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Abstract

UNDERSTANDING THE SITUATION IN THE URBAN ENVIRONMENT by MAJ George A. Glaze, IN, 54 pages.

The monograph addresses the Army's recent attempts at gaining situational awareness in the urban environment. By leveraging technology, programs like Land Warrior and the Military Operations on Urbanized Terrain (MOUT) Advanced Concept Technology Demonstration (ACTD) have identified means for enabling the urban decision-maker to make better decisions through enhanced situational awareness. Both programs attempt to mitigate friction on the battlefield through reliance on technology. By seeking a technological edge to provide enhanced situational understanding, can the Army gain optimal decision-making capability for the MOUT environment?

Field Manual 3.0, Operations, defines situational understanding as the product of applying analysis and judgment to the Common Operational Picture (COP) to determine relationships among factors of mission, enemy, terrain, time, troops available, and civilians (METT-TC). The pursuit of technology enhances only one aspect of situational understanding; that of providing the COP or situational awareness. The other portion, the analysis and judgment is not adequately addressed in programs like Land Warrior and MOUT ACTD.

Excessive trust in high-tech solutions may lead to a false sense of security easily removed by affordable counter technology. Training leaders to effectively handle the friction would be a better and more cost effective use of scarce resources. Authors Senge, Van Creveld, and Klein argue that effective combat decision-making is based on expertise and experience. Expertise and experience build confidence. Confidence in self and in other team members provides the foundation to handle the chaos in the urban environment.

This monograph seeks to explore the urban environment and decision-making through several avenues. Army doctrine will provide how the Army contends to deal with decision-making. Theorist on decision-making will provide the background on how people make decisions. Finally, the Land Warrior and MOUT ACTD programs will be examined to better enable Army soldiers to obtain situational understanding to optimize decision-making.

UNDERSTANDING THE SITUATION

IN THE URBAN ENVIRONMENT

A Monograph
by
MAJ George A. Glaze
Infantry

School of Advanced Military Studies
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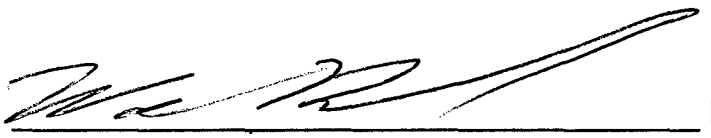

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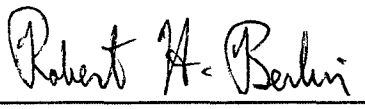

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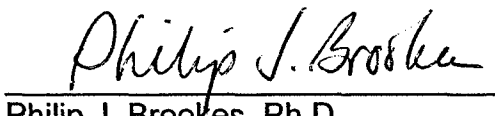

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CHAPTER 1: INTRODUCTION

On 8 September 2000, a platoon of soldiers from the 82d Airborne Division parachuted into the Joint Readiness Training Center at Fort Polk, Louisiana. The exercise was part of the Joint Contingency Warfighter Experiment, designed to evaluate how a number of new technologies might affect the way forces fight in the future. The experiment involved more than 4,000 soldiers from the 82nd Airborne, 10th Mountain and 4th Infantry (Mechanized) divisions as well as a company of Marines.[1] The experiment focused on assessing the effectiveness of several technologies to help officials decide which should be given priority for future development. In this training operation, the emphasis was on the urban environment that the soldiers face today and tomorrow. Specifically, two programs seek to give the future urban warrior an edge over the adversary: the Land Warrior and the Military Operations on Urbanized Terrain (MOUT) Advanced Concept Technology Demonstration (ACTD).

This monograph seeks to answer the question: Can the Army's recent experiments in Land Warrior and MOUT ACTD better enable the urban warrior to make optimal decisions in the attempt to obtain situational awareness? The Army's doctrine describes aspects of military decision-making and the urban environment. Theory on decision-making also stipulates key components to consider for optimal decisions. This paper researches both doctrine and theory to determine if the urban soldier is being better equipped to make decisions through the programs of Land Warrior and MOUT ACTD.

As a result of my research, a doctrinal model derived from several MOUT and operational Army Field Manuals did match the key components of decision-making theory. Specifically, decision-makers are better able to make decisions by having situational understanding about the problem. This situational understanding is derived from applying

[1] Defense News, 26.

analysis and judgment to information about the problem. The information about the problem may be called situational awareness.

This study finds that empirical testing of Army doctrine in the form of the Land Warrior and MOUT ACTD programs does not match the doctrine evenly to follow the components of theory. While the Army may improve the situational awareness of the urban combatant through technology, without proper analysis and judgment, situational understanding will not occur. The most essential quality to enable the urban decision-maker to make optimal decisions is by raising the level of experience. Experience is best gained through training.

Background

The world's population is becoming more urban. Estimates place three-fifths of the world's population will live in urban areas by the year 2015.[2] These factors must be considered in the planning for future military operations.

The flow of U.S. Army forces will likely be into ports and airports that have considerable urban sprawl. The traditional ranger and airborne methods of seizing airfield may secure these ports and airports. Follow-on forces will then expand beyond the airheads and be faced with maneuver through urban areas. Additionally, the cities themselves may contain critical assets like power plants or command and control nodes that may need military attention. The future of combat operations must address the urban environment.

The characteristics of man-made structures make military operations on urbanized terrain (MOUT) very challenging. Field Manual 101-5-1 defines MOUT as "All military actions planned and conducted on a topographical complex and its adjacent natural terrain where man-made construction is the dominant feature."[3] These features include multi-story buildings and sewers to provide the infantry soldier a true three-dimensional battlefield. A combat leader in the urban environment must consider many characteristics to include a compressed decision cycle

[2] Urban Working Group, J-8, Joint Staff, "Draft Handbook for Joint Urban Operations", 2 Dec 1998,7.
[3] FM 101-5-1, 1-100.

and compartmentalization. The city fight presents many options and the lethal consequences of choices demand careful selection.

The compressed timeframe for the decision-maker places unique challenges on the soldier. Russell Glenn, a MOUT expert from the RAND Corporation, states "Urban operations remain an enduring challenge: they are fairly characterized as difficult, dangerous, complex, and manpower-intensive relative to other environments."[4] The urban warrior must quickly analyze the available information and use judgment as he rounds each street corner. Contrast this challenge with the soldier in the wooded environment where team leaders and squad leaders maintain direct control, both visual and aural. Therefore, the compartmentalization created by the actual man-made structures requires quick, individual decision-makers.

Another characteristic of the urban fight is the compartmentalization of the city. The buildings and streets naturally divide the space into 50 to 200 meter intervals. These restrictions affect movement, field of view, and weapon effects. A defender may position himself at a point in the terrain where all the advantages are his. In the selection, the enemy selects optimal fields of view and positions that minimize or eliminates U.S. weapon strengths like standoff and precision munitions. In this way, the urban fight is a series of ambushes with the defender selecting the places to fight and the attacker selecting the time and deciding the reaction.

These characteristics of the urban environment provide numerous challenges to the soldier. Issues like compressed time frames and compartmentalization compound the problem set. Considering these characteristics with the ever-increasing global urbanization, the U.S. Army will fight in the city.

Significance

In efforts to overcome these MOUT challenges, the Army has attempted to assist the soldier in making decisions through the application of technology. The technology involved

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[4] Glenn, The Art of Darkness, xi.

gathers information to facilitate decisions. The complexity of the battlefield, emphasized further by urban terrain, can cloud a decision-maker's abilities.

The concept attempts to clear the vagueness that the urban environment presents by gathering more information for the decision-maker. The terms "situational awareness" and "situational understanding" have been connected with a leader making decisions. They are frequently used in the application of information and the technology that can obtain this information.

The over-reliance on technology to enhance combat effectiveness is not new. A.J. Bacevich wrote in his book, *Pentomic Era*, "soldiers must recognize that technology alone cannot guarantee fighting power; indeed in some respects the pell-mell pursuit of technology actually can upset the sensitive balance of human factors that invests a force with genuine qualitative superiority in combat."[5] Bacevich records a time of turmoil when the U.S. Army struggled with its mission in the atomic era, a period where deterrence came to rely primarily on the new destructive power technology of atomic weapons. Another author, Van Creveld, writes that modern wars repeatedly affirm the critical importance of fighting power, rather than high technology, in providing the margin of victory.[6] These cautions remain true even in times of military fiscal dieting where priorities are made that promise quick solutions instead of thorough analysis.

The United States Army will operate in urban environments in the future. The complexity of the city fight coupled with the short ranges of engagements requires quick, accurate decisions. Recent experiments in the Land Warrior and MOUT ACTD programs provide the urban warrior with information designed to aid in situational awareness. An examination to discover if both theory and doctrine are incorporated into the experiments is the purpose of this paper.

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[5] Bacevich, 156.

[6] Van Creveld, *Fighting Power: German and U.S. Army Performance, 1939-1945* (Westport, CT, 1982),

Research Methodology

The study is divided into five chapters. The introduction portion lays the foundation by providing the background on the army's search to gain situational awareness in the toughest of environments--the urban battlefield. The exploration will cover Army doctrine, theory, and experimentation.

Chapter 2 examines doctrinal sources from the U.S. Army with respect to how the Army plans to fight in the urban environment. This review considers how doctrine addresses the decision-making process. The analysis of current operational and MOUT manuals provides a doctrinal model on how the Army expects the urban warrior to make optimal decisions. This model is distilled from various doctrinal sources to provide a single framework for further analysis. These terms are critical in the analysis on what enables a urban soldier to make decisions.

Chapter 3 examines some decision-making theories to explore how people make decisions in complex environments. Complexity theory is reviewed as a comparison to the urban environment as challenging systems to cognitively grasp. Decision-making theories derived from life and death situations by firefighters and nurses are also reviewed. These theories provide concepts on how people make life-dependent decisions under time constraints. In this examination of theory, this document identified key components essential in all decision-making processes.

Chapter 4 discusses how well the Army doctrinal model from Chapter 2 incorporates the theoretical key components from Chapter 3. These results will determine if the doctrinal model has adequately considered theory in relation to the urban decision-maker and offer recommendations to doctrine if necessary.

Chapter 5 researches the U.S. Army's Land Warrior and the MOUT Advanced Concept Technology Demonstration (ACTD) programs. These programs are the best empirical testing of

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174.

our doctrine. The programs work towards providing a technological edge to the infantryman with emphasis on the urban environment. A detailed analysis compares the experiment process against the findings of Chapter 4. In other words, this chapter examines the Land Warrior and MOUT ACTD programs to see if decision-making doctrine and theory are considered.

Chapter 6 concludes the monograph by summarizing the findings of each chapter and synthesizing the conclusions to see if the urban warrior is being enabled to make optimal decisions through the Land Warrior and MOUT ACTD programs. An independent study from the Army Research Institute is reviewed on whether it corroborates this studies finding.

