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BATTLE COMMAND AND NETWORK CENTRIC WARFARE: PUTTING FIRST THINGS FIRST

by

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15.**Abstract**:
At the dawn of the Information Age, the commander's concept of operation, for arranging potential combat power into victorious campaigns, major operations, and battles, is still the essence of military operations. It is the commander who translates higher concepts and guidance, from the strategic to tactical levels of war, through his visualization of the operation to accomplish the mission. Consequently, his concept of operation directs all battlefield activities to achieve the desired military end-state. Network-Centric Warfare is a technologically based process designed to harness the power of the Information Age by exploiting technological advances to achieve dominance in the information domain. Through a network of new systems (sensors, information, and weapons), warfighters translate this information into dominant- warfare-centered Network-Centric Operations (NCO). NCO shifts the operational paradigm from platform-centric to effects-based operations, by linking geographically dispersed warfighters (through a common operational picture) to overwhelm potential adversaries. While the Network-Centric Warfare (NCW) concept properly focuses technology to improving the antiquated constructs of current command and control (C2) systems. it understates the paramount role of the commander in developing the play. and in the orchestration of the organization's execution of the plan (C2 process). This serious omission stems from an over-reliance on technology and the under estimation. of the power of the human element in NCW. In short, this approach makes the means (technology via Network-Centric Operations) more important than the end (successful military operations via the commander's concept).

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Network-Centric Warfare is a technologically based process designed to harness the power of the Information Age by exploiting technological advances to achieve dominance in the information domain. Through a network of new systems (sensors, information, and weapons), warfighters translate this information into dominant warfare-centered Network-Centric Operations (NCO). NCO shifts the operational paradigm from platform-centric to effects-based operations, by linking geographically dispersed warfighters (through a common operational picture) to overwhelm potential adversaries.

While the Network-Centric Warfare (NCW) concept properly focuses technology to improving the antiquated constructs of current command and control (C2) systems, it understates the paramount role of the commander in developing the plan and in the orchestration of the organization's execution of the plan (C2 process). This serious omission stems from an over-reliance on technology and the under estimation of the power of the human element in NCW. In short, this approach makes the means (technology via Network-Centric Operations) more important than the end (successful military operations via the commander's concept).

> Circumstances vary so enormously in war, and are so indefinable, that a vast array of factors has to be appreciated – mostly in light of probabilities alone. The man responsible for evaluating the whole must bring to his task the quality of intuition that perceives the truth at every point.
>
> Karl von Clausewitz, *On War*

Even in the information age, the commander's concept for arranging potential combat power into successful military operations remains the essence of any successful mission.[1] While the Network-Centric Warfare (NCW) concept properly focuses technology to improving the antiquated constructs of current command and control (C2) systems, it understates the paramount role of the commander in the C2 process (to determine the direction and in the orchestration of an operation). This serious omission by NCW theorists stems from equating the commander's concept (the idea developed in the C2 process).[2] In short, this approach seems to make the means (technology via Network-Centric Operations) more important than the end (successful military operations via the commander's concept). This paper will focus on the role of the commander as the decision-maker and the leader key to successful military organizations. Additionally, I will consider the utility of the technologically advanced Network-Centric Operations (NCO) over current C2 systems in conveying the commander's concept. Finally, I will corroborate the idea that NCO will not fundamentally change the preeminent role of the commander in planning and influencing the conduct of military operations, though it could dramatically change the C2 systems

[1]Karl von Clausewitz, On War (Princeton University Press, 1976), p. 186. Clausewitz lists "the skill of the commander" as one of three principle moral elements required for victory in war.

[2]Alberts, David S., John J. Garstka, and Frederick P. Stein, Network Centric Warfare: Developing and Leveraging Information Superiority (Library of Congress, 1999), pp 69-78.

employed to transmit his idea.

