.7
Radio frequencies & channel/network assignments	37.7
Availability of supporting fires (mortars & artillery)	33.0
Personnel location in adjacent friendly units	31.1
Photos of wanted enemy personnel & other high-value targets	31.1
Intelligence updates	31.1

Table 2
The 10 Types of Information Most Important in Assaulting

Type of Battlefield Information	Percentage of Squad Leaders
Location of units in contact with the enemy	65.1
Personnel location in adjacent friendly units	51.9
Location of threat personnel, vehicles, & weaponry	50.0
Location of personnel in my squad	47.2
Location of mines, obstacles, booby traps, & IEDs	47.2
CCP location	43.4
My location relative to other personnel	42.5
Ammunition remaining	36.8
Direction of movement for enemy personnel	36.8
Size, activity, location, unit, time, & equipment (SALUTE) reports from squad members	33.0

Table 3
The 10 Types of Information Most Important in Consolidating

Type of Battlefield Information	Percentage of Squad Leaders
CCP location	74.5
Ammunition remaining	56.6
Location of personnel in my squad	54.7
My location relative to other personnel	38.7
Location of nearest medical treatment site	38.7
Location of threat personnel, vehicles, & weaponry	35.8
Personnel location in adjacent friendly units	34.9
Status of those wounded in action (WIAs), those killed in action (KIAs), & enemy prisoners of war (EPWs)	33.0
Location of units in contact with the enemy	31.1
Food & water on hand	31.1

Table 4
The 10 Types of Information Most Important in Defending

Type of Battlefield Information	Percentage of Squad Leaders
Personnel location in adjacent friendly units	53.8
Location of threat personnel, vehicles, & weaponry	53.8
Ammunition remaining	52.8
Location of personnel in my squad	50.0
Location of units in contact with enemy	49.1
My location relative to other personnel	43.4
Food & water on hand	34.9
Availability of supporting fires (mortars & artillery)	34.0
CCP location	33.0
SALUTE reports from squad members	32.1

From a comparison of Tables 1 through 4, one may notice that many of the same types of information were important to squad leaders across combat situations. In fact, five types of information made the top ten list for all four of the combat situations investigated (i.e., location of threat personnel, vehicles, & weaponry; CCP location; ammunition remaining; personnel location in adjacent friendly units; & my location relative to other personnel). Two other types of information made the top ten list for three of the combat situations (i.e., location of personnel in my squad & location of units in contact with the enemy).

What Squad Leaders Least Wanted to Know

The 10 types of information least important to squad leaders when planning for an operation are shown in Table 5. Similarly, the 10 types of information least important to squad leaders when assaulting an objective, when consolidating and reorganizing on the objective, and when defending the objective from counterattack are shown in Tables 6 through 8, respectively.

Table 5
The 10 Types of Information Least Important in Planning

Type of Battlefield Information	Percentage of Squad Leaders
Guidance for interacting with media	48.1
Notes on specialty skills of each squad member	40.6
Current time of day	37.7
Cultural norms of civilians in my area of operation (AO)	36.8
Elapsed mission time	35.8
Mission-oriented protective posture (MOPP) level	32.1
Range cards & sector diagrams	30.2
Subterranean diagrams	30.2
Availability of reserves	28.3
Knowledge about sent messages being received	28.3

Table 6
The 10 Types of Information Least Important in Assaulting

Type of Battlefield Information	Percentage of Squad Leaders
Guidance for interacting with media	43.4
Elapsed mission time	39.6
Current time of day	36.8
Cultural norms of civilians in my AO	35.8
Current weather conditions (temperature, humidity, wind speed, wind direction)	35.8
Civilian leaders in my AO	33.0
MOPP level	32.1
Range cards & sector diagrams	31.1
Weather forecasts [beginning morning nautical twilight (BMNT), ending evening nautical twilight (EENT), moon phase & rise]	27.4
Notes on specialty skills of each squad member	23.6

Table 7
The 10 Types of Information Least Important in Consolidating

Type of Battlefield Information	Percentage of Squad Leaders
Cultural norms of civilians in my AO	42.5
Current time of day	42.5
Civilian leaders in my AO	40.6
Elapsed mission time	34.9
Guidance for interacting with media	34.0
Weather forecasts (BMNT, EENT, moon phase & rise)	30.2
Notes on specialty skills of each squad member	30.2
MOPP level	29.2
Current weather conditions (temperature, humidity, wind speed, wind direction)	28.3
Personnel data for each squad member (sizes, blood type, religion)	25.5

Table 8
The 10 Types of Information Least Important in Defending

Type of Battlefield Information	Percentage of Squad Leaders
Cultural norms of civilians in my AO	46.2
Current time of day	40.6
Elapsed mission time	40.6
Guidance for interacting with media	38.7
Civilian leaders in my AO	35.8
MOPP level	30.2
Current weather conditions (temperature, humidity, wind speed, wind direction)	30.2
Weather forecasts (BMNT, EENT, moon phase & rise)	27.4
Guidance for interacting with locals & non-combatants	25.5
Notes on specialty skills of each squad member	24.5

From a comparison of Tables 5 through 8, one may also notice that many of the same types of information were less important to squad leaders across combat situations. In fact, six types of information made the bottom ten list for all four of the combat situations investigated (i.e., guidance for interacting with media, current time of day, cultural norms of civilians in my AO, elapsed mission time, MOPP level, & notes on specialty skills of each squad member). Three other types of information made the bottom ten list for three of the combat situations (i.e., civilian leaders in my AO, current weather conditions, & weather forecasts).

Discussion

Somewhat counter to the findings of Christ and Evans (2002) and Shattuck et al. (2002), the present investigation found the battlefield information needs of squad leaders to be remarkably consistent across combat situations. For instance, 8 of the 10 most wanted types of information in assaulting and defending were identical (see Tables 2 and 4). Although there was a great deal of similarity in the types of information thought to be most important in each situation, there were some notable differences as well. For example, 74.5% of the squad leaders reported that the location of the CCP was most important during consolidation, though only 33.0% regarded this information as important during defensive operations. Similarly, 59.4% reported that it was most important to know the location of mines, obstacles, booby traps, and IEDs in planning situations, while only 19.8% regarded this as most important in defensive situations (see Appendix B).

