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NAVAL WAR COLLEGE  
Newport, R.I.

Breaking the Chains of Command: C4I in the Information Age

By

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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: \_\_\_\_\_

3 February 2003

## Abstract

### BREAKING THE CHAINS OF COMMAND: C4ISR IN THE INFORMATION AGE

The purpose of this essay is to assess the chain of command in the information age in an effort to identify unintended effects of information technology. In addition, this paper advances recommendations to digitally enhance and strengthen the chain of command.

Revolutionary changes to the way a military operates should, in all cases, be deliberate in nature because changes to fundamental military concepts will often times necessitate changes across the entire spectrum of military operations. Although information technology has only been with the uniformed services for a short time, its effects have been significant, and at times disconcerting. Some troubling affects of NCW on the chain of command are:

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This list is by no means complete. These individual areas were selected for analysis because their roles are pivotal to the way that NCW is altering the chain of command.

The U.S. military must consider how implementation of NCW technology will affect all facets of existing military doctrine and concepts. At this time, NCW appears to be evolving the other way around with the consideration being given to how doctrine and concepts can best fit NCW. This trend must be reversed to unleash NCW's full potential.

## INTRODUCTION

*Caesar dispatched letters and messengers into Sardinia and the neighboring provinces, with orders, as soon as they read the letters, to send supplies of men, corn, and warlike stores; and having unloaded part of the fleet, detached it, with Rabirius Posthumus, into Sicily, to bring over the second embarkation. At the same time he ordered out ten galleys, to get intelligence of the transports that had missed their way, and to maintain the freedom of the sea. He also ordered C. Sallustius Prispus, the praetor, at the head of a squadron, to sail to Percina, then in the hands of the enemy, because he heard there was great quantity of corn in that island: he gave these orders and instructions in such a manner as to leave no room for excuse or delay.*

Julius Caesar<sup>1</sup>

During the wars of antiquity, Caesar commanded his troops across vast distances. To do this, he had to utilize communications runners carrying dispatches and letters to direct the actions of his armies and navies. Orders given were not easily recalled so they had to be given careful consideration before they were sent. Moreover, they had to be clear and concise leaving little room for interpretation which could result in catastrophic delays or errors.

How much has changed since the days of Caesar? During a recent U.S. Air Force Operational Readiness Exercise, the survivable recovery center commander was astounded when it was recommended to him that some of the most expendable troops be identified as communications runners to carry messages and orders in the event that the communications systems were destroyed or incapacitated.<sup>2</sup> This method of communicating up and down the chain of command seems archaic in the information age especially considering how the emergence of computer networks has changed the way the chain of command communicates and interacts.

Information technology and Network Centric Warfare (NCW) have been heralded as new foundations for fighting and winning America's future wars. The U.S. military has

invested heavily in information infrastructures in an effort to build a global information grid (GIG) providing “a globally interconnected, end-to-end set of information capabilities, associated processes and personnel for collecting, processing, storing, disseminating, and managing information on demand to warfighters, policy makers, and support personnel.”<sup>3</sup>

NCW promises to change the future of warfare, providing operational commanders with near-instant access to force intentions, locations, tactics and a plethora of other important indicators. NCW is “an approach to the conduct of warfare that derives its power from the effective linking or networking of the war fighting enterprise. It is characterized by the ability of geographically dispersed forces (consisting of entities) to create a high level of shared battle space awareness that can be exploited via self-synchronization and other network centric operations to achieve commanders' intent.”<sup>4</sup> While NCW does not seek to make the chain of command irrelevant, it does change the manner in which it will be exercised.

The purpose of this essay is to assess the chain of command in the information age in an effort to identify unintended effects of information technology. In addition, this paper advances recommendations to digitally enhance and strengthen the chain of command.

## **BACKGROUND**

*“Failures of military communications affect every chain of command across every branch of the U.S. armed forces and its allies--all the way down to the soldier, engaged in combat, who is the one who stands to lose the most as a result of communication failure.”<sup>5</sup>*

One of the first lessons taught to all individuals entering military service is the importance of the chain of command. Understanding the chain of command allows troops to identify with their service and know how they fit into it. This becomes critically important in

times of war. When a superior or subordinate is killed in action, each individual in the chain of command must understand who will step in to fill the gap. In the military individuals are trained to know their boss' job as well as the tasks of their subordinates so that they may assume these responsibilities in the event of an injury, absence or death.

