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**Joint Military Operations Department**

**NETWORK CENTRIC WARFARE AND COMMAND & AND  
CONTROL: RETHINKING ORGANIZATIONAL  
ARCHITECTURE**

By

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## **ABSTRACT**

We know from history that the ability of a military commander to effectively control his forces was forever changed by the French Revolution and the *levee en masse*.<sup>1</sup> Thereafter, the sheer size and dispersion of forces made it necessary to subdivide them, and eventually to institute a rigid organizational system that has become increasingly more complex.

Communications became extremely difficult with the available signal technology, making it almost impossible to synchronize these widely dispersed forces. The subsequent arrival of the telegraph vastly improved military communications, and today forces of almost unlimited size and separation routinely share information and intelligence in near-real time.

From the late 20<sup>th</sup> century explosion in information and computing technology emerges the concept of Network Centric Warfare. Network Centric Warfare applies the vast potential of the Information Age to warfare, envisioning a netted battle force executing high-speed, synchronized operations with precise effect. Rich, scalable visualizations that reflect all relevant factors in the battlespace, or Common Operating Pictures (COPs) as they have been coined, become the essential element of United States military power in the 21<sup>st</sup> century.

Exactly what impact will Network Centric Warfare have on warfighting organization and command relationships? This is the operative question for the United States military as we struggle to implement the concept. With an eye toward a Network Centric future, this paper challenges doctrine and tradition by proposing changes to longstanding warfighting organizations and command relationships.

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## **INTRODUCTION**

Every so often in the history of mankind, technological advancements and the understanding of how to apply in novel ways, converge to allow quantum leaps in human capability. Many of these discoveries evolved from or were applied to warfare, allowing armies to dominate their adversaries until their advantage was effectively matched or countered. Such leaps in military capability have been termed Revolutions in Military Affairs. Roughly ten such events ranging from the development of the crossbow to the advent of nuclear weapons have been identified in the history of warfare.

Network Centric Warfare (NCW), a concept of the Information Age, seems poised to be the next great leap, but as yet lies tantalizingly beyond the horizon of contemporary technology and understanding. In the opening passage of the book, *Network Centric Warfare*, the authors acknowledge how little we currently understand about the manner and extent to which NCW will transform future warfare. We know less still about how to move forward from the present, and as a result, most of the current writing focuses on the romanticized ideal and avoids the hard questions of how to get there.

The “Global 98”<sup>2</sup> wargame, one of the first efforts to experiment with NCW, provided valuable insights into the challenges we face in Information Age warfare. An insight of particular import was the recognition that existing warfighting organization and command relationships will have to change to optimally employ the netted battle force. In fact, Global 98 identified our existing command architecture as possibly the single most difficult obstacle to moving toward Network Centric

Warfare.<sup>3</sup> Many years and much effort has gone into developing and refining the chain of command such that it has become paradigmatically difficult to envision any significant changes to it despite technological evolution, or even revolution as many suggest.

## **THESIS**

The current hierarchical command structure of the United States military is ill suited to take maximum advantage of the emerging concept of Network Centric Warfare (NCW). Bold thinking is necessary at this early stage to break us out of a static mindset so that we can begin to identify the path leading from the idealized endstate to where we presently stand. This paper seeks to contribute to the current understanding of the importance of the Common Operating Picture in NCW, and describe one conception of how it may organizationally impact the operational command and control of military forces in the future. I argue that by experimenting with alternative command structures that reflect the capabilities we foresee in the netted force, the United States military can begin to move farther and faster along the path that leads to Network Centric Warfare.