Because the Battlefield Information Questionnaire asked squad leaders to rate the importance of only 20 of the 88 types of information in each situation (i.e., the 10 most important and 10 least important), the actual level of agreement among squad leaders about particular types of information is probably higher (i.e., closer to 100%) than the percentages in Tables 1 through 8 and Appendixes B and C would suggest. While it is unclear what would have happened to the results had squad leaders been asked to rate more than 20 items, the pilot test findings suggest higher levels of agreement might have been found.

Nevertheless, the overall level of agreement among squad leaders tended to be higher for most wanted information than for least wanted information, comparing the percentages in Tables 1-4 with those in Tables 5-8. Perhaps it was harder for squad leaders to select least important types of information. In fact, several commented that just because they selected something as least important did not make it unimportant. Additionally, the pilot test findings suggest squad leaders may have had greater difficulty in choosing least important types of information.

One should be extremely cautious in generalizing beyond the one duty position and four combat missions examined in the present investigation. For example, battalion staff members and squad leaders could have considerably different views about what types of battlefield information they believe to be most important, because they perform grossly different tasks on the battlefield. Though four relatively common combat situations were examined in the present investigation, the results obtained may not apply to other types of missions (e.g., a cordon and search operation). Similarly, the present investigation did not examine potential differences between experienced and inexperienced squad leaders, such as those found by Shattuck et al. (2002).

Although we attempted to define the universe of potential battlefield information in developing the Battlefield Information Questionnaire, we do not claim to have reached that goal. Yet, in each combat situation on the questionnaire, squad leaders were given

the opportunity to add other types of information they thought were important. Only three instances of additional information were mentioned (i.e., signals, communication with an assaulting element, and high-value targets).

Knowing what experienced squad leaders want to know in various tactical situations should be a guiding force behind the design and development of future information delivery systems for those leaders, especially as it relates to the user interfaces of such systems. For those hardware and software developers who lack a military background, and may be unaware of the information preferences of their target audience, the findings of the present investigation should help to eliminate that knowledge gap.

Ideally, future information delivery systems should present what is considered to be the most important types of combat information in a clear and timely manner, such that leaders can understand the tactical situation almost immediately (e.g., by quickly glancing at a graphic display). Examples of these types of information are shown in Tables 1-4, and they are consistent with what Redden (2002) recommended should be pushed to Soldiers. In contrast, information of lesser importance does not need to be automatically presented and updated in real time, and can usually wait until a leader asks for it (e.g., by using an input device or making a menu selection). Examples of these types of information are shown in Tables 5-8, and are consistent with what Redden (2002) recommended Soldiers be able to access. These are some of the design issues that challenge system developers on a continual basis. Having an informed understanding of the information needs of intended users should promote the development and fielding of systems that are more effective, easier to use, and less costly to train.

References

- Christ, R. E., & Evans, K. L. (2002). *Radio communications and situation awareness of infantry squads during urban operations* (ARI Technical Report 1131). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (ADA405850)
- Department of the Army (2002). *The objective force in 2015* (draft white paper dated 14 October 2002). Arlington, VA: Objective Force Task Force.
- Donnelly, H. (2005). Battle lab seeks cohesive combat picture. *Military Information Technology*, 9(3), 1-2. Retrieved March 15, 2006 from <http://www.military-information-technology.com/article.cfm?DocID=923>
- Glumm, M. M., Pillalamarri, R., & Brundick, F. S. (2002). *The effects of information availability and information management on the performance of dismounted military teams* (ARL Technical Report 2835). Aberdeen Proving Ground, MD: U.S. Army Research Laboratory. (ADA408329)
- Human Resources Research Organization (2005). *Future army-wide soldier performance requirements* (ARI Research Product 2005-05). Arlington, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (ADA432475)
- Redden, E. S. (2002). *Virtual environment study of mission-based critical information requirements* (ARL Technical Report 2636). Aberdeen Proving Ground, MD: U.S. Army Research Laboratory. (ADA408807)
- Shattuck, L. G., Talcott, C., Matthews, M. D., Clark, J., & Swiergosz, M. (2002). Constructing battlefield understanding: A comparison of experienced and novice decision makers in different contexts. *Proceedings of the Human Factors and Ergonomics Society 46th Annual Meeting* (pp. 443-447). Santa Monica, CA: Human Factors and Ergonomics Society.

Appendix A
Battlefield Information Questionnaire

Battlefield Information Questionnaire

(PT No. 60-73)

Soldiers and leaders are likely to encounter a much higher volume and greater variety of information on future battlefields. In fact, we have identified 88 different kinds of battlefield information of potential interest to future squad leaders. As new systems to collect, package, and deliver this information are developed and fielded, we must insure squad leaders do not become overloaded by the sheer volume of information available at their fingertips. To reach this objective, ***we need your help in determining the kinds of battlefield information most important to squad leaders in different tactical situations.***

We believe future systems should present highly important information in a clear and timely manner, such that squad leaders can understand the tactical situation by quickly glancing at a graphic display. In contrast, future systems also may require squad leaders to spend a few seconds interacting with a display and input device in order to retrieve information that isn't needed right away or needed very often. But before we get started, please answer a few questions about your military background:

Are you, or have you ever been, a squad leader (circle your answer)? Yes No

If you answered "Yes", how many months did you serve in that position? _____

In what type of unit were you a squad leader (circle your answer)? Light Mech

How many months of combat experience do you have as a ***squad member?*** _____

How many months of combat experience do you have as a ***squad leader?*** _____

Instructions

We want you to select the kinds of battlefield information you believe to be most important in different tactical situations. Some types of battlefield information have greater importance because they are mission essential, they are needed frequently, or they need to be readily available at all times. Other information is less important because it is rarely critical to mission success, it isn't needed very often, or when it is needed, it isn't needed right away.

