NAVAL WAR COLLEGE
Newport, R.I.

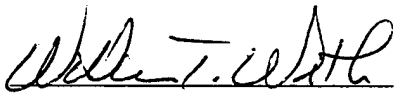
NETWORK-CENTRIC WARFARE AND THE COMMAND AND CONTROL OF AMPHIBIOUS OPERATIONS

By

William T. Worth
Lieutenant Commander, United States Navy

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

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: 

08 February 2000

COL W. J. Gibbons, USMC
Faculty Advisor

Security Classification of This Page: UNCLASSIFIED

REPORT DOCUMENTATION PAGE

1. Report Security Classification: UNCLASSIFIED	
2. Security Classification Authority: NA	
3. Declassification/Downgrading Schedule: NA	
4. Distribution/Availability of Report: DISTRIBUTION STATEMENT A: APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.	
5. Name of Performing Organization: JOINT MILITARY OPERATIONS DEPARTMENT	
6. Office Symbol: C	**7. Address:** NAVAL WAR COLLEGE 686 CUSHING ROAD NEWPORT, RI 02841-1207
8. Title (Include Security Classification): NETWORK-CENTRIC WARFARE AND THE COMMAND AND CONTROL OF AMPHIBIOUS OPERATIONS (U)	
9. Personal Authors: WILLIAM T. WORTH, Lieutenant Commander, U.S. Navy	
10. Type of Report: FINAL	**11. Date of Report:** 08 February 2000
12. Page Count: 24 Advisor: COL Gibbons	
13. Supplementary Notation: A paper submitted to the Faculty of the NWC in partial satisfaction of the requirements of the JMO Department. The contents of this paper reflect my own personal views and are not necessarily endorsed by the NWC or the Department of the Navy.	
14. Ten key words that relate to your paper: Network-Centric Warfare, Command and Control, Amphibious, Joint Vision 2010, OMFTS, CATF, CLF, CWC, Information Superiority, Connectivity	

15. Abstract: The vision of how the U.S. military will prepare to fight in the 21st century is the focus of *JV 2010*. The concept of Full Spectrum Dominance (FSD) was introduced as the underlying theme to achieve the goals of *JV 2010*. At the heart of FSD is the requirement to obtain information superiority on the battlefield. Network-Centric Warfare (NCW) is a concept that has spawned from advances in information and systems technologies. Through improved situational awareness and increased speed of command, NCW offers a means to gain information superiority and promises to significantly enhance the function of Command and Control (C2). Additionally, as Operational Maneuver from the Sea (OMFTS) represents the changing nature of amphibious operations, a thorough review of C2 doctrine is required. In view of the significance of information superiority and the potential for NCW to enhance the function of C2, it is imperative to include NCW concepts in doctrinal discussions concerning future amphibious operations. Integrating Commander Amphibious Task Force/Commander Landing Force (CATF/CLF) doctrine with NCW and "supported/supporting" forces fulfills the C2 requirements of OMFTS.

16. Distribution / Availability of Abstract:	**Unclassified**	**Same As Rpt**	**DTIC Users**
	X		

17. Abstract Security Classification: UNCLASSIFIED	
18. Name of Responsible Individual: CHAIRMAN, JOINT MILITARY OPERATIONS DEPARTMENT	
19. Telephone: 841-6461	**20. Office Symbol:** C

Security Classification of This Page: UNCLASSIFIED

Abstract of

NETWORK-CENTRIC WARFARE AND THE COMMAND AND CONTROL OF AMPHIBIOUS OPERATIONS

The vision of how the U.S. military will prepare to fight in the 21st century is the focus of *JV 2010*. The concept of Full Spectrum Dominance (FSD) was introduced as the underlying theme to achieve the goals of *JV 2010*. At the heart of FSD is the requirement to obtain information superiority on the battlefield. Network-Centric Warfare (NCW) is a concept that has spawned from advances in information and systems technologies. Through improved situational awareness and increased speed of command, NCW offers a means to gain information superiority and promises to significantly enhance the function of Command and Control (C2). Additionally, as Operational Maneuver from the Sea (OMFTS) represents the changing nature of amphibious operations, a thorough review of C2 doctrine is required. In view of the significance of information superiority and the potential for NCW to enhance C2, it is imperative to include NCW concepts in doctrinal discussions concerning future amphibious operations. Integrating Commander Amphibious Task Force/Commander Landing Force (CATF/CLF) doctrine with NCW and "supported/supporting" forces fulfills the C2 requirements of OMFTS.