The focal point of the chain of command is the commander. With command comes the legal authority to issue orders and compel subordinate obedience. Each level of the chain is responsible for the lower levels and accountable to all higher levels.<sup>6</sup> In addition, the chain of command defines the links between military officers and the political leadership. It provides each airman, Sailor, soldier and Marine a clear structure for the flow of orders as well as information, ideas and concerns. Moreover, it allows junior members access to the highest levels of command. A basic premise of the chain of command is that problems and issues should be resolved at the lowest level possible.<sup>7</sup>

Communications systems provide the foundation for the chain of command. As stated at the beginning of this paper, chains of command have moved through history from communications being carried via courier to an era where communications are carried around the globe in milliseconds via a global infostructure. While the methods of communicating have changed, the fundamental constructs of the chain of command have not. It is just as important now as it was during the times of Caesar.

Another key building block of the chain of command is its organizational structure. The military organization is hierarchical with two different branches. Joint Publication 3.0 describes it briefly:

*“The NCA exercise authority and control of the armed force through a single chain of command with two distinct branches...One branch runs from the President, through the Secretary of Defense, to the commanders of combatant commands for missions and forces assigned to their commands.*

*The other branch, used for purposes other than operational direction of forces assigned to the combatant command, runs from the President through the Secretary of Defense to the Secretaries of the Military Departments.”<sup>8</sup>*

In short, there is a war fighting chain of command under combatant commanders and a peace time chain of command under the service chiefs. Generally stated, the war fighting chain of command is leaner in order to remove unnecessary bureaucracy between the decision maker and the shooter.

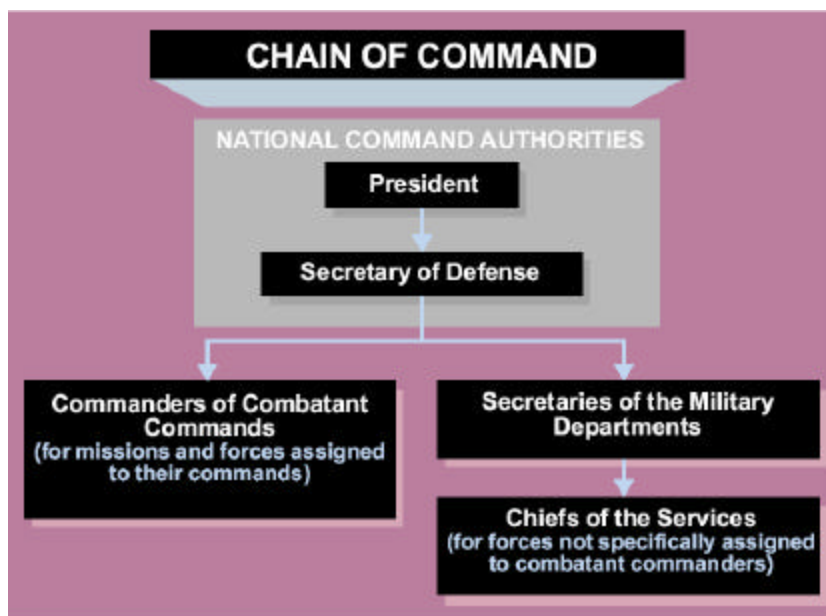


Figure 1. Chain of Command<sup>9</sup>

Another important aspect of the chain of command is the moral element. For the chain of command to work properly, subordinates must willingly follow the orders of superiors appointed over them. Canada’s Somalia Commission of Inquiry summed it up in saying:

*“Personal courage, integrity, sacrifice, a willingness to make difficult decisions, and a ‘clear sense of personal responsibility’ have characterized military leadership throughout the ages. When the sense of responsibility is married to ‘a deep personal understanding of the troops, their problems, a clear purpose, discipline, and hard training’, soldiers have followed leaders without coercion.”<sup>10</sup>*

The sense of loyalty and duty is a powerful force in the chain of command. Without it, no airman, Sailor, soldier or Marine would knowingly risk their lives, charging into battle. This is an intangible but it is one of the most important facets of the chain of command; at the same time it is also the most susceptible to disintegration if it is not given full regard.

Other concepts that are integral to an effective chain of command are unity of command and centralized control/decentralized execution. The U.S. Army's FM 3-0 defines unity of command, "Unity of command means that a single commander directs and coordinates the actions of all forces toward a common objective. Cooperation may produce coordination, but giving a single commander the required authority unifies action."<sup>11</sup> Centralized control/decentralized execution are explained in the U.S. Air Force's AFM 1-1. The benefits are that centralized control allows for the achievement of advantageous synergies, the establishment of effective priorities ensure unity of purpose and minimize the potential for conflicting objectives. It goes on to say "execution of aerospace missions should be decentralized to achieve effective spans of control, responsiveness, and tactical flexibility."<sup>12</sup> Although this excerpt is focused on aerospace forces, it is also applicable to land and naval forces. In fact, the operational flexibility and innovation offered by decentralized execution is often seen as one of the most important strengths of U.S. military forces.