CHAPTER 2: DOCTRINE

> The role of doctrine in establishing a foundation for MOUT training, technological development, and potential organizational change was widely recognized.
>
> -RAND-DBBL Conference on MOUT, 1998

The Army relies on doctrine to set the principles for the execution of operations. "It [doctrine] is the authoritative guide to how the Army forces fight wars and conduct operations other than war."[7] The examination of key manuals allows one to see how the Army wants to fight the future. The topics reviewed throughout include the urban environment, situational awareness, and optimal decision-making.

Several manuals require review for this monograph. Urban Operations (UO) is covered in FM 9-10, *Military Operations on Urbanized Terrain*, and FM 90-10-1, *An Infantryman's Guide to Combat in Built-Up Areas*. The draft version of FM 3-06, *Urban Operations*, is also reviewed. The concept of situational awareness is covered in several manuals including Field Manual 100-5, *Operations*, along with the soon to be released update, FM 3.0, *Operations*. Decisions-making considerations are described in FM 100-5 and FM 3.0 along with FM 101-5-1, *Staff Organizations and Operations*.

An examination of these publications determines what the Army defines as the urban environment. The complex nature of the man-made terrain increases the demand for information while this same complexity negates the ability to collect on that information. This chapter intends to distill how doctrine instructs the decision-maker to operate in the urban environment.

The findings of this chapter include the construction of a model. The complexities of the urban environment and the decision-making process portrayed in doctrine can be distilled into a situational understanding model. In this model, the formulation of situational understanding results from the application of analysis and judgment to situational awareness. Both the analysis -

judgment aspect and situational awareness must be present for the decision-maker to make the optimal decision with situational understanding. In fact, doctrine weights analysis and judgment, via experience and training, over situational awareness.

Urban Operations

The examination of how doctrine portrays the urban environment sets the framework for the soldier to make decisions. In this examination, MOUT doctrine emphasizes well-trained, quick-thinking soldiers to mitigate the lethal consequences that are inherent in urban terrain.

Written in 1979, FM 90-10 describes the urban battlefield and asserts the advantages and disadvantages of mobility, cover, and observation are equal for the attacker and the defender. Fighting within a built-up area is characterized by a three-dimensional battle. Within this environment, targets will generally be exposed for brief periods, frequently at ranges of less than 100 meters. This physical limitation means close, violent combat between forces and increases the lethality of automatic weapons, rockets launcher, handgrenades, and hand emplaced explosives.

This close violent combat requires a mastery of individual skills. The individual soldier often finds self reliance as the rule.

> Operating from, within, or through urban areas isolates and separates units. Frequently, operations are reduced to a series of small-unit battles. Greater dependence is placed on the individual soldier's and small unit leader's initiative, skill, and fortitude.[8] [Emphasis added]

FM 90-10 stresses the individual soldier able to fight independently with skill and initiative.

Written in 1993, FM 90-10-1 provides the infantryman with guidelines and techniques for fighting against a uniformed enemy; the manual does not discuss the cognitive aspect of enabling the urban decision maker to make optimal decisions. The manual updated many aspects of FM 90-10 in a practical sense. The science of urban warfare or physical tasks like room clearing and reflexive shooting drills, are covered in detail.

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[7] FM 100-5, v.

The June 1993 version of FM 100-5 describes urban operations requiring small unit leaders and the individual soldiers to make their best decisions quickly. "They [urban operations] can constrain technological advantages; they impact on battle tempo; they force units to fight in small, decentralized elements..."[9] This description sounds like the friction mentioned in Chapter 2 of FM 100-5.

> "Friction is the accumulation of chance errors, unexpected difficulties, and confusion of battle that impede both sides. It can never be completely eliminated, but left unchecked, it can have a devastating effect on unit agility. To reduce friction, leaders must continually read the battlefield, know when to decide, and act without hesitation."[10]

The individual soldier and small unit leader abilities of reading the battlefield, knowing when to decide and acting without hesitation, come from practice. This practice comes in the form of training.

FM 3.0 is the Army's soon to be released update to FM 100-5. FM 3.0 defines urban operations as "...offense, defense, stability, and support operations conducted in a topographical complex and adjacent natural terrain where manmade structures and high population density are dominant features."[11] The difficulty in conducting urban operations is also recognized by FM 3.0. "Units require careful preparation and thorough rehearsal to master using combined arms techniques in very close quarters. Urban operations place a premium on closely coordinated combined arms teams that are carefully protected."[12] The careful preparation and rehearsals are indicative of training to facilitate the making of decisions by urban warriors. Such training becomes more than a drill, but rather a bank of experience that matches patterns and offers solutions.

FM 3.06, as a reinforcing document to FM 3.0, describes the urban environment as the result of the interaction of the various physical and human characteristics that make up each

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[8] FM 90-10, 1-5.
[9] FM 100-5, 14-4.
[10] Ibid, 2-7.
[11] FM 3.0, 6-19.

urban area. "An urban area consists of a topographical complex where manmade construction or high population density is the dominant feature."[13] "To operate successfully in this complex environment requires rigorous, realistic Urban Operations (UO) training."[14]

FM 3.06 continues with future threats "...seeking urban areas for confronting Army forces because of the mitigating effects of the urban environment on Army capabilities and technological advantages."[15] The clutter of the physical structures, electromagnetic radiation, and population diminishes Army capabilities by making it difficult to acquire and effectively engage targets with long-range weapons without fear of harming the civilian population and critical infrastructure.[16]

Because of the restraints of urban terrain, FM 3.06 reiterates the demands placed on the decision-maker in the urban environment. This manual states, "...the urban environment is the most complex of all environments in which the Army conducts operations."[17] Chapter 3 of FM 3.06 discusses the compression of tactical factors like time and distance.

> "{Urban}Combat is quick and decisive; therefore, decision-making must be correspondingly fast. The impact of decisions and the outcome of battle occur in a matter of minutes.... The training of small unit leaders must emphasize understanding the commander's intent so that small unit leaders can recognize tactical opportunities and can act quickly to take advantage of them."[18]

The emphasis on training to facilitate rapid decisions is crucial. The compressed time frame demands quick and accurate decisions borne from training that replicates combat.

FM 3.06 continues with mission orders being the key to successful command and control (C2) in urban operations. Mission orders permit the small combat teams to react with flexibility to the intense, dynamic and unpredictable close combat. These mission orders "...require the

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[12] FM 3.0, 6-20.
[13] FM 3.06, 1-2.
[14] Ibid., 1-9.
[15] Ibid., 2-23.
[16] Ibid., 2-23.
[17] Ibid., 3-13.
[18] Ibid., 3-17.

commander's confidence in the professional good judgment of subordinates, and subordinates who are trained and empowered to operate on their own."[19]

According to FM 3.06, another requirement of leaders conducting urban operations is to remain mentally flexible. The situation can change rapidly because of the complexity of the human dimension. "Typical of the change is a stability operation that suddenly, for a variety of possible factors, requires the use of force."[20] Urban warriors must be able to adjust their mental focus from a non-combat to combat situation.

The evolution of U.S. Army urban doctrine is best summarized in FM 3.06. "The compartmentalized and complicated nature of the urban environment requires increased emphasis on initiative, judgment, and tactical and technical competence of subordinate leaders."[21] Urban operations place a premium on closely coordinated combined arms teams. Greater dependence is placed on the individual soldier's and the small unit leader's initiative, skill, and fortitude. These skills are acquired through tough, realistic training.

Situational Awareness

The development of the concept of situational awareness has been long and difficult. Army doctrine has realized the need for this term for over a decade. The actual term has changed in meaning from agility to executable information. The disconnect lies with the doctrinal failure to clearly formulate the wording and definition. Only by examining all the manuals on the subject was the author able to arrive at the distilled version believed to represent the cognitive abilities required for the decision-maker to make optimal decisions.

The 1993 version of FM 100-5 describes situational awareness under the 'agility' section of 'The Tenets of Army Operations'.[22] The section opens with agility in combat operations defined as the ability of friendly forces to react faster than the enemy and it is a prerequisite for

[19] FM 3.06, 3-27.
[20] Ibid., 3-28.
[21] Ibid.,, 6-9.
[22] FM 100-5, 2-7.

seizing and holding initiative. "It [agility] is as much as a mental as a physical quality"[23] The situational awareness portion closes the agility section in peacekeeping operations as a desirable state that perceives and anticipates changes in the environment, combined with the ability to act quickly within the intent of higher commanders. The results of this situational awareness leads to agility in operations other war that is vital to successful outcomes.[24]

The mentioning of situational awareness as a concept in the newly coined term of *peacekeeping operations* displays the struggle the Army had in 1993. FM 100-5 understands that technology in future conflicts is best used if it is integrated with technology. "Understanding the relationship between doctrine and technology begins with the premise that doctrine must be the engine that drives the exploitation of technology."[25] It is evident that the converse is not true: technology must not drive the doctrine.

In 1994, the Army's Training and Doctrine Command defined situational awareness as the "ability to have accurate and real-time information of friendly, enemy, neutral, and noncombatant locations; a common, relevant picture of the battlefield scaled to specific level of interest and special needs."[26] Achieving situational awareness, then, places a distinct emphasis on the flow of information. The action is facilitated by technology that moves this flow.

FM 101-5 adds no clarity to the vocabulary in FM 100-5. "The commander relies on his staff to get from battlefield "information" to battlefield "understanding", or situational awareness, quicker than his adversary."[27] In this quote, it appears that information is the raw data and that the staff translates that data into battlefield understanding or situational awareness. A later reference confirms the interchangeability of understanding and situational awareness. "The

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[23] FM 100-5, 2-7.
[24] Ibid., 2-7.
[25] Ibid.,, 2-3.
[26] TRADOC Pam 525-5, Glossary-7.
[27] FM 101-5, 1-3.

primary product the staff produces for the commander, and for subordinate commanders, is understanding, or situational awareness."[28]

The struggle of clarity in terminology continues in FM 101-5 declaring two types of information: understanding and decsion-making. Situational awareness information creates an understanding of the situation as the basis for making decisions. "Simply, it is understanding oneself, the enemy, and the terrain or environment."[29]

The second type of information, termed *executable information*, communciates a clearly understood vision of the operation and desired outcome after a decision is made. Examples of executable information include conclusions, recommendations, guidance, intent, concept statements, and orders.[30]

FM 101-5 also provides situational awareness refinement in the visualization of the battlefield. "The staff helps the commander communicate his battlefield visualization to subordiants by preparing orders and informational products to achieve a relevant common picture and situational awareness."[31]

These older manuals reflect a lack of a central and unifying baseline document. FM 100-5 places emphasis on situational awaress facilitating agility in peacekeeping operations. TRADOC Pam 525-5 defines situational awareness as the ability to have accurate and real-time information of friendly, enemy, neutral, and noncombatant locations; a common, relevant picture of the battlefield *scaled* to specific level of interest and special needs. FM 101-5 divides the information necessary for the commander as situational awareness information which creates understanding and execution information which communciates a clearly understood vision and desired outcome. Into this difficult defining of vocabulary, the Army's newest manual, FM 3.0, *Operations*, provides another view.

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[28] FM 101-5, 1-3.
[29] Ibid., 1-3.
[30] Ibid., 1-3.
[31] Ibid., 1-3.

