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CJTF and the Pathway to the Littoral

by

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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.

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Abstract of

CJTF AND THE PATHWAY TO THE LITTORAL

"Operational Maneuver from the Sea" (OMFTS) identified the littoral environment as the new frontier of joint warfare. Moreover, adapting maneuver warfare to the littoral environment has created many new challenges for the Joint Task Force Commander (CJTF). Sea Dragon, a five-year USMC Advanced Concept Technology Demonstration, was created to explore the principles and technical challenges addressed by OMFTS. This paper conducts an examination of the Sea Dragon framework to determine the contributions and disadvantages of this process to joint littoral warfare. Although Sea Dragon was devised to champion Marine Corps littoral objectives, its goals must complement the overall joint perspective. In addition, selected operational functions relative to the CJTF and his command of joint littoral operations are evaluated to determine inherent downfalls of the current force organization and technical applications. If pivotal issues associated with these functional areas are either ignored or mishandled, resultant difficulties may fracture future joint interoperability and negatively affect littoral operations. In this era of diminished resources, all services need to foster and contribute to joint warfighting requirements.

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CHAPTER ONE

INTRODUCTION

Thesis

"Operational Maneuver from the Sea" (OMFTS) identified the littoral environment as the new frontier of joint warfare. Consequently, the sea has become the springboard for gaining decisive advantage and exploiting the enemy's critical vulnerabilities. Adapting maneuver warfare to the littoral environment creates many new challenges for the Joint Task Force Commander (CJTF). High operation tempo and the ensuing necessity for seamless, real-time information places increased emphasis upon precision-guided munitions, sea-based fire support, and integrated Command, Control, Communications, Computer, and Intelligence (C4I) systems to successfully accomplish future operations.

Sea Dragon provides an experimental approach to structure development and implementation of requisite technology and doctrine in response to the challenges offered by OMFTS and twenty-first century expeditionary warfare. I will examine this experimental framework and contrast its objectives against selected functional requirements of the CJTF. I contend that *Sea Dragon*, and its associated experiments, offers a unique opportunity for the joint community to counter the challenges of the littoral environment. However, a detailed evaluation of the joint "capability end state" must be performed and applied to the experimental framework to ensure the CJTF a "successful pathway to the littoral."

Introduction

The requirements of the littoral environment do not decrease the importance of the forward presence and power projection missions for the Navy and the other services. Sea

control and battlespace dominance are necessary prerequisites for operational success. The very nature of the littoral adversely impacts transition of operations from sea to shore. Contact deconfliction requirements, uncertain threat axes, and restricted water maneuvering complicate operations in the near-land zone. Force protection of independent, isolated units imposes heightened demands upon multi-tasked sea platforms and Theater Ballistic Missile Defense (TBMD) resources. Furthermore, proliferation in world-wide weapons technology lessens the likelihood that battlespace dominance will not be contested by the enemy. Diesel submarines, mines, shore launched and sea-skimming missiles, and theater ballistic missiles (TBM) are just a few examples of technology readily available to any adversary.

To successfully accomplish a mission in the littoral, the CJTF applies the principles of momentum, tempo, and maneuver to mass effectively against the enemy's weaknesses. Strategy and tactics merge, and operational maneuvers against operational objectives replace direct amphibious assault tactics. Due to the chaotic nature of the littoral, battlespace awareness is critical. Exact locations of friendly, enemy, and civilian units must be distinguished, and positions and characteristics of friendly and hostile weapons systems identified. The changeable environment and unpredictable threats dictate more rapid decision-making and increased reliance upon a flexible command and control (C2) structure, intelligence, surveillance, and force protection methodology. Dispersal of assets decreases force vulnerability through reductions in concentrations. However, this force dispersal demands joint communication connectivity and system interoperability.

Sea Dragon, a five-year Advanced Concept Technology Demonstration (ACTD), was created by the USMC to explore the principles and technical challenges addressed by OMFTS.