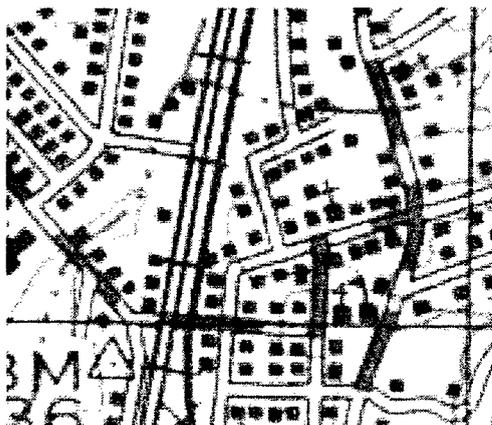
After describing a general tactical situation, we will briefly describe a series of four specific situations. For each specific situation, we want you to ***circle*** the 10 types of battlefield information you believe are ***most important*** in that situation. We then want you to ***draw a line through*** the 10 types of information you believe to be ***least important***. The list from which you will select the most and least important types of information is the same for all four situations.

General Situation

The year is 2012. You are the Squad Leader of the 3rd Squad, 2nd Platoon.

Your company has been deployed as part of a Joint Task Force in support of the long-time U.S. ally, Lovaka. Lovaka has been invaded by the Armed Forces of Gordovia. Gordovia has long supported rebellion, acts of violence, and destabilization in Lovaka, while proclaiming they are protecting the persecuted Gordo ethnic minority. The Gordo ethnic minority in Lovaka is indeed providing support to the invading Gordovian Army. Their attacks are focused on the seizure of a silver and gold mining region.

Your company is conducting operations against elements of the Gordovian Army and the Gordo Militia. Operations are focused on control of the town of La Bell Junction, a rail and road transportation center.



Map of the Area of Operations (AO)



Recon Photo of AO

All elements of the Joint Task Force are equipped with Future Force Warrior systems that provide much improved access to tactical information. Your squad members are equipped with digital communications, processing, status monitoring, and information management systems. These systems have been configured to provide you with graphic displays and data to:

- maintain your situation awareness
- alert you to changes in dispositions or status
- warn you of threats
- control and/or direct your unit
- request or direct available support and resources, including networked fires.

You are wearing a prototype **Future Force Warrior Leader's Ensemble** having five additional capabilities:

1. A built-in voice communications system networks you to your fire teams, platoon leader, other squad leaders and, when required, to supporting units including engineers, mortars, artillery, attack helicopters, and Joint fires (e.g., fighter-bombers or naval guns).
2. Helmet and wrist display devices provide: a) tailored enemy and friendly unit information displayed on maps and photographs; b) text information such as orders, SOPs, and tailored quick references; c) means to receive, compose, and transmit formatted or free text digital messages; and d) photographic and text report results from sophisticated reconnaissance, surveillance, and target acquisition (RSTA) systems and your platoon robotic systems.
3. A leader tablet provides mission planning and mission rehearsal tools, as well as a larger display area and the capability to manipulate its display through helmet and wrist displays.
4. An integrated computer stores and processes information on unit status, personnel locations, and orders.
5. Built-in sensors monitor a) health; b) expenditure of ammo, water, and other expendables; c) battery power remaining; and d) personnel and equipment status.



Lastly, your platoon has available short-range unmanned ground vehicles (UGVs), unmanned aerial vehicles (UAVs), and remote sensor systems that may be employed to support your mission.



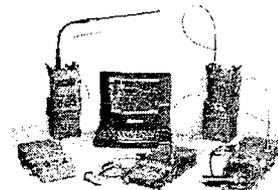
UAV

Can be directed to over fly targets and provide still images and video from photo, IR, and other sensors.



UGV

Can be maneuvered to provide reconnaissance and surveillance of targets, to provide still images and/or video from sensors, to serve as a platform for selected weapons, and to detect mines or NBC agents.



Remote Sensors

Can be hand emplaced, inserted by robot, or fired into locations to detect vehicles or personnel, to provide info on movement through an area, to provide video or audio of the target area, and to warn of NBC contamination.

Specific Situations

Situation 1. You are in the planning phase before an operation. You have received a warning order (WARNO) from your platoon leader. The platoon, as part of a larger force, is preparing to conduct a deliberate attack in two hours to destroy enemy forces and seize the railroad station and government administrative facilities in the center of town.

From the list below, please **circle** the 10 types of battlefield information you think are **most important** at this point in time. Then **draw a line through** the 10 types of information you think are **least important**.

