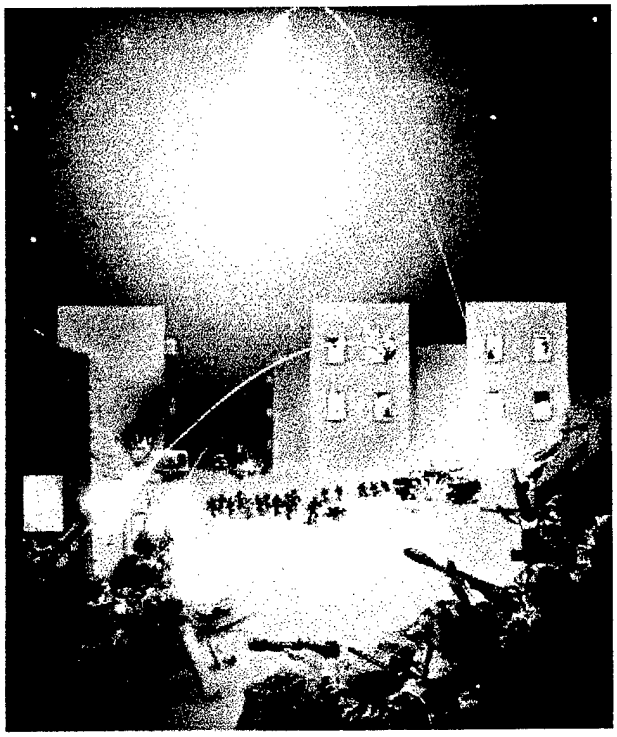
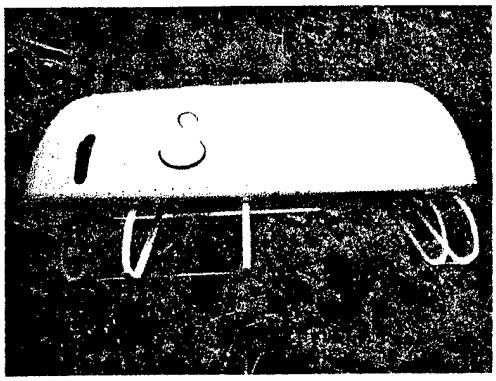
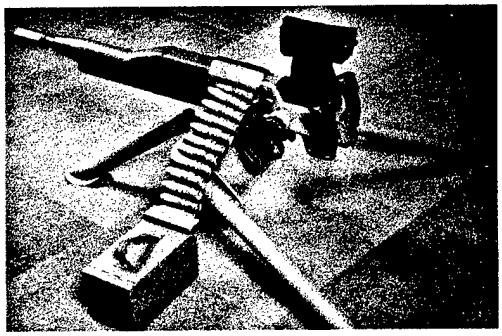
Military Operations in Urban Terrain (MOUT)

A Future Perspective for a Joint Environment







By

Stephen J. Mills
Major, US Army

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Military Operations in Urban Terrain (MOUT) is the likely future environment facing Joint Task Force Commanders. This unique battlefield environment will require the best efforts of U.S. forces to ensure victory. An integrated approach to MOUT is required in order to achieve victory in the future. This paper states that through an examination and focus in the areas of doctrine, training, organizational design, technology and the warrior, US forces will be best prepared for future MOUT. A future threat assessment is provided to serve as a baseline for comparison. The conclusion of the paper identifies the overarching importance of the individual combatant over other considerations such as organizational design, technology, etc,.

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Military Operations in Urban Terrain (MOUT)
A Future Perspective for a Joint Environment

By

Stephen J. Mills
Major, U.S. Army

An Advanced Research Project

A paper submitted to the Director of the Advanced Research Department in the Center for Naval Warfare Studies in partial satisfaction of the requirements for the Master of Arts Degree in National Security and Strategic Studies.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature _____

14 Feb 97

Paper directed by
John B. Hattendorf, D. Phil.
Director, Advanced Research Department

Faculty Advisors

Dr. Steven T. Ross
Naval War College
Ph.D

CDR Daniel Withers
Naval War College

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GLOSSARY

Advanced Warfighting Experiment (AWE) - TRADOC Battle Lab experimental event whose effort is focused on a major increase to warfighting capabilities. AWEs are center of gravity culminating efforts focused on a major increase to warfighting capabilities. AWEs address all the domains of doctrine, training, leader development, organization design, materiel and soldier systems requirements.

Army FORCE XXI - Force XXI is the redesign process of the Army for the 21st Century. It incorporates three complementary and interactive efforts. The first and most important element is focused on the redesign of Army operational forces. The second and supporting element is the redesign of the institutional forces-the elements that generate and sustain the operational forces. The third element is focused on the development and acquisition of information age technologies, which are the overall enablers of the Force XXI Campaign.

Commandant's Warfighting Lab (CWL) - The CWL, based at Quantico Marine Corps Base, is the USMC's only battlefield laboratory. Its charter is very similar to that of the TRADOC Battle Labs. The CWL is designed to experiment with new technology and concepts to support future USMC warfighting requirements. The CWL spearheads the Sea Dragon effort.

Dismounted Battlespace Battle Lab (DBBL) - TRADOC Battle Lab responsible for dismounted soldier battlefield domain. The DBBL address all the domains of doctrine, training, leader development, organization design, materiel and soldier systems requirements as they relate to dismounted battlespace. The DBBL spearheads the Army's MOUT ACTD effort, the Rapid Force Projection Initiative and numerous other programs.

Force Suitability Principle (FSP) - A force tailoring principle originated by doctrine writers at the U.S. Army Military Police School.

MOUT Advanced Concept Technology Demonstration (ACTD) - The MOUT ACTD is series of related field experiments designed to demonstrate the military worth of new concepts and technologies in the MOUT environment. The ACTD will be conducted in two iterations. Each iteration will consist of a two-year search for, and initial demonstration of, mature technologies to meet the user requirements, culminating in a series of field experiments to demonstrate the military value added of those capabilities. It will also set the stage for rapid acquisition of those technology applications, which are deemed valuable by the users.[1]

Military Operations in Built-Up Areas (MOBA) - A term synonymous with MOUT.

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[1] Burgess, pg 3

Military Operations in Urban Terrain (MOUT) - MOUT is defined as all military actions that are planned and conducted on terrain where man-made construction affects the tactical options available to the commander.[2] Also called MOBA.

Military Operations Other than War (MOOTW) - Encompasses the use of military capabilities across the range of military operations short of war. These military actions can be applied to complement any combination of the other instruments of national power and occur before, during, and after war. Also called MOOTW.[3]

Objective Crew Served Weapon (OCSW) - Conceptual weapon system currently under development by the Joint Service Small Arms Program and the U.S. Army Infantry School. This system is the planned replacement for both the M2 .50 cal Heavy Machine Gun and the MK19 40mm Grenade Machine Gun.

Precision Engagement (PE) - Precision engagement will consist of a system of systems that enables joint forces to locate the objective or target, provide responsive command and control, generate the desired effect, assess the level of success, and retain the flexibility to reengage with precision when required.[4]

Precision MOUT - Conventional forces conduct these operations to defeat an enemy that is mixed with noncombatants. They conduct these operations carefully to limit non-combatant casualties and collateral damage.[5]

Rapid Force Projection Initiative - DBBL initiative using an architecture of Hunters and Killer systems which work together to form the ground based Precision Engagement (PE) network.

Rules of Engagement (ROE) - Directives issued by competent military authority that delineate the circumstances and limitations under which U.S. forces will initiate and/or continue combat engagement with other encountered forces. ROE is often an important consideration in MOOTW, but applies across the entire range of military operations.[6]

Sea Dragon - The Sea Dragon Concept is the USMC's vision of warfighting in the 21st Century. Sea Dragon is a naval expeditionary concept applicable across the spectrum of conflict and in all warfare environments.[7]

Shooter to Sensor Linkage- The mechanism(s) by which data gained by sensors is processed to identify targets and the targets are passed to a weapon system for engagement

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[2] FM 90-10-1, pg. 1-1
[3] JP 3-07, pg. GL-3
[4] Army Vision 2010 homepage
[5] FM 90-10-1, pg. 1-2
[6] FM 100-23, pg. 112
[7] Commandants' Warfighting Lab (CWL) Home Page

Small Arms Common Module Fire Control System (SACMFCS) - Prototype full solution fire control system for small arms. This system incorporates night imaging, range determination and an integrated sensor package to increase weapon effectiveness. This system began as an initiative under the Joint Service Small Arms Program (JSSAP).

Surgical MOUT - These operations are usually conducted by Joint special operations forces. They include missions such as raids, recovery operations, and other special operations (for example, hostage rescue).[8]

[8] FM 90-10-1, pg. 1-1

EXECUTIVE SUMMARY

Introduction Military Operations in Urban Terrain (MOUT) is the likely future environment facing Joint Task Force Commanders. This unique battlefield environment will require the best efforts of U.S. forces to ensure victory. The recognition by doctrine writers and senior leaders that MOUT and Military Operation Other Than War (MOOTW) are strongly linked will be an important factor in the success of future MOUT.

An integrated approach to MOUT is required in order to achieve victory in the future. This integrated approach states that through an examination and focus in the areas of doctrine, training, organizational design, technology, and the Warrior, U.S. forces will be best prepared for future MOUT.

Historical Examples Historical examples of MOUT provide insights into how best to conduct future MOUT. Haiti, Somalia and Grozny provide examples as part of the Threat Assessment, (See Annex A). Haiti represents the lowest end of the MOUT conflict spectrum, Lebanon/Mogadishu represents the middle, and recent operations in Grozny, Chechnya, represent the highest level of intensity. A brief discussion of operations During WWII will provide a baseline for comparison with future MOUT. These examples lead to an appreciation of the differing complexities of MOUT throughout the full range of military operations.

Threat Assessment. A future threat assessment is included at Annex A. This assessment examines threat and friendly force doctrine, training, organizational design and technology and defines the environment within which future MOUT will be executed. By doing so, comparisons between threat and friendly forces can be made and examined.

Doctrine, Training, Organization, Technology and Warrior Analysis. Doctrine, training, organizational design and technology directly support the Warrior. The Warrior is the focus for success in the MOUT environment regardless of the level of conflict. The analysis of these areas will directly address what focus is required to defeat the future MOUT threat. This analysis is not intended to provide future MOUT doctrine or identify the ultimate answer(s) for organizational design. Its intent is to provide insights to the challenges ahead for U.S. forces in future MOUT.

Conclusion. Many opinions exist regarding how to best prepare for future conflict. While doctrine, training, organizational design, and technology must be considered, the most important component of battlefield success is the Warrior. The importance of dynamic MOUT doctrine, organizational design optimized for MOUT, and technological advances should not be underestimated. These factors are ***enablers,*** which directly support the Warrior. The key to victory in future MOUT is focusing these ***enablers*** in direct support of the Warrior. If accomplished by the Joint Military community, the probability of success of the Warrior in future MOUT across the entire spectrum of military operations will be enhanced.

Introduction

Military Operations in Urban Terrain (MOUT) is the likely future environment facing Joint Task Force Commanders. This unique battlefield environment will require the best efforts of U.S. forces to ensure victory. The recognition by doctrine writers and senior leaders that MOUT and Military Operation Other Than War (MOOTW) are strongly linked will be an important factor in the success of future MOUT. By applying this relationship, future MOUT doctrine can be focused to include an emphasis on all levels of conflict instead of only on the higher end of the conflict spectrum.

An integrated approach to MOUT is required in order to achieve victory in the future. This integrated approach states that through an examination and focus in the areas of doctrine, training, organizational design, technology, and the Warrior, U.S. forces will be best prepared for future MOUT. For the purposes of this paper, the term "Warrior" is defined as all individual combatants regardless of branch of service (i.e. soldier, sailor or marine).

Current and near-term MOUT efforts must also be examined. A thorough examination at ongoing efforts will assist in identifying what long term changes in doctrine, training, organizational design and technology are required to fight and win in future MOUT.