This experimental process will "investigate joint doctrine, tactics, techniques, procedures, and training with the application of selected technologies applicable to Marine Corps expeditionary warfighting."[1] The Commandant's Warfighting Lab (CWL) oversees this process and serves as "the focal point for warfighting refinements."[2] Currently, three consecutive exercises, Hunter Warrior, Urban Warrior, and Capable Warrior, are identified to assess present technology's impact upon warfighting and to examine future expeditionary warfare trends. Projected functional areas of experimentation include: command and coordination, fires and targeting, mobility and maneuver, survivability, sustainment, training, chemical and biological threats, and non-lethal responses.[3]

Although Sea Dragon was devised to champion Marine Corps littoral objectives, its goals must complement the overall joint perspective. This paper conducts a brief examination of the Hunter Warrior test concept to determine if this experiment emphasizes or detracts from joint warfighting capabilities and doctrine. Clearly, the results attained from Hunter Warrior and subsequent evolutions will impact the conduct of future operations in the littoral.

Following scrutiny of Hunter Warrior and its contributions to littoral warfare, the author addresses critical functions relative to the CJTF and his command of joint littoral operations. This discussion is limited to C2 organization, knowledge, logistics, target prioritization, and communications. Obviously, other functions exist that impact joint operations. However, these five specific functional areas, as depicted in figure (1), have *particular* importance in the littoral; they impact all domains (air, land, and sea) symmetrically.

Finally, planning for future operations in the littoral poses many questions. Foremost is the question of technology focus. The paper concludes with a general discussion regarding technology focus for the future, and provides recommendations for subsequent planning and experimental purposes. This is an era of tumultuous change, and we must use our resources wisely to ensure the joint forces are in position to accommodate future warfighting demands.

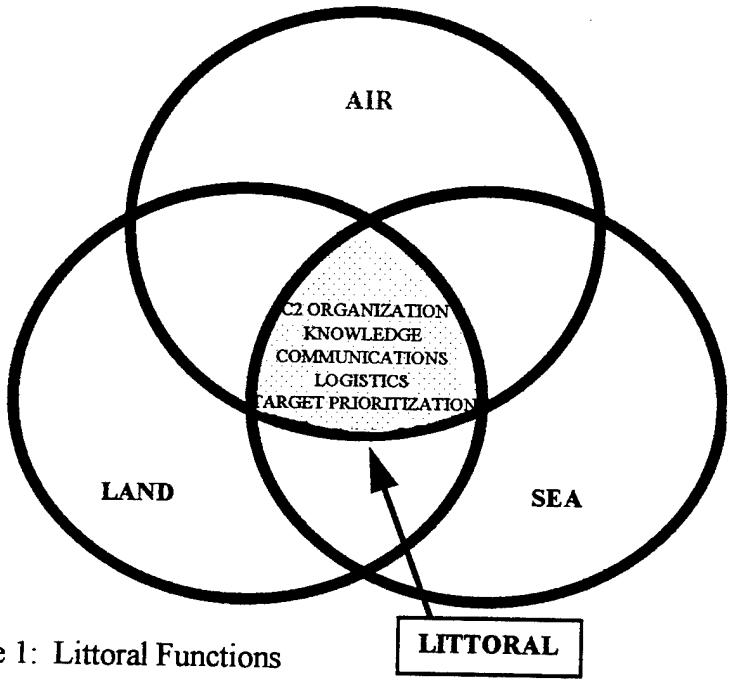

Figure 1: Littoral Functions

CHAPTER TWO

HUNTER WARRIOR AND JOINT WARFIGHTING CONTRIBUTIONS

Joint Perspective

The Sea Dragon ACTD intends to team "Fleet and Fleet Marine Forces within the joint warfighting framework to exploit tempo, precision, lethality, mobility, and information."[4] Intent upon molding future naval expeditionary warfare, the first phase of this experimental process emphasizes the utilization of current force infrastructure and enabling technology to:

> further expand the relevance of sea-based, forward deployed force contributions to the Joint Combatant Commanders. This experiment will evaluate the ability of afloat forces to operate successfully on a digital and extended battlefield using these new concepts and technologies.[5]

As the first experiment, Hunter Warrior Advanced Warfighting Experiment (AWE) focuses predominantly upon the operational and tactical requirements of small units engaged in a dispersed, open battlefield. Communication connectivity, C4I enhancements, enhanced fires and targeting, and force protection and sustainment are capabilities emphasized during the experiment scenario.[6]

Experiment Hypothesis

The test hypothesis inquires: "Can we significantly extend the area of influence of a modest forward afloat expeditionary force, and also significantly increase its effectiveness within that expanded area of influence?"[7] Digitized battlefield architecture, enhanced targeting capability, and responsive fires are "technical enablers" for the hypothesis. In addition, the introduction of the Newton Leatherneck Tactical Digital Assistant (TDA), a "streamlined command element,"[8] extends the area of influence to the individual unit level. The TDA

coupled with an Ericison radio and repeater base stations creates the leatherneck network, which provides unit connectivity with the Experimental Command Operations Center (ECOC). The ECOC functions as the primary command and control center for the Experimental Special Purpose Marine Air-Ground Task Force (SPMAGTF (X)) executing the exercise. Appendix A provides further elaboration concerning the specific communications network structure established for Hunter Warrior.