The Army's FM 3.0 does not acknowledge the executable information from FM 101-5, nor does it mention the term situational awareness. Instead, a new term, 'situational understanding', appears on numerous counts.

Field Manual 3.0, *Operations*, attempts to explain the fundamentals for full spectrum operations. Appendix A of this monograph provides the graphic portrayal of the concepts. "These fundamentals provide the conceptual foundations for execution in the field as well as leader development in the classroom."[32] The building blocks for these fundamentals are the elements of combat power. Figure 2-1 portrays the elements of combat power. They include maneuver, firepower, protection, information and leadership.

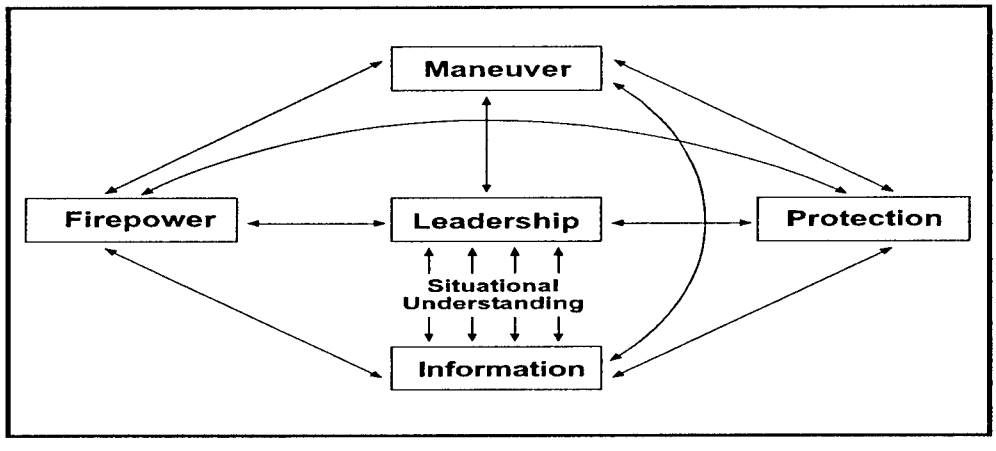

Figure 2.1 Elements of Combat Power

In the elements of combat power, the placement of situational understanding between information and leadership is essential. "Today, Army leaders use information collected by unmanned systems to increase their situational understanding before engaging the enemy."[33] A cautions arises: There is significant difference in the terms situational awareness and situational understanding and these terms are not clearly delineated. The raw data that an unmanned vehicle provides has not been through the analysis and judgment process. This raw data is situational

[32] FM 3.0, 4-2.
[33] Ibid., 4-10.

awareness or called information just as depicted in Figure 2-1. This information flows thorough a process of situational understanding to provide leadership.

To reiterate, the distinction between situational awareness and situational understanding is subtle, but profound. FM 3.0 defines situational understanding as the product of applying analysis and judgment to the Common Operational Picture (COP) to determine the relationships among the factors of the problem.[34] For the purposes of this paper, the COP represents situational awareness. This mental process includes knowing where the enemy is, where the soldier is, and where other friendly soldiers are. But situational understanding goes one-step further; the application of analysis and judgment to this information. In conducting this process, the information becomes useful in that it may be acted upon to provide a tactical advantage. Situational awareness is therefore a component of situational understanding.

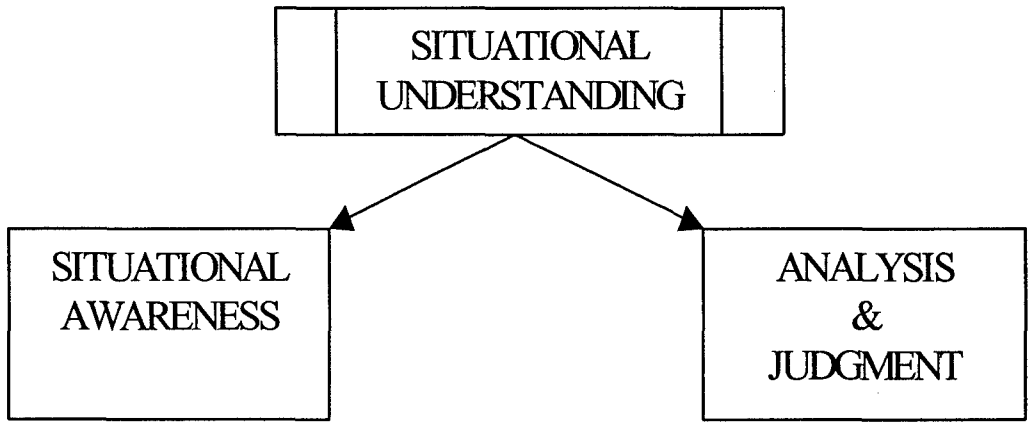

Figure 2.2 Components of Situational Understanding

This model is conceptualized by the author from the study of FM 3.0 with the TRADOC Pam 525-5, FM 100-5, and FM 101-5 in mind. "Information from the COP, transformed into situational understanding, allows commanders to combine the elements of combat power in new

[34] FM 3.0, Operations, 11-14. The essential factors are fundamental to assessing and visualizing the situation are mission, enemy, terrain and weather, troops and support available, time, and Civil considerations. (METT-TC).

ways."[35][emphasis added] This transformed COP has gone through analysis and judment to arrive at situational understanding. The author believes the doctrinal model in Figure 2.2 fits into the methodology of a tranforming Army.[36]

FM 3.0 cautions the Army, "Situational understanding has limits. It reduces the friction caused by the fog of war... [but] It demands as much, if not more, human judgment as it does machined-processed information."[37][emphasis added]. In this quote, the manual acknowledges that situational awareness with the application of analysis and judgment gives situational understanding.

The Army has provided an assortment of definitions for the terms situational awareness and situational understanding that are confusing. Throughout all the evolution of this vocabulary, the decision-maker remains a constant. He has decisions to make. It requires information that has been filtered through 'analysis and judgment' to enable the decision-maker to decide.

Situational understading is what the decision-maker needs in the urban environment to make optimal decisions. Situational awareness is a component of situational understanding, but must have analysis and judgment to be utilized by the decision-maker.

Decision Making

The review of how the Army intends to fight in the urban environment covers the decision-making processes. Decision-making is discussed in many Army manuals to include FM 101-5, FM 100-5, and FM 3.0. The definitions of decision-making and the enablers that are required need reviewed.

The preface for FM 101-5 states "FM 101-5 is the Army's doctrinal source for the military decision-making process, the doctrinal approach to decision-making that helps the

[35] FM 3.0, 4-10.
[36] In another leap to ascertain what doctrine is attempting to portray, the term situational dominance is used. Situational dominance is defined by this author as the obtainment of situational understanding, while denying the enemy the ability to obtain situational understanding.
[37] FM 3.0, 11-15.

commander and staff examine a situation and reach logical decisions."[38] But the heart of this manual is the detailed description of the Military Decision-Making Process or MDMP. The MDMP is a single, established and proven analytical process that is an adaptation of the Army's analytical approach to problem solving.[39] The process helps apply thoroughness, clarity, sound judgment, logic, and professional knowledge to reach a decision.[40]

The delineations of the roles of the staff and that of the commander are explicit. "Command and control is an essential element of the art and science of warfare."[41] FM 101-5 further stipulates that the command portion relies on the art with the control portion on the science.[42] The essence of decision-making lies in the commander.

The application of the MDMP described in FM 101-5 is a formal approach that requires adherence to steps that provide a thorough analysis. This mechanical approach may miss the cognitive aspects of the mind and can restrict creativity. The process is very product oriented with deliverables in each step.

The MDMP found in FM 101-5 is of little help to the urban warrior. The individual soldier on the urban battlefield finds himself in command of his world. In the compartmentalized nature of the urban fight, the room or alley that he is clearing separates him from outside support. He requires more of the conceptualization skills found in the art of command than in the staff process. In short, he makes decisions.

FM 100-5 covers the decision-making process in the Battle Command section. Leaders must assimilate thousands of bits of information to visualize the battlefield, assess the situation, and direct the military action required to achieve victory. "Thinking and acting are simultaneous activities for leaders in battle."[43] Again the urban environment calls for individuals, not staffs, to

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[38] FM 101-5, vii.
[39] Ibid., 5-1.
[40] Ibid., 5-1.
[41] Ibid., 1-1.
[42] Ibid., 1-1.
[43] FM 100-5, 2-14.

make these decisions. Every soldier is a potential leader as he passes out of sight around the next corner.

FM 100-5 defines decision-making as knowing if to decide, then when to decide and what to decide.[44] The manual also describes this leadership as "often guided by intuition and feel gained from years of practice and study."[45][emphasis added] In other words, these years of practice and study enable the decision-maker to make better decisions.

FM 3.0 envisions decision-makers relying on intuition and feel gained from years of practice and study. The soldiers of the 21st Century must be able to "exercise mature judgment and initiative under stressful circumstances and be capable of learning and adapting to meet demands of full spectrum operations."[46] Mature judgment comes from repetition with learning and adapting.

Finally, FM 3.0 notes that improved technologies will enhance decision-making, but cautions against an over-reliance on them. "Even with its advantages, the side with superior technology does not always win in land operations; rather, the side that applies combat power more skillfully usually prevails."[47] This view is interesting when compared with the majority of the other discussions on technology that emphasize technology delivering situational understanding.

All of the reviewed doctrine identifies decision-making requirements. FM 100-5 looks at leadership as often guided by intuition and feel gained from years of practice and study. FM 3.0 sees leaders exercising mature judgment and initiative under stressful circumstances and is capable of learning and adapting to meet demands of full spectrum operations.

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[44] Ibid., 2-14.
[45] Ibid., 2-15.
[46] Ibid, 1-17.
[47] FM 3.0, 1-13.

Summary

The Army relies on doctrine to set the principles for the execution of operations. The examination of key manuals allows one to see where the Army wants to go in the future. The review of doctrine considered the urban environment, situational awareness, and decision-making.

The urban environment offers many challenges to the soldier. The compartmentalized nature demands decision-making as an individual skill. The friction of the urban environment requires leaders and individuals to make their best decisions quickly. The training of small unit leaders must result in mentally flexible decision-makers.

The doctrinal review of situational awareness led to the construction of the Situational Understanding Model in Figure 2-2. The formulation of situational understanding results from the application of analysis and judgment to situational awareness. "It [situational understanding] enhances commander's decision-making by identifying opportunities for mission accomplishment, threats to the force or missions, and gaps in information."[48] Additionally, doctrine portrays both components of situational understanding with an emphasis towards the analysis and judgment. That is to say, doctrine does place more weight on analysis and judgment, via experience and training, over situational awareness.

Finally, the review of doctrinal decision-making discovered leaders often guided by intuition and feel gained from years of practice and study. FM 3.0 continues with the expectation of Army leaders exercising mature judgmnent that comes from repetition with learning and adapting.