Battle Command and the Commander's Concept of the Operation

Since "war is thus [sic] an act of force to compel our enemy to do our will"[3] it follows that we must have a strategy (a plan) to accomplish this task. It is equally clear that this act requires the use of one or more of the elements of power and must be formulated to achieve the political objective. Across the levels of war, strategic to tactical, it is the commander who translates higher concepts and guidance into successful military operations. The commander, through his operational concept, nests each level's understanding of the critical role their actions play in contributing to the success of their force in the echeloning of available forces. "Cascading concepts carry the top commander's intentions to the lowest levels, and the nesting of those concepts traces the critical path of concentration and priorities."[4] Consequently, it is the commander's concept of operations that directs all activities across the battlespace to accomplish the desired military end-state.

The U.S. Army calls this process battle command.[5] The purpose of battle command is to guide the commander through the decision-making process. Its framework consists of two vital components: decisions and leadership. Commanders formulate their decisions based on a mental picture of the current and future state of the battlefield. He gets his idea from information gathered from the higher commander's mission, intent, and his higher's concept of the operation. The

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[3]Clausewitz, p. 75.

[4]Willam E. DePuy, "Concepts of Operation: The Heart of Command, The Tool of Doctrine," Army Magizine, (August 1988): 26.

[5]Headquarters, Department of the Army, *Decisive Force: The Army in Theater Operations*, Washington, D.C.: FM 100-7, May 31, 1995, p. 1-7.

commander assesses the available information in terms of space, force, and time, and develops a concept of operation from his knowledge about his forces, the enemy and the environment. "The concept of the operations describes how a commander visualizes the major operation unfolding."[6] This activity is as much art as it is science since it requires the commander to combine what he knows (facts) and what he believes (assumptions), by experience and intuition, in order to see the future battle. General William E. DePuy boiled the development of the concept of operation down to this concise thought,

". . . at the heart of the process lies the mind of the commander. From the mind of that single person, a dominating concept of operation must emerge."[7] The presence of a dominant concept is so important to military operations that an "absence of a powerful and dominating concept concedes the initiative to your opponent; and his other qualities of leadership . . . will be simply irrelevant and ineffectual"[8] without one.

Leadership is the second imperative in battle command. Contrary to managerial practices, the commander does not abandon the process to his staff to complete. Once a decision is made, there is still much the commander must do to influence and bring his concept to fruition. Since, "War is nothing more than a duel on a large scale"[9] there are countless mental jousts the commander must land or deflect to force the enemy to do his will. Therefore, the commander must continue to direct

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[6]Decisive Force, p. 1-4.

[7]DePuy, p. 26.

[8]Ibid.

[9]Clausewitz, p. 75.

activities through preparation and inspire his organization as they flesh out the plan. During the final stages of planning, intelligence collection and reconnaissance begins, critical information requirements are gathered, and the main force deploys. The commander's presence has a calming effect on his subordinates during the tense period leading up to hostilities. His being there to see the concept through builds confidence if all goes well, or it puts him in position to modify the concept if the situation changes sufficiently to render it useless. "It is a demonstrated fact of life that opposing concepts cannot long coexist. The concept that prevails destroys the other. It is a zero-sum game."[10] Clausewitz characterizes the able commander as one who exhibits "a sensitive and discriminating judgment . . . [and employs] skilled intelligence to scent out the truth."[11] Thus, the commander who demonstrates these attributes, coupled with intuition, can lead and motivate soldiers and organizations to accomplish any mission.

Ultimately, however, it is the commander's visualization that is essential to this process. It is his conceptualization of the intent and concept of the operation, culled from experience and intuition, that gives the commander's concept a special, seasoned quality. Clausewitz believed that this quality, *coup d'oeil* or 'inner light', provided the experienced commander "the quick recognition of a truth that the mind would ordinarily miss or would perceive only after long study and reflection."[12] Therefore, the quality of the commander's idea and his vision are the critical factors in the

[10]DePuy, p. 28.

[11]Clausewitz, p. 101.