- | | |
|---|--|
| My location relative to other personnel | Availability of supporting fires (mortars & artillery) |
| Location of personnel in my squad | Logistical support availability |
| Personnel location in adjacent friendly units | Photos of wanted enemy personnel & other high-value targets |
| Location of non-combatants & unknown personnel | SALUTE reports from squad members |
| Location of threat personnel, vehicles, & weaponry | Intelligence updates |
| Location of mines, obstacles, booby traps, & IEDs | NBC reports & threats |
| Casualty collection point (CCP) location | Direction of movement for enemy personnel |
| Location of nearest medical treatment site | Reports from aerial & ground sensors in AO |
| Location of enemy POW collection point | Most likely threat COA (projected) |
| Platoon HQ location | Current order with associated text & graphic materials |
| Company HQ location | Contingency plans |
| Location of phase lines (LD/LC) & rally points | Guidance for interacting with locals & non-combatants |
| Location of supply points | Distance to planned objectives |
| LP/OP locations | Graphic depiction of maneuver boundaries |
| Location of attached personnel (demolitions team, medic) | MOPP level |
| Location of units in contact with enemy | A projected best COA for me in each situation |
| Key terrain locations | Weather forecasts (BMNT, EENT, moon phase & rise) |
| Location of prominent terrain features (water, vegetation, buildings) | ROEs in effect |
| Location of likely choke points & danger areas | Platoon leader's intent |
| Best route locations | Building plans (floor plans, construction material) |
| Location of aerial & ground sensors in AO | Area maps with contour lines |
| Location of unique equipment items within squad | Changes to our mission |
| Location of protected sites (churches, hospitals, schools) | Highest priority threat to my squad |
| Locations of planned fires | Capabilities of weapon systems, vehicles, & aircraft (friendly, enemy) |
| Soldier mission equipment status (computer, radio, optics) | Cultural norms of civilians in my AO |
| Squad mission equipment status (vehicle, sensors) | Current time of day |
| Physiological/medical condition of sqd members | Elapsed mission time |
| Language translation | Procedural lists for various tasks (job aids) |
| Ammunition remaining | Tactical performance measures for individuals |
| Food & water on hand | Tactics, techniques, & procedures for accomplishing various tasks/missions |
| Battery power remaining | Notes on specialty skills of each squad member |
| Status of equipment items attached, supporting, or adjacent | Current weather conditions (temperature, humidity, wind speed, wind direction) |
| Ability of squad members to support by fire | Personnel data for each squad member (sizes, blood type, religion) |
| Status of WIAs, KIAs, & EPWs | Common operating picture (display of tactical situation) |
| Radio frequencies & channel/network assignments | Location & status reports of adjacent units |
| Call signs | Effectiveness of squad fires on enemy (target coverage) |
| Challenges/passwords | Determination of friend or foe |
| Emergency & tactical signals (visual, hand/arm) | Range cards & sector diagrams |
| Availability of reserves | Knowledge about sent messages being received |
| Availability of engineer assets | Current building occupancy |
| High-priority information needs of superiors | Subterranean diagrams |
| Guidance for interacting with media | Time remaining until planned events (networked fires) |
| Importance of various pieces of information to the overall missions | Chain of command changes |
| | Civilian leaders in my AO |
| | Direction of movement for friendly personnel |
| | Other _____ |

Situation 2. The operation is now in progress. Your lead fire team reports arrival at the release point near the objective. Your squad is moving to a designated support by fire position, two buildings down the block. Your mission is to provide fires in support of the attack and to be prepared to assume the mission of 2nd Squad. You hear a series of explosions, followed by small arms fire.

From the list below, please **circle** the 10 types of battlefield information you think are **most important** at this point in time. Then **draw a line through** the 10 types of information you think are **least important**.

- | | |
|---|--|
| My location relative to other personnel | Availability of supporting fires (mortars & artillery) |
| Location of personnel in my squad | Logistical support availability |
| Personnel location in adjacent friendly units | Photos of wanted enemy personnel & other high-value targets |
| Location of non-combatants & unknown personnel | SALUTE reports from squad members |
| Location of threat personnel, vehicles, & weaponry | Intelligence updates |
| Location of mines, obstacles, booby traps, & IEDs | NBC reports & threats |
| Casualty collection point (CCP) location | Direction of movement for enemy personnel |
| Location of nearest medical treatment site | Reports from aerial & ground sensors in AO |
| Location of enemy POW collection point | Most likely threat COA (projected) |
| Platoon HQ location | Current order with associated text & graphic materials |
| Company HQ location | Contingency plans |
| Location of phase lines (LD/LC) & rally points | Guidance for interacting with locals & non-combatants |
| Location of supply points | Distance to planned objectives |
| LP/OP locations | Graphic depiction of maneuver boundaries |
| Location of attached personnel (demolitions team, medic) | MOPP level |
| Location of units in contact with enemy | A projected best COA for me in each situation |
| Key terrain locations | Weather forecasts (BMNT, EENT, moon phase & rise) |
| Location of prominent terrain features (water, vegetation, buildings) | ROEs in effect |
| Location of likely choke points & danger areas | Platoon leader's intent |
| Best route locations | Building plans (floor plans, construction material) |
| Location of aerial & ground sensors in AO | Area maps with contour lines |
| Location of unique equipment items within squad | Changes to our mission |
| Location of protected sites (churches, hospitals, schools) | Highest priority threat to my squad |
| Locations of planned fires | Capabilities of weapon systems, vehicles, & aircraft (friendly, enemy) |
| Soldier mission equipment status (computer, radio, optics) | Cultural norms of civilians in my AO |
| Squad mission equipment status (vehicle, sensors) | Current time of day |
| Physiological/medical condition of sqd members | Elapsed mission time |
| Language translation | Procedural lists for various tasks (job aids) |
| Ammunition remaining | Tactical performance measures for individuals |
| Food & water on hand | Tactics, techniques, & procedures for accomplishing various tasks/missions |
| Battery power remaining | Notes on specialty skills of each squad member |
| Status of equipment items attached, supporting, or adjacent | Current weather conditions (temperature, humidity, wind speed, wind direction) |
| Ability of squad members to support by fire | Personnel data for each squad member (sizes, blood type, religion) |
| Status of WIAs, KIAs, & EPWs | Common operating picture (display of tactical situation) |
| Radio frequencies & channel/network assignments | Location & status reports of adjacent units |
| Call signs | Effectiveness of squad fires on enemy (target coverage) |
| Challenges/passwords | Determination of friend or foe |
| Emergency & tactical signals (visual, hand/arm) | Range cards & sector diagrams |
| Availability of reserves | Knowledge about sent messages being received |
| Availability of engineer assets | Current building occupancy |
| High-priority information needs of superiors | Subterranean diagrams |
| Guidance for interacting with media | Time remaining until planned events (networked fires) |
| Importance of various pieces of information to the overall missions | Chain of command changes |
| | Civilian leaders in my AO |
| | Direction of movement for friendly personnel |
| | Other _____ |

Situation 3. Over the radio you hear, "Building clear, Soldier down." Your squad has just secured the platoon's primary objective, a row of small shops controlling the major intersection in the center of town. The platoon leader orders all squads to consolidate rapidly and prepare for a possible enemy counterattack.

From the list below, please **circle** the 10 types of battlefield information you think are **most important** at this point in time. Then **draw a line through** the 10 types of information you think are **least important**.