## **NETWORK CENTRIC WARFARE – WHAT IS IT?**

In their book, *Network Centric Warfare*, Alberts et al, describe NCW 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. In essence, NCW translates information superiority into combat power by effectively linking knowledgeable entities in the battlespace.’<sup>4</sup>

Shared battlespace awareness, as embodied in the “Common Operating Picture” (COP), emerged from Global 98 as the apparent enabler of all other operational aspects of NCW.<sup>5</sup> In this paper, the COP is further portrayed as the emerging capability that will allow substantially streamlined command and control (by removing command echelons) without sacrificing mission effectiveness. The mature Network Centric COP will far exceed outdated notions of the common operating picture, manually updated position maps for example, becoming infinitely more comprehensive, interactive and visual. In the ideal, they will integrate mission, commander’s intent, past developments, current situation, and future plans and probabilities; and be provided in a constant stream to end users in time to allow them to make optimum decisions and exploit fleeting opportunities.<sup>6</sup> They will allow the Network Centric Theater Commander to rapidly see, understand, and master operational art across a theater – orchestrating the movement of knowledgeable force



elements, regularly achieving positional advantage and engaging the enemy with decisive effect.

### **THE CHAIN OF COMMAND**<sup>7</sup>

**Command** - the art of motivating and directing people and organizations into action to accomplish missions.

*Source: Joint Pub 3-0, p. 11-15.*

**Command and Control** - the exercise of authority and direction by a properly designated commander over assigned forces to accomplish a mission.

*Source: Joint Pub 3-0, p. 11-15 .*

The National Command Authorities (NCA) exercise ultimate command of the armed forces through a single chain of command that includes two distinct branches. The operational, or warfighting chain, runs from the President, to the Secretary of Defense, to the commanders of Combatant Commands (COCOM). The administrative chain proceeds from the President, to the Secretary of Defense, to the Secretaries of the Military Departments. (See chain of command at Appendix B). Extensive subordinate structures exist below the COCOMs and service secretaries.

This paper focuses on the operational chain of command, and specifically from the COCOM downward. As alluded to earlier, the multi-layered nature of our current warfighting structure has been an evolutionary response to the growing size, complexity and specialization of military forces. Along with higher echelons, the Napoleonic model (*corps-division-brigade-regiment-battalion-company-platoon*) illustrates the extent to which our military forces have become rigidly institutionalized. It is hard today to imagine an operational command structure that does not descend

from four-star to three-star level, and then branch into service or functional components before descending in step fashion, potentially to the lieutenant – platoon commander. This approach to command and control has been standardized to the point that it is currently employed as a matter of convenience or even routine. In the typical task force structure (Appendix C), orders must potentially pass through five layers of command before reaching the level of warfighting.<sup>8</sup> In a Network Centric environment, where the broadest conceivable dissemination of information can be instantaneous, such layering and dependency on serial interchanges quite obviously becomes an impediment to the full actualization of Network Centric Warfare. The ability to increase speed of command, in particular, will demand more express avenues of communication.<sup>9</sup>

We are all familiar with the game wherein a verbal message (order) is passed in a whisper through a series of individuals to test the consistency of the transmission. Invariably what emerges differs significantly from the original communication. The degree of the change (error) and the time between the first and last transfer (delay time) grows with each transaction. And when we consider that the error and delay time could have been exponentially reduced by conveying the message aloud to the entire group simultaneously, we must ask ourselves what value is added by each subsequent player that warrants the sacrifice in speed and clarity (of intent). Put another way, if technology suddenly restores the capability for instantaneous force-wide communication in the pre-Napoleonic sense, what grounds would justify not taking full advantage of such an opportunity?

## NOTIONAL COMMAND MODELS

The concept of a netted force and the nature of hierarchical organizations are naturally at odds – the free interaction of the former contrasting sharply with the rigid control of the latter. In fact, a central aspect of an ideal network is the ability of the netted entities to interact in the complete absence of control. As organizational constructs, the two represent near polar opposites, and herein I contend, lies the difficulty that currently stifles our ability to envision novel organizational and command relationships for Network Centric Warfare.