As previously stated, five functions particularly affect joint operations in the littoral: C2 organization, knowledge, logistics, target prioritization, and communications. Although Hunter Warrior explores capabilities associated with knowledge, logistics, communications, and targeting, these objectives are oriented towards Marine Corps-developed capabilities. In particular, the AWE fails to investigate joint C2 organizational impacts and contributions. One experimental objective area, "enhanced fires and targeting" does attempt to address other service roles in fire coordination; however it selectively focuses on the Marine Air-Ground Task Force (MAGTF) roles and abilities.[9] The following sections highlight additional AWE areas that are problematic for future joint warfare.

Joint Warfighting Applications

The Hunter Warrior AWE proposes significant improvements in situational awareness and communications for the MAGTF. However, when reviewed in terms of joint applicability, several functional areas are candidates for joint intervention in the future. Task coordination, asset prioritization, force integration, and C2 organizational issues necessitate joint coordination for Hunter Warrior and subsequent exercises to make a significant contribution to joint littoral warfighting.

Task coordination and prioritization of assets. Setting reasonable, achievable goals is key to a successful exercise. It is impractical to address the entire issue of littoral warfare, and its impact upon future force structure and interoperability, in a single exercise. By the same token, caution must be exercised in making general assumptions. Hunter Warrior's concept of operations assumes non-contested airspace and sea dominance. Thus, the ground conflict will receive total support from dedicated assets. To assume that there will be no resource contention for weapons once a call for fire transpires, is unrealistic. Consequently, the issues of resource contention and allocation remain unexamined within the context of the Hunter Warrior experiment. Therefore, it is difficult to ascertain what scheduling and resource impacts dispersed ground operations *will* place upon force assets. This idealistic scenario leads to the faulty assumption that the current joint force structure and doctrine will support similar ground maneuvers without resource contention or significant coordination of assets.

Force integration. Hunter Warrior features the ECOC as the dominant command and control node in the littoral. The ECOC tasks include planning and shaping, command, combat information, and engagement coordination (i.e., fire coordination and maneuver) actions during the exercise scenario.[10] Under current joint doctrine, the Joint Force Air Component Commander (JFACC) controls air assets and develops joint air operations plans to support joint force objectives.[11] Clearly, the relationship between the JFACC and the ECOC staff must be defined to establish and clarify areas of responsibility and control. Without consideration to joint command structure, Hunter Warrior proposes another "stovepiped" control system that does nothing to uphold overall joint operational requirements.

Knowledge and C2 organization. The ability of enhanced C4I capabilities to provide a common tactical picture to the small-unit level, is one key Hunter Warrior objective.[12] Connectivity between forces in the field and the ECOC, is fundamental to the experiment, but this only addresses specific Marine Corps C4I issues in the littoral. Employing essentially a point-to-point network, this exercise requires that some modifications be performed in the Joint Maritime Command Information System (JMCIS), to support C4I connectivity to dispersed troops. However, overall joint intelligence, communication (e.g., bandwidth and network restrictions), and command and control implications have not been addressed.

Navy and Marine Corps organizational and technical requirements cannot dictate overall requirements for the joint organization. On the contrary, CJTF requirements must propel the conduct of these future experiments and C2 requirements from a "top-down" approach. Although it is important to determine Navy and Marine Corps requirements for operational support on an extended, non-contiguous battlefield, joint stipulations must prescribe the experimental decision framework. The CWL advertises Sea Dragon and its AWE's as "a *process* for achieving enhanced Naval & *Joint* expeditionary capabilities."[13] If this is to be achieved, then a detailed evaluation of the joint "capability end state" is essential in determining future experimental requirements.