Table of Contents

INTRODUCTION

"How we respond to dynamic changes concerning potential adversaries, technological advances and their implications, and the emerging importance for information superiority will dramatically impact how well our armed forces can perform its duties in 2010."—Joint Vision 2010

In 1996 the Chairman of the Joint Chiefs of Staff published *Joint Vision 2010* (*JV 2010*). Analogous to a mission statement in the corporate world, *JV 2010* suggests a mission statement for the U. S. military which prescribes how we will prepare to fight in the early 21st century. Conveyed in his vision of the future of America's military, the Chairman introduced the concept of "Full Spectrum Dominance."[1] As the underlying theme of *JV 2010*, the importance of this concept can not be overstated. "Full Spectrum Dominance will be the key characteristic we seek for our Armed Forces in the 21st century."[2]

This "conceptual template"[3] of America's Armed Forces relies heavily on the emergence of information technologies. At the very heart of Full Spectrum Dominance is the necessity to obtain information superiority on the battlefield. *JV 2010* states, "We must have information superiority: the capability to collect, process, and disseminate an uninterrupted flow of information while exploiting an adversary's ability to do the same."[4] Controlling access to information will have significant impact on the operational commander's ability to shape the battlefield and effectively function in the Command and Control (C2) role.

Through advances in information and systems technologies, the commander's situational awareness on the battlefield and ability to make critical decisions in a timely manner are greatly improved. From these advances originated the concept of Network-Centric Warfare (NCW), a concept with potential to dramatically enhance the function of C2. Based on information networks, access, and shared awareness, NCW "offers a method to build information superiority, a key factor to success in future battlespace."[5] As the concept of NCW continues to evolve

rapidly, it will have tremendous impact on the commander's ability to improve speed of command in the C2 process. Accordingly, it is imperative that we include NCW concepts in doctrinal discussions pertaining to future warfighting concepts. As ADM Johnson, the Chief of Naval Operations stated, "The information revolution has fundamentally changed the nature of naval warfare. The battlefield of the 21st century will be one in which the force with mastery of the information spectrum will prevail, making information superiority critical to our warfighting success."[6]

This changing nature of naval warfare is indicated in the Marine Corps' approach to future amphibious operations. Their "capstone concept," Operational Maneuver from the Sea (OMFTS) is a response to both anticipated conflicts, and opportunities.[7] Information management represents one such opportunity. By achieving information superiority, NCW uses information management to enhance the function of C2. This paper examines current C2 doctrine for amphibious operations and evaluates the impact of NCW on its ability to meet the requirements of future amphibious operations and OMFTS.

COMMAND AND CONTROL CONCEPTS

In the process of applying operational art, the commander considers several operational functions to ensure the success of his mission. This enables him to "synchronize [the efforts of his] forces in combat", as well as the efforts of "many operational-level activities."[8] These functional concepts include: operational command and control (C2), operational intelligence, movement and maneuver, operational fires, operational logistics, and operational protection. CAPT Helms refers to C2 as, "the process that commanders, including command organizations, use to plan, direct, coordinate, and control their own and friendly forces and assets in

accomplishment of their mission."[9] By the very nature of this definition, C2 is arguably the most important operational function. Transcending the boundaries of each of the other five functions, it is the process that ties all six functions together in order to achieve unity of effort among the forces.

Analysis of C2 in amphibious operations requires a review of current Naval and Marine Corps C2 doctrine. The joint definition of C2 is "the exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission."[10] Although this underlying theme (purpose) is common across Navy/Marine Corps lines, the means by which it is implemented (doctrine) differs significantly. Therefore, a thorough understanding of Navy and Marine Corps C2 doctrine is required before the effects of NCW on amphibious operations can be evaluated.

Naval C2 Doctrine: "In simple terms, the purpose of Command and Control is to ensure that subordinates carry out the commander's desires. The ability to issue orders and instructions and to direct the implementation of those instructions and orders is implicit and serves as a cornerstone for effective Command and Control."[11] Naval C2 doctrine is based on the Composite Warfare Commander (CWC) concept. The prominent theme in CWC is one of centralized command and decentralized execution and authority. The CWC organizational structure originated in the 1970s as a means of strengthening the defensive posture of U.S. Carrier Battle Groups (CVBGs) against the threat of a Soviet attack. The CWC is established as the central command authority. In turn, the CWC delegates authority to subordinate warfare commanders in the areas of anti-air warfare (AAWC), anti-surface warfare (ASUWC), space and electronic warfare (SEWC), and undersea warfare (USWC). Coordinators subordinate to the warfare commanders manage the force assets. The decentralized authority lends itself well to a

more effective CVBG defensive posture across the major functional areas, while maintaining unity of command and effort. Although the Soviets no longer pose the same threat, CWC remains the foundation of Naval C2 doctrine.