## **NCW: TRANSFORMING THE CHAIN OF COMMAND**

*"NCW offers an almost limitless opportunity to improve military operations and to reduce their costs. It promises to raise the art of war to new heights and enables us to compress military campaigns into time frames to be more consistent with our 21st century world."<sup>13</sup>*

Superlatives such as the one above have made many skeptical of NCW. While far-sweeping statements abound, NCW advocates have yet to substantiate their claims. If changes associated with NCW are drastic then they require close analysis. Revolutionary changes to the way a military operates should, in all cases, be deliberate in nature because changes to fundamental military concepts will often times necessitate changes across the entire spectrum of military operations. Although information technology has only been with the uniformed services for a short time, its effects have been significant, and at times disconcerting. Some troubling affects of NCW on the chain of command are:

1. Information overload
2. Flattening of organizational structures
3. Centralized control and centralized execution
4. Network failure equals disconnected chain of command
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This list is by no means complete. These individual areas were selected for analysis because their roles are pivotal to the way that NCW is altering the chain of command.

### **INFORMATION OVERLOAD**

*“There’s too much information to process. Too many systems. Too many devices. Too many antennas. Too little interoperability. The military needs to say ‘O.K., what’s important here?’ Information management needs to take place down at the lowest level.”<sup>14</sup>*

The chain of command has always had to deal with a large quantity of information, but in the past the middle echelon leaders filtered the information. NCW allows digital networks to inundate the operational commander with information. Furthermore, this

instantaneous information can come from a diverse group of sources, from the battlefield to stations in the continental United States.

Professor Milan Vego argues that the need for intermediate levels of command will be even more important in the NCW environment, “The enormous increase in the volume of information should be focused on providing timely, accurate, and above all, relevant intelligence to the respective commanders. This means that an intermediate level of command *must* exist to filter information from subordinate command echelons; otherwise the commander’s decision-making will be greatly complicated because of information overload.”<sup>15</sup>

Information overload occurs “when so much information is coming in that the receiver cannot separate the wheat from the chaff.”<sup>16</sup> This in turn can cause “paralysis through analysis”, where commanders are unable to deliver a timely decision because they are weeding through extraneous information. As a result NCW may actually be increasing the “fog of war” and blurring the levels of command so that joint task force (JTF) commanders are acting on tactical information that should be dealt with at much lower levels of command.<sup>17</sup> In addition, lower echelon leadership using the common operating picture--a graphic depiction of the entire battle space--may be reacting to threats that are best dealt with by operational level commanders. “The danger lies in the picture’s collapsing all participant’s perceptions of what is tactical versus operational versus strategic, and, by doing so, creating strong incentives for all to engage in information overload in an attempt to maintain their bearing in this overly ambitious big picture.”<sup>18</sup> If multiple echelons of command are engaging the same threats in the same area of operations, they may also be risking friendly fire losses.

Another troubling aspect of the abundance of available information is that it may be perceived as valid and accurate information simply because it resides on the network. Face to face meetings between commanders and intelligence analysts invariably include discussions on the validity of the information. In a networked environment, there is an inclination to accept the data as legitimate, especially in a fast paced NCW environment where double checking slows the decision-making process. This implied trust in the accuracy of intelligence information may lead to a false sense of battle space awareness, resulting in poor decision making and an unfavorable outcome.

### **FLATTENING OF ORGANIZATIONAL STRUCTURES**

*“In the traditional military organization, created and sustained by its control system and the formal allocation of power along the chain of command, training is one of the most important mechanisms for the establishment of culture, commitment, standards and communication procedures. The military managerial culture contains and embodies the idea of managers “owning” their units, having the full responsibility for its well being. In virtual organizations this concept must be replaced by something else.”<sup>19</sup>*

Many advocates of NCW see the traditional hierarchical chain of command flattening because networks will make intermediate levels of command unnecessary. This concept is promulgated in the business world with the current development of virtual organizations. Benefits of virtual organizations are that they support highly dynamic processes, build contractual relationships among entities, provide edgeless permeable boundaries and offer reconfigurable structures.<sup>20</sup> Businesses find these constructs very useful because they allow for the elimination of costly mid-level management. While these virtues have merit in the business world, they do not translate well into the military chain of command. The very consistent and dependable organization provided by the chain of command is an asset in the

highly unpredictable wartime environment where chaos reigns supreme. In contradiction to the virtual organization, the military chain of command is founded on predictable processes, trust based relationships, defined boundaries and conventional military structures.