The recurring theme throughout the doctrinal areas of urban environment, situational awareness and decision-making is training. The analysis and judgment component of situational understanding only comes from training that emphasizes the exercise of these cognitive skills.

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[48] FM 3.0 11-14.

CHAPTER 3: THEORY

> Theory then becomes a guide to anyone who wants to learn about war from books; it will light his way, ease his progress, train his judgment, and help him avoid pitfalls"
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> Clausewitz[49], *On War*

Clausewitz's comments ring as true today as they did in his time. The study of theory provides framework for discussions of the abstract that explain the concrete. Theory can illuminate the future and make the path easier to traverse without stumble. The student of theory has a readily available supply on which he may draw inferences to deal with reality. Such a capability assists the decision-maker when time is short and critical decisions must be made. Such conditions exist in the urban environment.

This chapter examines the theories behind complexity, situational awareness and decision-making. The urban environment poses many dilemmas to the individual soldiers. Because of the compartmentalized nature of the urban fight, each soldier has key decisions to make. General Krulak recognized this fact and coined the term 'Strategic Corporal'. Today's soldier faces many decisions that are not only survival for himself and squad mates, but have potentially strategic ramifications.[50] How the soldier arrives at decisions in the demanding urban setting is important. The relevance of situational awareness in this decision-making also must be sorted. In examining the theories, key components for the urban decision-maker to make optimal decisions with regard to theory are identified.

The findings of this chapter are numerous, but have a central theme. A decision-maker arrives at a decision in various ways. Quick, decisive decision-makers have commonalities. One such trait is experience. Experience is mandatory for the decision-maker to quickly arrive at an optimal decision. Training remains the most efficient method for obtaining this experience.

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[49] Carl von Clausewitz, *On War*, 141.
[50] Parameters, 26.

The complexity of the urban environment, the information requirements in situational awareness and the methods of reaching a decision all place emphasis on the experienced-based cognitive activity.

Urban Environment

In *Complexity*, Mitchell Waldrop discusses a pyramid shaped learning structure of things as commonplace as air. He writes,

> ...the hierarchical, building block structure utterly transforms a system's ability to learn, evolve, and adapt. Think of our cognitive building blocks, which include concepts as red, car, and road. Once a set of building blocks like this has been tweaked, refined and thoroughly debugged through experience...then it can generally be adapted and recombined to build a great many new concepts...[51]

In dealing with complex systems, a baseline ability is necessary in order to make cognitive leaps. The building blocks assist in speeding up the mental process. "Instead of moving through that immense space of possibilities step by step, so to speak, an adaptive system can reshuffle its building blocks and take giant leaps."[52]

In *The Logic of Failure*, Dietrich Dörner describes complexity as the label given to the existence of many interdependent variables in a given system. "The more variables and the greater their interdependence, the greater that system's complexity."[53] The variables in the cities are almost too numerous to track. Information like the actual type of concrete used in the construction of buildings and the method of pouring have impacts on the soldier. It follows, the more developed the city, the more complexity for the urban warrior.

Dörner continues with complexity stating that it is subjective rather than objective. Dörner describes the use of 'supersignals' by experienced individuals to reduce complexity, collapsing a number of features into one.[54] "We learn supersignals from experience, and our

[51] Waldrop, 170.
[52] Ibid., 170.
[53] Dörner, 38.
[54] Ibid., 39.

supply can differ greatly from another individual's."[55] The amount of training affects the amount of experience.

Both Dörner and Waldrop present complexity as challenging for the decision-maker. The decision-maker is best enabled by maintaining an experience base that aids in quickly sorting out the relevant information and deciding. Whether the terms adaptive systems or supersignals, the individual that has experience is better able to handle the complex. The soldier that has been well trained is better able to confront the complexities of urban operations. A key component in making decisions in the complexity of the urban environment is experience gained through training.

Situational Awareness and Situational Understanding

The terms situational awareness and situational understanding are not directly found in theory, but are represented in context. The information necessary for the decision-maker to decide is traceable to situational awareness and the cognitive concept of situational understanding is also found.

Martin Van Creveld summarizes his lessons of *Command in War* by considering the history of command as "a race between the demand for information and the ability of command systems to meet it. That race is eternal; it takes place within every military (and, indeed, civilian) organizations, at all levels and at all times."[56] Creveld recognizes the challenges of decision-makers and the information required to make the decisions. The ability of the information to reach the command system or decision-maker is only one part of the equation. How the decision-maker uses the information is another.

Van Creveld cautions against only attempting to fix the more obvious side of the equation:

> "To believe that the wars of the future, thanks to some extraordinary technological advances yet to take place in such fields as computers or remotely controlled sensors,

[55] Dörner, 39.
[56] Creveld, 265.

> will be less opaque and therefore more subject to rational calculations than their predecessors is, accordingly, sheer delusion."[57]

Van Creveld reflects on numerous commanders and decision-makers from the past to reach this conclusion. He concedes rationality is not easy to apply to this field. Situational awareness is fleeting at best. Van Creveld posits the attainment of certainty in a contest of two opposing wills is impossible.[58]

Van Creveld concludes his book with emphasis on discovering ways to improve training, doctrine, and organization after identifying limitations. "Instead of confining one's actions to what available technology can do, the point of the exercise is precisely to understand what it cannot do and then proceed to do it nevertheless."[59] In other words, he requires the decision-maker to know the limitations of the information brought by technology and be willing and able to decide with or without. Van Creveld demands for decision-makers to see beyond the technology and enhance those abilities that facilitate making decisions without perfect information or situational awareness through training that builds experience.

Author Gary Klein takes another approach to situational awareness in explaining how experts appear to have an overall sense of what is happening in a situation. Novices may be confused by all the data elements, experts see the big picture, and they appear to be less likely to fall victim to information overload.[60] "Skilled decision makers may be able to seek information more effectively than novices. This skill in information seeking would result in a more efficient search for data that clarify the status of the situation."[61] Klein actually places skill and expertise above the situational awareness ability. "Experts are not only better at forming situational

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[57] Creveld, 266.
[58] Ibid., 266.
[59] Ibid., 275.
[60] Klein, 152. Klein continues on page 175 with training to high-skill levels should emphasize perceptual skills along with mastery of procedures.
[61] Ibid., 154. Klein conducted studies of chess master and novices under various time constraints. He concluded that experienced people have an impressive ability to withstand time pressure and generate plausible options so they do not have to waste effort and attention by comparing lots of options.

awareness and seeing the big picture, but they can detect when they are stating to lose the big picture."[62]

In summary, Van Creveld provides for the decision-maker and the information needed to make decisions as separate entities. He cautions against waiting for the information to become clear or the attainment of situational awareness before deciding. Klein theorizes that the person with maximum training or expert, has a better ability to obtain and use situational awareness. A key component for the decision-maker concerning situational awareness is experience built from training.

Decision-Making

Decision-making theory considers several enablers that aid the individual. Concepts like naturalistic decision-making and recognition-primed decision-making consider the experience base of the individual. In this vein, Gary Klein provides the framework.

Klein looks at how people make decisions with missing information, time constraints, vague goals, and changing situations. Klein studied various high-risk jobs like fire fighting and intensive care units where life and death decisions that are time sensitive are made routinely. A *naturalistic decision-making* is discussed where high stakes are involved like when a fireground commander makes a poor decision, lives can be lost.[63]

In this study, Klein found that people might draw on conventional sources of power to make decisions like deductive logical thinking, analysis of probabilities, and statistical methods. These methods tend to be time consuming and resource intensive. But Klein discovered more than these typical sources.

The central theme for less typical, time-constrained sources is experience. In natural settings where analytical sources may not be available, Klein observed the powers of intuition,

[62] Klein, 158.
[63] Ibid., 4.

mental simulation, metaphor, and storytelling.[64] The power of intuition facilitates a quick solution. "Intuition depends on the use of experience to recognize key patterns that indicate the dynamics of the situation."[65] The power of mental simulation allows the decision maker to see the endstate of a possible course of action. The power of metaphor allows the decision maker to tap other experiences by finding parallel incidents and there solutions. The power of storytelling allows the packaging of the experiences for reuse later. Klein found all these sources of power originating from experience.

Klein explains this strategy as the recognition-primed decision-making or RPD. He found decision-makers using their experience to allow them to identify a reasonable reaction as the first on they considered, so they did not bother thinking of others.[66] Klein developed the RPD model on the basis of field studies of the way that experienced personnel actually made decisions. "The model explains how people can use experience to react rapidly and make good decisions without having to contrast options."[67]

Klein defines a term called leverage points as a focus for building a solution.[68] "Military commanders also need to detect leverage points. Klein bases these military observations on his understanding of maneuver warfare being based on discovering efficient opportunities for achieving powerful results. A skilled commander is able to study a map and quickly detect the leverage points. Clausewitz refers to this ability as *Coup d'oeil,* or inward eye, referring "...to the quick recognition of a truth that the mind would ordinarily miss or would perceive only after

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[64] Klein, 3.
[65] Ibid., 31. Clausewitz writes in *On War*, "As with a man of the world instinct becomes almost habit so that he always acts, speaks, and moves appropriately, so only the experienced officer will make the right decision in major and minor matters—at every heartbeat of war. Practice and experience dictate the answer...".p.120.
[66] Ibid., 17. Klein devotes a chapter in his book to expertise. There are many things that experts see that are invisible to everyone else: fine discriminations, patterns, alternative perspectives, missing-events, the past and the future, and the process of managing decision-making activities.
[67] Ibid., 101.
[68] Ibid.,, 113.

long study and reflection."[69] Klein considers the leverage points as possibilities that provide fragmentary action sequences, kernel ideas, and procedures for formulating a solution.[70]

In summary, Klein reveals several enablers that aid the individual in decision-making. He examines how people in life and death scenarios make decisions with missing information, time constraints, vague goals, and changing situations. The central theme for less typical, time-constrained sources is experience. In natural settings where analytical sources may not be available, Klein observed many sources of power to include intuition, mental simulation, metaphor, and storytelling. All of these are born through experience.

SUMMARY

Decision-making theories place emphasis on experience-based cognitive activity. Complexity challenges decision-makers by overwhelming the indicators. The use of previously obtained building blocks or learned supersignals assist the decision-maker in prioritizing the information. These building blocks and supersignals come through training that replicates reality.

Situational awareness remains useful, but cannot be emphasized more than the actual decision-making skills. Klein maintains the importance of experience which breeds tools like leverage points and mental models. The cognitive abilities that are required to solve complex problems arrive through experience that facilitates the use of situational awareness that recognizes what information is necessary and relevant for future decisions.

What emerges from the theory is the emphasis on experience. While other means of learning and thinking are important factors, actual participation in a complex action is the best way to learn. Short of actual combat, training builds experience.

[69] Clausewitz, 102.
[70] Klein, 116.

CHAPTER 4: ANALYSIS

This chapter considers how well the Army doctrinal model from Chapter 2 incorporates the theoretical components from Chapter 3. The intent here is to determine if the doctrinal model adequately considered theory in relation to the urban decision-maker from the views of complexity, situational awareness, and decision-making. Recommendations to doctrine are also offered.