Summary

Until recently, Sea Dragon and its AWE's remained purely a Marine Corps interest. The Navy has newly taken an active interest in the experimental framework and proposed technology advances. Due to the expense of fleet exercises, and the political implications of Hunter Warrior, the Navy cannot afford to ignore the opportunities this AWE presents.

Likewise, Hunter Warrior and its sister experiments offer a unique opportunity for the joint community to experiment in the littoral setting and critique applicable tactics and technology.

Sea Dragon, "a means for [*i*]*nsertion* of science & technology to enable the warfighter,"[14] has had an auspicious beginning. It has taken necessary strides to evaluate expeditionary warfare and propose solutions to the force inadequacies outlined in OMFTS:

> Operational Maneuver from the Sea requires that we focus our efforts on those areas which afford us the greatest return. Specifically, we must improve our operations, modernize our capabilities, and strengthen our intellectual underpinnings.[15]

Ultimately, the Sea Dragon process must benefit the CJTF and the conduct of joint operations in the littoral. As discussed above, the current Hunter Warrior experiment does not focus sufficiently upon joint capability and organizational difficulties. To function as true technology "enablers" for the warfighter, the future AWE's must provide an adequate framework to examine joint issues as well as specific Navy and Marine Corps tasks. In this era of diminished resources, all services need to foster and contribute to joint interoperability. It is essential that Sea Dragon's triad of exercises does not promote unique, "stovepiped" technology and doctrine that detract from joint objectives. Disregard of joint interoperability and doctrinal issues creates the danger that technical advances can prove ineffectual at the operational level of war. The next chapter highlights functional aspects of the littoral operational environment that make excellent candidates for future AWE examination. In particular, the following chapter addresses specific CJTF littoral requirements and concerns, and provides insight on possible solutions.

CHAPTER THREE

CJTF LITTORAL REQUIREMENTS AND CONCERNS

Due to the nature of threat and environment, operations in the littoral region pose many challenges to the CJTF. The Hunter Warrior AWE addresses connectivity, sustainment, and force protection objectives associated with the Marine Corps' involvement in the littoral. Yet, at the joint operational level, attainment of these objectives requires more organizational, system, and doctrinal adjustments to facilitate force integration and proficiency.

To limit the scope of this analysis, only five crucial functions that affect joint operations are examined in this chapter: C2 organization, knowledge, logistics, target prioritization, and communications. If pivotal issues associated with these functional areas are either ignored or mishandled, resultant difficulties may fracture future joint interoperability and negatively affect littoral operations. Success or failure of dispersed operations hinges upon the provision and availability of accurate, real-time knowledge, adequate logistic and fire support, and the presence of a flexible, responsive C2 organization. Although each of these factors plays a major role in the successful conduct of joint operations, communication support is integral to all areas. Interoperable and reliable communication networks form the critical foundation of operations. Without adequate communications, mission execution and success is jeopardized.

Figure (2) reveals how the principles of war form the basic "building blocks" for littoral operational functions. Based upon the principles of war as outlined in Joint Pub 1, Joint Warfare of the Armed Forces of the United States, and the Joint Mission Essential Task

List (JMETL), these building blocks provide a pathway to successful prosecution of future joint operations.[16] Note in particular, operational movement and maneuver requires contributions from all the functions to be a success.

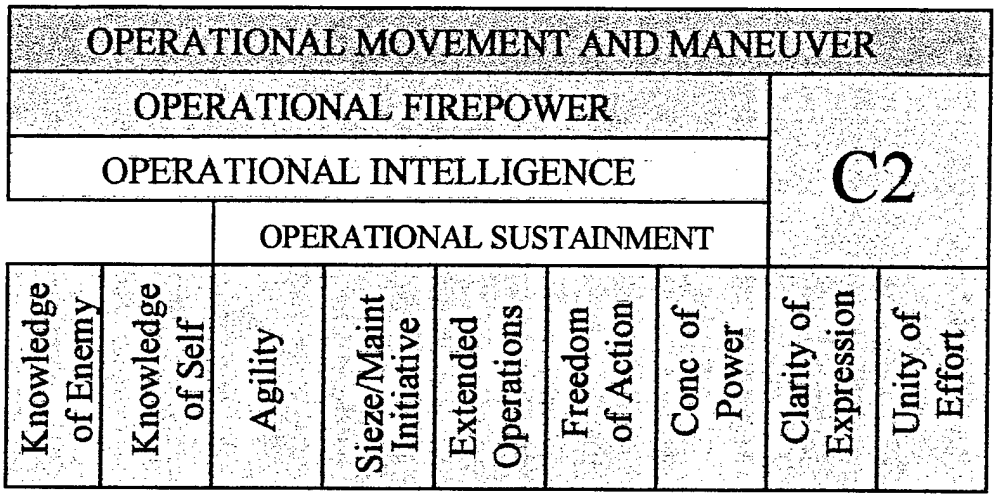

Figure 2: "Building Blocks" of the Littoral

*NOTE: Operational Sustainment represents both operational support and operational protection.