[12]Ibid, p. 102.

organizations ability to function and accomplish the military operation.[13] Consequently, in the design of his concept, the commander provides the dominant idea from which his organization derives its concentration and priorities and cannot be perceived as merely data to be passed through a network.[14]

Network-Centric Warfare and Network-Centric Operations

The Network-Centric Warfare concept is a technologically based process designed to harness the power of information technology through the principle of networking (exploiting information to the maximum extent possible[15]). Ultimately, the intent of NCW is to increase the speed and precision of all military operations. Then, through a network of new technologies (sensors, information, and weaponry) translate this data into dominant warfare-centered NCO.[16] Thus, NCO was developed to be the warfighting philosophy to apply the NCW concepts (speed of command and self-synchronization) across the full spectrum of military operations.[17]

The conduct of Network-Centric Operations, under the umbrella of an on-going revolution in technology, shifts its focus from platform-based to effects-based operations to access the

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[13]Bankes, Steven C., Carl H. Builder, and Richard Nordin, Command Concepts: A Theory Derived From the Practice of Command and Control <http://rand.org/publications/MR/MR75> 1999, 18.

[14]Bankes, p. 18.

[15]Alberts, pp. 12, 88.

[16]Edward A. Smith, Jr., "Network-Centric Warfare: What's the Point?," LIV,1 (Winter 2001): 59-60.

[17]Naval War College, "Network-Centric Operations: A Capstone Concept for Naval Operations in the Information Age", NWC 1078, 2000, p. 1.

technological power of the information age.[18] Specifically, NCO theorists plan to leverage information technology to overwhelm adversaries within the domains of information warfare, precision strikes, space warfare, and maneuver. Essentially, NCO shifts the paradigm from focusing on discrete physical events to capturing larger systems effects from a "robust networking of well-informed, geographically dispersed warfighters".[19] Herein lies the fundamental change to the conduct of military operations proposed by NCO: exploiting the information domain to gain information superiority that permits users to conduct operations without effective opposition.[20] "This description makes it clear that Network-Centric Operations are really about optimizing combat power – that is, combat efficiency."[21]

Therefore, the goal of NCO is to increase the organization's capabilities to operate under network-centric and effects based conditions by effectively accessing and sharing information and knowledge. The key is to access to information rapidly, faster than the opponent, and more importantly, possess the ability to process information into specific knowledge about one's enemy. Simply put, "to use information as a source of power."[22] Though this aspect is not new, turning inside the enemy commander's decision cycle, it does have subtle nuances in NCW which purport

[18]Ibid, pp 1-3.

[19]NCW 1078, 2000, p. 1.

[20]Ibid.

[21]Smith, p. 61.

[22]VADM Arthur K. Cebrowski, Network-Centric Warfare Lecture, 23 April 2001.

to give us information dominance over our adversaries by networking linked entities.[23] In sum, these linked networks (sensors, information dominance, and engagement grids) will fundamentally change the way we exploit and distribute information and can dramatically improve our ability to convert this information/ knowledge (at an accelerated rate) into superior combat power.[24]

Finally, NCO leads to the successful attainment of the two basic tenets of NCW: speed of command and self-synchronization. The intentions of the NCW theorists are to dramatically alter the way we conduct military operation through the application of the technologies mentioned above. Although one could get the impression that NCW will be all information and information-related technologies, there are important "human-centric"[25] components of NCO.[26] The NCW concept does account for the need to build a commander's "philosophy" into plans for the conduct of warfare in the information age. However, in NCO the inference is that commanders will wield their influence differently in the information age.[27] This is to say that sensors and information technology can provide a real-time common operational picture, where the commander's concept and his intentions could not. The goal is to reduce the fog and friction of war, through assemblage of information/knowledge, to a point where our battlefield awareness is heightened to the point of

[23]Alberts, p. 115

[24]Ibid.

[25]Alan D. Zimm, "Human-Centric Warfare," Proceedings (May 1999): 28.

[26]Department of Defense, Measuring the Effects of Network-Centric Warfare (Washington, DC: 1999), 1-2.