A balance must be struck between the freedom of interaction that characterizes a network and the rigid control that characterizes the military hierarchy. In pioneer writings on Network Centric Warfare, Vice-Admiral Arthur K. Cebrowski discusses the need to “fix the command and control delay time issue,”<sup>10</sup> and the further requirement to “review existing command structures and doctrines to ensure we remove all impediments to speed.”<sup>11</sup> The apparent choice is between complete control and no control; but as in most things, the answer lies somewhere in between.

From the perspective of seeking a balance between these two competing concepts, these models briefly describe hypothetical Network Centric command organizations that reflect the elimination of Service/Functional component Command echelons. In addition, I briefly discuss untraditional roles for the Theater Commander and National Command Authorities (NCA) under the premise that we

can achieve much faster speed of command while maintaining sufficient operational control.

My purpose here is not to prove that these simple models form the basis of a future Network Centric command architecture, or even that they will work better in Network Centric Warfare than the existing command structure without change. I can no more do that at present than the best minds engaged in the quest for NCW can define exactly what it is we are all seeking. My point is that we have to start developing alternative structures and experiment, experiment, experiment. Only through comprehensive empirical investigation can we hope to identify an optimum Network Centric command structure.

The central tenet of NCW, and thus a key aspect of these models, is “battlespace awareness” as embodied in the COP. These models assume that the extensive situational awareness and other services provided to lower echelon commanders will more than compensate for any value input lost as a result of deleting command layers. In all three models, the **Theater Command** is seen as the organization responsible for producing and distributing COPs as its primary operational responsibility. Managing the flow of awareness between elements of the netted force becomes as clear a theater function as managing logistics flow.

Much of the nomenclature used to describe the models is theoretical and used primarily for descriptive purposes. The model names, **Theater Command and Collaboration**, **National Command and Collaboration**, and **Multiple Operations Force**, for lack of better descriptors, indicate the echelon exercising nominal operational control over Theater Force Elements (TFEs).<sup>12</sup> I say nominal because the

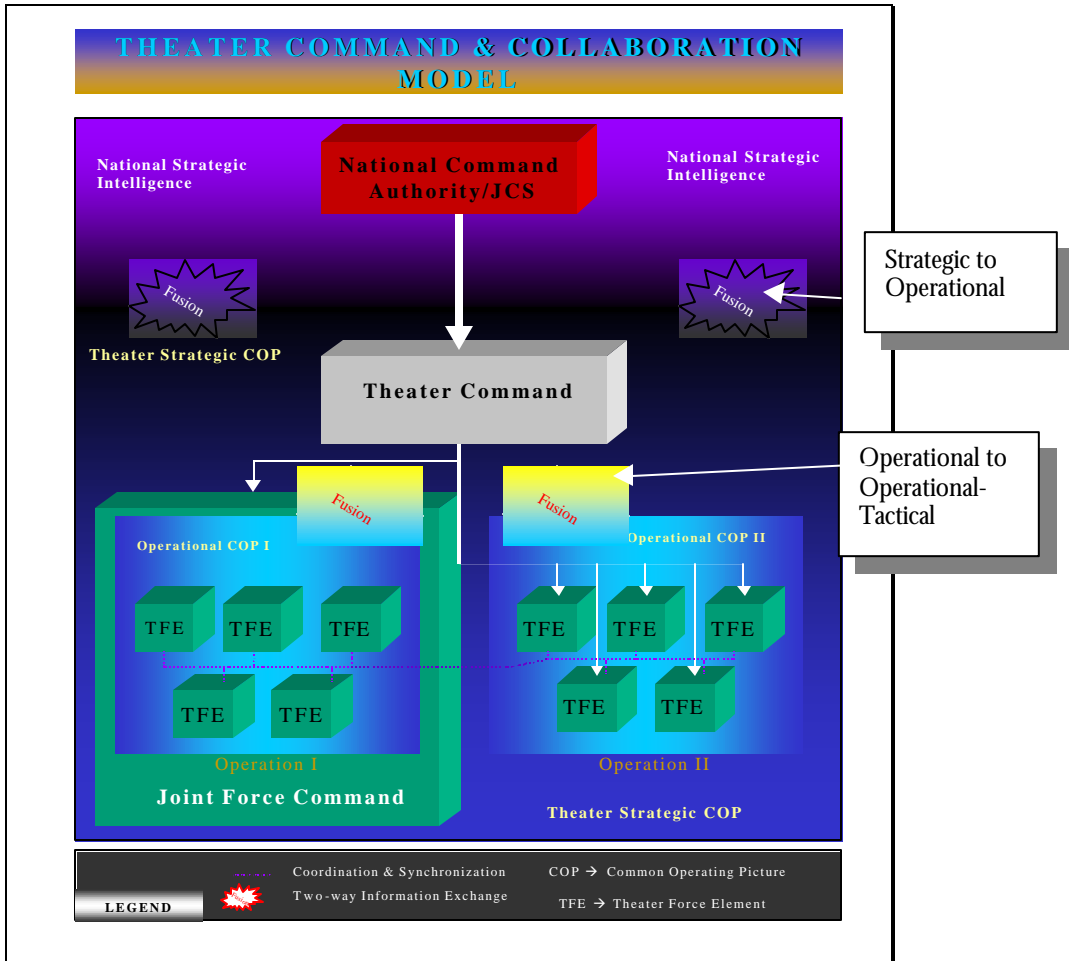
current trend is clearly toward decentralized operations and away from strict higher echelon control, vis-à-vis the current emphasis on the importance of commander's intent and the Network Centric concept of self-synchronization.