Analogous to the CVBG, an Amphibious Ready Group (ARG) utilizes the same C2 concept. Adapted to the amphibious threat environment, it continues to provide the means to effectively perform assigned tasks. "(CWC) doctrine organizes the capabilities of the naval force functionally, enabling the naval commander to mass naval fires and achieve synergy from the force's capabilities. In essence—the concentration of naval fires—is useful in operations in the littorals, and vital in operations at sea."[12] Independent CVBG and ARG operations incorporate separate CWC command organizations. In the case of a CVBG/ARG operating in a joint effort, the Joint Force Commander (JFC) may choose to incorporate an overall CWC who, in turn, assigns subordinate warfare responsibilities based on the combined assets of the group. Essentially, one CWC organization is absorbed by the other. By virtue of rank, the CVBG Commander will normally assume the role of CWC. As an alternate method, JFC maintains individual CWC integrity and identifies forces as "supported" and "supporting" based on priorities. For example, air assets from the CVBG may be assigned as a "supporting" force for the "supported" ARG mission. In this case, both CWC organizations remain in tact, the JFC assigns forces based on priorities, and control of the ARG is not relinquished to the CVBG based solely on seniority.

Naval doctrine outlined in NWP 5-01 addresses unity of effort, centralized direction, and decentralized execution as the basic principles of a sound command organization. "Unity of effort is necessary for effectiveness and efficiency. Centralized direction is essential for controlling and coordinating the efforts of the forces. Decentralized execution is essential

because no one commander can control the detailed actions of a large number of units or individuals."[13] Through the collective effort of the CWC organization, these principles are maintained. The effectiveness results from assigning functional responsibilities to subordinate warfare commanders under a single superior, the CWC.

Marine Corps C2 Doctrine: The objective of Marine C2 doctrine is no different than that of the Navy. However, there is a difference in the means by which the ends are achieved. In contrast to the functional structure inherent in the CWC concept, Marine C2 is based on a task organization structure. At the highest echelon, the Fleet Marine Force (FMF) is a combined arms force which includes land, air, and service support elements. These forces are subsequently assigned to Marine Air-Ground Task Forces (MAGTFs) for employment at the fleet level. FMFRP 2-12 emphasizes the significance of the MAGTF, "The cornerstone of Marine capabilities is the MAGTF. The MAGTF's strength lies in its capacity to be tailored to virtually any crisis or contingency, deploy to potential crisis areas by strategic airlift or amphibious shipping, and sustain the employment of combined arms assets. The MAGTF provides decision makers with a global crisis response capability."[14]

Structured to accomplish a specific mission, each MAGTF has a command element (CE), ground combat element (GCE), aviation combat element (ACE), and combat service support element (CSSE). The resultant force provides air and ground power with logistic support under a single commander. The CE is responsible for C2 within a MAGTF. Maintaining the integrity of the MAGTF task organization is critical to its success. Dividing a MAGTF therefore, would jeopardize its ability to accomplish a mission. The four basic types of MAGTFs are categorized by the size of the force involved. In each of the four MAGTF structures the task organization is the same, based on the principles of centralized command and supporting task elements. Similar

to the CWC concept, the simple structure minimizes ambiguity within the organization while enhancing unity of command and effort at all levels. The specific MAGTFs assigned to an ARG are the Marine Expeditionary Unit (Special Operations Capable), (MEU(SOC)), or the Marine Expeditionary Brigade (MEB) depending on the scale of operations. The combined ARG/MAGTF is collectively referred to as the Amphibious Task Force (ATF).

Amphibious C2 Doctrine: The roots of present day amphibious operation doctrine originated some 80 years ago. Following World War I, Naval and Marine planners recognized the potential for amphibious operations as a means to project naval power during the Pacific island campaigns. "Marine Corps amphibious warfare pioneers ... seized on this requirement ... and developed the doctrine, tactics and equipment that would carry the United States to victory in World War II."[15] Surprisingly, much of the original amphibious operation concepts that were combat tested in World War II and Korea remain the same today. Specifically, despite changes in tactics and weapons resulting from quantum leaps in technological advances throughout the years, the original C2 concept remains in tact.

This C2 concept is the foundation upon which Joint Doctrine for Amphibious Operations (Joint Pub 3-02) is written.[16] Its effectiveness is a result of the flexible command relationship between the Commander, Amphibious Task Force (CATF) and Commander, Landing Force (CLF), and the parallel naval and Marine Corps chains of command. This unique command structure ensures that unity of command and effort, and operational coherence are not compromised. CATF is a naval officer responsible for the operation and exercises Operational Control (OPCON) over the entire force, with the exception of the planning phase. CLF is a Marine Corps (or Army) officer who has OPCON of the landing force (LF).