[27]Alberts, p. 71.

constructing a common operational picture.[28] NCW proposes to construct the common operational purpose through a collaborative decision making process. The bottom line is to 'wed' the planning and execution processes more closely, due to the aforementioned information age technological changes. What has not changed, and something that should receive much greater emphasis in NCO, is the preeminence of the commander's concept. Without saying concept of the operations, the "commander's philosophy" as used in NCO is the central idea that will still be needed to "empower commanders at every level" to accomplish the mission.[29]

In the same way, self-synchronization speaks to the imperative of operating within the higher commander's concept. Self-synchronization forwards the idea of nested concepts through the levels of command into the information age. The difference is that the NCW vision is to increase the subordinate's ability to operate at a higher tempo over increased battlespace by shared knowledge. The knowledge will come from the networking of sensors and actors and will facilitate greater initiative by subordinates. Ultimately, self-synchronization will empower subordinate organizations to operate at increased speed as part of a synergistic whole through the employment of knowledge gained from information networking.[30] In summary, NCO is a new way of operating forces in anticipation of technological advances in warfare brought on by the information age.[31] The NWC tenets of speed of command and self-synchronization are the capstone elements of NCO and,

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[28]Ibid, p. 71-73.

[29]NWC 1078, 2000, p. 9.

[30]Ibid.

[31]Ibid, p. 6.

through information dominance, are expected to lockout enemy options before they have the opportunity to act.

Conclusions and Observations: From Concept to Application

In an age where technology is the means of choice to achieve one's end, there is a tendency to ascribe more power to technology than is warranted. In other words, technology alone is not the answer; it is merely an enabler for fielding the answer. Accordingly, the pursuit of technological solutions is justified as long as we recognize its application for what it is – an enabler. "Technology is perhaps best understood as an abstract system of knowledge, an attitude toward life and a method for solving its problems."[32] Thus, the position of technology is in a subservient role to the supported activity and, in a perfect world and would provide an environment that allows the operator to perform more efficiently and effectively.

There are three aspects of NCW and NCO, however that must be developed more fully to enhance the warfighters ability to thoroughly leverage the technology in support of military operations. First, expand the human-centric focus of NCO, specifically, the role of the commander as the decision-maker. How can the NCO concept for military operations in the Information Age proceed without a credible focus on the operational idea? It's the commander's shared vision, for every military operation, which binds all activity into a coordinated, synchronized act to accomplish a task or solve a problem. NCW theorists assert, "The Information Age has changed the way we

[32]Martin van Creveld, Technology and War (New York, MacMillan, 1991), 312.

[will] reach decisions"[33] and that may be true, but it has not changed the fact that decisions (a choice) have to be made. "It is the aim of every commander to concentrate all available combat power against the enemy at just the right time and in just the right place to win battles, campaigns, and wars."[34] Accordingly, it is the commander's concept of the operation that will continue to be the paramount step in decision-making and the idea that guides the execution of future military operations.

Although the technological advances of the Information Age will affect the way C2 systems are organized, these technologies will not supplant the operational concept that will still be derived in the mind of the commander(s). NCW theorists acknowledge this requirement in their discussion of future evolutions of "collaborative decision-making", but fail to emphasize the commander's (human-centric) role.[35] However, the same writers bar the notion of the commander's vision making the leap to NCW. Implicitly they imply technological hardware and not the commander's concept will drive military organizations to the successful completion of their missions. Contrary to the NCO bumper stickers, NCW is too much about technology. Not exclusively, but to the detriment of the human aspect of NCO. "The human user is the key element, yet our [NCW] concentration is more on hardware, bandwidth, baud rates, and wires and electrons."[36]

The fact that NCO endeavors to take full advantage of Information Age technologies does not

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[33]Alberts, p. 73.

[34]DePuy, p. 30.

[35]Alberts, p. 73.