- | | |
|---|--|
| My location relative to other personnel | Availability of supporting fires (mortars & artillery) |
| Location of personnel in my squad | Logistical support availability |
| Personnel location in adjacent friendly units | Photos of wanted enemy personnel & other high-value targets |
| Location of non-combatants & unknown personnel | SALUTE reports from squad members |
| Location of threat personnel, vehicles, & weaponry | Intelligence updates |
| Location of mines, obstacles, booby traps, & IEDs | NBC reports & threats |
| Casualty collection point (CCP) location | Direction of movement for enemy personnel |
| Location of nearest medical treatment site | Reports from aerial & ground sensors in AO |
| Location of enemy POW collection point | Most likely threat COA (projected) |
| Platoon HQ location | Current order with associated text & graphic materials |
| Company HQ location | Contingency plans |
| Location of phase lines (LD/LC) & rally points | Guidance for interacting with locals & non-combatants |
| Location of supply points | Distance to planned objectives |
| LP/OP locations | Graphic depiction of maneuver boundaries |
| Location of attached personnel (demolitions team, medic) | MOPP level |
| Location of units in contact with enemy | A projected best COA for me in each situation |
| Key terrain locations | Weather forecasts (BMNT, EENT, moon phase & rise) |
| Location of prominent terrain features (water, vegetation, buildings) | ROEs in effect |
| Location of likely choke points & danger areas | Platoon leader's intent |
| Best route locations | Building plans (floor plans, construction material) |
| Location of aerial & ground sensors in AO | Area maps with contour lines |
| Location of unique equipment items within squad | Changes to our mission |
| Location of protected sites (churches, hospitals, schools) | Highest priority threat to my squad |
| Locations of planned fires | Capabilities of weapon systems, vehicles, & aircraft (friendly, enemy) |
| Soldier mission equipment status (computer, radio, optics) | Cultural norms of civilians in my AO |
| Squad mission equipment status (vehicle, sensors) | Current time of day |
| Physiological/medical condition of sqd members | Elapsed mission time |
| Language translation | Procedural lists for various tasks (job aids) |
| Ammunition remaining | Tactical performance measures for individuals |
| Food & water on hand | Tactics, techniques, & procedures for accomplishing various tasks/missions |
| Battery power remaining | Notes on specialty skills of each squad member |
| Status of equipment items attached, supporting, or adjacent | Current weather conditions (temperature, humidity, wind speed, wind direction) |
| Ability of squad members to support by fire | Personnel data for each squad member (sizes, blood type, religion) |
| Status of WIAs, KIAs, & EPWs | Common operating picture (display of tactical situation) |
| Radio frequencies & channel/network assignments | Location & status reports of adjacent units |
| Call signs | Effectiveness of squad fires on enemy (target coverage) |
| Challenges/passwords | Determination of friend or foe |
| Emergency & tactical signals (visual, hand/arm) | Range cards & sector diagrams |
| Availability of reserves | Knowledge about sent messages being received |
| Availability of engineer assets | Current building occupancy |
| High-priority information needs of superiors | Subterranean diagrams |
| Guidance for interacting with media | Time remaining until planned events (networked fires) |
| Importance of various pieces of information to the overall missions | Chain of command changes |
| | Civilian leaders in my AO |
| | Direction of movement for friendly personnel |
| | Other _____ |

Situation 4. Your task force has just secured the town. You're not sure how long your squad will need to remain in its current position. As your squad improves its defensive positions, mortar fires begin to fall in and near those positions. You hear the sound of enemy assault rifles to your right, near your tie-in point with 1st Squad.

From the list below, please **circle** the 10 types of battlefield information you think are **most important** at this point in time. Then **draw a line through** the 10 types of information you think are **least important**.

- | | |
|---|--|
| My location relative to other personnel | Availability of supporting fires (mortars & artillery) |
| Location of personnel in my squad | Logistical support availability |
| Personnel location in adjacent friendly units | Photos of wanted enemy personnel & other high-value targets |
| Location of non-combatants & unknown personnel | SALUTE reports from squad members |
| Location of threat personnel, vehicles, & weaponry | Intelligence updates |
| Location of mines, obstacles, booby traps, & IEDs | NBC reports & threats |
| Casualty collection point (CCP) location | Direction of movement for enemy personnel |
| Location of nearest medical treatment site | Reports from aerial & ground sensors in AO |
| Location of enemy POW collection point | Most likely threat COA (projected) |
| Platoon HQ location | Current order with associated text & graphic materials |
| Company HQ location | Contingency plans |
| Location of phase lines (LD/LC) & rally points | Guidance for interacting with locals & non-combatants |
| Location of supply points | Distance to planned objectives |
| LP/OP locations | Graphic depiction of maneuver boundaries |
| Location of attached personnel (demolitions team, medic) | MOPP level |
| Location of units in contact with enemy | A projected best COA for me in each situation |
| Key terrain locations | Weather forecasts (BMNT, EENT, moon phase & rise) |
| Location of prominent terrain features (water, vegetation, buildings) | ROEs in effect |
| Location of likely choke points & danger areas | Platoon leader's intent |
| Best route locations | Building plans (floor plans, construction material) |
| Location of aerial & ground sensors in AO | Area maps with contour lines |
| Location of unique equipment items within squad | Changes to our mission |
| Location of protected sites (churches, hospitals, schools) | Highest priority threat to my squad |
| Locations of planned fires | Capabilities of weapon systems, vehicles, & aircraft (friendly, enemy) |
| Soldier mission equipment status (computer, radio, optics) | Cultural norms of civilians in my AO |
| Squad mission equipment status (vehicle, sensors) | Current time of day |
| Physiological/medical condition of sqd members | Elapsed mission time |
| Language translation | Procedural lists for various tasks (job aids) |
| Ammunition remaining | Tactical performance measures for individuals |
| Food & water on hand | Tactics, techniques, & procedures for accomplishing various tasks/missions |
| Battery power remaining | Notes on specialty skills of each squad member |
| Status of equipment items attached, supporting, or adjacent | Current weather conditions (temperature, humidity, wind speed, wind direction) |
| Ability of squad members to support by fire | Personnel data for each squad member (sizes, blood type, religion) |
| Status of WIAs, KIAs, & EPWs | Common operating picture (display of tactical situation) |
| Radio frequencies & channel/network assignments | Location & status reports of adjacent units |
| Call signs | Effectiveness of squad fires on enemy (target coverage) |
| Challenges/passwords | Determination of friend or foe |
| Emergency & tactical signals (visual, hand/arm) | Range cards & sector diagrams |
| Availability of reserves | Knowledge about sent messages being received |
| Availability of engineer assets | Current building occupancy |
| High-priority information needs of superiors | Subterranean diagrams |
| Guidance for interacting with media | Time remaining until planned events (networked fires) |
| Importance of various pieces of information to the overall missions | Chain of command changes |
| | Civilian leaders in my AO |
| | Direction of movement for friendly personnel |
| | Other _____ |