The urban environment doctrine considers the theories of complexity. Both Dörner and Waldrop present complexity as challenging systems for the decision-maker. The decision-maker is best enabled by maintaining an experience base that aids in quickly sorting out the relevant information. Using terms like adaptive systems and supersignals, theorists look for the individual that has experience as better able to handle the complex. A key component in making decisions within the complexity of the urban environment is experience gained through training.

FM 3.06 states "The compartmentalized and complicated nature of the urban environment requires increased emphasis on initiative, judgment, and tactical and technical competence of subordinate leaders."[71] Urban operations place a premium on closely coordinated combined arms teams. Greater dependence is placed on the individual soldier's and the small unit leader's initiative, skill, and fortitude. These skills are acquired through tough, realistic training.

The situational awareness doctrine considers the theories of situational awareness. Decision-making theory places emphasis on experience-based cognitive activity. Decision-makers are challenged by the overwhelming information in complex environments. The use of experience in the form of previously obtained building blocks or learned supersignals assist the decision-maker in prioritizing. These building blocks and supersignals come through realistic training.

Klein maintains the importance of experience which breeds tools like leverage points and mental models. Situational awareness remains useful, but cannot be emphasized more than the actual decision-making skills. The cognitive abilities that are required to solve complex problems arrive through experience, which in turn facilitates the use of situational awareness that recognizes what information is necessary and relevant for future decisions. The key component of decision-making according to theory is experience.

The complexities of the urban environment and the decisions-making process portrayed in doctrine, facilitate the construction of the situational understanding model derived from the use of analysis and judgment on situational awareness. The formulation of situational understanding results from the application of analysis and judgment to situational awareness. "It [situational understanding] enhances commander's decision-making by identifying opportunities for mission accomplishment, threats to the force or missions, and gaps in information."[72]

The decision-making doctrine considers the theories of decision-making. The central theme for less typical, time-constrained sources is experience. Klein reveals several enablers that aid the individual in decision-making. He examines how people in life and death scenarios make decisions with missing information, time constraints, vague goals, and changing situations. In natural settings where analytical sources may not be available, Klein observed many sources of power to include intuition, mental simulation, metaphor, and storytelling. All of these sources come from experience.

With these summaries, the overall analysis demonstrates doctrine does consider theory. Both doctrine and theory break decision-making into two components: information requirements, which are fullfilled by situational awareness, and cognition based on analysis and judgment. Both doctrine and theory also consider analysis and judgment via experience over the obtainment of situational awareness.

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[71] FM 3.06, 6-9.
[72] FM 3.0, 11-14.

Recommendations

Clearly define terms. Situational awareness and situational understanding are terms the Army generally fails to define clearly and consistently. Without clear definitions, requirements for technolgy that enable situational awareness and situational understanding cannot be decisive.

Explain how to obtain analysis and judgment. In obtaining the situational understanding that FM 3.0 demands for decisive operations, analysis and judgment must be applied. But Army doctrine fails in the stipulation of how the analysis and judgment is conducted.

Klein writes of the key to effective decision-making as building expertise. The normal response is to develop training to teach people to think like experts. But in most settings this can be too time-consuming and expensive. However, Klein argues that if people cannot be taught to think like experts, perhaps they can be taught to learn like experts. His method is this:

-Deliberate practice with goals and evaluation criteria

-Compile an extensive experience bank

-Obtain accurate, diagnostic and timely feedback

-Review past experiences to gain new insights and learn from mistakes.[73]

The theoretical component addresses the need for experience in detail to enable the decision-maker to make optimal decisions. The doctrinal model provides little emphasis on this matter. The challenge exists that if the subject is not emphasized in doctrine, it will not be funded and emphasized in training, which builds the experience. Klein states "The emphasis is on being poised to act rather than being paralyzed until all the evaluations have been completed."[74]

Train. The compartmentalized and complicated nature of the urban environment requires increased emphasis on initiative, judgment, and tactical and technical competence of subordinate leaders. Urban operations are the most difficult for combat. This competence and

[73] Klein, 104.
[74] Ibid., 30.

judgment does not come from technology. It comes from tough, realistic training. Urban Operations demand greater dependence on the individual soldier's and small unit leader's initiative, skill, and fortitude. Even the best doctrine is limited to general approaches to specific problems. In order to prepare urban warriors for combat, the doctrine has to be tied to extensive training.

Summary

This chapter considered the Army doctrinal model from Chapter 2 through the theory perspective. Doctrine considers complexity, situational awareness and decision-making with incorporation of theory. Recommendations include the Army clearly defining terms, explaining the obtainment of analysis and judgment, and emphasizing the training of decision-makers to build experience. Such considerations will better enable the urban decision-maker to make optimal decisions.

CHAPTER 5: EXPERIMENTS

> The laboratory at best is an imperfect predictor of battlefield effectiveness; and even where the employment of advanced technology is politically unconstrained, it is far from military panacea.
> MG Robert H. Scales, Jr. in *Future Warfare*

The Army is working to improve situational awareness capabilities at the lowest tactical level. Two current US Army programs are attempting to equip the individual soldier with technology able to bring COP information right to the soldier. The Land Warrior program and the MOUT Advanced Concept Technology Demonstration (ACTD) are efforts to outfit the infantry soldier with the latest technology and posture for future innovations.

These efforts demonstrated their current progress at the recent Joint Readiness Training Center Joint Contingency Force Advanced Warfare Experiment (JRTC-JCFAWE) rotation at Fort Polk, Louisiana. The Land Warrior Program and the MOUT Advanced Concept Technology Demonstration participated in the Advanced Warfighter Exercise with a brigade from the 10th Mountain Infantry Division, a platoon from the 82d Airborne Division and a company from the U.S. Marine Corps. Selected units conducted numerous live fire and force on force exercises to provide feedback on the current programs.

The Land Warrior and ACTD programs attempt to give soldiers a significant advantage by using current and future technologies in the urban fight. The ability of the Army to gather critical, yet impartial information on on-going procurement operations in the armed services appears challenging. If doctrine and funding are wedded to technology that seeks situational awareness, the *Logic of Failure* may already exist.[75] The application of scarce resources like funding and time towards the component of the situational understanding model not emphasized by doctrine and theory cannot be prudent.

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[75] Dörner writes in *The Logic of Failure* about the nature of thinking when dealing with complex problems. Specifically, he discusses on pages 7 and 8 the mistakes people make by following blind alleys they follow down and the detours they take in attempting to cope with such problems.

Clearly, both doctrine and theory emphasize experience built from training as examined in Chapters 2 and 3. The Army's essential training manual, FM 25-101, states "Training must conform to Army doctrine. Doctrinal manuals provide leaders correct procedures and principles in order to conduct training properly."[76] The Land Warrior and MOUT ACTD programs, while attempting to provide the Army with situational awareness, are not focused on the essential decision-maker enabler – experience.

Land Warrior

The review of the Land Warrior program considers many points to include concept, capabilities, and cost. The Land Warrior program was conceived as an effort to remedy many of the shortcomings in today's infantry. Using enhanced technologies, the program attempts to provide the soldier with overmatching capabilities. The cost for the program is high – only matched by the expectations. In this regard, the Land Warrior program fails to enable the decision-maker to make optimal decisions in the urban environment.

The foundational concept behind Land Warrior requires review. In concept, Land Warrior targets the modernization the infantry. Specifically, "...the Land Warrior is designed to maximize existing, mature technologies to correct soldier deficiencies in the near term and bring the soldier into the digitized battlefield of the Objective Force."[77] The crucial identification of these deficiencies determines the requirements for procurement. The requirements were determined through numerous studies conducted in the early 1990s.[78] As the Army transforms, the requirements must also adjust to set priorities for procurement. If not, technologies discovered during development may drive the procurement.

The assumption that the increasing of information available to the soldier increases the abilities is not valid when considering doctrine and theory. In capabilities, the US Army reports the Land Warrior program as the "premier program for enhancing the infantry soldier's battlefield

[76] FM 25-101, 1-5.
[77] Land Warrior Briefing Packet, Rev 9-1-00.

capabilities through the development and integration of an assortment of systems, components and technologies into a cohesive and combat effective system."[79] The modular system provides soldiers with night-vision capabilities, advanced computers and radios, enhanced personal protection, and a sophisticated new rifle.[80] Consequently, the focus of the program continues to match technologies to the increasing of informational collecting capabilities of the soldier. Without analysis and judgment, the information is not providing its full potential.

The program is very expensive. The September 2000 edition of National Defense magazine reported the Army has spent between $2 billion and $3 billion on Land Warrior. "The Army has requested $528 million for the program in the 2004-2207 budget."[81] The same article reports the systems could be fielded as early as 2012.

Compare this expense with the approximate $100 million to provide the National Training Center with a MOUT site. The fact that our premier heavy force training center is without a MOUT site has not gone unnoticed and the TRADOC Commander, General Abrams, is working to fix this shortfall.[82] According to doctrine and theory, analysis and judgment gained through experience best enables the decision-maker to make optimum decisions. A training facility that provides experience through repetitive, realistic training appears more appropriate.

Expectations match the high costs of Land Warrior. "As the first integrated fighting system, Land Warrior will significantly increase the soldier's situational awareness, lethality, and survivability."[83] Within these high expectations lie a danger; the Land Warrior program walks a fine line between the situational awareness and situational understanding terminology. A dangerous example of misuse is found in the JCF-AWE Handout. "This integrated system [Land Warrior] vastly increases the soldier's situational awareness, allowing him to rapidly analyze data

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[78] See Appendix E for a slide from the Land Warrior Briefing.
[79] Land Warrior Briefing Packet, Rev 9-1-00.
[80] See Appendix B for a more complete description of the Land Warrior system.
[81] National Defense, 16.
[82] Briefing to Gen Abrams, 10 Nov 99.
[83] Land Warrior Briefing Packet, Rev 9-1-00.

and determine the best course of action."[84] As discussed in Chapter 2 of this paper, the components of situational understanding are situational awareness and analysis and judgment. Having situational awareness does not allow a soldier to make optimal decisions until analysis and judgment has been applied.

In summary, the Land Warrior program attempts to provide assistance to just one component of the doctrinal decision-making model of situational understanding. Such a single-minded approach without integration into training that produces experience is not really fully integrated. Doctrine and theory both emphasize the analysis and judgment portion of situational understanding; in fact, theories even posit that situational awareness without experience often exacerbates the decision-maker challenges.

In addition to the single-aspect approach, the Land Warrior program requires the consideration of many points to include concept, capabilities, and cost. Attempts to improve the shortcomings of today's infantry forces are commendable. The overall concept requires constant doctrinal and theoretical review to ensure relevancy. The cost for the program is high while training shortfalls exist in areas like facilites. In this regard, the Land Warrior program fails to enable the decision-maker to make optimal decisions in the urban environment.