[36]Zimm, p. 28.

mean NCO can afford to denigrate the roll of the commander in NCO. To be fair, elements of the battle command are mentioned in NCO, but in a passing, obligatory, and minimizing way. This perspective gives too much credit to information technology as the last word in NCO. Information technology is not a panacea and it will never provide perfect information/ knowledge and real-time battlespace awareness without the commander's concept of operations to coordinate/synchronize all battlespace activities.

NCO claims to be for the warfighter, however, the NCO concept has all but removed the most able warfighter – the commander. The commander and his concept are a conspicuous by the manner in which they are marginalized in the concept of NCO. The truth is that NCO emphasizes technological innovations as the means to information superiority and not the commander's concept aided by technological marvels. These omissions will result in the desynchronization of NCO if it is not addressed. One has to wonder, "What is driving the sensors and actors in their collection of information and knowledge?" and "Who is telling whom what to shoot?"

The complexity of the future battlefield is no excuse for ignoring the essence of a military operation. "A concept of the operation is the principle tool of the commander for integrating all elements of his force. This role has always been the chief contribution of a good concept, but its importance rises in direct proportion to the growth of complexity."[37] Therefore, NCO principles such as battlespace awareness, dispersed forces, dominant maneuver, rapid rates of change, concentration of combat power, and effects-based operations demand a strong commonly known

[37]DePuy, p. 28.

and understood concept of operation. Correspondingly, the NCW tenets (speed of command and self-synchronization) will not be effectively employed without the common operation picture established by the commander's concept of the operation.

Second, another view for developing the architecture for information superiority and information operations to achieve full-spectrum dominance will be through an incremental fielding of portions of the network. Technologically, elements of the network will continue to evolve, so it will be impossible to field the entire system to the degree imagined. The idea, fielding the entire sensor grid is worthy of consideration, but in reality, the robust "system of systems"[38] capable of providing the perfect knowledge envisioned by NCO enthusiasts cannot be assembled. What is being theorized amounts to a worldwide crystal ball or an omnipotent, ever-present fly on the wall for the intrusion, collection, and defense of information systems. In fact, "the infostructure, the systems that carry and process information,"[39] fielding is a hotly debated subject. Inter-service agreement on the requirement, money, and available technology are but a few of the serious hurdles to fielding of the proposed infostructure needed to support NCO. Though it is hard to imagine that the U.S. Armed Forces would not employ new Information Age technologies to upgrade its sensor architecture, gaining consensus on what that infostructure will be another issue.

At the heart of this issue is what each service must trade to get their desired infostructure and whether that benefit will be worth its cost. The most prominent issue is the proposal to downsize military forces in favor of highly trained forces equipped with high-technology weapons. This issue

[38]William J. Perry,"Desert Storm and Deterrence," Foreign Affairs 70 (Fall 1991): 76-77.

is so difficult because it strikes the nerve of NCO concepts which favor technologically based solutions as "the" bridge to the complexities of the future battlefield. As noted above, technology may not provide the answer to all our future battlefield needs. Therefore, the issue boils down to one of balance, "How much of the old and new is the right mix to prepare our Armed Forces for warfare in the Information Age?" "Will a 50% increase in technological advances over the next 25 years be enough for the U.S. to maintain the position of the dominant military power on the globe?" Or is the opposite true, "Will technological solutions become so prevalent, all things being equal, high-technology warfare becomes a wash and we need to maintain our "physical" infrastructure to keep our edge?"

Another challenge, if one accepts that some form of infostructure will be developed, is the problem of converting information to knowledge. The NCO vision for its infostructure is predicated on timely access to information that will result in providing the warfighter near-perfect knowledge to act on. However, information/knowledge collected and culled through a sophisticated system cannot provide perfect knowledge and unless specifically designed will fail to convey a discrete list of information required to make timely, accurate decisions. This is especially true under the chaotic, stressful, and time sensitive conditions (fog and friction) that permeate warfare. The *Vincennes* shoot down of the Iran Air Flight 655 is a good example of sensory overload.