Historical Perspective

History has shown the MOUT environment to be an integral component of most military operations. Past conflicts have treated the area of operations as a battleground with restrictive maneuver limitations for mounted forces. Therefore, dismounted forces, augmented with functional support such as engineers, artillery, armor, and close air support, have dominated MOUT. These operations narrowly focused on closure and destruction of the enemy forces, sometimes involving massive collateral damage. Illustrative of such an operation was the Battle of Berlin (April--May 1945). A Russian soldier described the street to street fighting in the following manner:

> ***Deploying into assault squads and assault groups with each corps holding at least one division in reserve - the 3d Shock Units proceeded to lay down massive artillery fire, blasting away yard by yard, sitting guns in any open space and lining up the Katyusha rocket launchers to fire phosphorus into strong points and buildings, setting off fires***[i]

> ***Rather than fight for individual buildings, the tanks would go forward and blow them to pieces section by section, eliminating snipers. Sheltering civilians, huddled in basements and underground shelters, found themselves in the thick of this ferocious fighting, choking, blinded and maimed amidst the thunder of explosive charges or swept by the terrifying spurts of flame-throwers. Dragging the dead and dying out of the rubble at street level exposed the inhabitants to the sportive habits of Soviet airmen, diving down to rake streets, soldiers, fire fighters and anything that moved.***[ii]

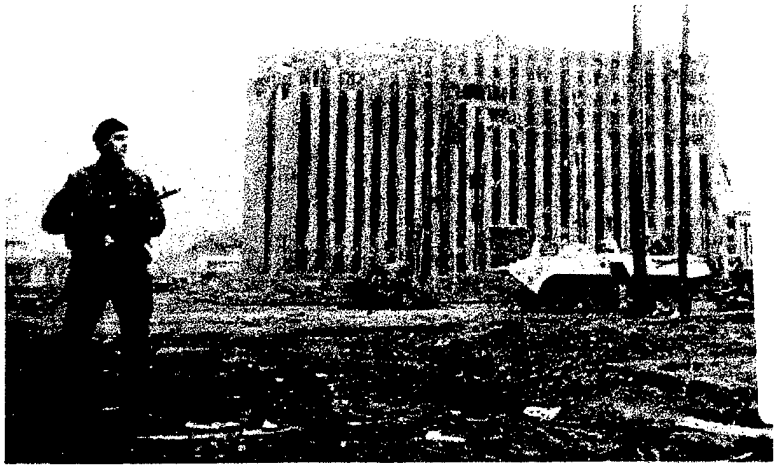
This description of MOUT warfare in World War II describes a less constrained era in the conduct of war. This mindset continued into the 20th Century.

> ***In the age of air power and of the missile-armed field army, it is inconceivable that any battle for a city will be fought through street by street, district by district, to the finish. The issue will be decided well before that time by the intervention of air bombardment and the most***

[i] Frederickson, pg. 583
[ii] Frederickson, pg. 583

destructive heavy weapons under the control of the field army, according to which side has command of the air. The fighting will end in the retirement or capitulation of one side well before the city can be half taken or, on the other hand, wholly re-won by the defending force.[iii]

Combat in MOUT today, by comparison, is characterized by such descriptive terminology as "surgical MOUT" (operations conducted by joint special operations forces--such as raids, recovery operations, and rescues), and "precision MOUT" (operations undertaken by conventional forces to defeat an enemy that is mixed with noncombatants).[iv] Both descriptive terms connote a concern for collateral damage that is conspicuously absent (and perhaps technologically unfeasible) from the preceding description of the street fighting in Berlin during World War II.



Characteristics of the Future. Future MOUT will embrace the full range of military operations, but will most likely focus on the lower end of the conflict spectrum.

The MOUT challenge of the future will not be meeting an enemy force on force. I can see situations where we will be required to use many or all of our offensive capabilities, but this will be the exception. This is not the environment of the future. We will be in the urban areas. Our problem is not that we have to conquer the urban areas as much as we may have to become

[iii] Marshall, pg. 31
[iv] FM 90-10-1

the city manager.[v]

Additionally, future operations predominately will focus on control of populations and territory by not only combat arms forces, but combat support and service support forces as well.

Technologically extended battlespace will manifest itself at the tactical level. Enhanced communications will translate into increased potential lethality making full-dimensional, simultaneous attack possible. Precision Engagement technologies will provide U.S. forces with a capability to strike at multiple locations, while ensuring minimal exposure of friendly forces. At the same time, employment of increasingly lethal weapons will be constrained by the scrutiny of players in the international media, international organizations, and individual political figures. The specter of excessive collateral damage witnessed by these players has become an issue made more visible by our own information technology advancements.

In future MOUT, "information technologies will be relied upon to increase the volume, accuracy, and speed as well as dissemination of battlefield information to commanders, allowing organizations to overmatch adversaries in this capability."[vi] Superiority in information technologies can be a two edged sword. The possession of superior informational capabilities does not automatically bring with it a parallel, embedded capacity to protect and sustain this advantage. This cautionary note is especially true of military applied information technologies which can trace many of their origins to "off-the-shelf" civilian hardware. These technologies are available, may be acquired by our enemies, and must be countered if so acquired.

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[v] LTG Zinni Interview, 5 Dec 96

Additionally, the proliferation of joint, multinational, and interagency information nodes in the face of extended lines of communications and finite security resources will broaden the vulnerabilities of such information facilities, systems, and functions. Sophisticated or unsophisticated threat forces can disrupt these information systems. Over-reliance on information technology will make U.S. forces vulnerable if appropriate counter-measures are not in place.

Stress on leaders, warriors, and staffs, precipitated by the intensity of MOUT, will remain a core issue into the 21st century. Overload of battlefield information precipitated by advances in technology will add to the burden of U.S. forces. Enlightened rules of engagement (ROE), supporting Rules of Interaction (ROI), force protection, (to include fratricide avoidance measures), and a clearly defined and achievable end, should help in mitigating against this stress.

[vi] TRADOC PAM 525-5, pg. 1-5

Future MOUT Threat Assessment

A future threat assessment is included at the appendix[vii]. This assessment examines threat and friendly force doctrine, training, organizational design and technology and defines the environment within which future MOUT will be executed. By doing so, comparisons between threat and friendly forces can be made. Several key elements are identified in the Threat Assessment. First, changes in Threat forces will occur in doctrine, training, organizational design and technology. These changes will occur over time and will be influenced by many factors. Second, likely future enablers for threat forces will be:

- Use of low technology Information Warfare (IW) to take advantage of U.S. force dependence on battlefield digitization
- Increase in night operations to minimize the effectiveness of U.S. Precision Engagement capability
- Optimizing use of restrictive ROE, the media element and non-combatants to further Threat objectives
- Improved Tactics, Techniques and Procedures (TTPs)

Finally, future Threat forces will continue to be more capable and will successfully challenge U.S. forces in future MOUT.

[vii] The Future MOUT Threat Assessment was a joint effort between the U.S. Army Infantry School Threat Office and the Author.

MOUT ACTD & SEA DRAGON ACTD - Complimentary and Required

Introduction. - To best understand the requirements for effective empoyment of U.S. forces in future MOUT, it is imperative to understand current efforts in support of near-term MOUT. For the purpose of this paper, near-term MOUT is defined from present to ten years hence; future MOUT focuses out to the year 2020. First, both the U.S. Army and USMC have individual combat development efforts in support of near-term MOUT. These efforts, the U.S. Army MOUT Advanced Concept Technology Demonstration (ACTD) and USMC Sea Dragon, focus on providing the MOUT Warrior with new and emerging technology to dominate the near-term MOUT environment. Second, it is important to note that while these efforts are service specific, they are not uncoordinated or isolated efforts. The MOUT ACTD and Sea Dragon programs are in fact, complimentary in nature. The MOUT ACTD focuses on the Joint MOUT Warrior in the tactical environment while Sea Dragon provides the ***Operational Context*** where maturing technologies, such as those resulting from the MOUT ACTD, can be tested and evaluated in a Joint and Naval Expeditionary force (NEF) operational setting. These initiatives will help prepare the Joint MOUT Warrior for near-term and future MOUT success.

MOUT Advanced Concept Technology Demonstration (ACTD)

Introduction. An ongoing major effort in support of the Warrior in future MOUT is embodied in the MOUT ACTD, spearheaded by the Dismounted Battlespace Battle Laboratory (DBBL), Ft. Benning, GA. The DBBL is a part of the U.S. Army's Battlefield Laboratories program under the direction of the U.S. Army's Training and Doctrine Command (TRADOC). The DBBL, like the other TRADOC Battle Labs, is chartered to experiment and evaluate new and emerging technology under its applicable battlespace domain. This experimentation is undertaken using the TRADOC tenets of Doctrine, Training, Leader Development, Organization, Materiel and Soldiers (DTLOMS). The DTLOMS experimentation approach ensures that the experimentation and evaluation follow a well rounded, holistic approach to warfighting.

Program Overview. The overarching objective of the MOUT ACTD is to improve the Warrior's operational ability to dominate the MOUT environment.

Furthermore:

> ***"The MOUT ACTD is designed to demonstrate the military worth of new technologies which when placed in the hands of Soldiers and Marines will increase their command and control capabilities, lethality and survivability. It will also set the stage for rapid acquisition of those technology applications which are deemed valuable by the users."***[viii]

The MOUT ACTD will accomplish this objective by identifying and evaluating new technology for relevance and insertion into the process to support the MOUT ACTD objective.

> ***The ACTD will be conducted in two iterations. Each iteration will consist of a two-year search for and initial demonstration of mature technologies to meet the user requirements, culminating in a series of***

[viii] Burgess, pg. 1

> ***field experiments to demonstrate the military value added of those capabilities. Following the field experiments will be a two-year residual period during which the experimental technologies remain with the experimental unit in order for that unit to finalize the associated Tactics, Techniques, and Procedures (TTPs) and other integration issues for that piece of equipment. The ACTD will execute the two iterations of experimentation (FY 97-98 and FY 99-00) each followed by a two year residual period. The first iteration will focus on mature technologies with the latter focusing on a full-spectrum MOUT capability.***[ix]

Throughout this experimentation process, some technologies will fail, concepts will be applied which will not work and other changes will be made. Following the successful identification and validation of candidate technologies, required changes in DTLOMS would be completed. This process of identification, experimentation, and insertion will be iterative. The MOUT ACTD, like the USMC Sea Dragon Initiative, is of a near term focus (10 years or less). While the focus of these two initiatives is near term, they will provide far-reaching and significant impacts on future MOUT warfare. The success of the MOUT ACTD will hinge on how well the DBBL can manage this unique process by identifying those technologies which will best support the Warrior in future MOUT.

Proposed Capabilities. The centerpieces of the MOUT ACTD are several technological areas of focus.[x] These areas of focus provide insight into how the MOUT ACTD will achieve its previously stated overarching objective. These areas provide a framework for experimentation and a vision of what the DBBL and the U.S. Army believe are keys to success in future MOUT.

[ix] Burgess, pg. 3

[x] Burgess, pg. 2-3

Increased Command, Control, Communications, Computers and Intelligence (C4I).

Requirements include:

- Enhanced awareness of friendly and enemy forces and non-combatants
- Disseminating information between Warriors
- Access to relevant information in the MOUT urban database
- Communications systems which operate effectively in MOUT environment to include inside buildings and other MOUT unique obstacles
- Decreased warrior load (i.e. pack load)

Increased Force Protection/Survivability. Requirements include:

- Survivability (Body Armor)
- Counter Mine capability
- Counter Sniper capability
- Non-lethal weapons
- Counter Mortar/Artillery
- Improved Structure Entrance/Breaching Tools

Increased Lethality/Engagement. Requirements include:

- More effective, MOUT-capable lethal weapons
- Development of organic precision munitions
- Development of universal/lightweight precision target designators

Conclusion. The MOUT ACTD spearheaded by the DBBL is a major component of the Defense Department's effort to drastically improve U.S. forces capability in the MOUT environment. This effort is not isolated. It has a direct link to the USMC Sea Dragon Initiative. Successes of the DBBL MOUT ACTD will go forward into the process. The DBBL has many partners in this effort. As the official Army lead agency, the DBBL must successfully integrate and focus the Joint combat developments community for the MOUT ACTD. This focus will produce the best possible package of MOUT technology, to include the DTLOMS considerations to support that technology.