Appendix B
Percentage of Squad Leaders Selecting 88 Types of Battlefield Information
as Most Important in Four Combat Situations
(in decreasing order of average importance)

Type of Battlefield Information	Combat Situation				Average
	Plan	Assault	Consolidate	Defend	
Location of threat personnel, vehicles, & weaponry	60.4	50.0	35.8	53.8	50.0
Casualty collection point (CCP) location	46.2	43.4	74.5	33.0	49.3
Ammunition remaining	38.7	36.8	56.6	52.8	46.2
Location of personnel in my squad	28.3	47.2	54.7	50.0	45.1
Location of units in contact with enemy	28.3	65.1	31.1	49.1	43.4
Personnel location in adjacent friendly units	31.1	51.9	34.9	53.8	42.9
My location relative to other personnel	40.6	42.5	38.7	43.4	41.3
Location of mines, obstacles, booby traps, & IEDs	59.4	47.2	20.8	19.8	36.8
Availability of supporting fires (mortars & artillery)	33.0	22.6	22.6	34.0	28.1
Direction of movement for enemy personnel	13.2	36.8	24.5	27.4	25.5
Locations of planned fires	28.3	19.8	17.0	31.1	24.1
Status of WIAs, KIAs, & EPWs	7.5	19.8	33.0	34.0	23.6
Intelligence updates	31.1	22.6	17.9	22.6	23.5
SALUTE reports from squad members	10.4	33.0	17.9	32.1	23.4
Food & water on hand	17.0	9.4	31.1	34.9	23.1
Location of nearest medical treatment site	22.6	10.4	38.7	14.2	21.5
Radio frequencies & channel/network assignments	37.7	15.1	17.0	16.0	21.4
Highest priority threat to my squad	17.9	25.5	17.0	20.8	20.3
Changes to our mission	17.0	22.6	20.8	15.1	18.9
Ability of squad members to support by fire	4.7	24.5	15.1	27.4	17.9
Location of attached personnel (demolitions team, medic)	14.2	15.1	29.2	12.3	17.7
Best route locations	17.9	17.0	22.6	6.6	16.0
ROEs in effect	25.5	11.3	12.3	12.3	15.3
Location of phase lines (LD/LC) & rally points	26.4	13.2	12.3	6.6	14.6
Soldier mission equipment status (computer, radio, optics)	15.1	6.6	23.6	10.4	13.9
Battery power remaining	13.2	8.5	16.0	17.9	13.9
Photos of wanted enemy personnel & other high-value targets	31.1	14.2	6.6	2.8	13.7
Area maps with contour lines	21.7	9.4	10.4	11.3	13.2
Location of likely choke points & danger areas	15.1	16.0	6.6	15.1	13.2

Type of Battlefield Information	Combat Situation				
	Plan	Assault	Consolidate	Defend	Average
Key terrain locations	20.8	9.4	9.4	12.3	13.0
Contingency plans	10.4	8.5	16.0	17.0	13.0
Building plans (floor plans, construction material)	25.5	11.3	7.5	7.5	12.9
Platoon leader's intent	17.9	7.5	12.3	12.3	12.5
Squad mission equipment status (vehicle, sensors)	15.1	6.6	16.0	12.3	12.5
Location & status reports of adjacent units	11.3	15.1	5.7	17.0	12.3
Physiological/medical condition of squad members	8.5	5.7	19.8	11.3	11.3
Call signs	16.0	11.3	5.7	10.4	10.8
Determination of friend or foe	11.3	13.2	5.7	11.3	10.4
Reports from aerial & ground sensors in AO	10.4	11.3	8.5	8.5	9.7
Current building occupancy	5.7	13.2	15.1	3.8	9.4
Language translation	21.7	7.5	3.8	3.8	9.2
Platoon HQ location	3.8	8.5	16.0	7.5	8.9
Most likely threat COA (projected)	12.3	4.7	9.4	8.5	8.7
Location of non-combatants & unknown personnel	7.5	11.3	5.7	10.4	8.7
Direction of movement for friendly personnel	6.6	13.2	8.5	5.7	8.5
Emergency & tactical signs (visual, hand/arm)	4.7	11.3	8.5	9.4	8.5
Effectiveness of squad fires on enemy (target coverage)	3.8	13.2	1.9	14.2	8.3
Company HQ location	5.7	3.8	11.3	9.4	7.5
Capabilities of weapon systems, vehicles, & aircraft (friendly, enemy)	6.6	8.5	3.8	9.4	7.1
Status of equipment items attached, supporting, or adjacent	2.8	4.7	11.3	9.4	7.0
Common operating picture (display of tactical situation)	6.6	8.5	4.7	7.5	6.8
Range cards & sector diagrams	0	5.7	8.5	12.3	6.6
LP/OP locations	10.4	3.8	4.7	7.5	6.6
Challenges/passwords	4.7	4.7	5.7	11.3	6.6
Location of protected sites (churches, hospitals, schools)	10.4	3.8	4.7	5.7	6.1
Distance to planned objectives	10.4	8.5	3.8	.9	5.9
Location of enemy POW collection point	7.5	4.7	10.4	.9	5.9