An initiating directive issued by the JFC establishes the ATF. Among other things, this assigns a mission and its forces, designates CATF and CLF, and defines the Amphibious Operating Area (AOA) in terms of sea, land, and airspace. During the planning phase, CATF and CLF are coequal in planning matters and decisions. Following embarkation of the LF, CATF assumes full responsibility of the ATF and the operation. CATF's experience in amphibious operations and involvement in the planning phase is a critical factor that enables the flexibility to efficiently exercise this authority while maintaining unity of command and effort. For this reason, no other Navy commander will exercise this authority and responsibility. CLF is the only other commander to assume authority and responsibility of the ATF when the LF is established ashore as the main effort.

The success of this long-standing concept can be attributed to the simple nature of the theory. Once the LF is embarked, the naval forces are the main effort. Their mission is to safely maneuver the ATF, secure the AOA, and support the establishment of the LF ashore. Once established ashore, there is a transfer of control and full responsibility of the operation and LF to the CLF. At this point, the LF becomes the main effort and naval forces of the ARG perform in a supporting role. A similar analogy can be made for OMFTS in terms of preponderance of force. The sea-based nature of OMFTS eliminates the definite point at which operations are traditionally "phased ashore". However, it does not eliminate the shift in main effort from a naval ARG aspect to the Marine LF. CLF would assume full authority and responsibility of the ATF when the main effort shifts to the LF, based on the preponderance of force focused ashore. Throughout the operation, the naval forces of the ATF maintain a concurrent CWC structure while the Marine forces maintain a parallel task organization (with a CE) within the LF. These parallel command structures effectively converge under the CATF/CLF concept.

The effectiveness of this unique relationship is a product of training and the flexibility inherent in amphibious C2 doctrine. CATF, CLF, and their respective staffs are co-located aboard a single ARG ship. This facilitates planning and coordination throughout all phases of operations. Extensive training forges a professional working relationship among the naval and Marine Corps forces. Regardless of the advances that network technology promises, the CATF/CLF relationship would be seriously degraded if CATF were assumed by a CVBG Commander in combined CVBG/ARG operations. Conversely, amphibious operations are strengthened when JFC designates supporting forces. The benefits of this concept are twofold. First, JFC assigns CVBG assets in a supporting role for the ATF. Additionally, he delineates when the ARG shifts to a supporting role for the LF (main effort) in OMFTS amphibious operations. This not only preserves the integrity of the CATF/CLF organization in a joint CVBG/ARG scenario, it would also act as an enabler for the OMFTS concept. The combined effect of the CATF/CLF and "supported/supporting" concept enables the commander to exploit enemy weaknesses through the use of rapid decisions, speed, flexibility, and a higher tempo of operations.

Over the years, the ATF's ability to maintain operational coherence, unity of command and unity of effort has proven its effectiveness time and again. In a 1991 *Marine Corps Gazette* article LCDR Pierce summed it up well, "An amphibious campaign requires unity of command. Based on doctrine that has differed little from World War II, amphibious command relationships, as described in JCS Pub 3-02, are completely straightforward."[17] The challenge ahead is to maintain the same level of effectiveness in future amphibious operations (OMFTS) C2 doctrine. Advances in information technology will assist in adapting the CATF/CLF concept to meet these needs.

NETWORK-CENTRIC WARFARE

In order for today's military forces to achieve the objective of Full Spectrum Dominance introduced in *JV 2010*, thorough exploitation of information and systems technologies is required to obtain information superiority in the battlefield of the future. Network-Centric Warfare (NCW) is being heralded by many prominent military officials as the key step toward achieving this goal. In a presentation at the 1999 Command and Control Research and Technology Symposium, VADM Arthur Cebrowski recognized the impact of NCW on future military operations when he stated, "[NCW] offers a method to build information superiority, a key factor to success in the future battlespace."[18]

Advances in computer and information technologies have been a catalyst for global emergence into the "information age". A product of the information age, NCW is gaining momentum as the catalyst to project the U.S. military to the forefront of this new era. Current military doctrine is predicated on Platform-Centric Warfare in which tactics, techniques and procedures have evolved with technology around the capabilities and limitations of individual weapon systems, platforms, and forces. NCW is an information based concept that deals not with the capabilities of specific weapons systems, but with the synergistic effect of integrating the weapons systems, platforms, and forces. Shifting focus from traditional Platform-Centric Warfare to NCW is of such significance that some consider it the catalyst driving the military into a Revolution of Military Affairs (RMA). While the RMA issue is debatable, it should not undermine the role that NCW could have in shaping tomorrow's battlefield. The intent here is not to explain "how" NCW will be implemented in terms of hardware and systems. Rather it is to explain the theory, or "what" NCW will add to the commander's considerations when applying operational art in amphibious warfare.