The Sea Dragon Concept & The Sea Dragon ACTD

Introduction. The Sea Dragon Concept is the USMC's vision of warfighting in the 21st Century. Sea Dragon is a naval expeditionary concept applicable across the range of military operations and in all warfare environments.[xi] The Sea Dragon Concept is the vehicle through which implement the naval services' "Forward ... From the Sea Strategy" will be implemented. Sea Dragon provides the ***Operational Context*** where maturing technologies, such as those resulting from the MOUT ACTD, can be demonstrated in the setting of Joint and NEF operations. Its objective:

> ***"Remain relevant to a changing future by reshaping Naval Expeditionary Warfare within the Joint Warfighting Framework"***

Several key components and concepts are focused to directly support the Sea Dragon[xii]:

- Naval units, infused with emerging technology, conducting operations dispersed in breadth and depth across an extended seamless littoral battlefield
- A Command and Control paradigm which combines a new decision process with decentralized information dissemination to the user level
- Exploitation of long range fire and accurate indirect fires from mobile dispersed systems
- Utilization of enhanced mobility, survivability, communications and sustainment to execute a maneuver warfare approach, limit force exposure and gain a decisive advantage
- Employment of less than lethal technologies to increase the repertoire of tools and options available to expeditionary forces
- Exploitation of technology to leverage training and education in gaining increased depth of individual skill and unit capability

Sea Dragon has a 5-Year Experimentation Plan (5YEP) which includes a series of Limited Objective Experiments (LOE) and Advanced Warfighting Experiments (AWE) designed to support the overall Sea Dragon program by evaluating new and emerging

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[xi] Commandants' Warfighting Lab (CWL) Home Page
[xii] Sea Dragon Overview Briefing

technology and concepts. The Commandants Warfighting Laboratory (CWL) spearheads this entire effort.

The CWL is the agency responsible for implementing Sea Dragon. The CWL, based at Quantico Marine Corps Base, is uniquely suited to implement this concept. The charter of the CWL is much like that of the DBBL. Both agencies are designed to experiment with new technology and concepts to support future warfighting requirements.

Program Overview - Sea Dragon

The 5YEP for Sea Dragon includes the following three major events:

Hunter Warrior - Small unit operations on a dispersed, open battlefield. Units conduct intelligence gathering and targeting. C2 by Special Purpose Marine Air/Ground Task Force (SPMAGTF) (X) CE. Target STARTEX - 3rd QTR 97.

Urban Warrior - Operations in urban, near urban, and close terrain. Units conduct intelligence gathering, targeting, maneuver, and close combat. C2 by MEF (Fwd) CE. Target STARTEX - 3rd QTR 1999

Capable Warrior - NEF (MEF/Fleet) level operations combining virtual and live forces comprising operational level deception and maneuver in response to crisis, with the objective of containing/obviating incipient MRC.

These events all have unique objectives, but all support the overarching Sea Dragon objective previously identified. This process will use a (SPMAGTF) as the experimentation force, which will allow for continuity throughout the five-year experimentation process. The SPMAGTF Headquarters element is permanently assigned to the CWL to ensure continuity of effort.

Several LOEs will be conducted in between and in support of the three major experiments just outlined.

Conclusion. The Sea Dragon Initiative spearheaded by the CWL is another component in our effort to dominate the future MOUT environment. The vision of USMC operations in the 21st Century is embodied in Sea Dragon. Their "quest for relevance" and acknowledgment of changing battlefield environments will ensure Naval Expeditionary forces are prepared to fight and win in the future MOUT environment.

Comparison of MOUT ACTD and Sea Dragon Initiative

The MOUT ACTD and Sea Dragon ACTD are individual service efforts to better define the near term MOUT environment and ensure U.S. forces dominate that environment regardless of foe and/or conditions present. The process used in both efforts accomplishes many of the key components likely for victory in future MOUT. These components include, but are not limited to:

- ***Holistic Approach***
- ***Direct Input from the Warrior***
- ***Increased use of Modeling and Simulation in support of experimentation***

By applying these components, U.S. forces will achieve victory in future MOUT.

Holistic Approach. Both the MOUT ACTD and Sea Dragon are heavily focused on technology for battlefield success in the MOUT environment. This focus, however, does not discount the importance of other factors for battlefield success. For example, the MOUT ACTD Management Plan clearly delineates the process to be used by experimentation units developing TTPs for each new system. These TTPs are of prime importance in the development of future doctrine. For example, the USMC's Sea Dragon program retains control of the C2 element of the SPMAGTF. By doing so, the CWL in the execution of Sea Dragon will be in a much better position to analyze and examine organizations and C2 issues in future warfare. These two examples illustrate how both the DBBL and CWL not only focus on technological enhancements to MOUT, but how other considerations such as Doctrine, Training, Leader Development, Organization, Materiel and Soldiers (DTLOMS) effect warfighting. Numerous other examples exist showing clearly that both the DBBL and CWL have an integrated, holistic approach of how to best experiment and determine what technologies will best support the Warrior in the near term

MOUT environment.

Direct Input from the Warrior One of the most important components of successful combat developments efforts is to ensure that the user has input into a system before it is fielded. During development of many past combat systems, "users conferences" have convened in which no user was present. Often, many of those in attendance had little or no military experience. In the case of the DBBL, the user input is the key to their success. Warriors from a variety of units such as the 82nd ABN Division and 101st AASLT Division provide experimentation personnel for DBBL Advanced warfighting Experiments (AWEs) and Battle Lab Experiments (BLEs).

Branch specific units are often used based on the type of experimentation being conducted. Military Police units and combat developers are often used during Non-Lethal Weapons experimentation due to MP expertise in that area. The U.S. Military Police Directorate of Combat Developments and the DBBL have a very strong relationship on Non-Lethal Weapons technology and other areas.

The U.S. defense community is not alone when it comes to fully integrating the user in the combat developments process. The following example provided by a combat developer from the United Kingdom demonstrates commonality amongst the combat development community.

> ***The lesson learned yet again at great expense is that you can't solve defence problems by simply throwing money at them, nor by only technology. It pays to have a few practical soldiers (or marines or airmen) around the place to keep people's feet on the ground.***[xiii]

The bottom line on experimentation with emerging technology is that user requirements must be met. These requirements cannot be achieved if the user is not an

integrated part of the process. Other factors such as senior officer/NCO participation, industry/contractor influences, available resources, etc., can often interfere with direct Warrior level input. The DBBL and CWL continue to ensure that Warrior level input is a key component of their respective experimentation programs.

Use of Modeling and Simulation (M&S) with Experimentation. The use of M&S is an integral component of both the MOUT ACTD and Sea Dragon. In most cases, M&S is used for a variety of purposes, but has one objective; to ensure the overall success of the effort. M&S provides:

- Analytical underpinnings in support of investment decisions
- Direct support for development of doctrine and TTPs

Analytical Underpinnings - Both the DBBL and CWL are optimizing M&S to provide concrete evidence of battlefield performance of emerging technology. New technology can be evaluated before bending any metal, thus preserving investment capital. Following favorable initial evaluation, further "field testing" can be conducted.

Intense scrutinization of performance is demanded by current and likely future resource constraints. Systems competing for scarce combat development funding must show their relative value against other systems. Model & Simulation is the approved method of showing the value of emerging technology. Without validated analytical underpinnings, which can best be provided through M&S, competing new technology will not be considered in the budgetary process. Both the DBBL and CWL have organic M&S capabilities in direct support of their MOUT efforts. Their use and expertise of M&S in support of future MOUT continues to play a predominant role in their respective

[xiii] Hogg, pg. 182

operations. Model & Simulation provide analytical underpinnings in support of investment decisions.

Direct Support for Doctrine and TTP Development - Model & Simulation provides both the DBBL and CWL with organic capability to conduct initial doctrine and TTP development for new and emerging combat systems. Current efforts of both the DBBL and CWL include the full instrument of organic MOUT "test bed" facilities to gather and collect user data during new technology experimentation. A key part of this experimentation will be the initial development of doctrine and TTPs for employment of the new technology. Users will be tasked to develop innovative methods of employment of new technology. Model & Simulation will play a crucial role in this process.

These uses of M&S in support of the MOUT ACTD and Sea Dragon recognize the great benefits which M&S can provide. Model & Simulation are especially important due to the ongoing decline in available resources. We have been forced to rethink older experimentation methods now that cost is considered as an independent factor in all major combat development decisions for investment. Model & Simulation provide us an effective tool to maximize available resources and to make the best possible future investment.

Conclusion. The steady decline of available resources coupled with the high operational tempo of U.S. force deployments in support of regional contingency operations makes it imperative that all branches of service synchronize their efforts. The MOUT ACTD and Sea Dragon accomplish this feat. For that reason, these initiatives are both complimentary and required. Through the successful execution and management of the MOUT ACTD. and Sea Dragon ACTD, future MOUT Warriors will achieve victory in the MOUT

environment.

Doctrinal Considerations for Future MOUT

Doctrine in support of future MOUT will have many similarities to current doctrine. Emerging technological advances and warfighting concepts will alter doctrine, but likely will not completely discard what is in place today. While U.S. force dominance at the higher end of the conflict spectrum is likely, several key factors concerned with the remainder of this spectrum will necessitate changes in doctrine. These factors are:

- ***Military Operations Other Than War (MOOTW) in Future MOUT***
- ***Infrastructure & Post Conflict Resolution***
- ***Digitization***
- ***Precision Engagement***
- ***Use of Non-Lethal Weapons***
- ***Rules of Engagement (ROE)/Rules of Interaction (ROI)***

Some of the MOUT battlefield functions associated with the use of combat arms such as offensive and defensive operations will change somewhat by advances in technology, organizational structure, etc. Regardless of what occurs, U.S. forces will have the organic capability to dominate the higher end of the conflict spectrum in the future MOUT environment. With this in mind, a discussion on how to better conduct primarily combat arms type functions is not required.

Technology will play an important, supporting role in future MOUT. It will be imperative that doctrine writers and others successfully integrate new technology into future MOUT doctrine.

> ***Dramatic improvement in the effectiveness of Military Operations in built-up Areas (MOBA) can be achieved by integrating existing and new technologies under operational doctrine developed explicitly for MOBA***[xiv]

As previously mentioned, the likelihood of high intensity conflict in future MOUT

[xiv] Defense Science Board Task Force on Military Operations in Built-up Areas (MOBA), pg. 2

will remain low. To that end, a discussion is required on how U.S. forces will best deal with the lower end of the conflict spectrum. The above listed factors primarily focus on this level of future MOUT.

Military Operations Other Than War (MOOTW). Military Operations Other Than War (MOOTW) encompass a wide range of functions for U.S. forces. These functions are relevant to all members of the Joint community and the combined arms team. Combat, combat support and combat service support expertise is required in MOOTW. The bottom line is that the likely environment for MOOTW is the MOUT environment. The future MOUT environment will likely require U.S. forces to be flexible in assuming many non-traditional functions.

> ***The U.S. military will likely find itself conducting these non-traditional functions (in MOOTW) mainly because no one else in the Area of Responsibility (AOR) has the organic capability to do so. These non-traditional functions will require us to use non-traditional TTPs. Future MOUT will likely be at the lower end of the conflict spectrum and will require us to be flexible, innovative and be prepared to perform non-traditional functions.***[xv]

> ***Joint doctrine must become broader and accomplish more of the lower end of the conflict spectrum.***[xvi]

The recognition by doctrine writers and senior leaders that MOUT and MOOTW are strongly linked will be an important factor in the success of future MOUT. By applying this relationship, future MOUT doctrine can be focused to include an emphasis on all levels of conflict.

[xv] LTG Zinni Interview, 5 Dec 96
[xvi] LTG Zinni Interview, 5 Dec 96

Infrastructure & Post Conflict Resolution Another area of importance in future MOUT is Host Nation (HN) infrastructure. Infrastructure should be defined as not only physical infrastructure, but can also include security, social, and spiritual infrastructure. Infrastructure therefore contains a number of elements, all which significantly contribute to the overall stability of a region or environment. Preservation of infrastructure can have a dramatic effect on the way the affected host nation and its' indigenous population views U.S. forces. Preservation of infrastructure (security, local government, and religious structures for example) can significantly lessen the danger to U.S. forces by instilling good will and minimizing the requirement to use U.S. resources to rebuild what has been destroyed. Rules of Engagement, Precision Engagement (PE) and minimization of collateral damage all contribute to this end.

Unique capabilities of individual participants likely will play an important role in future MOUT. One such example is the unique role played by Military Police. The following statement describes how Military Police expertise and training will likely affect future MOUT.