Type of Battlefield Information	Combat Situation				Average
	Plan	Assault	Consolidate	Defend	
Logistical support availability	5.7	.9	3.8	10.4	5.2
Location of supply points	4.7	2.8	4.7	8.5	5.2
High-priority information needs of superiors	6.6	5.7	4.7	2.8	4.9
Graphic depiction of maneuver boundaries	6.6	4.7	1.9	4.7	4.5
Availability of reserves	2.8	2.8	7.5	4.7	4.4
Personnel data for each squad member (sizes, blood type, religion)	8.5	1.9	5.7	0	4.0
NBC reports & threats	5.7	4.7	.9	4.7	4.0
Guidance for interacting with locals & non-combatants	6.6	4.7	0	3.8	3.8
Tactics, techniques, & procedures for accomplishing various tasks/missions	5.7	4.7	0	4.7	3.8
Location of prominent terrain features (water, vegetation, buildings)	6.6	2.8	2.8	2.8	3.7
Subterranean diagrams	3.8	4.7	2.8	2.8	3.5
Importance of various pieces of information to the overall mission	3.8	4.7	3.8	.9	3.3
Location of aerial & ground sensors in AO	2.8	1.9	1.9	5.7	3.1
A projected best COA for me in each situation	1.9	1.9	1.9	6.6	3.1
Cultural norms of civilians in my AO	4.7	1.9	.9	4.7	3.0
Current order with associated text & graphic materials	4.7	1.9	1.9	2.8	2.8
Chain of command changes	3.8	1.9	4.7	0	2.6
Weather forecasts (BMNT, EENT, moon phase & rise)	3.8	1.9	1.9	2.8	2.6
Availability of engineer assets	4.7	.9	1.9	1.9	2.3
Location of unique equipment items within squad	2.8	.9	2.8	2.8	2.3
Civilian leaders in my AO	5.7	1.9	.9	0	2.1
Current time of day	1.9	1.9	1.9	2.8	2.1
Knowledge about sent messages being received	2.8	2.8	1.9	0	1.9
Elapsed mission time	0	2.8	1.9	1.9	1.6
Time remaining until planned events (networked fires)	0	1.9	1.9	1.9	1.4
MOPP level	2.8	0	.9	1.9	1.4

Type of Battlefield Information	Combat Situation					Average
	Plan	Assault	Consolidate	Defend	Average	
Current weather conditions (temperature, humidity, wind speed, wind direction)	1.9	.9	.9	1.9	1.4	
Guidance for interacting with media	.9	.9	2.8	0	1.1	
Notes on specialty skills of each squad member	.9	0	0	1.9	.7	
Tactical performance measures for individuals	0	0	1.9	0	.5	
Procedural lists for various tasks (job aids)	.9	0	0	0	.2	

Note. N = 106

Appendix C
Percentage of Squad Leaders Selecting 88 Types of Battlefield Information
as Least Important in Four Combat Situations
(in increasing order of average importance)

Type of Battlefield Information	Combat Situation				
	Plan	Assault	Consolidate	Defend	Average
Guidance for interacting with media	48.1	43.4	34.0	38.7	41.1
Cultural norms of civilians in my AO	36.8	35.8	42.5	46.2	40.3
Current time of day	37.7	36.8	42.5	40.6	39.4
Elapsed mission time	35.8	39.6	34.9	40.6	37.7
Civilian leaders in my AO	28.3	33.0	40.6	35.8	34.4
MOPP level	32.1	32.1	29.2	30.2	30.9
Notes on specialty skills of each squad member	40.6	23.6	30.2	24.5	29.7
Current weather conditions (temperature, humidity, wind speed, wind direction)	22.6	35.8	28.3	30.2	29.2
Weather forecasts (BMNT, EENT, moon phase & rise)	21.7	27.4	30.2	27.4	26.7
Range cards & sector diagrams	30.2	31.1	24.5	14.2	25.0
Procedural lists for various tasks (job aids)	25.5	22.6	21.7	21.7	22.9
Knowledge about sent messages being received	28.3	21.7	21.7	17.9	22.4
Subterranean diagrams	30.2	18.9	20.8	18.9	22.2
Personnel data for each squad member (sizes, blood type, religion)	18.9	21.7	25.5	22.6	22.2
NBC reports & threats	17.9	22.6	22.6	24.5	21.9
Guidance for interacting with locals & non-combatants	22.6	22.6	16.0	25.5	21.7
Availability of engineer assets	22.6	21.7	16.0	21.7	20.5
Availability of reserves	28.3	21.7	15.1	14.2	19.8
Chain of command changes	23.6	16.0	17.9	17.0	18.6
Tactical performance measures for individuals	17.0	17.0	15.1	17.0	16.5
Language translation	9.4	17.9	19.8	18.9	16.5
Location of protected sites (churches, hospitals, schools)	13.2	16.0	17.0	18.9	16.3
Challenges/passwords	17.0	20.8	10.4	9.4	14.4
Location of aerial & ground sensors in AO	14.2	13.2	13.2	14.2	13.7
Tactics, techniques, & procedures for accomplishing various tasks/missions	11.3	17.9	12.3	13.2	13.7
Logistical support availability	14.2	15.1	10.4	13.2	13.2
Physiological/medical condition of squad members	16.0	17.0	9.4	10.4	13.2