The commander, from his Aegis combat system, was provided voluminous amounts of information, however, volume did not equate to situational awareness. Consequently, the specific

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[39]Alberts, p. 79.

facts that the aircraft was gaining altitude and was higher than reported were available, but not known by him.[40] The system cannot be blamed for not passing the pertinent information, as noted the facts were in the system. This unfortunate incident should serve as a warning, that more information is not necessarily better; sometimes the most difficult thing is to "know what you know."[41] Consequently, it appears that we need an infostructure and a system capable of pulling discrete pieces of information/knowledge for the mission's execution. "Unless there is a framework in which to view it, to understand its patterns, and to selectively concentrate or ignore individual elements, its volume will be debilitating."[42]

Additionally, we will be faced with having to adapt this infostructure and C2 architecture to the threat of asymmetric warfare. In 1999 the U.S. could not accomplish information dominance in our war with the technologically unsophisticated Serbians; even though information operations and information superiority are core tenets of our vision for joint military operations.[43] Our failure to gain information dominance in Kosovo makes one question whether information superiority, to the extent envisioned, is probable or even possible due to the fog and friction of war.[44]

The failure of U.S. Armed Forces to obtain information superiority in Kosovo does not make

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[40]Zimm, p. 29.

[41]Zimm, p. 29.

[42]Ibid.

[43]US Joint Chiefs of Staff, Joint Doctrine for Information Operations," Joint Pub. 3-13, October 1998, p. i.

[44]Timothy L. Thomas, "Kosovo and the Current Myth of Information Superiority," Parameters,(Spring 2000): 14.

network-centric predictions of unencumbered information operations that result in information dominance believable at this time. An unsophisticated adversary in Serbia destroyed numerous UAVs with dumb weapons, deceived satellites through the use of decoys and camouflage, and overcame the destruction of their LOC by employing landlines and cellular phones.[45] Asymmetrically, the Serbs employed deception and covert means to limit the technological superiority of coalition forces. Consequently, the NCW concept for an over-arching infostructure for information operations and information superiority needs to be tempered in order attain some systems capable of providing an acceptable measure of information dominance.

Lastly, the C2 theory required for the command and control of future NCO, as stated in NCW is nebulous. The writers of Network-Centric Warfare: Developing and Leveraging Information Superiority, present a smorgasbord of probable affects in the realm of C2 (dispersed forces, battlespace awareness, self-synchronization) which will require the process to change radically to remain viable.[46] However, it seems more likely that the C2 process (command and command and control) will remain relatively static. Whereas the technological advances of the C2 systems would change dramatically to incorporate the C2 theory necessary to fully employ information technologies and address the structural changes required by current military organizations to implement NCW concepts.

In the network-centric world the commander's C2 requirements (command and command and control) will not change. Regardless of the operation, at a point in time, the dispersed forces

[45]Thomas, p. 16.

preparing to conduct NCO will have to be put in motion and after some period pause for the commander to issue further instructions. His instructions, in the future as now, will focus the interactions among the battlespace entities and allocate/synchronize these resources between commands. In NCO, forces may be dispersed, instructions may have to be passed electronically, and subordinate commander's may participate (collaborative decision making) in the decision, but these activities do not change the process. Additionally, the NCW concepts of sharing a common operation picture, task organizing to accomplish a specific mission, and operating with initiative within the higher commander's intent are carry overs from today's joint doctrine and can be accommodated by the current C2 process.[47] Thus, while the means may evolve, "the exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of the mission,"[48] the end ("the authority vested in an individual . . . for the direction, coordination, and control of military forces"[49]) remains the same.

The complexity of tying all these network-centric elements together, due to the networking of technologically advanced sensors and actors, requires an upgrade in the capabilities of the current C2 systems. In addition, changes in organizational structure, to enable units to efficiently and effectively dominate the network-centric battlespace, require coordination to establish local tactical

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[46]Alberts, pp. 78-82.

[47]U.S. Joint Chiefs of Staff, *Joint Vision 2020 America's Military Preparing for Tomorrow*, Washington, D.C.: Office of the Joint Chiefs of Staff, June 2000, pp 6-11.