MOUT Advanced Concept Technology Demonstration (ACTD)

The MOUT ACTD program also deserves review. This program also considers utilizing technology to mitigate the challenges in the city fight. As another approach to improve the soldier's performance in MOUT, the ACTD program also falls short in enabling the decision-maker to make optimal decisions. The limited cognitive focus and no clear linkage to other programs or designs hinders the benefits this program could provide.

After US military operations in Mogadishu, Haiti, and Bosnia, the MOUT ACTD was initiated to improve US military forces capabilities in a MOUT environment. The initial study group researched the urban environment. Potential adversaries can achieve military parity with

[84] JCF-AWE Handout, 8. See Annex C for more details.

US forces because of the complex nature of urban terrain; unique factors include noncombatants, electro-magnetic interference, densely compacted areas, and a three-dimensional battlefield.[85]

The overall concept of the MOUT ACTD program seeks to buy off-the-shelf technology to improve the soldier's abilities in MOUT. Current technologies provide for advancements in simple items like elbow padding to complex items like rifle-launched explosive entry munitions. The program is not hampered by a long research and development phase with strict procurement procedures.

The specifics of the program include five functional groupings. These five functional groups consist of C4I, Force Protection, Mobility, Engagement, and Modeling and Simulation. Once identified, these groups were then turned into procurement requirements.[86] The disconnect forms when determining these requirements.

The MOUT ACTD failure to link doctrine, theory and previous studies while determining the requirements of the program is evident. A panel of Army and Marine officers gathered to determine the requirements for procurement and this author found no evidence of the panel considering the Land Warrior requirements. Additionally, the newer manuals of FM 3.0 and FM 3.06 are evolving concepts that must be supported by procurement programs. While any attempts to improve the soldier's abilities in MOUT are noteworthy, the linking of the requirements to doctrine and theory are crucial. Terms like situational awareness and situational understanding need to be doctrinally defined and correctly incorporated into this program. Direct linkage to doctrine, theory and previous studies must be established.

The focus of the program works to "Improve the operational capabilities of Soldiers and Marines in MOUT".[87] The program seeks to evaluate advanced technologies to provide technological dominance in MOUT, including Tactics, Techniques, and Procedures (TTPs).

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[85] MOUT ACTD Slide Briefing, Slide 2.
[86] Appendix D has more details.
[87] MOUT ACTD Slide Briefing, Slide 4.

Additionally, the ACTD seeks to provide interim capabilities to operational units with TTPs while setting the stage for rapid acquisition of selected technologies.[88]

While the MOUT ACTD programs requirements that mainly targets needed physical remedies for the urban fight, the program addresses little of the cognitive aspect of the soldier. The few situational awareness providers like the Urban Unmanned Aerial Vehicle (UAV) only target situational awareness by providing real-time video feeds. The absence of any cognitive enhancing training incorporated into the program displays disconnect with doctrine and theory.

In review, the MOUT ACTD program requires further analysis. Additionally, the disconnect of the program from doctrine, theory and previous studies displays a lack of MOUT focus for the Army. By seeking to acquire off-the-shelf technology to mitigate the challenges for the soldier in the urban battlefield, the MOUT ACTD limits the focus to few cognitive solutions.

Summary

The Land Warrior program and the MOUT Advanced Concept Technology Demonstration (ACTD) are efforts to outfit the infantry soldier with the latest technology and posture him for future innovations. These programs attempt to bring situational awareness or COP information right to the soldier. While many of the initiatives are promising, the challenge comes from linking the theory and doctrine into the procurement and execution of new technologies.

The programs must follow doctrine and theory. Doctrine and theory weigh the analysis - judgment component of situational understanding more than situational awareness. Scarce resources like time and money spent on the weaker component is not prudent. The lack of inclusion of the theory and doctrinal components into the procurement of these emerging technologies ensures a flawed experiment. The technologies must be developed to support the doctrine and theory as enablers. To create doctrine from theory only to have technologies developed ancillary or on differing azimuths is unacceptable.

[88] MOUT ACTD Slide Briefing, Slide 4.

CHAPTER 6: CONCLUSION

> Once the force is engaged, superior combat power derives from the courage and competency of soldiers, the excellence of their training, the capability of their equipment, the soundness of their combined arms doctrine, and above all, the quality of their leadership.[89]
>
> FM 100-5

The findings of this paper are numerous. Each chapter provided insight into the thesis question: Can the Army's recent experiments in Land Warrior and MOUT ACTD better enable the urban warrior to make optimal decisions in the attempt to obtain situational awareness? The review of doctrine and theory decision-making provided foundational concepts that are not emphasized in the Land Warrior and MOUT ACTD programs.

Chapter 2 Doctrinal Findings

The review of Army doctrine provided numerous glimpses into the struggle to capture the cognitive processes of decision-making. The complexities of the urban environment offer many challenges to the soldier. The compartmentalized nature demands decision-making as an individual skill. The friction of the urban environment requires leaders and individuals to make their best decisions quickly. The training of small unit leaders must result in mentally flexible decision-makers.

The review of doctrine provided for the creation of a situational understanding model that considered training as essential. This model is composed of two parts: situational awareness and analysis and judgment. Additionally, doctrine portrays both components of situational understanding with an emphasis towards the analysis and judgment. That is to say, doctrine does weight analysis and judgment, via experience and training, over situational awareness.

The recurring theme throughout the doctrinal areas of urban environment, situational awareness and decision-making is training. The analysis and judgment component of situational understanding only comes from training that emphasizes the exercise of these cognitive skills.

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[89] FM 100-5, 2-12.

Chapter 3 Theory Findings

Decision-making theories also placed emphasis on experience-based cognitive activity. Complexity challenges decision-makers by overwhelming the indicators. The use of previously obtained building blocks or learned supersignals assist the decision-maker in prioritizing. These building blocks and supersignals come through training that replicates reality.

Situational awareness remains useful, but cannot be emphasized more than the actual decision-making skills. Gary Klein maintains the importance of experience which breeds tools like leverage points and mental models. The cognitive abilities that are required to solve complex problems arrive through experience that facilitates the use of situational awareness that recognizes what information is necessary and relevant for future decisions.

What emerges from the theory is the emphasis on experience. While other means of learning and thinking are important factors, actual participation in a complex action is the best way to learn. Therefore, the training that builds experience is heavily weighed.

Chapter 4 Analysis Findings

The analysis of Army decision-making doctrine found consideration given to theories on decision-making. Each of the three areas of the urban environment, situational awareness and decision-making were adequately incorporated. Additionally, Army decision-making doctrine takes decision-making theory into consideration in that experience is the key component.

Chapter 5 Land Warrior and MOUT ACTD Findings

This study finds that empirical testing of Army doctrine in the form of the Land Warrior and MOUT ACTD programs does not match the designs of doctrine and theory. Through these programs, the Army may improve the situational awareness of the urban combatant through technology. The challenge, however, occurs when the decision-maker is not trained for proper analysis and judgment built from experience. Without analysis and judgment, situational understanding will not occur. Both theory and doctrine consider the most essential quality to

enable the urban decision-maker to make optimal decisions is by raising the level of experience. Experience is best gained through training.

An Additional Study

The Army Research Institute for the Behavioral and Social Sciences conducted an Infantry Situational Awareness Workshop at Fort Benning, GA in September 1998. This meeting aimed at identifying infantry situational awareness requirements, matching these requirements to various technologies, and identifying better ways of measuring situation awareness.[90] The study's primary conclusion remained on the infantry soldier and unit with emphasis on training and leader development requirements.[91]

Additionally, the study found that new training techniques and approaches are needed. "Soldiers and leaders must be trained in the basics, as well as in how to use the technology-based situational awareness systems."[92] This includes "hyper-proficient individuals and teams who can fully exploit available situational awareness technologies."[93] The emphasis here is again on the soldier training on cognitive skills.

Finally, the study describes the pitfalls the Army should avoid in the quest for situational awareness. The "leaders must be specifically trained how to use the new situational awareness information to make better decisions."[94] The study cautions against waiting for "perfect" situational awareness before making a decision.[95] The ARI study continues by finding that leaders need critical reasoning and critical thinking training. The soldiers must be "innovative,

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[90] Army Research Institute for the Behavioral and Social Sciences, Infantry Situation Awareness, 31 December 1998, v. See Appendix F.

[91] Ibid, v. It is relevant to note the compiled study refers to situational awareness on page v as "the ability of a person to develop an adaptive internal model of his or her environment." The study acknowledges that technological advances drive the importance of situational awareness, but training and development must occur for the soldiers and leaders to obtain the situational awareness (SA).

[92] Ibid., ix.

[93] Ibid., ix.

[94] Ibid., ix.

[95] Ibid., ix.

adaptive, and have the ability to handle and reduce uncertainty."[96] Such an enabled soldier can handle the challenges of the most complex problems.

The findings of the ARI research corroborate the findings of this study. Situational awareness, while helpful, is not the most essential component for decision-makers. The best enabler for decision-makers is experience found in training under tough realistic training.

Summary

Decision-making requirements are generated by doctrine. FM 100-5 looks at leadership as guided by intuition and feel gained from years of practice and study. FM 3.0 expects leaders to exercise mature judgment and initiative under stressful circumstances and be capable of learning and adapting to meet demands of full spectrum operations. One conclusion from this doctrine is mature judgment and the ability to learn are crucial for future decisive opertations. This analysis - judgment is not obtained by technology, but rather through training that builds this mature judgment.

The efforts of the Land Warrior and ACTD programs to give a decisive edge to the urban warrior are incomplete. The programs provide situational awareness, but do encorporate analysis and judgment that enable situational understanding. The key to obtaining the decisvie edge lies in training that builds experience. Only then are soldiers enabled to utilize situational awareness in making decisions with situational understanding.

A shift of mind occurs when an organization is continually expanding its capacity to create its future. For such and organization, adaptive learning is coupled with generative learning that enhances the capacity to create.[97] Such qualities and abilities are necessary to solve the most complex of problems, and the urban environment provides the most complex of problems. The Army must consider this theory and others like it when implementing training and technologies that enable the decision-maker.

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[96] Army Research Institute for the Behavioral and Social Sciences, Infantry Situation Awareness, 31 December 1998, 5.

Recommendations

The establishment of an Urban Operations Agency. The Land Warrior and MOUT ACTD programs must be monitored for consistency. The lack of an overarching agency with identified requirements and subsequent procurement goals impact in the Army urban operations. This agency must have oversight on the Doctrine/Organization/Training/Leader Development/Materiel and Soldiers (DOTLMs) process for urban operations. All combined – arms training centers (CTCs) and MOUT sites in the Army would have input into the organization. This agency would standardize the training at the MOUT sites to enable soldiers to train and gain proper experience.

A possible candidate to become the lead agency is the Combined Arms MOUT Task Force (CAMTF). As a think tank for urban operations, the United States Army Infantry School began a focused study with the creation of CAMTF. The CAMTF charter reads "The combined arms MOUT task Force led by USAIC is organized to ensure MOUT doctrine, training strategy and requirements for squad thru corps is met for the 21st century."[98] Specifically, the CAMTF could identify the doctrinal changes, training strategy and requirements for combined arms combat. The products so far have been general tactics, techniques and procedures for urban operations. The cognitive connection must be made to link the theory and doctrine to the training with technology.