NCW is defined as, "an information superiority-enabled concept of operations that generates increased combat power by networking sensors, decision makers, and shooters to achieve shared awareness, increased speed of command, higher tempo of operations, greater lethality, increased survivability, and a degree of self synchronization."[19] In theory, NCW incorporates three grids in which information flows vertically and horizontally throughout all levels of command. The sensor grid facilitates information input. Sources of information could range from troops on the ground to satellite imagery, or anything in between. The information grid (command and control grid) is the means by which the information is collected, analyzed, and on which command decisions are made. The engagement grid (shooter grid) contains information on the progress of actions being carried out in the battlespace. Battlespace, used in place of battlefield, refers to the information medium in addition to the geographic features of the operating area. These theoretical grids do not infer a particular strategy in and of themselves, rather they are a "means to empower strategies to accomplish objectives, or ends."[20]

Assuming that an information infrastructure, or "infostructure"[21] is available, NCW introduces a new dimension to consider when evaluating the operational factors of space, time, and forces. This additional factor, connectivity, is the degree to which the forces have access to the three grids. A low degree of connectivity would have little effect on the factors of space, time, and forces. However, a high degree of connectivity, inferred from a net-centric environment, affects space, time, and force considerations significantly. As Vego notes, "At any level of war, freedom of action is primarily achieved by properly balancing the factors of space, time, and forces."[22] Freedom of action is significantly enhanced when the primary tenets of NCW are considered in conjunction with space, time, and forces. These tenets are information superiority, shared awareness, adaptability, speed of command, and self-synchronization. For

example, in terms of space, a net-centric battlespace, reduces the relevance of distance. Geographic dispersion of forces must still be considered but may not be a critical factor. NCW may effectively extend the limitations of a specific weapon platform through links with other platforms of greater capability. Through shared awareness, traditional constraints resulting from geographic dispersion now have a synergistic effect as a force multiplier. Accordingly, a commander has the option to mass effects without the need to mass forces. Multi-unit interaction is accomplished on-line without the logistic constraints of passenger movements. Through information superiority, the commander is able to gather, process, and integrate real time information. This instantaneous flow of information compresses the time required to make decisions and thereby increases speed of command.

NCW creates an environment conducive to action vice reaction, enhancing the element of surprise. Shared awareness significantly increases situational awareness at all levels of operation. This lends itself to flexibility and adaptability in terms of options available (branches and sequels) and synchronized maneuver that were previously not available in a platform-centric environment. As the battlespace evolves, NCW has potential to reduce the "fog of war" through continuous updates and shared awareness.

It is readily apparent that NCW will add a new dimension to the operational factors of space, time, and forces. The extent of change is proportional to the degree of force connectivity, or degree of shared awareness. However, NCW is more than just a concept of networked systems. The network is the means through which data is transferred. It is not until that data has been gathered, filtered, processed, and disseminated that the concept of NCW is complete. NCW's potential "is realized as a direct result of the new relationships among individuals, organizations, and processes that are developed."[23] This responsibility rests with the Command

and Control organization. Effective C2 doctrine is essential to fully exploit the information. This infers two assumptions. First, there must be an effective C2 structure in place to facilitate the mechanics of collecting and processing the data. Second, and most important, it lies not in the control aspect but in the command qualities of the C2 organization. What is needed is a C2 structure that "encompasses the high-level, creative aspects of command as well as the direct-order and control aspects." [24] Without this, the true value of NCW will not be realized.

ANALYSIS

The effects of NCW on amphibious operations C2 doctrine can be analyzed using one of two approaches. The first considers NCW as the foundation upon which C2 doctrine is based. The corollary approach maintains current amphibious doctrine as a foundation to which NCW concepts are applied. In either case, NCW represents a theory, as yet unproven militarily. Advocates of NCW warn against its use as a strategy for conducting combat, "Rather, [NCW] is a tool, a means to empower strategies to accomplish objectives, or ends."[25] Therefore, the following analysis is based on the latter approach. To assess the role of NCW on future amphibious operations, the following areas are covered: NCW theory, revised C2 doctrine, OMFTS, and CVBG/ARG operations.

NCW is the tool that puts a new perspective on warfare in terms of C2. It can be considered an enabler to realize the vision of *JV 2010*. The concept represents a means to "refine" current doctrine. Innovative in nature, it is prudent to implement the concept gradually and in a controlled environment. Only after the lessons learned have been evaluated and techniques refined can NCW be considered justification to "redefine" current doctrine. These

cycles in which doctrine is reviewed will be accelerated to reflect the rapid rate at which NCW is evolving.