C2 Organization

Operational command and control (C2) enables joint operational synergism and synchronization of force efforts and initiatives. This process allows the commander to supervise and direct actions of his subordinates. Commanders achieve effective C2 through the balance of authority and subordinate initiative and autonomy.[17] To facilitate the command and control process, a C2 organization must promote effective force integration, facilitate task coordination, and provide a responsive, flexible force structure.

Force integration. Due to current operational tempo, the Navy tends to be the first on-scene participant in a littoral operation. To support integration and coordination of follow-on joint forces, the naval command structure must closely complement the joint task

force (JTF) organization. Yet, the Navy's current C2 structure does not mesh with the JTF C2 organization in a manner that is conducive for follow-on joint operations. Naval C2 organizational structure is aligned to counter either surface, subsurface, or air threats. However, the joint task force structure supports functional tasking and more smoothly accommodates a myriad of additional tasks. A successful marriage between naval and joint force organization would maximize combat power and ensure that integral forces retain effectiveness.

With the advent of advanced technology and the proliferation of weapons of mass destruction (WMD) carried on multiple delivery platforms, it is no longer relevant to correlate threat with a single, analogous platform. C2 organizational configuration must transpire from the top-down to ensure that all tasks and capabilities are integrated appropriately. Therefore, the Navy and Marine Corps must align their C2 structures to support the CJTF (not the reverse).

Task coordination. Tight coordination of tasking and assets is essential in the littoral setting. Force coordination is highly dependent upon uninterrupted information flow between the CJTF and his subordinates. Moreover, the littoral requires the CJTF to drastically reduce the time to acquire, select and destroy targets in an effort to operate within the enemy's decision cycle. It becomes crucial that the C2 organizational structure supports this fractured decision cycle. Time conservation is critical for mastery of the littoral environment. Consequently, all unnecessary intermediate levels of control between the operational commander and the tasked unit must be eliminated.

To avoid multi-tasking of a single platform by more than one subordinate commander, the C2 organizational structure must accommodate tight coordination of platform and weapon assets. This organizational requirement becomes more essential in the littoral than in other environments. Due to the unstable nature of the littoral setting, both defensive and offensive actions may be required simultaneously. This occurrence places great demands upon theater assets, and without tight coordination, resource conflicts will remain unresolved.

Flexible structure. With the advent of instantaneous information, increases in operational tempo require combat units to become more self-sustaining and autonomous. A C2 organization that can be rapidly reconfigured to conform to a particular mission, would provide flexible, quick response capability. As circumstances become more uncertain and missions undefined, the capability to quickly reconfigure an organization from basic areas of functionality is a necessity. A flexible C2 organization meets the challenge of sustainment and protection demands of dispersed units in the field.

GCCS support. The Global Command and Control System (GCCS) integrates all major service and theater C4I systems. GCCS is the primary means of providing situational awareness, intelligence data, and decision aids to the CJTF. In the littoral environment, transfer of control from afloat to ashore must be seamless; GCCS provides the medium for smooth transition of command and control of amphibious operations. As the basic mechanism for command and control, the configuration and implementation of GCCS must support flexible C2 requirements. Subsequent to any organizational change, modifications to GCCS may be required to sustain both vertical and horizontal information flow requirements.