[48]U.S. Joint Chiefs of Staff, *Department of Defense Dictionary of Military and Associated Terms*, Washington, D.C.: Office of the Joint Chiefs of Staff, JCS Pub. 1, January 1986, p. 74.

[49]Ibid.

sensor control, to maneuver sensors and apply fires, and execute local self-synchronization between units.[50] However, a very important aspect missing from the NCO C2 theory, addressed briefly above, is the creation of C2 system capable of pulling discrete information/knowledge for a specific information requirement. A system capable of targeting and sorting data into specific information groups and interpreting this information to form explicit knowledge provided by sensors. This theory is visualized in this expression by the authors of "Command Concepts:"

> "A comprehensive theory of C2 should explain not only how to organize, connect, and process information, it should also explain something about the quality of ideas and their expression and about how the qualities of people contribute to or detract from C2, not just how they are organized together. What is needed is a deeper theory that encompasses the high-level, creative aspects of command as well as the direct-order and control aspects."[51]

Again, it will be great to have a network of sensors from which to collect data, but it would be better if the sensors could be programmed to selectively short and analyze for specific information/knowledge required for a decision. Reason would dictate that if a network of sensors can be established, then they can be designed to discriminate/interrogate targets to provide the detailed knowledge necessary to attain information superiority.

Recommendations for a Reality Based Force

As stated, in *Joint Vision 2020*, the way ahead for U.S. Armed Forces envision strategic concepts which include: decisive force, power projection, overseas presence, and strategic agility.[52]

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[50]Alberts, pp 115-122.

[51]Bankes, p. xii.

[52]U.S. Joint Chiefs of Staff, *Joint Vision 2020 America's Military Preparing for Tomorrow*, Washington,

The *Vision* goes on to stress, "If our Armed Forces are to be faster, more lethal, and more precise . . . , we must continue to invest in new military capabilities."[53] The only way the Armed Forces can meet the Chairman's vision is to evolve today's platform-centric force into a network-centric force for tomorrow. The NCW concept is a way of developing military capabilities in anticipation of technological advances in warfare brought on by the Information Age. However, for any concept to act as an effective bridge from today to the force of tomorrow, it must build on the best elements from our current forces.

Through the application of advanced technologies, units conducting NCO are expected to derive power from "the rapid and robust networking of well-informed, geographically dispersed warfighters."[54] The linked networks (sensors, information dominance, and engagement grids) will exploit and distribute information and dramatically improve our ability to convert this information/knowledge (at an accelerated rate) into superior combat power.[55] Technology, as we can see, is transforming warfare, but the crux of the issue is what part of America's arsenal must be evolved/revolutionized and whether it will be worth the risk of conducting wholesale changes to a fully engaged forced.

The most prominent proposal is to downsize military forces in favor of highly trained forces equipped with "more" high-technology weaponry. Conceptually this sounds great, until you realize

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D.C.: Office of the Joint Chiefs of Staff, June 2000, p. 1.

[53]Ibid.

[54]NWC 1078, p. 6.

[55]Ibid.

the Armed Forces have to "axe" forces and structure to make way for the technologically based solutions for the future battlefield. This is not to say, "resist change," or "ignore technology." Change is inevitable and technology is already an integral component of the force, part of every weapon and system. Therefore, the issue boils down to one of balance, "What is the right mix of force and technology in preparing our Armed Forces for warfare in the Information Age?" Some would say, "More force and less technology," others just the opposite, but one thing is certain in either arrangement, "The human is the governing factor in total information dominance and network-centric warfare."[56] Embedded in the NCW concept are some human-centric aspects of NCO, but they are de-emphasized rather than accentuated. This is backwards. How can NCO accomplish the NWC tenets of speed of command and self-synchronization in future military operations if its central focus is not on the people who will make it work? After all, it is people and not technology that created the NCW concept. In the same way, the role of the commander, the C2 process, and the purpose for the system of sensors have been all but ignored in the rush to embrace emerging technologies and hardware. It is this aspect of NCW and NCO that gives one an uneasy feel concerning the seemingly unbridled enthusiasm for technology and the under appreciation for people. It makes one suspect of the entire concept, like a plan based on hope.