NCW is far from being unanimously accepted as a viable means of reshaping the battlefield. Opponents contend that inherent vulnerabilities and network related constraints render the concept impractical and ineffective. Such concerns merit consideration. However, in as much as there are hurdles that the system engineers must confront, some assumptions have to be made to evaluate the application of NCW theory. This analysis of NCW theory assumes that a majority of the design limitations can be overcome. Areas of concern include security, accessibility, and connectivity.

Current technology is proof that information security can be achieved. Cooperative Engagement Capability (CEC) and Secret Internet Protocol Routing Network (SIPRNET) offer two examples. In fact, CEC is essentially a scaled down version of NCW principles. Shared information is used to enhance overall situation awareness, adapt to situations, and synchronize force efforts at increased rates. Accessibility directly impacts connectivity. What will be required to ensure requisite access at each level? These issues will affect the degree to which the commander can use NCW to shape the battlespace. Regardless, even in a totally degraded net-centric environment (current battlespace), operations are still possible. Effectiveness is a function of proficiency, and therein lies a need to maintain proficiency in the basic tactics, techniques, and procedures. Similar concerns arise in a multinational effort. However, limited connectivity does not equate to a limiting constraint. The commander must plan to the level of the least common denominator (non-NCW) but this should not limit the operations of the connected forces (NCW). This simply makes the analysis of factors space, time, and forces more critical and further reinforces the importance of maintaining proficiency in the basics. In some

cases, it may be desirable to restrict accessibility. This raises the issue of maintaining the system. Who will be the NCW "web master" responsible for information access, accuracy, relevance, and dissemination? An operational level staff would be appropriate based on its familiarity with the strategic and tactical desires and requirements.

The concerns cited serve as caution against justifying manning reductions, or restructuring, based solely on theoretical NCW capabilities. Reductions below a level required to maintain proficiency in the basics would not be prudent. Although military application of NCW theory is very promising, it should not be considered a "be all, end all". Like any new concept, it is not without flaws. However, the potential benefits of NCW are far too great to dismiss it on the grounds of these perceived vulnerabilities. This is apparent when applying the concept of NCW to amphibious warfare.

Critics of the CATF/CLF concept assert that it does not meet the needs of future amphibious operations and therefore, must be revised. Proponents counter that NCW enables CATF/CLF to meet those needs. NCW enhances the principles of centralized command and decentralized execution. In conjunction with a sound C2 organization, it will serve to further enhance unity of command and unity of effort. Additionally, the basic tenets of NCW (synergistic effect of information superiority, shared awareness, speed of command, and self-synchronization) complement those of OMFTS (mainly overwhelming tempo and momentum, pitting strength versus weakness, and emphasis on intelligence, deception, and flexibility). Therefore, revised C2 doctrine must be based on the CATF/CLF concept.

A combination of CATF/CLF, "supported/supporting" concept, and NCW adequately meet the requirements for effective C2 doctrine in OMFTS. The CATF/CLF concept is combat proven and has survived the test of time. With NCW, it will only enhance amphibious

operations and OMFTS through superior information management, battlefield mobility, and the lethality of conventional weapons. It minimizes the risk of introducing a new, unproven concept while "supported/supporting" affords the JFC flexibility to adapt to various requirements.

A likely scenario is the combined CVBG/ARG. In this case, it would be ill-advised to transfer command of an amphibious operation to a CVBG Commander based solely on his superior rank. Rather, CVBG assets should be identified by the JFC to act in a supporting role for the ATF, based on priority of the mission. Their involvement should not automatically infer that the CVBG Commander assume the role of CATF/CLF. The CATF/CLF concept has been tailored for amphibious operations. To consider a CVBG Commander qualified to assume responsibility of an ATF is not justified. A CVBG Commander traditionally lacks the degree of amphibious experience to fulfill the role of CATF and is geographically detached from the ATF. Similarly, the "supported/supporting" concept can be applied within the ATF. It will enable the JFC to delineate when CLF would assume the role of CATF based on the main effort shifting to the LF's preponderance of force ashore.