Knowledge

Knowledge consists of the collection and integration of information and intelligence delivered to the right person, at the right place and time, in a usable format. This involves not only intelligence data from advanced sensors, but also, the provision of analytic tools created through dynamic modeling and simulation. Distributed networks and parallel processing provide "decisionable" information that aids in controlling the tempo of battle, by permitting "commanders to leverage superior knowledge to engage at the time, place, and pace of their choice."[18] Highly dependent upon the collection and analysis of information, "Knowledge-Based Warfare (KBW)" describes the process of dynamic, collaborative planning functions focused upon battlespace nonlinear effects and outcomes.[19]

The culmination of KBW provides situational awareness of the battlespace. However, awareness for the commander implies more than just military situational data. Mastery of future conflicts will demand access to knowledge gained from political, economic, and diplomatic sources as well. The resultant situational awareness is implemented by an integrated command, control, communications, computer, intelligence, surveillance, and reconnaissance (C4ISR) system which delivers information both to the CJTF and forces in the field, through a dynamic, distributed planning and information network.[20] These C4ISR systems must easily accommodate different missions as dictated by the littoral. Only information that is necessary to fight and win, and deemed "actionable"[21] for the commander, should be executed in common, adaptable format. Moreover, information must be protected and not restricted to timely use. Notwithstanding technological advances, the requirement for information in responsive, usable format to own forces at every level remains unfulfilled.

A recent study of operations in Bosnia brought the issue of information accessibility to lower-echelon troop levels to the forefront. Despite continuing efforts to provide the CJTF and upper level decision-makers with sophisticated, cutting-edge technology, "subordinate brigades and battalions typically conduct operations much as they did twenty years ago."[22] The proliferation of cheap, affordable technology available to adversaries makes this failing even more critical than in the past. Now, potential adversaries may be outfitted with cellular phones that provide communications that are not impacted by terrain features. If OMFTS is to be successful, disperse units in the field must have the ability to communicate enemy position, strengths, and vulnerabilities to the commander. The Hunter Warrior AWE examines rudimentary solutions to correct this deficiency, but any resultant technology must be incorporated into other service capabilities as well.

An effective battlefield C4ISR architecture must support the commander's decision cycle in less time than that of the adversary's cycle. The ultimate goal presumes domination at all levels of battlespace. Requirements still exist for improved technologies to display precise battle damage assessment, accurate friendly and foe identification, and modeling tools for thorough risk assessment . The commander, not functional technicians, has the obligation to become the advocate for future system requirements. Development of an integrated C2 architecture must support the requirements of the littoral, rather than merely being "technology in search of an application."

Logistics

Two aspects of logistics continue to plague the CJTF: force sustainment and allocation of assets. These key functions determine the culminating point for littoral

operations. Although OMFTS promises to reduce logistics infrastructure ashore, satisfactory sustainment of dispersed ground forces remains a challenge. Additionally, the uncertain threat environment of the littoral requires a responsive method for allocation of weapon and force assets.

Force sustainment. The commander must be cognizant of the status of own force logistic inventories and distribution. The demand for accurate, real-time logistics planning tools and accurate logistics situational awareness remains critical and unresolved. Review of many operational after-action analysis reports indicates a repeated inability to sufficiently track supplies in transit, and to maintain an accurate accounting of inventory and location.[23]

The introduction of the Global Combat Support System (GCSS) may correct these tracking deficiencies at the operational level. GCSS, in concert with GCCS, promises to provide the CJTF with interoperability between command and control functions and combat support functions. A future application, called joint total asset visibility, advertises the ability to query the C2 network for stock locations.[24] The Marines also plan to experiment with a new logistics tracking tool, Combat Service Support (CSS) Enterprise, during the Hunter Warrior AWE.[25]

Allocation of assets. Force allocation in support of mission objective still remains a difficult task for the CJTF. Devising a proven, joint methodology for assignment of platforms and weapon systems to ground force defense remains one of the more pressing issues. Extensive intelligence estimates and risk analysis must be performed to support resource allocations during each phase of the operation. The CJTF requires C4I system capability that links national and theater intelligence collection assets in support of specific joint tactical

systems. The dilemma created by multi-tasking of force assets further complicates the assessment process. For example, naval platforms are often tasked to perform numerous functions to preserve sea dominance in addition to any defensive function assigned.

Target Prioritization

Dynamic reassessment of the target priority list is essential in the uncertain littoral environment. The shortened decision cycle mandates that intelligence targeting data be kept accurate and current. Additionally, limited theater resources necessitate the prioritization of assets that require active defense. Joint Pub 3-01.5, Doctrine for Theater Missile Defense, requires the Joint Force Commander to prioritize protection of critical assets.[26] Most recently, a joint message to senior leaders set the foundation for fire coordination expediency:

> If not practical because of time sensitivity, emergency or exceptional circumstances, then all affected commanders will be informed with the commander executing the mission accepting the operational risk.[27]

Area coverage defense requirements in the littoral greatly outnumber any TBMD and platform assets available to the commander. Throughout all phases of the operation, the process of prioritization requires dynamic apportionment of assets as the intelligence estimate of enemy capabilities is revised. Protection of own center of gravity should drive the process as well. Clearly, applications of battlespace awareness and KBW must support the CJTF with this complex task of asset allocation and target prioritization.