Type of Battlefield Information	Combat Situation				
	Plan	Assault	Consolidate	Defend	Average
Area maps with contour lines	11.3	10.4	14.2	10.4	11.6
Current building occupancy	17.0	6.6	10.4	11.3	11.3
Location of non-combatants & unknown personnel	15.1	5.7	11.3	12.3	11.1
Location of supply points	10.4	11.3	14.2	7.5	10.8
Best route locations	8.5	10.4	10.4	13.2	10.6
Time remaining until planned events (networked fires)	11.3	10.4	7.5	13.2	10.6
Location of unique equipment items within squad	12.3	8.5	7.5	12.3	10.1
Location of enemy POW collection point	12.3	6.6	5.7	14.2	9.7
Location of prominent terrain features (water, vegetation, buildings)	9.4	7.5	9.4	12.3	9.6
Current order with associated text & graphic materials	7.5	9.4	13.2	8.5	9.6
Graphic depiction of maneuver boundaries	7.5	7.5	11.3	12.3	9.6
Battery power remaining	12.3	12.3	10.4	2.8	9.4
Photos of wanted enemy personnel & other high-value targets	5.7	10.4	8.5	12.3	9.2
High-priority information needs of superiors	11.3	12.3	5.7	7.5	9.2
Company HQ location	10.4	12.3	6.6	7.5	9.2
Importance of various pieces of information to the overall mission	11.3	10.4	7.5	7.5	9.2
A projected best COA for me in each situation	13.2	4.7	8.5	8.5	8.7
Food & water on hand	10.4	12.3	7.5	4.7	8.7
ROEs in effect	5.7	8.5	8.5	11.3	8.5
Common operating picture (display of tactical situation)	7.5	4.7	11.3	10.4	8.5
LP/OP locations	5.7	10.4	10.4	6.6	8.3
Platoon HQ location	9.4	9.4	6.6	7.5	8.2
Most likely threat COA (projected)	13.2	4.7	8.5	5.7	8.0
Key terrain locations	6.6	4.7	8.5	11.3	7.8
Distance to planned objectives	6.6	2.8	6.6	14.2	7.5
Platoon leader's intent	8.5	4.7	5.7	10.4	7.3
Status of WIAs, KIAs, & EPWs	16.0	5.7	2.8	4.7	7.3

Type of Battlefield Information	Combat Situation				Average
	Plan	Assault	Consolidate	Defend	
Building plans (floor plans, construction material)	8.5	5.7	4.7	7.5	6.6
Reports from aerial & ground sensors in AO	4.7	6.6	7.5	7.5	6.6
Determination of friend or foe	6.6	4.7	10.4	3.8	6.4
Call signs	5.7	8.5	7.5	3.8	6.4
Capabilities of weapon systems, vehicles, & aircraft (friendly, enemy)	5.7	6.6	5.7	7.5	6.4
SALUTE reports from squad members	15.1	2.8	1.9	4.7	6.1
Emergency & tactical signs (visual, hand/arm)	9.4	3.8	4.7	4.7	5.6
Location of phase lines (LD/LC) & rally points	1.9	4.7	7.5	8.5	5.6
Status of equipment items attached, supporting, or adjacent	8.5	5.7	1.9	4.7	5.2
Location & status reports of adjacent units	8.5	3.8	3.8	1.9	4.5
Soldier mission equipment status (computer, radio, optics)	2.8	3.8	3.8	6.6	4.2
Location of attached personnel (demolitions team, medic)	1.9	4.7	5.7	4.7	4.2
Contingency plans	3.8	6.6	2.8	2.8	4.0
Effectiveness of squad fires on enemy (target coverage)	5.7	2.8	3.8	2.8	3.8
Ability of squad members to support by fire	9.4	2.8	.9	1.9	3.7
Locations of planned fires	.9	3.8	6.6	2.8	3.5
Ammunition remaining	3.8	3.8	3.8	1.9	3.3
Locations of likely choke points & danger areas	2.8	1.9	4.7	3.8	3.3
Squad mission equipment status (vehicle, sensors)	.9	4.7	2.8	4.7	3.3
Changes to our mission	2.8	2.8	1.9	4.7	3.0
Direction of movement for friendly personnel	2.8	1.9	3.8	2.8	2.8
Availability of supporting fires (mortars & artillery)	3.8	4.7	1.9	0	2.6
Highest priority threat to my squad	3.8	1.9	.9	3.8	2.6
My location relative to other personnel	6.6	2.8	0	.9	2.6
Intelligence updates	0	3.8	.9	4.7	2.3
Personnel location in adjacent friendly units	5.7	0	0	2.8	2.1
Location of personnel in my squad	6.6	.9	.9	0	2.1
Location of mines, obstacles, booby traps, & IEDs	2.8	2.8	.9	1.9	2.1

Type of Battlefield Information	Combat Situation					Average
	Plan	Assault	Consolidate	Defend	Average	
Radio frequencies & channel/network assignments	.9	4.7	1.9	.9	2.1	
Direction of movement for enemy personnel	2.8	.9	1.9	0	1.4	
Location of nearest medical treatment site	2.8	.9	0	1.9	1.4	
Casualty collection point (CCP) location	1.9	.9	0	2.8	1.4	
Location of units in contact with enemy	2.8	.9	0	.9	1.1	
Location of threat personnel, vehicles, & weaponry	.9	0	0	.9	.4	

Note. N = 106

Appendix D
List of Acronyms and Abbreviations

AO	Area of Operation
ARI	U.S. Army Research Institute for the Behavioral and Social Sciences
ARL	U.S. Army Research Laboratory
BMNT	Beginning Morning Nautical Twilight
CCP	Casualty Collection Point
COA	Course of Action
EENT	Ending Evening Nautical Twilight
EPW	Enemy Prisoner of War
HQ	Headquarters
IED	Improvised Explosive Device
IR	Infrared Radiation
KIA	Killed in Action
km	kilometer
LC	Line of Contact
LD	Line of Departure
LP	Listening Post
m	meter
MANPRINT	Manpower and Personnel Integration
MOPP	Mission-Oriented Protective Posture
NBC	Nuclear, Biological, and Chemical
NCO	Non-Commissioned Officer
OP	Observation Post
POC	Point of Contact
POW	Prisoner of War
PT	Personnel Test
R	Retired
ROE	Rules of Engagement
RSTA	Reconnaissance, Surveillance, and Target Acquisition
SALUTE	Size, Activity, Location, Unit, Time, and Equipment
SMA	Sergeant Major of the Army
SME	Subject Matter Expert
SOP	Standard Operating Procedure
UAV	Unmanned Aerial Vehicle
UGV	Unmanned Ground Vehicle
WARNO	Warning Order
WIA	Wounded in Action