According to Vego, “There is a widely held belief that new information technologies will...allow greater span of control for the commander and thereby eliminate the need for middle level command echelons; and...the tasks performed by these echelons will be relegated to the staffs or supporting organization or experts in the rear.”<sup>21</sup> Vego is opposed to the suggestion that networks connected via the GIG will make the intermediate level of command obsolete. In addition, the reduction in mid-level leadership increases the reliance on centralized control, thus shedding one of the U.S. military forces’ key strengths, decentralized execution. Professor Vego states, “Eliminating intermediate command echelons because technology allows a larger span of control cannot be explained in terms of sound command organization. Information technology cannot change the fact that the number of subordinate force elements grows arithmetically while the number of their relationships grows geometrically.”<sup>22</sup>

### **CENTRALIZED CONTROL AND EXECUTION**

According to Maj Gen Dean Cash, director of joint experimentation and conceptual development at Joint Forces Command, the chain of command is being turned into a “Web of Command” that instantly links Pentagon leaders to junior officers in the trenches, bypassing the traditional chain of command.<sup>23</sup> These changes could result in some form of super-enhanced unity of command under a JTF commander, combatant commander or perhaps even the Pentagon. This begs the question, what happens if your highest echelon is

eliminated through attrition or if they become disconnected from the forces in the field?

With a traditional chain of command, the intermediate commanders leverage decentralized execution and press forward to accomplish their objectives. In the NCW world, the troops may be unable to act on their own because they would be over reliant on centralized control.

The proposition of webs of command is that the JTF commander empowered by NCW can easily and efficiently communicate orders to the forces in the field without the delay associated with mid-level leadership's involvement. The web of command may move responsibility for tactical operations to the JTF commander or above. The notion of webs of command is closely related to the concept of flat or lateral chains of command and centralized control and centralized execution. The negative impacts of this were clearly demonstrated during the Gulf War.

During Operation DESERT STORM, the Iraqi Command and Control (C2) structure was attacked with devastating results. Because Iraq employed poorly trained conscripted forces--with the noted exception of the Republican Guard--they had to rely on centralized control and centralized execution. When Iraq's C2 infrastructure was destroyed, the forces had no higher direction and shortly thereafter took to surrendering en masse. Had these forces been experienced and led by competent intermediate-level commanders, they could have seriously complicated U.S. military efforts or at the very least retreated and consolidated with other Iraqi forces preparing for the next phase of battle. Because the Iraqi army relied on centralized control/centralized execution, the elimination of the C2 infrastructure made them impotent on the battlefield.

While centralized control and decentralized execution empowers forces, centralized control and centralized execution equates to micromanagement. FM 3-0 cautions

“Information technology can reduce but not eliminate uncertainty. It gives commanders windows of opportunity that, with quick and decisive action, help them seize the initiative. Commanders may lose opportunities if the quest for certainty leads to centralized control and decision making. Technologically assisted decision making may tempt senior leaders to micromanage subordinate actions. This is not new...”<sup>24</sup>

The capability to view the battlefield with unmanned aerial vehicles (UAVs) offers another perspective, “During the Afghanistan war, a group of top-level commanders was able to watch the UAV lock in on a target via streaming video. Sitting inside the Pentagon, the brass gave the order to fire the missile that destroyed the target--on the other side of the globe. This capability has a dark side, however. It is easier for the command to micromanage. There is this impression that instant communications lets us do remote control war-fighting. And that’s a danger.”<sup>25</sup> Vego writes, “...highly integrative technologies and information gathering may create a false belief that centralized decision-making will result in greater effectiveness. Such a trend needs to be avoided because highly centralized decision-making will unnecessarily restrict the freedom of action for operational commanders and their subordinate tactical commanders. An increase in the information volume was historically best resolved though *decentralized*, not centralized command and control.”<sup>26</sup>

## **NETWORK FAILURE EQUALS DISCONNECTED CHAIN OF COMMAND**

*Information is the currency of victory on the Battlefield*

Gen. Gordon Sullivan, USA (ret)<sup>27</sup>

Over reliance on NCW may eventually leave the U.S. with the inability or lack of experience to effectively control forces when systems are incapacitated or destroyed. Most

people who work in a networked environment have experienced days when everybody went home early because the network was out of service. Where work was once done with typewriters by flashlight, a power failure or an e-mail server outage can now incapacitate a workforce. In the peacetime environment, losses can be measured in personnel hours and work slowdowns, but during war, the effects will be measured in numbers of killed in action, missing in action and equipment lost.