> ***The war is over and now you are cleaning the place up. There is still a security problem. There is a re-establishment of order problem. You will see a heavy infrastructure redevelopment meaning everything from the physical infrastructure (Water, sewer, ports, etc.) to the security infrastructure. This is a role for MP. You are going to have civil affairs, Psyops, heavy engineers, civil/military type organizations and others to help re-establish local infrastructure. This type of environment requires MP Battalions. ..... In an overall sense, Post Conflict Resolution is an ideal environment for Military Police.***[xvii]

Digitization. Digitization will provide the future individual Warrior the capability to see the battlefield in real time, communicate with leaders in all environments and act as a

[xvii] LTG Zinni Interview, 5 Dec 96

system feeding into the Precision Engagement network. These capabilities will make the future Warrior more effective in future MOUT throughout the entire range of military operations. When required, Warriors will provide leaders the capability of quick battlefield assessment, target prioritization, and elimination. At the lower end of the conflict spectrum, these organic digitization capabilities will allow leaders at all levels to get real time imagery of day-to-day activities in the future MOUT environment.

> ***As the Army moves toward terrain visualization in FORCE XXI, hard copy paper maps and products are giving way to a digital, information based system. The information based system provides digital maps and analyses which feed into the battle command systems directly, as well as indirectly through mission planning and rehearsal systems and simulations.***[xviii]

This increased capability to communicate down to the individual Warrior will significantly affect all aspects of future MOUT. Future Joint and service doctrine must ensure that the full impact of digitization is analyzed and incorporated. Digitization will be a key component of success in future MOUT.

Precision Engagement. Precision Engagement (PE) applies more to higher intensity conflict, but has application at all levels of future MOUT. It will provide U.S. forces the capability to selectively neutralize threat targets in all conditions while minimizing collateral damage and fratricide. On the higher end of the spectrum, PE likely will be a dominant characteristic of warfare.

> ***By 2020, real-time responsiveness of sensor-to-shooter systems will become a reality. For the first time in history, this responsiveness will allow the striking force to maneuver fires rather than forces over long ranges, and allow direct and simultaneous attack on many of the enemy's centers of gravity.***[xix]

[xviii] Military Operations Concept on topographic Support for Terrain Visualization

[xix] "Battlefield of the Future" pg. 3-10

At the lower end, PE will provide U.S. forces the capability to selectively apply force in the form of precision fire when required, with minimal risk of collateral damage. This surgical application of force will cause threat forces to frequently choose indirect offensive actions such as booby traps and snipers. Direct action in mass against U.S. forces will be minimized based on the possession of these PE capabilities.

Use of Non-Lethal Weapons. In direct correlation to ROE/ROI is the employment of non-lethal weapons in support of MOUT. Non-lethal weapons provide all warriors and leaders additional flexibility in the application of force. This added capability is especially relevant in MOUT. The MOUT environment is unique in the fact that it often has both combatants and non-combatants mingled in such a way that normal lethal means of force is not the ideal tool to achieve mission success. Therefore, the MOUT environment requires additional tools to ensure mission success. Warriors and leaders using non-lethal technologies will have the capability to control crowds, restrict movement of persons and vehicles, and better administer use of force. To best control crowds and individuals, non-lethal tools are required, which provide the individual warrior or team with mounted and dismounted employment capabilities. Future non-lethal technologies will provide warriors and leaders with alternatives to enhance control of both individuals and crowds in all environments—whether mounted or dismounted.

Rules of Engagement (ROE)/Rules of Interaction (ROI)

Rules of Engagement (ROE) are designed to provide the Warrior and leaders a framework for the application of force. Specific military operations require unique ROE and can be modified as the situation warrants. Their intent to be used as a control measure can be successful as long as the ROE are written in a manner that fully support

the mission objects, desired end state of the operation and the commander's intent.

A manifestation of human dimension skills is embodied in the formulation of ***Rules of Interaction (ROI)***.

> ***The need for ROI stems from the condition that rules of engagement (ROE), in many instances, do not adequately address interaction between soldiers and other operational players (joint, multinational, and interagency). The focus of ROE normally is towards the use of force by military personnel.***[xx]

Warriors engaged in the future MOUT environment must be familiar with the psychological as well as the physical environments likely to be encountered. Warriors' roles and actions in each of these environments must be detailed enough to address Warrior to player interactions supportive of the desired strategic end state. Rules of Interaction (ROI) predicated on interpersonal communication skills (IPC) fill this requirement and enhance the Warrior's persuasion, negotiation, and communications abilities.

> ***Rules of Interaction, supportive of ROE, serve to increase a Warrior's survivability by reducing the likelihood of incidents escalating to lethal confrontations. Specific ROI, provide the soldier with a tool to address non-traditional threats such as political friction, ideologies, and culture.***[xxi]

The development of ROI will necessarily involve input from other functional proponents such as civil affairs, PSYOP, legal, and Public Affairs to ensure that ROI are regionally and culturally specific and supportive of the strategic end state.

Conclusion. The development of future MOUT doctrine must remain an ongoing process. Senior leaders and doctrine developers must reassess continuously the relevancy of doctrine works in progress. Current indicators strongly point to the likelihood of

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[xx] Snyder, pg. 10

MOOTW type warfare occurring in the MOUT environment. With this in mind, both service and Joint doctrine must be developed which will maximize U.S. force dominance in the future MOUT environment. The above listed factors are some, but not all, of the unique items, which must be considered.

[xxi] Snyder, pg. 13

Training Considerations for Future MOUT

Future MOUT training will most likely have its roots based in current training practices. New warfighting concepts and emerging technology will directly affect future MOUT training. Individual and collective training requirements will continue to be identified, developed, and implemented in the Joint services. These training processes are not where the true challenges to future MOUT training will be found. The keys to training success for future MOUT will depend on other factors. These factors include, but are not limited to:

- ***Realism in MOUT training***
- ***Joint MOUT Training***
- ***Integration of Combat Developments and Concept Development Processes***

Realism in MOUT Training

Current practices for MOUT training attempt to provide the Warrior with realistic conditions in which to train. This attempt falls short in most instances. These failures include, but are not limited to:

- Unsophisticated and poorly simulated indigenous populations
- Inability to alter the environment in support of tactical employment
- A lack of MOUT unique distracters
- Pushing ***Mindset*** as part of the future MOUT experience

Correcting these failures in future MOUT training likely would have a profound effect on the expertise and success of Joint forces in future MOUT.

Unsophisticated Indigenous Population - A key element in successfully rendering a realistic MOUT environment rests in the accurate replication of likely indigenous populations. The key differentiation between the MOUT environment and other battlefield

environments is that the MOUT environment most often entails direct interface with an indigenous population. This population is often large and can have a significant impact on most military. For the MOUT environment to be truly realistic, the indigenous population must be accurately portrayed. Inaccurate portrayal lessens the training value of any MOUT training scenario and/or facility.

In order to accurately portray the indigenous population, MOUT training must first require role players to receive special training to ensure that they provide an accurate representation of a particular region of the world. Current practices often use poorly trained or untrained DOD personnel as role players to accomplish this task. Often times MOUT training includes only threat forces, without any indigenous population. Training must next provide region-specific role players for their facilities. The added realism provided by this process could make future MOUT training facilities ideal not only for MOUT training, but also for mission rehearsal. To accomplish this, role players should be trained to support multiple regions of the world such as the Middle East, Europe, etc. We must acknowledge the important component, which the indigenous population plays in future MOUT by ensuring that they are accurately portrayed.

Limited Ability to Alter the Environment - "Training as you fight" remains a bedrock principle of training. Current MOUT training facilities often are heavily restricted in what one may or may not do because of limitations imposed by local environmental factors, available resources or government regulation. Future training MOUT facilities must be designed in a manner, which lets the Warrior replicate the combat functions of the MOUT environment. These combat functions often include altering the environment through the use of explosives as a necessary battlefield function. The future Warrior must not have to

contend with whether or not it is proper to break a window in a MOUT training facility because his unit has to pay to have it fixed. Infantry forces training in future MOUT training facilities must have the opportunity to blow a hole in a building wall to enhance battlefield maneuver. The only focus of the Warrior in future MOUT training must be to the mission at hand. Future MOUT facilities must be designed so that the myriad of combat functions required can be practiced to the fullest extent possible -- to include the limited destruction of portions of the MOUT training environment.

MOUT Unique Training Distracters - Along with an accurately portrayed indigenous population, the physical MOUT environment must have realistic characteristics. These characteristics include streetlights, cars parked on the streets, traffic, windows in buildings, and normal urban activity (people walking down the street, traffic). Current MOUT facilities often have very few, if any of these characteristics.

Emphasize "mindset" as a part of the MOUT experience - Future MOUT training must incorporate the entire conflict spectrum, not just the higher end of the spectrum. Current MOUT training focuses on maneuver warfare but does little in regards to MOOTW. Recent MOUT experience has demonstrated U.S. forces often will be dealing with restrictive ROE and will be undertaking many non-traditional functions. Such restrictions and non-traditional functions in future MOUT likely will increase in the future. Future MOUT will require the Warrior to adopt a MOUT mindset in order to achieve success. In the past, the primary focus in MOUT has been on the physical destruction of the threat. Future MOUT Warriors must focus on the entire conflict spectrum.

Future MOUT training must incorporate better methods to training Warriors on the application of force. Commander's guidance and ROE provide some assistance in this

regard, but much more training is required. Combat arms forces are placed at a great disadvantage when confronted with the application of force in the dynamic MOUT environment at the lower end of the conflict spectrum. These forces are trained to "close with and destroy the enemy." Issuing restrictive ROE does not fix the dilemma for combat forces. They are still faced with a tough situation. Future MOUT training must include the opportunity for combat forces to train in the graduated application of force prior to having to do so in a real world contingency operation.

Joint MOUT Training. Currently, MOUT training is generally conducted within the respective services. Warriors would greatly benefit in future MOUT training if it was conducted in a Joint fashion. Recent contingency operations continue to place Joint forces in the MOUT environment. These Joint forces would have benefited greatly if Joint MOUT training had been conducted prior to an actual contingency operation. Real world Joint operations are not the ideal time to discover that interoperability problems existed such as incompatible communications assets or vastly differing TTPs for MOUT. These challenges could be minimized through Joint MOUT training.

The U.S. Army is currently allocating a significant amount of resources to the MOUT training facility located at the Joint Readiness Training Center (JRTC), Ft. Polk, LA. This facility when complete will represent MOUT training at its finest. Painstaking attention to detail, infusion of technology to provide real time data collection and After Action Review (AAR) capability are only two of numerous reasons why this facility is significant. With this capability, a strong case could be made to incorporate Joint MOUT training as part of the normal JRTC rotation. Currently, the primary mission of JRTC is train U.S. Army light forces. A portion of the training includes MOUT and MOOTW.

Incorporation of an USMC Warrior contingent into the normal JRTC rotation would provide an enhanced experience for both the US Army forces and USMC forces. It would also provide a great opportunity to further examine issues of MOUT TTP, interoperability and other Joint MOUT issues.

Integration of Combat Developments and Concept Development Processes

Technology will play a significant role in the success of the Warrior in future MOUT. The most efficient manner in which to ensure that the Warrior has the right technology is to involve the Warrior in both the combat development and the concept development processes. Recent downsizing of all Services within DOD coupled has limited such involvement. The bright spot on the horizon is work being conducted by both the Dismounted Battlespace Battle Lab (DBBL) and the Commandant's Warfighting Lab (CWL). These efforts are a road map on how to successfully bridge the gap between emerging concepts and technology.

Current combat development work being conducted by the DBBL is a showcase on the immediate and long-term positive effects of integration of the Warrior in both the combat development and concept development processes. The DBBL, as part of its technology experimentation, uses active component and reserve component warriors to conduct experimentation. Furthermore, it continually uses all branches of warriors in all Military Occupational Specialties (MOS) to conduct its experimentation. Part of this process involves the parallel development of concepts and TTPs by the warriors and leaders going through the experimentation. Through this integration of technology evaluation and concept development, the DBBL quickly identifies promising emerging technology along with applicable TTPs in tandem. The result is shortened development

time lines, putting the right technology in the hands of future Warriors. The CWL uses a similar process for Special Marine Air/Ground Task Force (SPMAGTF) for experimentation. In this case, the SPMAGTF's sole purpose is to conduct directed experimentation for the CWL in support of Sea Dragon. No other organization provides this tight integration of technology evaluation and concept development.