Develop a Soldier Leadership training program. Programs that complement the cognitive requirements to utilize the situational awareness provided by programs like Land Warrior and MOUT ACTD are important. By incorporating interactive leader development into foundational schools like the soldier basic, advance individual training, the noncommissioned officer basic and advanced courses, and the officer basic and advanced courses, leaders and potential leaders throughout the organization are equipped to make optimal decisions. In

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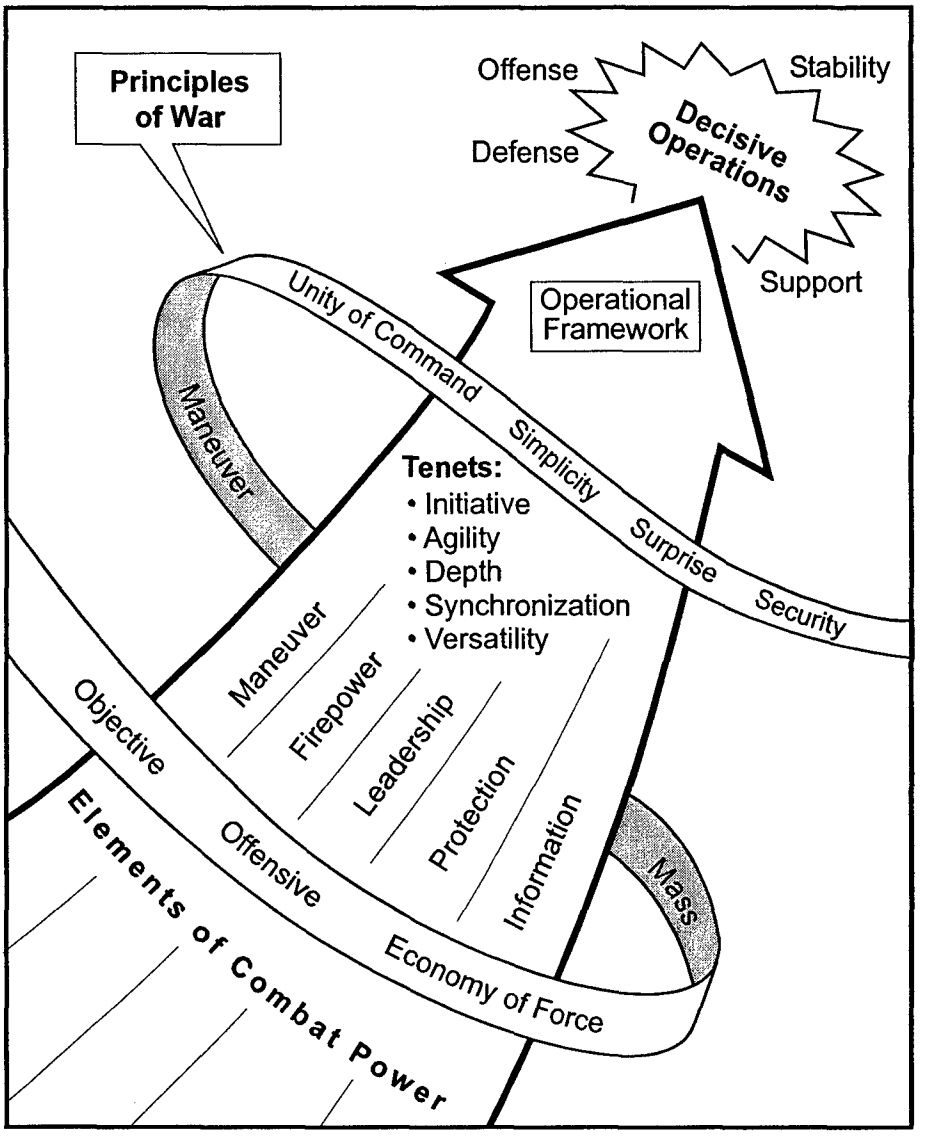
[97] Peter Senge, 14.
[98] CAMTF Product Update and Handouts for Working Group Conference, 9-10 August 2000.

understanding the cues and processes of decision-making at such fundamental levels, soldiers will seek out and provide opportunities for decisions.

APPENDIX A


Principles of War
Offense
Stability
Defense
Decisive Operations
Support
Operational Framework
Unity of Command
Simplicity
Surprise
Security
Maneuver
Tenets:
• Initiative
• Agility
• Depth
• Synchronization
• Versatility
Maneuver
Firepower
Leadership
Protection
Information
Mass
Objective
Offensive
Economy of Force
Elements of Combat Power

LAND WARRIOR

LAND WARRIOR V0.6 (CONFIGURATION)

INTEGRATED HELMET ASSEMBLY

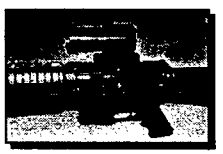
- COLOR DISPLAY
- LIGHTWEIGHT ASSAULT HELMET W/SUSPENSION
- NIGHT VISION
- AUDIO SYSTEM

JCF AWE COMPUTER/RADIO SUBSYSTEM

- COMPUTER
- SOLDIER RADIO
- PCMCIA GPS
- DEAD RECKONING MODULE
- HANDHELD FLAT PANEL DISPLAY

WEAPON SYSTEM

- M4 MODULAR WEAPON SYSTEM
- LIGHT WEIGHT THERMAL WEAPON SIGHT (-)
- MULTI-FUNCTION LASER (-)
- WIRING HARNESSES & CABLING (HYBRID)
- DAYLIGHT VIDEO SIGHT
- OTHER EXISTING WEAPON & ACCESSORIES



PROTECTIVE CLOTHING & INDIVIDUAL EQUIPMENT SUBSYSTEM

- MOLLE
- INTERCEPTOR
- POUCH CELL BATTERIES
- POWER (HYBRID)
- PERMETHRIN BDUs

SOFTWARE SUBSYSTEM

- SOFTWARE (SEE FUNCTIONALITY)

CLOSE, PERSONAL, AND BRUTAL — MAKE THE FIGHT UNFAIR

APPENDIX C

Land Warrior

The JCF AWE provided the venue for examining the Land Warrior system. A Land Warrior Platoon was in the forced-entry airdrop, early entry follow-on, and two live fires - a Military Operations in Urban Terrain (MOUT) live fire and a live-fire ambush. By participating in these realistic field exercises early in the Land Warrior program, we gain valuable insights for continued development of the Land Warrior System.

The night airdrop provided an example of one of these insights. A patrol was moving through the woods when an enemy sniper took the patrol under fire at 300 meters and killed or wounded three soldiers. The patrol spread out, keeping track of each other by using their digital maps on helmet-mounted displays, their locations automatically updated by integrated satellite location systems. The soldiers used their night vision devices and thermal sights to engage and eliminate the sniper and his spotter at long range. The squad leader, observing the action ahead, checked his soldier's locations on his display. He saw they were close, and used his squad radio to confirm before firing, avoiding a potential fratricide. The soldiers eliminated the sniper threat, experiencing only three casualties versus a typical sniper kill rate in this scenario of 30 - 50 casualties.

The Land Warrior system is the latest version of modular soldier system equipment. This version includes a modular weapon system (with pointing lasers and advanced sights), laser rangefinder, digital compass, and daylight digital sight; a day-and-night helmet-mounted display of computer and sensor inputs; night vision capability; protective clothing and individual equipment enhancements (body armor and chemical equipment); and an individual soldier computer/radio. This integrated system vastly increases the soldier's situational awareness, allowing him to rapidly analyze data and determine the best course of action.

Although the data assessment is underway, quick-look observations show significant promise for the objective Land Warrior system. Units assembled faster, sometimes in half the time, and soldiers were more confident, lethal, and survivable.

C4I

R1: Identification of friendly, enemy, noncombatants
R2: Powered optics
R3: Hands-free non-line of sight communication
R4: Produce/Update Maps
R5: Intelligence Collection/Dissemination
R6: Night Vision/Light Source
R7: Through wall sensor
R33: Sniper detection
R36: Hand Held Target designator
R41: Position/location in buildings

Force Protection

R9: Level IV Body Armor
R10: Man-portable shield
R11: Clearly mark all friendlies
R12: Joint protection
R13: Lightweight mask
R14: Personal protection kit
R15: Hearing protection
R26: Improved obscurant
R42: Casualty evacuation
R35: Flexible cuffs

Mobility

R28: Get on top of building

Co grade Officers and NCOs

Engagement

R8: Remote marking
R16: Detect/Disarm Booby Traps
R21: Hands-free sling
R24: Soft round
R25: Non-lethal tools/munitions
R27: Blow man-sized hole in concrete
R29: Precision Mortar
R30: Non-explosive breach
R31: Non-lethal blunt trauma training round
R34: Non-lethal grenade
R37: Point munition

Modeling and Simulation

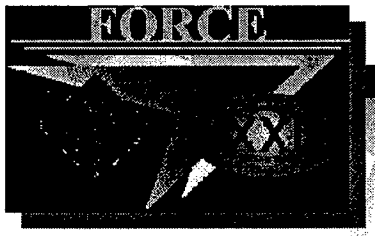
R40: Mission Planning/ Virtual Rehearsal Tools

LAND WARRIOR

LAND WARRIOR OPERATIONAL REQUIREMENTS DOCUMENT BACKGROUND

ARMY SCIENCE BOARD
1991 SUMMER STUDY
FINAL REPORT
"SOLDIER AS A SYSTEM"
DEC 91

ADVANCED
TECHNOLOGY
DEMONSTRATION
SEP-DEC 92



NTC
TF AWE
97

WARRIOR
FOCUS AWE
95

JOINT
CONTINGENCY
FORCES
AWE
SEP 2000

OPERATIONAL
REQUIREMENTS
DOCUMENT (ORD) FOR
THE
LAND WARRIOR SYSTEM
APR 94

TRADOC
APPROVED
ORD
3 AUG 99

91 92 93 94 99 2000

MISSION NEED STATEMENT (MNS)
FOR THE ENHANCED INTEGRATED
SOLDIER SYSTEM - DISMOUNTED
SEP 93

HQDA STAFFING
COMPLETE -NO
NONCONCURRENCES
RECIEVED

LAND WARRIOR SYSTEM DEVELOPMENT HAS BEEN DRIVEN BY APPROVED ORD SINCE APR 94

CLOSE, PERSONAL, AND BRUTAL — MAKE THE FIGHT UNFAIR

APPENDIX F

In September 1998, the Army Research Institute for the Behavioral and Social Sciences conducted the Infantry Situational Awareness Workshop at Fort Benning, GA. The purpose of the conference included identifying Infantry situational awareness requirements, matching these requirements to various technologies, and identifying better ways of measuring situation awareness.[99] The study's primary conclusion remained on the infantry soldier and unit with emphasis on training and leader development requirements.[100]

It is relevant to note the compiled study refers to situational awareness as "the ability of a person to develop an adaptive internal model of his or her environment."[101] The study acknowledges that technological advances drive the importance of situational awareness, but training and development must occur for the soldiers and leaders to obtain the situational awareness. This concept of situational awareness does not match the previous definitions from theory and doctrine.