According to Frank Lanza, CEO of L-3 Communications, “We’re developing the information grid so that every platform will have the same information and if one or two platforms fail, their functions are automatically taken over by other platforms. Every platform will be able to be the command center.”<sup>28</sup> Building redundant capabilities into networks helps avert many catastrophic failures, but no network is failure proof. Considering the possibility that future networks will be failsafe, Frank Lanza reflected, “Companies can’t keep commercial networks up and running and we have been in the business for 50 years.”<sup>29</sup>

In the NCW future, will the U.S. military know how to operate without the network? Can the U.S. military get “low tech” in the face of catastrophic network failures? Our adversaries certainly can. In fact, that is where they have a decided asymmetric advantage over NCW forces. These questions must be addressed before serious reliance on NCW should be incorporated into military operations.

### **“UNITED STATES ONLY” CHAIN OF COMMAND**

NCW may be creating a “United States only” chain of command. In the past American forces have been able to incorporate close allies such as Britain into the chain of command; NCW may make that unachievable. If the U.S. military is unwilling or unable to

share the technology associated with NCW, combined operations with coalition partners will become more complex, not less.

The U.S. military is quickly outpacing its allies and coalition partners in the areas of weapon systems and technological capabilities.<sup>30</sup> This has led to frustration and confusion when conducting combined exercises and operations. In addition, if U.S. systems are not interoperable with our allies' systems or vice versa, the prospect of friendly fire incidents will grow incrementally and the gap between United States and coalition capabilities will become insurmountable.

Allied war fighting constructs should not be abandoned lightly, the United States benefits from the increased size, cost sharing and enhanced political legitimacy that accompanies coalition warfare. FM 3-0 states "Although the U.S. sometimes acts unilaterally, it pursues its national interests through alliances and coalitions when possible."<sup>31</sup> Network interoperability is difficult to achieve within the joint service structure; in fact, it is one of the primary factors behind the development of the GIG and the publication of C4I for the Warrior, both of which were developed in order to bolster joint interoperability and ultimately create a seamless military communications network.

### **WHERE DO WE GO FROM HERE?**

*Never before have armies been challenged to assimilate the combined weight of so much change so rapidly. In this environment, the payoff will go to organizations which are versatile, flexible, and strategically agile, and to leaders who are bold, creative, innovative, and inventive. Conversely, there is enormous risk in hesitation, undue precision, and a quest for certainty.*

Gen. Gordon Sullivan, USA (ret)<sup>32</sup>

This paper has focused exclusively on the concept of a military chain of command fused with NCW. Although this paper specifically outlines potential problems, each of these can be reconciled with a careful application and assessment of the intended effects for the chain of command.

Information overload, while a bona fide issue, was a concern for the chain of command even before NCW. To deal with it, the intermediate-level leaders filtered information for their commanders, essentially eliminating information they felt could be dealt with effectively at their level or below. The same can be done in the NCW enhanced chain of command; in fact, it can be done better because in addition to the existing structure, systems can also be programmed to eliminate duplicate information as well as information that has already been processed by the operational commander. Furthermore, concepts such as “push you/pull me” can assist greatly in reducing the information burden. The “push you/pull me” concept allows information that is identified as critical or relevant to the operational commander to be pushed forward for action and allows commanders to perform ad hoc queries to pull in data at their request.<sup>33</sup> The concept is simple yet effective given proper controls.

Flattened organizational structures relate closely to the concepts of webs of command and centralized control and execution. Centralized control and execution have been tried and found lacking. The thought that this can be desirable in a digital chain of command should be abandoned. While the structure offers personnel savings and may speed decision making, it is simply too risky until it has been demonstrated to provide a significant advancement.

As far as webs of command are concerned, this phenomenon existed in the traditional chain of command. It is similar to a commander that likes to reach straight down to the

troops to get things done quickly and a subordinate who skips intermediate layers of command because they believe it is faster or perhaps because they lack trust in their intermediate chain. How has this been resolved in the past? Eventually the commander learned that this method is counterproductive or lost the support of their personnel, in either case, the problem tended to resolve itself. With a digitally enhanced chain, the system can be programmed to allow commanders to communicate with lower echelons while automatically copying intermediate echelons. In addition, subordinate information flowing up the chain can be automatically routed and coordinated with the correct echelons. In either case, the methods support rather than detract from the effectiveness of the chain of command.