Conclusion. Future MOUT training will have its roots in the past, but will address the factors just discussed. Realism in training is an essential element in training effectiveness. Our ability to drive home important aspects of both individual and collective training is the key to the value of that training. Realism in future MOUT training must provide an accurate "feel" to the trainee and must force the trainee to become proficient in the task(s) being trained. Joint MOUT training is required to ensure interoperability, TTPs, Command and Control and other issues can be understood and resolved prior to the conduct of real world contingency operations. Joint training provides the vehicle to ensure continuity between all Joint forces in future MOUT. The DBBL and CWL are currently pioneering integration of combat developments and concept development processes. The potential insights and contributions to the materiel fielding process to be gained in this arena cannot be ignored. U.S. Joint forces in future MOUT will be best served if these factors are considered and acted upon in a timely fashion.

Organizational Design in Future MOUT

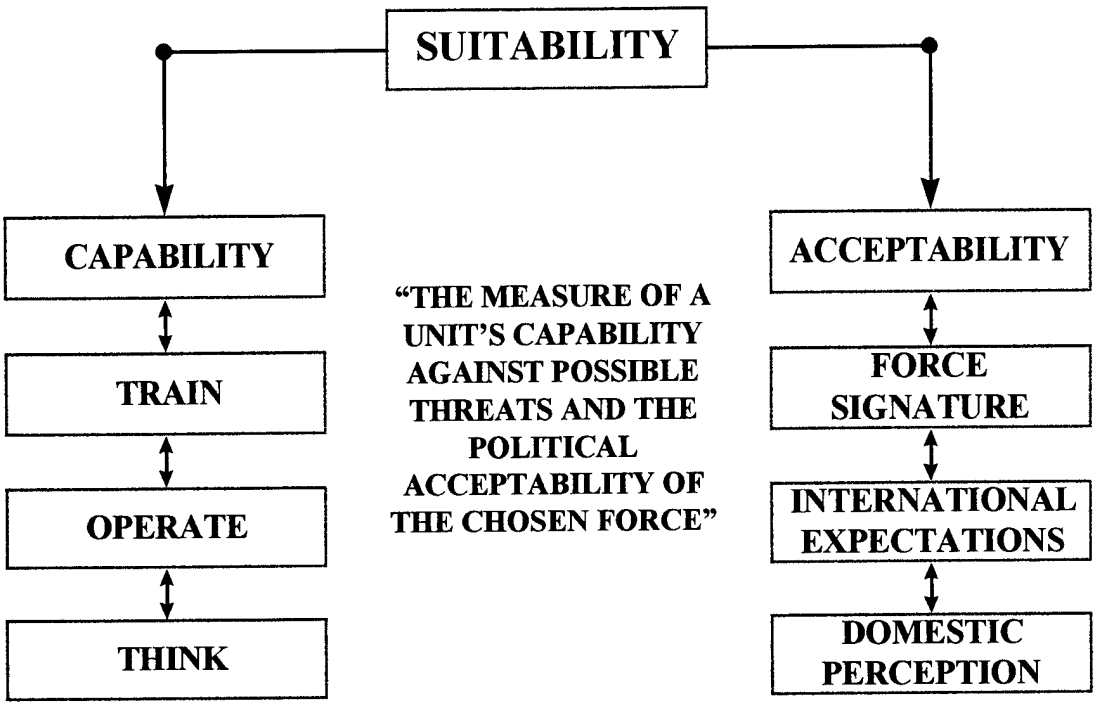
Recent contingency operations in the MOUT environment have shown that organizational success can be best achieved through force tailoring, often in a Joint fashion. Significant changes in organizational design likely are not required to achieve victory in future MOUT. Small Unit Operations (SUO) will remain the key to both tactical and operational success in future MOUT. The importance of SUO in MOUT can be attributed to the previously addressed likely level of war for future MOUT.

Efforts, such as Army Force XXI and Sea Dragon, will address future organizational changes. These efforts will examine the proposed threat, new battlefield systems, and other considerations to identify the optimal base force(s) required. In the end, the task force commander's primary method of ensuring organizational and mission success in future MOUT will be through effective force tailoring.

> ***The "Force Suitability Principle (FSP)" is a tool available to the military planner and leader when considering force tailoring for future MOUT. The essence of this principle recognizes that units should be chosen/tailored to meet a threat based upon an assessment of that unit's capability (predicated upon how that unit trains, operates and thinks) and the unit's political acceptability (predicated on the unit's force signature, the expectations of the international community, and the perceptions of the U.S. populace). After this assessment, feasibility constraints can be factored into the equation. The Force Suitability Principle should not only be applied in comparing branch proponent to branch proponent (i.e.; Infantry Vs MP), but also compare functions across the spectrum of joint and multinational operations. The Force Suitability Principle is embedded in several capstone level Army Field Manuals which include FMs 100-23, 100-7, and 100-16***[xxii].

[xxii] Snyder, pg. 15

Below is a graphic representation of the Force Suitability Principle:



Military planners and senior leaders will use force tailoring as a key component of future MOUT. The FSP provides a method to better evaluate units for their relative merits as part of a future MOUT force.

Technology in Support of Future MOUT

Technological innovation and advancements continue to be a primary focus for many as a method to overcome the fiscal realities of likely future conditions. While technology can have a significant impact on warfare regardless of battlespace or environment, it is not a panacea and must be approached with some caution. Mere possession of superior technological capabilities does not automatically bring with it a parallel and embedded capacity to sustain the advantage. Also, the MOUT environment physically negates the effectiveness of some types of technology.

> ***At the higher end of the conflict spectrum, you will see the value of technology and the value of traditional Tactics, Techniques and Procedures (TTPs) in MOUT. At the lower end, technology becomes less effective and the TTPs become less traditional.***[xxiii]

Historical examples abound of how technologically inferior forces have used innovations; timing or other means to defeated technologically superior forces. As previously discussed, the success of MOUT is directly linked to the success of the individual Warrior. Therefore, technology in support of future MOUT is best discussed using a "Warrior system approach." This approach will outline emerging technology from the individual level through systems used in support of future MOUT. The statement below illustrates the belief that new and emerging technology will play a significant role in future MOUT.

> ***The United States may need new technologies if it employs such tactics and seeks to maintain the lead that its forces possess in close combat. As advanced sensors and conventional weapons technologies proliferate and provide greater stand-off ranges for enemy forces, the United States should concentrate on achieving capabilities that will allow it to leap ahead of these developments. We need new means to enhance the***

[xxiii] LTG Zinni Interview, 5 Dec 96

lethality of our munitions and the protective characteristics of our materials and systems.[xxiv]

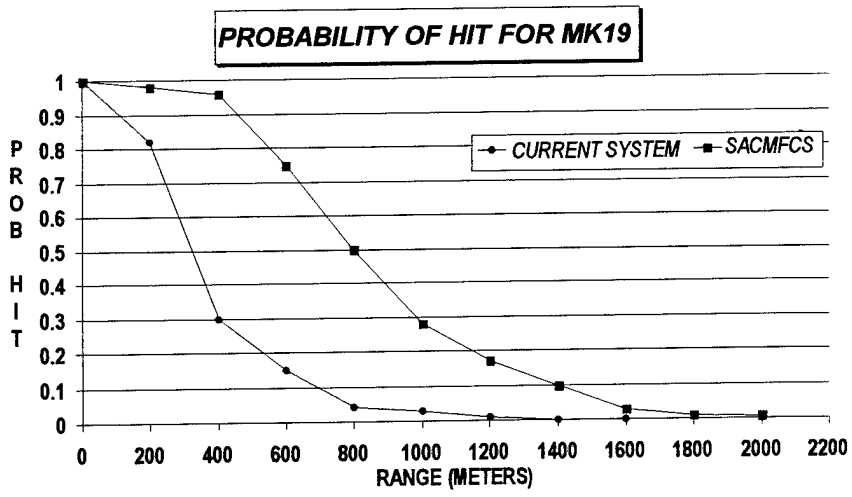
The Warrior in future MOUT will have unique requirements. The graphic below focuses on several key areas of concern. These areas will be discussed individually. Note that most of these areas are already being addressed by the Joint combat developments community, the Dismounted Battlespace Battle Lab (DBBL) as part of the MOUT ACTD effort or by the USMC under the Sea Dragon/Urban Warrior initiative.

LETHALITY

Small Arms Fire Control. Precision fire control is best described as a subset of precision strike, but for the individual Warrior. Full solution fire control in small arms systems has been successfully demonstrated in the Small Arms Common Module Fire Control System (SACMFCS) initiative under the Joint Service Small Arms Program (JSSAP). This technology has been thoroughly evaluated. The Small Arms Common Module Fire Control System (SACMFCS) program advanced development effort initiated in 1991 administered by the JSSAP Office at the Armaments Research Development and Engineering Center (ARDEC), Picatinny Arsenal, NJ. During this time, SACMFCS was tested on numerous occasions by JSSAP technicians and the Joint services. These evaluations tested SACMFCS on both the MK19 and M2 .50 caliber MG. Significant performance gains in first burst-hit capability were demonstrated on both weapon systems.

[xxiv]"Battlefield of the Future" pg. 3-15

Below is a graphic depiction of the effectiveness of SACMFCS.[xxv]



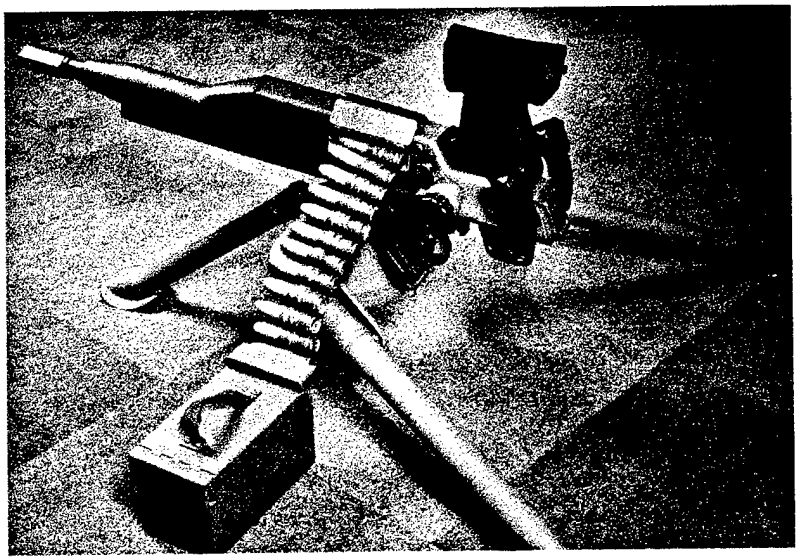
The SACMFCS prototype demonstrated the improvement which can be realized in first burst probability of hit (Ph) with full solution fire control. At 600 meters, the MK19 GMG has a .15 Ph (15% chance) for first burst. On the other hand, the SACMFCS prototype in testing gave the user a .75 Ph (75% chance) for first burst hit. This equates to an improvement of fivefold in first burst Ph.

The primary purpose of individual and crew served weapons fire control efforts is to increase lethality and survivability of friendly forces. Precision fire control reduces the expertise required to engage and destroy threat targets. This is especially important considering the highly stressful conditions experienced on current and future battlefields. To that end, the U.S. Army has taken the lead on the development of a new class of small arms and crew served weapons systems. These systems, outlined in the Army's Small Arms Master Plan, will incorporate full solution fire control with integrated all weather, all conditions capability. Their development and projected First Unit Equipped (FUE) fielding in the 2010-2015 time frame with fielding plans extending beyond 2015 provide us

[xxv] Mills, 5 Sep 95

a realistic glimpse of what kind of offensive systems the Warrior may carry.

Objective Crew Served Weapon (OCSW). The OCSW system is designed to replace both the M2 .50 cal Heavy Machine Gun (HMG) and the MK19 Mod 3 Grenade Machine Gun (GMG). The current system as proposed uses a 25mm high explosive air bursting munitions. Extensive use of lightweight/high strength materials and optoelectric full solution fire control are ideally suited to the requirements of ground forces in the 21st Century especially the MOUT environment. Inherent ammunition characteristics of OCSW reveal this system's ammunition fires munitions with a much flatter trajectory at comparable ranges. The net effect is a significant improvement in engaging moving targets. Below is graphic representation of this system:



The OCSW system will add significant combat capability to those operating in the MOUT environment for several reasons. First, as was previously addressed, the use of full solution fire control will minimize both collateral damage and ammunition consumption. Successful mastery of these two key battlefield considerations will ensure maximum effort is devoted toward defeating the threat versus sustaining the friendly effort. Second, OCSW

air bursting ammunition will provide decisively violent target effects and the capability to defeat defilade targets. Currently, neither the M2 .50 Cal HMG nor MK19 GMG can successfully provide these capabilities. Finally, through the use of lightweight, high strength materials, this system will have the capability to be dismounted with a significant decrease in manpower. The MK19 GMG with tripod currently weighs 144 lbs. The OCSW with tripod and fire control will weigh less than 40 lbs. The overall effect of OCSW in the MOUT environment is a quantum leap in lethality and survivability for the 21st century.