However, several findings came from the study. In the most critical infantry situational awareness requirements the findings were, "a key situational awareness system requirement is that it must allow infantry teams to excel in night and limited visibility operations, particularly in restricted and urban terrain."[102] This finding means the Land Warrior, and other experiments, must meet these requirements.

Additionally, the study found new training techniques and approaches are needed. "Soldiers and leaders must be trained in the basics, as well as in how to use the technology-based situational awareness systems."[103] This includes "hyper-proficient individuals and teams who

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[99] Army Research Institute for the Behavioral and Social Sciences, Infantry Situation Awareness, 31 December 1998, v.
[100] Ibid., v.
[101] Ibid., vii.
[102] Ibid., ix.
[103] Ibid., ix.

can fully exploit available situational awareness technologies."[104] The emphasis here is again on the soldier training on cognitive skills.

Finally, the study describes the pitfalls the Army should avoid in the quest for situational awareness. The "leaders must be specifically trained how to use the new situational awareness information to make better decisions."[105] The study cautions against waiting for "perfect" situational awareness before making a decision.[106]

The ARI Situational Awareness Workshop also provided a model of situational awareness based on cognitive theory and Army operational considerations in Chapter 3. The shortfall of this model is the study group sets up the parameters for this model as a commander tool. Specifically, the study says: "...for the purposes of this paper, we describe SA as knowledge of a specific situation that enables a commander to:

- Place current battlefield events into context;
- Readily share a portrayal of the situation with staff and subordinates; and
- Predict, expect, and prepare for future states and actions."[107]

The study obviously considers the commander as the decision-maker. The construct of this monograph, and for the purposes of training in the complex urban environment, each soldier must be considered a decision-maker.

The ARI continues by finding the leaders need critical reasoning and critical thinking training. The soldiers must be "innovative, adaptive, and have the ability to handle and reduce uncertainty."[108] So in the rest of the study, if quoted as commander, then consider the soldier needing those skills.

The ARI study views situational awareness as having five interrelated components.

- Battle Skills
- A continually revised mental representation used consciously in decision-making

[104] Army Research Institute for the Behavioral and Social Sciences, Infantry Situation Awareness, 31 December 1998, ix.
[105] Ibid., ix.
[106] Ibid., ix.
[107] Ibid., 19.
[108] Ibid., 5.

- Automatic processes used in decision-making, including pattern analysis, procedural zed knowledge, and an analogical engine
- Spontaneous input
- Technological support.[109]

The study introduces a sixth component, native skills, that underlies most of the previous five. The study reports native skills as "a collection of abilities inherent and perhaps innate to a commander that directly affect how the commander establishes situational awareness (i.e., intuitive processes ordinarily not under conscious direction)."[110]

The study continues by stating "that commanders who have imagination and intuition, who are innovative and creative and have the ability to battle command will be successful under all circumstances, especially during combat operations.[111] These are safe observations considering both Clausewitz and more recently, Klein. The leader who can cognitively grasp the problem can readily apply a solution.

The study of the mental model requests that the Army investigate the native skills arena. If proven essential for battlefield success, then the Army must examine the origins. Are they character traits or skills that can be learned. If trainable, then the study advocates the training of such basic qualities.

The mental model study postulates that "unless one has the native skills of imagination, the ability to visualize and the ability to battle command, complete situational awareness is not possible to achieve. Even if technology makes available every possible piece of relevant information about the battlefield to the commander situational awareness will never be achieved without the native intellectual skills to put the information into context."[112]

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[109]Army Research Institute for the Behavioral and Social Sciences, Infantry Situation Awareness, 31 December 1998, 19.
[110] Ibid., 20.
[111] Ibid., 27.
[112] Ibid., 27.

BIBLIOGRAPHY

Books

Bacevich, A.J. *The Pentomic Era*, The US Army Between Korea and Vietnam. Washington, DC: National Defense University Press, 1986

Beniger, James, *The Control Revolution*, Cambridge, MA: Harvard University Press, 1986.

Bertalanffy, Ludwig von, *General System Theory*, New York, 1975.

Casti, John, *Complexificatoin*, New York, NY: Harper Perennial, 1994.

Clausewitz, *On War*, edited and translated by Michael Howard and Peter Paret. Princeton, New Jersey: Princeton University Press, 1976.

Cohen, Eliot and Gooch, John, *Military Misfortunes: The Anatomy of Failure in War*, New York: Vintage Books, 1990.

Dörner, Dietrich, *The Logic of Failure*: Why Things Go Wrong and What We Can Do to Make Them Right, New York, NY: Metropolitan Books, 1996.

Friedman, George and Meredith, *The Future of War*, New York, NY: Crown Publishing, 1996.

Edwards, Sean J. A. *Mars Unmasked: the Changing Face of Urban Operations.* Santa Monica: RAND, 1998.

Fowkes, Ben. Ed. *Russia and Chechnya: The Permanent Crisis*. New York: St Martin's Press, 1998.

Gall, Carlotta & de Waal, Thomas. *Chechnya: Calamity in the Caucasus*. New York: New York University Press, 1998.

Glenn, Russell W. *Combat in Hell: A Consideration of Constrained Urban Warfare.* Santa Monica: RAND, 1996.

_____. *Denying the Widow-Maker: Summary of Proceedings RAND-DBBL Conference on Military Operations on Urban Terrain.* Santa Monica: RAND, 1998.

_____. *Marching Under Darkening Skies: The American Military and the Impending Urban Operations Threat.* Santa Monica: RAND, 1998.

_____. *"...We Band of Brothers:" The Call for Joint Urban Operations Doctrine.* Santa Monica: RAND, 1999.

_____. *The City's Many Faces.* Santa Monica: RAND, 1999.

Kelly, Kevin, *Out of Control*, New York, NY: Addison-Wesley, October, 1995.

Klein, Gary, Sources of Power: How People Make Decisions, Cambridge, Massachusetts: The MIT Press, 1998.

Macgregor, Douglas A., *Breaking the Phalanx: A New Design for Landpower in the 21st Century*. Westport, Connecticut: Praeger Publishers, 1997.

Marshall, SLA, *Men Against Fire*, Glouchester, MA: Peter Smith Publishers, 1978.

Naveh, Shimon, *In Pursuit of Military Excellence*, London: Frank Cass Publishers, 1997.

Peters, Ralph, "The Future of Armored Warfare." *Parameters* 27 (Autumn 1997), 50-59.

_____. "Our Soldiers, Their Cities." *Parameters* 26 (Spring 1996): 43-50.

Schultheis, Robert and Sumner, Mary, *Management Information Systems*, Edwardsville, IL: Irwin Books, 1995.

Senge, Peter M., *The Fifth Discipline*: The Art and Practice of the Learning Organization, New York, NY: Doubleday, 1990.

Turabian, Kate L. *A Manual for Writers of Term Papers, Theses, and Dissertations*. 6th ed. Chicago: University of Chicago Press, 1987.

Van Creveld, Martin, *Command in War*, Harvard, MA., Harvard University Press, 1985.

Van Creveld, Martin, *Technology and War*: From 2000 B.C. to the Present, New York, NY: The Free Press, 1991.

Walthrop, Mitchell, M., *Complexity*, The Emerging Science at the Edge of Order and Chaos, New York, NY: Touchstone, 1993.

Government Publications

Scales, Robert H., Jr. *Future Warfare.* Carlisle Barracks, Pa: U.S. Army War College, May 1999.

Urban Working Group, J-8, Joint Staff, "Draft Handbook for Joint Urban Operations", 2 December 1998.

US Department of Defense. Field Manual 25-100, *Training the Force.* Washington DC: HQ Department of the Army, November 1988.

US Department of Defense. Field Manual 25-101, *Battle Focused Training.* Washington DC: HQ Department of the Army, September 1990.

US Department of Defense. Field Manual 34-3, *Intelligence Analysis.* Washington DC: HQ Department of the Army, March 1990.

US Department of Defense. Field Manual 34-8, *The Commander's Intelligence Handbook.* Washington DC: HQ Department of the Army, September 1992.

US Department of Defense. Field Manual 34-130, *Intelligence Preparation of the Battlefield.* Washington DC: HQ Department of the Army, June 1985.

US Department of Defense. Field Manual 90-10, *Military Operations on Urbanized Terrain.* Washington DC: HQ Department of the Army, 1979.

US Department of Defense. Field Manual 90-10-1, with Change 1, *An Infantryman's Guide to Combat in Built-Up Areas.* Washington DC: HQ Department of the Army, 1993.

US Department of Defense. Field Manual 100-6, *Information Operations.* Washington DC: HQ Department of the Army, August 1995.

US Department of Defense. Field Manual 101-51, *Staff Organization and Operations.* Washington DC: HQ Department of the Army, May 1997.

US Department of Defense. Field Manual 101-5-1, *Operational Terms and Graphics.* Washington DC: HQ Department of the Army, September 1997.

US Department of Defense. TRADOC Pamphlet 525-5, *Force XXI Operations.* Washington DC: HQ Department of the Army, August 1994.

US Army Research Institute. *Infantry Situation Awareness.* Alexandria, VA: U.S. Army Research Institute for the Behavior and Social Sciences, December 1998.

Articles

Cox, Matthew. *Land Warrior Gives Infantryman Advantage in Tests*, Defense News, 9 October 2000, 26.

Czerwinski, Thomas J., Command and Control at the Crossroads, Parameters, Carlisle Barracks, PA: Autumn 1996.

Erwin, Sandra I. *Land-Warrior Follow-On Planned for '04.* National Defense, September 2000, 16-18.

Geibel, Adam. "Lesson in Urban Combat: Grozny, New Years Eve, 1994." *Infantry* 85 (November-December 1995): 21-25.

Goodman, Glenn W. *Revolutionary Soldier*, Armed Forces Journal, October 1999, 56-64.

Grange, David L. and Kelley, James A., Information Operations for the Ground Commander, Military Review, March-April 1997.

Grau, Lester W. "Russia Urban Tactics: Lessons from the Battle for Grozny." *Strategic Forum* 38 (July 1995): 1-4.

Groves, BG John R., " Operations in Urban Environments." *Military Review* 78 (July-August 1998): 31-40.

Hahn, Robert F. and Jezior, Bonnie. "Urban Warfare and the Urban Warfighter of 2025". *Parameters 29*, (Summer 1999): 79.

Thomas, Timothy L. "The Battle for Grozny: Deadly Classroom for Urban Combat." *Parameters* 29 (Summer 1999): 87-102.

Thomas, Timothy L. "The Russian Armed Forces Confront Chechnya: I. Military-Political Aspects 11-31 December 1994." *The Journal of Slavic Military Studies* 8, no. 2 (June 1995): 223-256.

Vizard, Frank. *Future Soldier*. Popular Science, July 2000, 42-47.