Communications

Communication connectivity is pivotal to control of the littoral. C4I provides the "glue" that binds all the services together for true joint integration. In the future, operations may be conducted in a severely degraded communications environment, therefore the growing

dependence upon command and control presents a vulnerability that can be exploited by enemy capabilities. Promotion of communication survivability dictates the elimination of vulnerable nodes and propels system configurations to distributed, dynamically reconfigurable architectures. In addition, the requirement for survivable and standardized networks continues to drive the communication acquisition process.

The goal of a "common tactical picture" has not been totally realized, but advancements have been made to bring absolute battlespace awareness to the commander. There remain demands to get critical and relevant information to the right place, and at the right time, and to tailor information for the user. Similarly, bandwidth requirements for improved imagery, logistics tracking, and communications continue to increase, but technology has recently offered rapid advances in this arena. However, regardless of extensive C4I advances, there is no substitute for a clear "commander's intent." If communications either fail or come under attack, subordinate commanders must still be capable of completing the mission. Commander's intent allows subordinates sufficient flexibility to maintain initiative and unifies force effort in goal achievement.

Summary

Increasingly higher levels of coordination and synchronization between the services, are required to successfully conclude missions in the littoral and elsewhere. The demand for complex, interoperable C4I systems and planning tools for the commander continues to expand to meet these warfighting challenges. Although state-of-the-art technology is viewed as the solution to the "fog of war," the requirement for effective leadership and responsive organizational structure has not lost importance. Application of advanced technology is

necessary to counter adversaries armed with sophisticated and highly destructive weaponry; however, these applications must be advantageous and provide information that is "actionable" for the warfighter. In our effort to "harness technology," we must be cautious, for technology may "harness" us.

CHAPTER FOUR

TECHNOLOGY FOCUS AND CONCLUSIONS

Charting future joint focus in the littoral requires extensive examination to determine effective C2 organizational structures and doctrine, provide essential C4I technical innovations, and create sufficient collaborative planning tools for the CJTF. The eventual introduction of sophisticated technologies which allow commanders to visually follow the movement of forces in the field, and to direct force deployments through real-time video input, may soon become a reality. Integrated tactical networks that service both voice and data switching for highly mobile ground elements, are rudimentarily demonstrated in the Hunter Warrior AWE. Advances in high-speed parallel processing provide enhanced surveillance capabilities, and the ability to process and evaluate large quantities of digital image data. All the above capabilities aid in attaining dominant battlespace awareness for the CJTF.

Harnessing the Technology

In the near future, the CJTF will benefit from seamless real-time information exchanges for C2, collaborative planning between Joint and Coalition forces, as well as rapid dissemination of a common operational picture and associated imagery. These technical advances aside, emphasis must be placed upon harnessing future technology and investments for military benefit, as opposed to private sector industrial gain. Too often, niches are created for sophisticated technology prior to identification of valid military requirements. In addition, heightened reliance upon technical solutions for planning and conduct of operations creates

the concern of loss in basic operating skills. Technical innovation is not the panacea for poor military leadership or planning:

> "[G]reat victories of military forces are often attributed to superior firepower, mobility, or logistics. In actuality, it is often the commander who makes good decisions and executes these decisions at a superior tempo who leads his forces to victory."[28]

Furthermore, the provision of readily available, massive volumes of intelligence and information does not guarantee improved situational awareness for the CJTF. Technology is only as faultless as the operator who employs it, "namely: the worst 'information throughput' bottleneck in any computer system is between the display screen and the brain of the human facing it."[29]

Conclusions

Current joint doctrine and the world situation place many demands upon the operational commander. Resource allocation and organizational conflicts continue to create challenges for the CJTF. The need to integrate and coordinate joint forces to effectively execute operations in the littoral requires C2 organizations that are flexible and adaptable. Battlespace awareness, common tactical picture, and accessible information to all force levels provide the necessary impetus for the CJTF to make rapid decisions and to conduct successful littoral operations against an enemy armed with advanced weaponry . Increasingly, technology determines how we fight and when we fight. Technology also serves as a force magnifier, thus it is essential that future technical developments are correctly manipulated to provide a useful blue print for future armed conflict in the littoral. The Sea Dragon AWE framework creates a framework for leveraging applicable technology. Provided joint requirements and organizational considerations are incorporated into future experiments, the

Hunter Warrior AWE, and subsequent experiments, allow the joint services an excellent opportunity to mold future warfighting capabilities and doctrine for the littoral environment.