Networks fail; what's important is how military personnel react to the failures. To ensure the chain of command can continue to operate without NCW in the information age, the military needs to train and exercise in its absence. This is not a new idea; the U.S. military routinely practices methods of employing power while under restrictions. Such training will probably be exceedingly difficult because efforts used to analyze data and make decisions in a NCW environment will have to be spent manually building and disseminating information products. Nonetheless, problems need to be identified and resolved before, not during war.

A final recommendation is that the United States starts developing NCW gateway systems to interact with allies and coalition partners. Gateway systems should allow the chain of command to incorporate subordinate or equivalent allied forces into the command structure. These systems need not provide allies with access to sensitive or classified United States only information, but does need to provide access to the common operating picture, air tasking order and other critical information items. By incorporating coalition partners and

allies into our systems, the United States can encourage simultaneous technology development that will help close the existing technology and weapons platforms gaps that exist today.

## CONCLUSION

*The American military's biggest problem? It lets technology drive strategy, rather than letting strategy determine technology*

Brig Gen. Don Morelli, USA (ret)<sup>34</sup>

This paper asserts that NCW has changed the chain of command and that some of these changes are unintentionally weakening the chain of command. NCW is an extremely complex and ambitious concept that is being employed to satisfy a myriad of operational requirements across the full spectrum of military operations. It is this complexity that accounts for the way it has been misapplied to existing military constructs. Because of its ambitious nature, a determined, systematic developmental approach must be adopted.

This paper only analyzed one aspect of military operations--the chain of command--and it does not claim to have conceived every detrimental or for that matter beneficial affect of incorporating NCW into the chain of command. The U.S. military must consider how implementation of NCW technology will affect all facets of existing military doctrine and concepts. At this time, NCW appears to be evolving the other way around with the consideration being given to how doctrine and concepts can best fit NCW. This trend must be reversed to unleash NCW's full potential.

## End Notes

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<sup>1</sup> Julius Caesar, The African Wars, Trans. W. A. McDevitte and W. S. Bohn, <<http://classics.mit.edu/Caesar/african.html>>, [1 Jan 2003].

<sup>2</sup> The author has extensive experience in deployed communications and operational readiness exercises including sustaining operations during communications failures.

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<sup>5</sup> Amy C. Cospers, "What we have here is a failure to communicate" Combat Communications & Commerce, 29 Mar 2002. <[http://combat.thebroadbandeconomy.com/ar/broadband\\_failure\\_communicate/](http://combat.thebroadbandeconomy.com/ar/broadband_failure_communicate/)> [12 December 2002].

<sup>6</sup> Air Command and Staff College. *Guidelines for Command*. Air University Press, Maxwell Air Force Base, Alabama, May 1995, 10.

<sup>7</sup> *Ibid.*, 10.

<sup>8</sup> U.S. Joint Chiefs of Staff. Joint Publication 3-0, Doctrine for Joint Operations, Washington, DC, 10 Sep 2001, II-5.

<sup>9</sup> *Ibid.*, II-3.

<sup>10</sup> Report of the Somalia Commission of Inquiry. "The Chain of Command" Minister of Public Works and Government Services Canada, 1997. < <http://www.dnd.ca/somalia/vol1/v1c4e.htm>> [2 January 2003].

<sup>11</sup> U.S. Department of the Army, *U.S. Field Manual 3-0, Operations*, (Washington, DC: Headquarters Department of the Army, 14 June 2001), 4\_14.

<sup>12</sup> U.S. Department of the Air Force, AFM 1-1, *Basic Aerospace Doctrine of the United States Air Force*, vol. 1, March 1992, 9.

<sup>13</sup> David S. Alberts, John J. Garstka and Frederick P. Stein. Network Centric Warfare - 2nd Edition. September 1999, <<http://www.dodccrp.org/NCW/ncw.html>> [15 December 2002].

<sup>14</sup> Amy C. Cospers, "What we have here is a failure to communicate" Combat Communications & Commerce, 29 Mar 2002. <[http://combat.thebroadbandeconomy.com/ar/broadband\\_failure\\_communicate/](http://combat.thebroadbandeconomy.com/ar/broadband_failure_communicate/)> [12 December 2002].

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