CONCLUSION

NCW is integral to the vision of *JV 2010*. An OMFTS enabler, it will enhance our ability to effectively conduct amphibious operations into the 21st century. NCW will serve as a means to refine, not redefine, the concept of Command and Control in amphibious operations. With the concept of OMFTS on the horizon, a review of C2 doctrine is needed to ensure its adequacy for future amphibious operations. As GEN Krulak noted, "With exponentially exploding technology in weapons and our ability to process information, the ability to optimize the command and control structure will take on even greater importance."[26]

Current C2 doctrine based on CWC (Naval CVBGs and ARGs), task organization (Marine MAGTFs), and CATF/CLF (amphibious operations) has proven to be effective in the respective areas of naval warfare. NCW and "supported/supporting" concepts will act as enablers in two ways. First, they will enable a combination of the three concepts to meet the requirements of future amphibious operations. Additionally, they will serve to further refine the CATF/CLF concept to adapt to the specific requirements of OMFTS. Integrating the concepts of CATF/CLF, NCW, and "supported/supporting" offers the best solution and should be the foundation for C2 doctrine in future amphibious operations. "CATF, CLF, AOA, and unity-of-command principles exercised by the Navy amphibious task force commander and Marine landing force commander still work and will continue to work until we prove that something else actually can do better."[27] NCW will only serve to improve its effectiveness by effectively compressing the factors of space, time, and forces through the factor of connectivity.

> *"New and better weapons, transport, and communications are sure to come in the future as they always have come in the past; and we must be always ready to change organization, tactics, and procedures as they require. But we must be slow to change in peace those methods repeatedly found successful in war until such new factors enter the problem. Change is not necessarily progress."*--Admiral W.H. Blandy, 1951

NOTES

[1] Chairman of the Joint Chiefs of Staff, Joint Vision 2010, (Washington, D.C.: The Joint Chiefs of Staff, 1996), 2.

[2] Ibid.

[3] Ibid., 1.

[4] Ibid., 16.

[5] VADM Arthur K. Cebrowski, "Network-centric Warfare: An Emerging Military Response to the Information Age" in a Presentation at the 1999 Command and Control Research and Technology Symposium, 29 June 1999, 1.

[6] ADM Jay L. Johnson, "Network-Centric Warfare: Realtime Awareness", All Hands, January 1998, 53.

[7] Marine Corps Combat Development Command, United States Marine Corps Warfighting Concepts for the 21st Century (Marine Corps Combat Development Command, Quantico, VA., n.d.), Foreward.

[8] CAPT Chet Helms, Operational Functions (U.S. Naval War College, Joint Military Operations Department, Newport, R.I., n.d.), 1.

[9] Ibid., 2.

[10] Joint Chiefs of Staff, Department of Defense Dictionary of Military and Associated Terms (Joint Pub 1-02) (Washington, D.C.: 15 April 1998), 85.

[11] LTCOL Timothy P. Massey, "Command and Control for Operational Maneuver from the Sea, Where Do We Go from Here?" (Unpublished Research Paper, U.S. Naval War College, Newport, R.I.: 17 May 1999), 2.

[12] MAJ Christopher M. Bourne, "Old Joint Team Needs New Approach," U.S. Naval Institute Proceedings, April 1998, 48.

[13] Naval Doctrine Command, Naval Operational Planning (NWP 5-01) (Rev. A) (Norfolk, VA.: May 1998), 5-4.

[14] Headquarters United States Marine Corps, Marine Air-Ground Task Force: a Global Capability (FMFRP 2-12) (Washington, D.C.: 10 April 1991), Forward.

[15] LTCOL Norman C. Davis, "Changing Amphibious Command Relationships," U.S. Naval Institute Proceedings, March 1999, 94.

[16] Massey, 4.

[17] LCDR Terry C. Pierce, "MAGTF Warlords: A Naval Perspective," Marine Corps Gazette, July 1991, 38.

[18] Cebrowski, 1.

[19] David S. Alberts and others, Network Centric Warfare: Developing and Leveraging Information Superiority, 2d ed. (Rev.) (Washington: CCRP, 1999), 2.

[20] Cebrowski, 1.

[21] Alberts, 6.

[22] Milan Vego, On Operational Art, 4th draft, (U.S. Naval War College, Joint Military Operations Department, Newport, R.I., 1999), 53.

[23] Alberts, 87.

[24] Carl H. Builder and others, Command Concepts: A Theory derived from the Practice of Command and Control, (Santa Monica, CA.: Rand, 1999), xii.

[25] Cebrowski, 1.

[26] GEN Charles C. Krulak, "Doctrine for Joint Force Integration," Joint Force Quarterly, Winter 1996-97, 21.

[27] RADM Leonard F. Picotte and CAPT Kendall King, "Amphibious Redux," U.S. Naval Institute Proceedings, June 1997, 65.

BIBLIOGRAPHY

Alberts, David S., John J. Garstka, and Frederick P. Stein. Network Centric Warfare: Developing and Leveraging Information Superiority. Washington, D.C.: CCRP, 1999.