Recommendations

The previous chapters have discussed several avenues to assist the CJTF in attaining a "successful pathway to the littoral." The following iterates the principal findings:

---Joint operational requirements must be considered and integrated in Hunter Warrior and subsequent experimental scenarios. Moreover, technical and C2 organizational modifications must be driven from the "top-down" to ensure non-duplication of effort and interoperability for future joint operations.

---Conditions in the littoral mandate a truncated decision cycle for the commander. It is essential that the C2 organization is tailored to support more rapid decision-making and divergent missions. Thus, elimination of all unnecessary levels of control in the organization must occur. Furthermore, the C2 organization must be flexible and capable of rapid reconfiguration in response to the changing threat environment.

---An effort must be made to provide only "actionable" information to the commander. Future system design requirements should guard against unnecessary information "saturation."

---The military commander must become proactive in system definition and design. Without military service involvement, acquired technology may not fulfill the intended mission requirements.

APPENDIX A

HUNTER WARRIOR COMMUNICATION NETWORK

The Newton Leatherneck TDA provides three modes of communication to the dispersed field units: automatic position location and reporting, quick reaction (e.g., medic request), and interactive full dialog (call for fire). Additional features provide navigation capability, email, situational awareness reporting, and support night operations. The Leathernet communications network (using Marine Semi-automated forces model, Marine SAF) and the Navy's FASTFLEET (Naval Task Force maneuver) model are being utilized to simulate forces and provide situational awareness to Experiment control Group (EXCON).

A call for fire in over the horizon (OTH) gold message format from a ground unit will be transferred to the Experimental Combat Operations Center (ECOC). Joint Maritime Command Information System (JMCIS) and Combat Operations Center Interim (COC-I) will serve as the Command and Control baseline systems which forward requests for fire and other information to Automated Deep Operations Coordination System (ADOCS), Advanced Tactical Weapons Coordination System (ATWCS), Service System Command Advanced Field Artillery Tactical Data System (AFATDS), and battlefield visualization tools.[30]

The AWE construct examines the impact of a flattened C2 architecture and the capabilities of an enhanced COC. Although the majority of naval functionality is simulated, the exercise addresses the feasibility of hosting a majority of command decision processes afloat in an effort to reduce C2 nodes ashore. These conditions are hypothesized to provide the "individual dismounted Marine and mounted operational maneuver elements (OME)"[31]

with sufficient information and communications to provide "GCCS (Global Command and Control System) and GCSS (Global Combat Support System) to the foxhole."[32]

APPENDIX B

LIST OF ABBREVIATIONS

ACTD	Advanced Concept Technology Demonstration
ADOCS	Automated Deep Operations Coordination System
AFATDS	Advanced Field Artillery Tactical Data System
ATWCS	Advanced Tactical Weapons Coordination System
AWE	Advanced Warfighting Experiment
CJTF	Joint Task Force Commander
CWL	Commandant's Warfighting Laboratory
C2	Command and Control
C4I	Command, Control, Communications, Computer, and Intelligence
C4ISR	Command, control, communications, computer, intelligence, surveillance, and reconnaissance
ECOC	Experimental Command Operations Center
EXCON	Experiment Control Group
GCCS	Global Command and Control System
GCSS	Global Combat Support System
JFACC	Joint Force Air Component Commander
JMCIS	Joint Maritime Command Information System
KBW	Knowledge-Based Warfare
OME	Operational Maneuver Elements
OMFTS	Operational Maneuver from the Sea
OTH	Over the Horizon
MAGTF	Marine Air-Ground Task Force
TBM	Theater Ballistic Missile
TBMD	Theater Ballistic Missile Defense
TDA	Tactical Digitial Assistant
SAF	Semi-automated Forces
SPMAGTF (X)	Special Purpose Marine Air-Ground Task Force

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