Shooter-to-Sensor Linkage - As previously discussed, the Warrior is now viewed as a combat system and, as such, will serve as an independent battlefield sensor package capable of becoming part of the Precision Engagement (PE). This capability for Warriors to act as "hunters" for the PE is embodied in the ongoing DBBL Rapid Force Projection Initiative (RFPI). This initiative is a complete architecture of Hunters and Killer systems which work together to form the ground based PE. Using advanced position navigation systems, sensors and Precision Guided Munitions (PGM) technology, RFPI will successfully integrate these assets into an effective and deadly PE. The advent of Global Positioning Systems (GPS) and PGMs will create the capability for the individual Warrior to bring lethal fires with pinpoint accuracy to any battlefield location regardless of the conditions. The concept of "if I can sense you, I can engage you" is coming to fruition. The relationship between the Warrior and the PE will grow stronger and more effective as time passes.

SURVIVABILITY

Non-lethal Weapons Technology. Non-lethal weapons provide all warriors and leaders additional flexibility in the application of force. This added capability is especially relevant in MOUT. The MOUT environment is unique in the fact that it often has both combatants and non-combatants mingled in such a way that normal lethal force is not the ideal tool to achieve mission success. Recent contingency operations in Haiti, Somalia and other locations have clearly demonstrated the usefulness of Non-Lethal technology. Therefore, the MOUT environment requires additional tools to ensure mission success.

> ***The addition of non-lethal weapons not only adds a new category in the force continuum, but also fortifies other categories previously regarded as having limited value. In the past, we typically would move directly from deterrence to combat, but with the addition of non-lethal weapons, we strengthen the potential for show-of-force and riot-control tactics.***[xxvi]

Future non-lethal technologies will provide warriors and leaders with alternatives to enhance control of both individuals and crowds in all environments—whether mounted or dismounted.

Warriors and leaders using non-lethal technologies will have the capability to control crowds, restrict movement of persons and vehicles, and better administer use of force.

> ***The show-of-force tactic is no longer an empty threat, because we now can escalate to the next level (on the use-of-force continuum) with the confidence that we can be effective without resorting to the use of deadly force.***[xxvii]

To best control crowds and individuals, non-lethal tools are required which provide the individual warrior or team, non-lethal employment capabilities.

[xxvi] No premium on Killing, pg. 27
[xxvii] No premium on Killing, pg. 27

Non-lethal systems will continue to evolve. Future non-lethal systems most likely will be an integrated capability of the Warriors' primary weapon. The delivery of non-lethal weapons technology by Unmanned Aerial Vehicles may be a common method of employment in future MOUT. Other non-lethal initiatives such as acoustic weapons, vehicle stoppers, entanglements and others will be developed and used in the future. Future non-lethal systems will provide Warriors additional options in the application of force in the MOUT environment.

Body Armor - There are many advocates for the use of body armor, and for good reason. Body armor, especially in MOUT environments, can provide the Warrior enhanced survivability at the time and place the Warrior chooses. Current body armor often is too heavy and cumbersome for long periods of sustained use. With current technology, the higher the threat level, the heavier the body armor becomes. Trade-offs have to be made with the current technology in body armor.

Future body armor may actually present itself in the form of a complete coverage defensive garment for the Warrior. Two challenges exist which make this concept difficult to achieve. First, finding a materiel, which is light, durable, and can withstand the kinetic force of threat weapon systems, is no small task. Even if the combat development community and industry find what they believe is an answer, threat systems can most likely counter the materiel fairly rapidly. Cost is another huge factor. The concept of finding body armor, which can defeat all threat systems, would most likely require considerable resources, and the continual decline of available resources make the prospect of fielding high tech body armor a challenge.

Stealth - Stealth technology continues to be an important element of most major combat

systems. Now that the Warrior has been defined as a combat system, stealth technology should be applied. Past efforts of placing infrared dye in the Battle Dress Uniform (BDU) and using camouflage face paint to provide a measure of stealth provide only minimal assistance to the Warrior in regards to stealth. The lethality of current and future battlefields requires us to provide the Warrior with an enhanced stealth capability. The U.S. Army has established the Soldier System Command (SSC) to take the lead in providing the individual warrior with the best possible tools for warfighting. The Army's acknowledgment that a separate R&D element focusing on warrior issues is of paramount importance. The move demonstrates the seriousness the Army now places on the "Soldier System." This individual Warrior focus is our best chance to continue to develop the type of soldier systems, which will ensure our success on the battlefields of tomorrow. Efforts of the SSC will provide the focus and commitment to Warrior issues such as stealth, which will be critical factors for future conflicts.

Digitization. Information technology continues to explode in terms of both complexity and capability. As it relates to warfighting, the capability to successfully assimilate the increased volume, accuracy, and speed of available information will provide a force with a decided advantage. An indicator of this capability can be seen in the proliferation of automation equipment. Portable computers are now being employed at all levels of command and support, and by individual warriors. Future Army plans for a digitized warrior include an individual warrior computer capable of processing battlefield imagery, communications with higher headquarters and even monitoring the current status of the users vital signs.

Below is a current version of the above mentioned warrior computer undergoing field-testing:

While this proposed system enhances acquiring and processing information, it also creates problems in dissemination and focusing that information for those best capable to act upon it.

Combat Identification (Combat ID) - Combat ID is critical to the success of future MOUT for several reasons. First, the American public opinion strongly supports any materiel technology efforts which will reduce or eliminate fratricide on the battlefield. Desert Storm and its intense coverage by the media was a revelation to the average American. . During Desert Storm, fratricide was a critical concern of U.S. ground troops. Many still believe that through the use of PGM and "smart munitions" U.S. forces have the capability to place lethality when and where we choose. Many also believe that we have the capability to apply technology to the individual warrior so that the risk of fratricide is significantly diminished. Second, the key difference between the MOUT environment and

other battlefield environment is the general proximity to non-combatants and the likelihood of collateral damage. MOUT requires precision fires to maximize success. Combat ID systems help ensure fires remain precision fires versus fratricide. Finally, MOUT is an arduous and logistics heavy battlefield environment, which requires all efforts to be focused toward the objective. Combat ID systems fully support that focus by helping ensure combat power is not wasted through fratricide.

The DBBL continues to aggressively pursue this initiative as part of its overall MOUT ACTD strategy. Its ongoing experimentation with the Battlefield Combat Identification System (BCIS) is yielding promising results. The capabilities embodied in BCIS address many of required capabilities required in future MOUT. Experimentation in this important area will continue with the ultimate goal to develop a combat ID system which will ensure that only threat forces are engaged and defeated.

Personal Protection Kit (PPK) - The concept of the PPK is a direct result of the ongoing DBBL MOUT ACTD effort. A series of user-level working group conferences identified the requirement for numerous Civilian-Off-The-Shelf (COTS) solutions for the individual Warrior. These items are generally low cost, high payoff items such as kneepads, goggles, gloves, hearing protection and other technologies, which are currently in use for similar purposes. The PPK would be a modular and expendable equipment package, which would provide the Warrior with a baseline set of tools for the MOUT environment. Over time as conditions in the MOUT environment change, the contents of the PPK could be changed to best support the needs of the Warrior.

Supporting Technology for the Warrior in Future MOUT

Unmanned Aerial Vehicles (UAV). Current and projected use of UAVs clearly shows this technology or other technology offering similar capabilities is here to stay. As UAV technology continues to evolve, it is becoming more reliable, less expensive and more capable. Recent use of UAVs in Bosnia demonstrates their value on the battlefield, especially in the MOUT environment. The following statements provide a feeling for the role UAVs are likely to play in future military operations to include MOUT:

> ***The promising initial results in deployments and previous exercises suggest UAVs will play an increasingly more important role in both land and maritime operations in the future. UAVs help close the sensor-to-shooter loop by providing the JTF and its components with the technology required to "see" the modern battlefield.***
>
> **J. J. Sheehan**
> **General, U.S. Marine Corps**
> **Commander in Chief, U.S. Atlantic Command**
> **August 1995**

> ***... I was looking at Predator [imagery displays] yesterday ... It was flying over an area ... at 25,000 feet. It had been up there for a long time, many hours, and you could see the city below, and you could focus in on the city, you could see a building, focus on a building, you could see a window, focus on a window. You could put a cursor around it and [get] the GPS latitude and longitude very accurately, remotely via satellite. And if you passed that information to an F-16 or an F-15 at 30,000 feet, and that pilot can simply put in that latitude and longitude into his bomb fire control system, then that bomb can be dropped quite accurately onto that target, maybe very close to that window, or, if it's a precision weapon, perhaps it could be put through the window.... I'd buy a lot of UAVs in the future.***
>
> **Admiral William A. Owens**
> **Vice Chairman of the Joint Chiefs of Staff**
> **June 1995**

The near term future procurement program for UAVs includes both tactical and operational level UAVs. Past experience with the use of UAVs has proven their relative

value on the battlefield. A family of UAVs is the future goal for U.S. forces. One of the most important lessons learned from the Persian Gulf War was the operational need for a family of UAVs, which the Congress reaffirmed.

UAVs are especially useful in MOUT. Their role in future MOUT has the potential to be even more substantial. UAVs as currently designed have numerous capabilities for military operations:

- Extended Reconnaissance - All weather, sustained intelligence gathering
- Precision Engagement - Act as a part of the precision strike network
- Communication Relay - Act as temporary communications relay platform

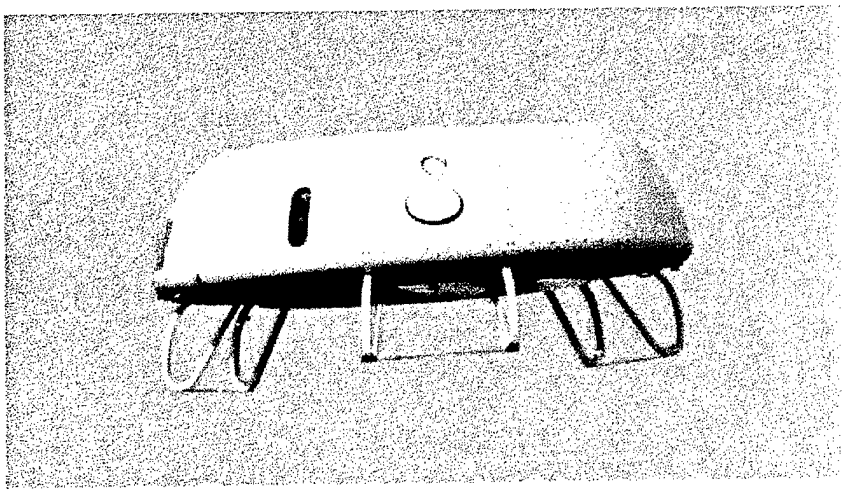
The 1994-1995 report on UAVs published by the Office of the Secretary of Defense (OSD) concurs with the prospect on increased UAV use in future MOUT.

> ***As mentioned, we are also discovering that UAVs can be ideally used in Operations Other Than War, and the idea of "urban reconnaissance" for military operations in built-up areas makes a strong case for future vertical take-off/lift capabilities.***

Future UAV use will provide UAV systems to both tactical and operational level commanders. This "layered" approach for UAV employment, which provides commanders access to UAV technology will a have significant impact on combat operations. Future MOUT will benefit from future UAV systems. The current approach for UAV employment fails to fully support future MOUT.