How do we intend to empower commanders at every level, to speed up battlefield activities through the shared battlespace awareness and accomplish the mission at a significantly greater

[56]Zinn, p. 31.

optempo without someone pulling it together?[57] A commander and his concept of the operation, which binds all activity into a coordinated, synchronized act is the one thing that will hold the "thin client architecture" together. It makes little sense that NCO, conducted on an increasingly complex battlefield, would de-emphasize the preeminence of the commander's concept – it should receive much greater emphasis. If the bottom line is to 'wed' the planning and execution processes more closely, due to the aforementioned information age technology opportunities, then do not wish away the problem. To self-synchronize the capabilities that networking sensors and actors, information operations and effects-based operations provide, one must act from a common operational picture. The picture based on the battle tested, commander's concept.

Similarly, the C2 process (command and command and control) must remain a fluid activity to effectively control the complexities of future military operation. One may argue that flattening the hierarchal pyramid creates a new process, but the object does not change. The elements of the art of command and of the science of control will still be employed. However, the technological advances of the C2 systems will change dramatically, providing the architecture to incorporate the C2 theory necessary to fully employ developing information technologies. The C2 systems will also have to address the structural changes required by current military organizations to implement NCW concepts like the thin client architecture. The target is to increase the organization's capabilities to operate under network-centric and effects based conditions by effectively accessing and sharing information and knowledge. Here again, the bottom line of the C2 process or C2 system

[57]NWC 1078, p. 9.

architecture is to support the NCO C2 capabilities which predicts greater demands due to a reduced gap between the planning and execution processes.

Finally, the robust "system of systems"[58] architecture for information superiority and information operations should be planned to be fielded in layers. Since the goal is "to use information as a source of power"[59] one must devise a method for rapidly converting information to knowledge. Information operations and information superiority are predicated on timely access to information which will result in providing the warfighter near-perfect knowledge. Rather than collecting every bit of information, NCO needs an infostructure and a system capable of pulling discrete pieces of specific information/knowledge for the mission's execution.

This approach is completely compatible with effects-based operations to gain access through a "bottom up verses top down" networking of assets. This multi-tiered and expeditionary sensor package should be designed with a discriminate/interrogate function to collect specific data in support of military operations. Thus, a higher form of synthetic intelligence that gets sensors beyond elementary clerical shorting and pattern analysis is critical to the success of NCO. Again, it will be great to have a "total" network of sensors from which to collect data the world over. However, since a complete network will not be possible in the foreseeable future, it would be best if the sensors could be maneuverable to surge and tailored for a specific theater. Also, sensors should be programmable to collect specific information/ knowledge required for a decision and not just pull data indiscriminately.

[58]Perry, pp. 76-77.

Beyond the technical portion of the sensor information network, the demand placed by NCO on personnel to become theater area experts is unprecedented. Not only will analysts be required to "know" potential adversaries, they will be asked to cue sensors to pick up indicators from nebulous historic-regional traits. In addition, the "Red Cell" experts will have to cull through voluminous sources and documents (imagery, photos, and video) to discern and distinguish the enemy's intentions. Technology can help manage the shear volume, but skilled analysts must be trained to make the expert call.

Clearly, to remain a dominant military power the U.S. will have to adapt its Armed Forces to leverage the technologies available in the age of information. There is little debate on whether technology is transforming warfare; it is. An on-going military-technical revolution attests to this and in fact, has already peaked debate over whether these changes constitute a revolution or an evolution. Revolution in Military Affairs or not, what is imperative is that the U.S. lead in harnessing the information technology and its people to develop a force capable of dominating adversaries through the 21st Century and beyond.

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[59]Cebrowski, Lecture, 23 April 2001.

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