Bierly, Jerome F. and Thomas E. Seal. "Over-the-Horizon Amphibious Operations." Marine Corps Gazette, July 1991, 41-42.

Bourne, Christopher M. "Old Joint Team Needs New Approach." U.S. Naval Institute Proceedings, April 1998, 47-51.

Builder, Carl H., Steven C. Banks, and Richard Nordin. Command Concepts: A Theory Derived From the Practice of Command and Control. Santa Monica, CA.: Rand, 1999.

Cebrowski, Arthur K. "An Emerging Military Response to the Information Age." Presentation. 1999 Command and Control Research and Technology Symposium, n.p.: 29 June 1999.

Cebrowski, Arthur K. and John J. Garstka. "Network-Centric Warfare: Its Origin and Future." U.S. Naval Institute Proceedings, January 1998, 28-35.

Cushman, John H. "Joint Command and Control." Military Review, July 1990, 25-34.

Davis, Norman C. "Changing Amphibious Command Relationships." U.S. Naval Institute Proceedings, March 1999, 94-96.

Dawson, J. Cutler, James J. Fordice, and Gregory M. Harris. "The IT-21 Advantage." U.S. Naval Institute Proceedings, December 1999, 28-32.

Helms, Chet. Operational Functions. Joint Military Operations Department, U.S. Naval War College, Newport, R.I.: n.d.

Johnson, Jay L. "Network-Centric Warfare: Realtime Awareness." All Hands, January 1998, 52-53.

Krulak, Charles C. "Doctrine for Joint Force Integration." Joint Force Quarterly, Winter 1996-97, 20-23.

Kuhn, James K. "Network Centric Warfare: The End of Objective Oriented Command and Control?" Unpublished Research Paper, U.S. Naval War College, Newport, R.I.: 13 February 1998.

McKearney, Terry J. "Rethinking the Joint Task Force." U.S. Naval Institute Proceedings, November 1994, 54-57.

Massey, Timothy P. "Command and Control for Operational Maneuver from the Sea, Where do we go from here?" Unpublished Research Paper, U.S. Naval War College, Newport, R.I.: 17 May 1999.

Picotte, Leonard F. and Kendall King. "Amphibious Redux." U.S. Naval Institute Proceedings, June 1997, 63-65.

Pierce, Terry C. "MAGTF Warlords: A Naval Perspective." Marine Corps Gazette, July 1991, 38-40.

_____. "Taking Maneuver Warfare to Sea." U.S. Naval Institute Proceedings, April 1995, 74-77.

Schmitt, Paul S. "Operational Command and Control: Integrating the Undersea Environment into Network-Centric Warfare." Unpublished Research Paper, U.S. Naval War College, Newport, R.I.: 18 May 1998.

U.S. Joint Chiefs of Staff. Department of Defense Dictionary of Military and Associated Terms (Joint Pub 1-02) Washington, D.C.: 15 April 1998.

U.S. Joint Chiefs of Staff. Doctrine for Command, Control, Communications, and Computer (C4) Systems Support to Joint Operations (Joint Pub 6-0) Washington, D.C.: 30 May 1995.

U.S. Joint Chiefs of Staff. Doctrine for Joint Operations (Joint Pub 3-0) Washington, D.C.: 1 February 1995.

U.S. Joint Chiefs of Staff. Joint Doctrine for Amphibious Operations Washington, D.C.: 7 February 1992.

U.S. Joint Chiefs of Staff. Joint Doctrine Capstone and Keystone Primer Washington, D.C.: 15 July 1997.

U.S. Joint Chiefs of Staff. Joint Doctrine for Command and Control Warfare (Joint Pub 3-13.1) Washington, D.C.: 7 February 1996.

U.S. Joint Chiefs of Staff. Joint Vision 2010 Washington, D.C.: 1996.

U.S. Joint Chiefs of Staff. Unified Action Armed Forces (UNAAF) (Joint Pub 0-2) Washington, D.C.: 24 February 1995.

U.S. Marine Corps. Marine Air-Ground Task Force: A Global Capability (FMFRP 2-12) Washington, D.C.: 10 April 1991.

U.S. Marine Corps. The Role of the Marine Corps in the National Defense (FMFM 1-2) Washington, D.C.: 21 June 1991.

U.S. Marine Corps. United States Marine Corps Warfighting Concepts for the 21st Century Quantico, VA.: n.d.

U.S. Navy. Naval Command and Control (NDP 6) Washington, D.C.: 19 May 1995.

U.S. Navy. Naval Operational Planning (NWP 5-01) (Rev. A) Washington, D.C.: May 1998.

U.S. Navy. Naval Warfare (NDP 1) Washington, D.C.: 28 March 1994.