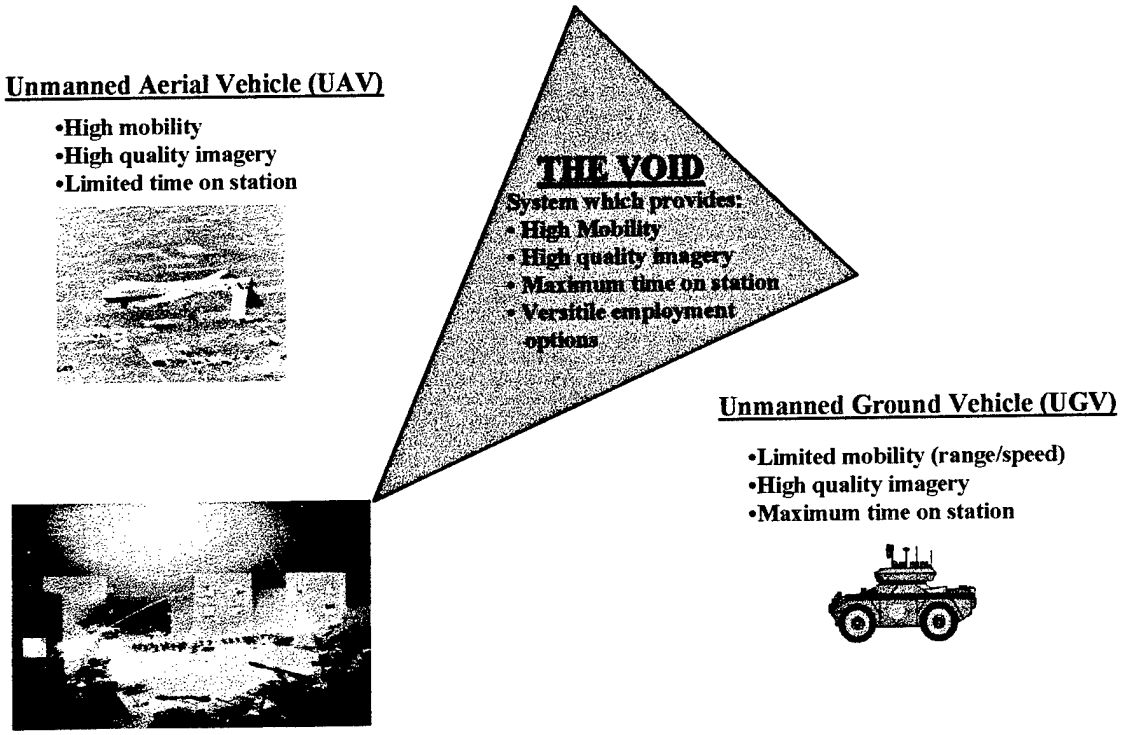
Highly mobile platforms, which can be used to deliver sensor packages, conduct crucial resupply and other MOUT related tasks are required. A possible solution to this deficiency is embodied in the Cypher program sponsored by Sikorsky. Cypher is not a UAV, but rather an airborne delivery system.

Below is the current operational prototype of Cypher:



In Future MOUT, a Cypher like vehicle could deliver a sensor package to a static location (top of building), deliver ammunition or other needed supplies. Its integration into the family of UAV fills a gap between the true UAV and the Unmanned Ground Vehicle (UGV), which is limited by its mobility and speed.

The figure below depicts the current gap which exists between the UAV and the UGV:



The CWL is currently conducting extensive experimentation in the area of UAVs. The X-Drone is the current UAV test platform for the CWL.[xxviii] This system is a low cost UAV that is not currently being pursued by any other service. Several other UAVs are under consideration by the CWL for future evaluation. The CWL is also interested in testing Kaman Aerospace's BURRO (broad-area unmanned retail resupply operations) UAV.[xxix] This system is designed to be an unmanned helicopter used for resupply. In this capacity, it would fill the earlier discussed role of Cypher. In either case, aerial resupply by UAV may become a reality in the future MOUT environment. It appears that the CWL plans to integrate UAV technology into all aspects of future MOUT warfare. Future MOUT will require more versatile and capable UAVs. Future UAVs may be used for a myriad of battlefield tasks to include the following:

- Resupply
- Relay and retransmission of communications
- Delivery vehicle for sensor packages
- Delivery vehicle for both lethal and non-lethal payloads
- Acting as a part of the Precision Strike capability
- Offensive Precision Strike
- Reconnaissance

Updated TTPs will be required to ensure these assets are best employed in support of future MOUT. For example, a mixture of high-flying UAVs such as today's Predator UAV along with a low flyer such as Cypher might offer the best combination for MOUT. The high flyers would provide precision strike capability, situational awareness and real time battlefield information. The low flyers could provide the close in detail piece in support of precision strike when collateral damage concerns were paramount. The low

[xxviii] UAV Update, Marine Corps Gazette
[xxix] UAV Update, Marine Corps Gazette

flyers also could be used to deliver static temporary sensor packages and communication relay systems in support of MOUT. This force tailored mix of high flyers (Predator Type) and low flyers (Cypher) would provide the on scene commander with the required capabilities for victory.

Conclusion. The success of MOUT is directly linked to the success of the individual Warrior. Several key points should be made about the role of technology in future MOUT. First, technology must be considered as something which supports the Warrior, not something that in itself is the key to victory. The current "Revolution in Military Affairs" will most likely make our Warriors capable in future MOUT. We must use and continue to develop technology to support the Warrior in future MOUT. We must not make the mistake of attempting to substitute technology as the prime instrument of success instead of the Warrior. Next, we must guard against over reliance on technology. The threat will use this over reliance against us to great advantage. Furthermore, we must train and equip our Warriors with the capability to revert to manual means when technology fails them in combat. Murphy will always be with us. The truth of the matter is that when GPS fails, if one cannot read a map or conduct terrain association to navigate, the ongoing operation will suffer. Finally, while systems such as UAVs, cruise missiles and other PE technology will most likely be available in future MOUT, the conflict will be decided by the individual Warrior in the MOUT environment.

Conclusion

Many things exist which effect our opportunities for victory in future MOUT. Emerging technology, organizational design and doctrine, for example, are unique components of warfighting in all battlefield environments--including MOUT. This paper has attempted to show the value of using an integrated approach to achieve victory in the future MOUT environment. Following an analysis of the likely threat force and environment, this approach focused on the forces of doctrine, training, organizational design, technology and the Warrior to provide an answer. The outcome is clear. While the above listed factors must be considered when planning for MOUT, the most important component of battlefield success in future MOUT is the Warrior. The importance of dynamic MOUT doctrine, organizational design optimized for MOUT, and technological advances should not be underestimated. Technology for example, directly affects lethality and survivability of US forces. These factors are *enablers*, which directly support the Warrior. The key to victory in future MOUT rests in how well senior leaders and the DOD community focus these enablers in support of the Warrior.

MOUT 2020 Threat Assessment

INTRODUCTION. This Threat Assessment provides an estimate on possible Threat forces that may be encountered in a MOUT environment to the year 2020. It outlines examples of Threat doctrine, training, organizations, and technology. While this assessment focuses on the Threat within a MOUT environment, MOUT is only one part of a more widespread Threat occurring throughout a given country. Several types of MOUT environments will continue to occur through the year 2020. Recent examples include Haiti, Lebanon and Chechnya.

Haiti represents the low end of the MOUT conflict spectrum. The Threat encountered was very low-intensity. It included disgruntled ex-soldiers, small special interest militia type forces, and random acts of criminal violence (looting, destruction of property, etc.).

Lebanon/Mogadishu represents the middle of the conflict spectrum. The Threat encountered in this area ranged from terrorist groups through organized tribal or religious militias. In Lebanon, there was both direct and indirect support from conventional military forces.

The low/mid portion of the conflict spectrum should not be equated with relative importance. These conflicts can be just as important and influential to a nation's strategic objectives as high intensity conflicts. United States forces remain in Haiti and were forced to leave Beirut after only one terrorist attack costing the U.S. a significant measure of prestige in the region and spurring on more aggressive actions by those adversaries to test U.S. resolve.

Recent operations in Grozny, Chechnya represent the highest level of intensity in

MOUT. Threat forces possessed many systems consistent with well-armed light infantry forces. These systems, while impressive, were not designed for decisive engagement with tank heavy forces. Threat forces were further strengthened because of their familiarity with that environment.

Future contingencies likely will be regional and in an urban setting. The scale, terrain, climate, indigenous culture, and character of the opposing forces will vary widely from case to case. The potential threats during this time will range from roving bands of insurgents through relatively well equipped regional forces to military powers. By 2020, regional conflicts may involve participants who threaten or use chemical, biological, or nuclear weapons. The threat or actual use of weapons, hostage taking or attacks on civilians, may be used by adversaries to constrain U.S. responses and sway public opinion.

Urban warfare is the most likely environment for conflict and will increase in the future. The ongoing movement of rural populations drives this to urban areas.

> ***A demographic upheaval of unprecedented proportions is today transforming almost the entire developing world - known during the Cold War as the Third World-from predominately rural society to an urban one. For the first time, because of unimpeded population growth and a related shift from rural-based to urban-based societies, more people live in cities in the developing world than in cities in the industrialized world. By the year 2020, the developing world will have accounted for 90% of the world's population growth since 1930."***[xxx]

> ***"Thus, the future killing grounds of the developing world will not be the impenetrable forests or remote mountain areas where guerrilla wars have traditionally been fought; rather, they will be the crowded, built-up areas in and around the less-developed world's burgeoning urban centers, whose residents will become inextricably enmeshed in insurgent-government conflict as rebels attempt to topple or replace existing governments."***[xxxi]

[xxx] Taw, pg. 1-2
[xxxi] Taw, pg. 7

Recent MOUT and MOOTW contingencies only reinforce the point that the United States is the only super power capable of assisting beleaguered, developing countries. We can only conclude that the U.S. most likely will be involved in many Military Operations in Urban Terrain (MOUT) which span the full range of military operations.

Doctrine. The immediate objective of Threat forces will be to assist a national effort to discredit the host nation's government and separate it from the US. Identifiable doctrine will vary based on many factors. Doctrine will also vary between and within identifiable groups, and will evolve as the U.S. operation continues. Threat forces will recognize that they cannot attack superior U.S. forces on an equal basis. There will be no doctrine that readily lends itself to association with any particular nation or military. Doctrine will be a product of prior military training, national characteristics, social mores, and of resident or "volunteer" Warrior groups.

Offensive. Threat force doctrine will stress seizing the initiative to pursue Threat objectives emphasizing the greatest number of enemy casualties with the greatest amount of media coverage (at selected places and times). The Threat will concentrate its operations from the ***"slumburbs"*** where the greatest support is likely to be found. The residential areas of the very wealthy will be high target areas this was demonstrated in the last FMLN offensive in San Salvador. Such targets will severely constrain the capability of U.S. forces to use their greatest advantage of air power and indirect fire. When possible the Threat will conduct special operations outside the built-up area including over international borders (Example: Chechen delivery of nuclear material into a Moscow park; Chechen taking of hostages outside Chechnya).

The Threat will attempt to use information warfare as a primary tool against U.S. forces. With a notebook computer, a "Techno-Warrior" who penetrates our "tactical Internet" will possess great potential to negatively effect U.S. force operations. As U.S. forces increase their reliance on digitization and C2, Threat forces will increase their efforts to use this reliance against U.S. forces. Threat forces will attempt to recruit Techno-Warriors in support of offensive operations. Techno-Warriors can operate in relative safety providing an economy of force t similar to a sniper.

Ambushes and raids will be common, generally in squad to platoon size elements. Targets will be undefended or lightly defended local government or military targets. As in the past, Threat efforts most likely will be against rear area targets, which are often in built-up or urban areas. Rear area targets are often less guarded than are other targets. The most common rear area targets are U.S. force and Host Nation logistics centers, which offer low cost and high payoff in materiel and psychological impact. Furthermore, such attacks against U.S. forces dependent on supply and maintenance will demand a commitment of combat troops to guard these sites. This increases the cost for U. S. forces and commits combat troops into fixed sites that can be isolated and destroyed. It establishes a long-term tendency to retake the initiative from a superior enemy force.

Small-unit night operations will be common. Threat units will attempt to maximize effectiveness through the use of sophisticated, man portable, night imagery systems. Much of this technology will be available to Threat forces from a multitude of sources providing an advantage to the Threat, even in the face of U.S. superior technology, based on an intimate knowledge of their "home" urban environment. Historically, potential enemy forces (local government and US) have minimized night operations to limit

fratricide and non-combatant casualties. Curfews, however, will not negatively affect Threat operations.

Future MOUT will require more dispersion by Threat forces in an attempt to minimize the likely Precision Engagement capability possessed by U.S. forces. Maneuver in the "urban canyon" will be most difficult for Threat forces. The Threat will use their in-depth knowledge of familiar terrain, night operations and Own the Night (OTN) technologies to be more effective in future MOUT.

Operations that might be considered defensive can be used in an offensive manner. Mines will be employed not just to produce casualties or harass, but also to channel enemy forces into prepared kill zones. Anti-aircraft ambushes with Surface-to-Air (SAM) and snipers will force the enemy to restrict flight operations, fly higher, or commit escort aircraft to every operation. Threat forces because of their proven effectiveness in past MOUT operations will maximize snipers. Mature, highly skilled Threat snipers will provide a stealthy, highly effective and devastating offensive capability. For Threat operations, snipers provide leaders a superb economy-of-force tool. Snipers will aggressively eliminate key targets and personnel to damage the local government's credibility.

There will be a tendency to use "harmless" non-combatants to achieve military and political results such as happened with the U.S. involvement in Somalia. The Threat will use peaceful demonstrations and/or protests to cover moving their forces. This shield could be used to conduct combat operations and produce U.S. and host nation casualties.

The Threat will have a keen awareness of the applicable ROE, which govern U.S. force operations. Threat forces will use this knowledge in a direct attempt to use those

ROE against us. Past MOUT and MOOTW have shown how effective Threat forces can use ROE in combination with the media to further their cause.

The Threat will adapt, as it learns what operations work and which do not. For example, the Threat will use command-detonated mines. When U.S. forces begin to use engineers to sweep, the Threat will ambush the personnel. When U.S. forces send reaction forces, they will be damaged or destroyed as in Mogadishu. Threat forces will attempt to get between U.S. forces and encourage fratricidal firefights. For example, in January 1995, there was a firefight between a Russian tank and a Russian motorized rifle unit, which lasted for six hours before the Russian units, could identify each other and establish a cease-fire.

Defensive. Threat forces will use the defense while in transition to offensive operations. The goal of the defense is to protect logistics/caches, inflict casualties, and embarrass the enemy government(s) through showing their impotence. The Threat will defend high value areas and likely will also defend from highly populated areas to limit any enemy's unrestricted use of artillery or aerial-delivered ordnance. While a large area defense such as the Palestine Liberation Organization (PLO) conducted in Grozny, Simon and Beirut will be less common it represents the high end of the conflict spectrum. Generally, the Threat will defend well-selected areas for limited time periods to accomplish limited objectives.

The Threat will defend according to a detailed plan of action. Selected buildings and areas will be strongpointed and organized for a 360-degree defense (also including aerial and subsurface considerations). The Threat will use all floors of the building and prepare routes of communication and escape by making holes in interior walls and digging

shallow communications ditches in open areas. They will use tunnels and sewers for movement as well as for important nodes (command posts, logistics sites, and hospitals). They will also use "off limits" sites (historic buildings, hospitals, orphanages, churches, etc.) for critical facilities knowing that the cost to the enemy of destroying these areas would be very damaging in the eyes of the world.

As was previously discussed in the offense, snipers will be key personnel in defensive operations. There will be two types of snipers. The first will be above average marksmen with no special equipment. The second will be above average marksmen or specially trained personnel who will have special rifles (hunting or sniper) with day and sometimes night-capable optics. They will target any personnel identifiable as leaders and key vehicle crewmen (commanders, drivers). Snipers with anti-material weapons will damage or destroy all robotic type vehicles realizing that these ground or aerial devices represent key reconnaissance assets.

Threat operations will seek to separate attacking combat vehicles from their accompanying infantry. They will use light and portable anti-armor ambushes to attrit the enemy whenever possible. They will carefully recon firing positions to ensure that minimum arming range restrictions will not hamper operations. They will integrate mines and barricades into the overall defensive plan to attrit, slow, divert, and separate enemy elements. Operations such as these were responsible for destroying 112 of 120 combat vehicles of the Russian 131st Motorized Rifle Brigade in January 1995 while engaged in operations in Grozny, Chechnya.

Local counterattacks and ambushes will be common, as will night operations. When the Threat is forced to abandon positions, it will generally leave one or more

personnel to cover the withdrawal of the main element. Personnel will expect to fight in isolation, a disadvantage overcome by thorough preparation (caches/log sites).

Intelligence will be an area of emphasis. Intelligence gathering in MOUT will depend primarily upon Human Intelligence (HUMINT) from supporters, infiltrators, translators, etc. Communications (conventional telephone and radio) intercept as well as computer exploitation will also be important sources of intelligence.

The Threat will possess the capability to make and deliver nuclear, biological and/or chemical munitions. There will be every attempt to be very specific in targeting (enemy troops, local ruling class). Collateral damage and damaging publicity situations will be avoided.

Psychological operations and media manipulation will be critical components of Threat doctrine. Media personnel will be carefully brought and protected when their "impartial" help is required and prevented from free movement as fits the needs of the Threat. The local government personnel and military will be specific high value targets for psychological operations as will the effort to alienate the local government and military from US forces.

Training/Leader Development. Training levels will greatly vary within the Threat. There likely will be three levels. The first and lowest level will occur within the supporters of the Threat. The second level will be seen among terrorist or militia type groups. The third and most proficient level will be among the Warrior class. In all cases, conducting actual operations will reinforce training. Training sites generally will be outside the city or outside the country and frequently funded by outside sources.

The supporters of the Threat will be poorly trained or trained in only specific areas

(intel gathering and reporting, mine laying, limited booby trap preparation and emplacement). They may have very limited weapons training. This group likely will support the Threat through the civilian occupations of its members (truck drivers, doctors, and communications personnel).

Terrorist or militia personnel will be well trained in small unit (team, squad) tactics, techniques and procedures but poorly trained in platoon and company operations. They will be proficient in the execution of small unit battle drills. Training in the use of small weapons (pistols, rifles, machine guns, grenade launchers, hand-held anti-armor weapons) and special devices (night vision devices, hand-held SAMs, mines, booby traps, mortars) will be detailed. Snipers will be specially selected and trained in weapons and Tactics, Techniques, and Procedures (TTPs). Training on heavier equipment (armored vehicles, crew served air defense weapons, and artillery) will be limited. These personnel will also be well indoctrinated politically and/or religiously. Leaders will be somewhat better trained than the rank and file. This training will not provide a strong basis in platoon or above operations.

The third and most proficient group will be the Warrior class including both local nationals and foreign personnel. A current example of foreign personnel is the presence of radical Islamic Muslim Iranian Mujahaden in Bosnia attempting to exert and maintain Muslim influence in the region as a countermeasure to U.S. and other Western influences. Future Threat forces will have received their training from conventional or special operations sources while in the military, or from other highly trained individuals. They will be proficient in individual weapons and TTPs through squad, platoon, company and sometimes battalion levels. An example of this class would be the Iranian Revolutionary

Guard Corps personnel who fought in Bosnia in the early 1990's. These Warriors trained (and indoctrinated) local volunteers, led local units, and/or integrated into local units.

Organizational Design. Threat forces will be organized along historical terrorist and guerrilla lines. The Threat generally will not mirror the downsizing trend caused by leaps in Command, Control, Communications, and Intelligence (C4I) and weapons effectiveness seen in Western armies. Operations security concerns will influence organizations. The command structure will be highly compartmentalized at middle and higher levels although the highest group may be highly public figures as was the case with General Dudayev (Chechnya) and Abimael Guzman (Sendero Luminoso, Peru). Organizations will vary among supporters, terrorists, guerrillas and the Warrior groups.

The supporters will be very loosely organized and will operate as individuals when called by their command structure. They will have a contingency organization for conventional operations consisting of squads, platoons, and companies.

Terrorists will be organized into small two-to-three-person cells at the lowest level. They will have the capability to combine cells into roughly squad size (7-12 personnel) elements and to operate in platoon size structures. These elements will have a common basis in training and experience but limited experience and capability in C3 at the platoon level. There will be no special weapons organizations.

Guerrilla type forces will be formally and more conventionally organized into infantry type squads, platoons, and companies. Special weapons squads and teams will exist within platoon, company, and battalion structures. These units will provide air defense (SAM and medium/heavy machine gun), anti-armor, and indirect fire (light/medium mortar) support. There may also exist (as in Chechnya) small teams or

squads of armored vehicles as shock or counterattack forces. Guerrilla organizations will function fairly well up to and including the company level. At and above the battalion level, organizations will not function well due to limited training and experience.

The Warrior class also will have conventional organizations. Squads (10-12 personnel) and platoons (34-40 personnel) will be organized with a clear and effective chain of command. Due to the limited numbers of this group, they will rarely operate at or above company level. Company level operations will be similar in organization and effectiveness to Chechen operations conducted outside the republic.

There will be a national or umbrella type C4I structure. There will be one overall leader with between one and three trusted deputies. Removing the head of the organization will result in a decrease in combat operations and then a resurgence along previous lines (as seen with the Sendero Luminoso and the Chechen resistance). There will be a staff organized into administrative/personnel, operations, training, intelligence, logistics, psychological operations, and political/religious sections. This structure will be mirrored in the Threat organization in cities.

Technology. As with all the Doctrine, Training, Leader Development, Organization, Materiel, and Soldiers (DTLOMS) there will be large variations in weapons within the Threat. Small arms range from derringers and pistols to light machine guns. These will include a large mixture of origins and calibers with the most sophisticated types being foreign produced and the largest quantities being the types, which the local government uses. There will be an emphasis on small, easily carried and concealed automatic weapons with high rates of fire. The most common caliber will be the local government forces (to enable resupply through raids, theft, etc.) carry.

Medium weapons will range from medium machine guns through anti-armor weapons. The most common types will be those carried by the local government forces. Anti-armor weapons may be an exception if the Threat is supported by extra-national powers (Nicaragua's support of the FMLN in El Salvador). These could be soft launch, fire and forget weapons designed to defeat the best armor in the world.

Indirect fire weapons will range from home made catapult (FMLN type) explosive launchers through mortars and possibly local government artillery and MRL systems. Smart, terminally guided mortar rounds will be available in sufficient quantities to attack high value enemy targets. Both radio type proximity fuse rounds and "dumb" rounds to combat radio frequency weapons/jammers will be available. Incendiary munitions also will be used against specific targets.

Demolitions, explosives and mines will include everything from late 20th century versions to the most modern available on the world market. In an environment where the enemy will have tremendous technological advantages, old and unsophisticated devices such as simple booby-traps may have great value. 20th century type hand grenades will continue to be critical and heavily used devices.

There will be a variety of special weapons or specially modified weapons. These may include weapons with no flash and no acoustic launch signatures. Surface-to-Air Missile systems likely will have multiple proximity type warheads of greatly increased power. Threat forces will possess limited quantities of very sophisticated night vision/thermal type target acquisition sights. Laser/red dot devices will be common for small arms. Sniper rifles will range from conventional calibers into heavy anti-materiel calibers with munitions designed to penetrate targets and explode inside.

The Threat will use the entire spectrum of communications from couriers (memorized, or written and encoded messages) to sophisticated frequency hopping radios. Local telephones will be heavily used. The 2020 version of the Internet will be used to communicate outside the city and country as needed. Encryption will be manual and sophisticated.

Threat forces at all levels of organization will be capable of delivering NBC munitions. Nuclear material contamination will be most common although the Threat may use very small, very low yield nuclear devices against high priority targets (bridges, enemy C4I sites). Biological weapons will be race/ethnicity specific when possible (i.e. targeted against foreign/US personnel or the ruling ethnic group). Chemical incapacitants will be the most commonly used, mainly to disable enemy troops in non-lethal ways.

Directed Energy Weapons will include limited quantities of laser blinding devices and very small quantities of "hard kill" laser weapons. Crude acoustic weapons will be available in very limited quantities based on limited utility in MOUT environments.

Conclusion. The MOUT Threat will be dangerous, unpredictable and greatly varied in its training, material, and organization. Threat forces will use whatever means at their disposal to meet their objectives. Future Threat "enablers " to meet Threat objectives will be different from those of today. Threat forces will focus on low tech Information Warfare (IW) capabilities to take advantage on U.S. force heavy dependence on digitization. The Threat will actively recruit "techno-Warriors" to attack U.S. force digitization capabilities. Threat tactics will change to maximize the use of snipers in both offensive and defensive operations. Threat tactics will also emphasize the use of small unit operations during night and times of limited visibility. This will minimize the effectiveness

of U.S. force precision strike technology and to also capitalize on the Threat familiarization with its "home" terrain. Finally, Threat forces will use the media and an in-depth understanding of U.S. force ROE to maximize their effectiveness. Other key concerns will be the "high tech" materiel pockets of Directed Energy Weapons and Weapons of Mass Destruction. Most dangerous will be the Warriors who fight by no particular rules, certainly the rules of its foe.

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