The force elements in these models (see diagrams at page 10 and 12) enjoy the freedom of initiative we seek in NCW, acting alone or in concert with each other. TFEs represent scaleable forces ranging from three-star commands (nominally equivalent to a corps, numbered fleet, MEF, or numbered Air Force) to an individual platform or tactical ground unit. Other TFEs will comprise new weapons systems, organizations, and capabilities as yet unfielded. The staff composition of these units will reflect significantly greater service integration than current joint force components, and what constitutes a TFE will be completely unrestrained by distance or physical separation. Highly skilled joint commanders, for whom the training curriculum must yet be written, will command the NCW TFE, and the troops that serve under them will likewise have benefited from extensive interoperability training before serving with a forward force element. Of existing capabilities, Special Operations Forces probably come closest to the interoperability envisioned for Theater Force Elements. Evolving as just described, these NCW TFEs will actually become the "knowledgeable entities linked in space" that NCW visionaries foresee. Shared awareness, increased speed of command, higher tempo operations, greater lethality, increased survivability, and a degree of self-synchronization become not only understandable, but also achievable.

## THEATER COMAMND AND COLLABORATION MODEL

The **Theater Command and Collaboration** model bears the closest resemblance to the existing National Command Structure. The primary difference, and an aspect common to all three models, is the fact that the Service (Army, Navy, Air Force, Marines) and/or Functional (Land, Air, Maritime) component commanders are deleted, placing a sub-theater Joint Force Commander (JFC), and alternatively the Theater Commander himself, in direct operational command of TFEs. Most of the roles traditionally played by Service Component Commanders (organizing, preparing, training, equipping, providing, and supporting component forces) are removed from the operational chain of command, as they are quite obviously support and logistics functions. Operational tasking of the Services as component commanders will no longer be necessary, as any conceivable mission will be executed by TFEs acting on higher intent conveyed through the COPs or responding to direct commands emanating from higher theater or national command levels.

The traditional role of Functional Component Commanders is subsumed within the responsibilities of the Network Centric JFC or Theater Commander, who will deftly manage the increased breadth, pace, and intensity of operational responsibilities with the aid of highly skilled staffs, deployable cells of expertise, and robust decision support products and services imbedded in the COPs. Theater Commanders will realistically possess the tools and capability to actually exercise OPCON<sup>13</sup> – a seldom if ever used aspect of current doctrine.



(This diagram created by the author for illustrative purposes)

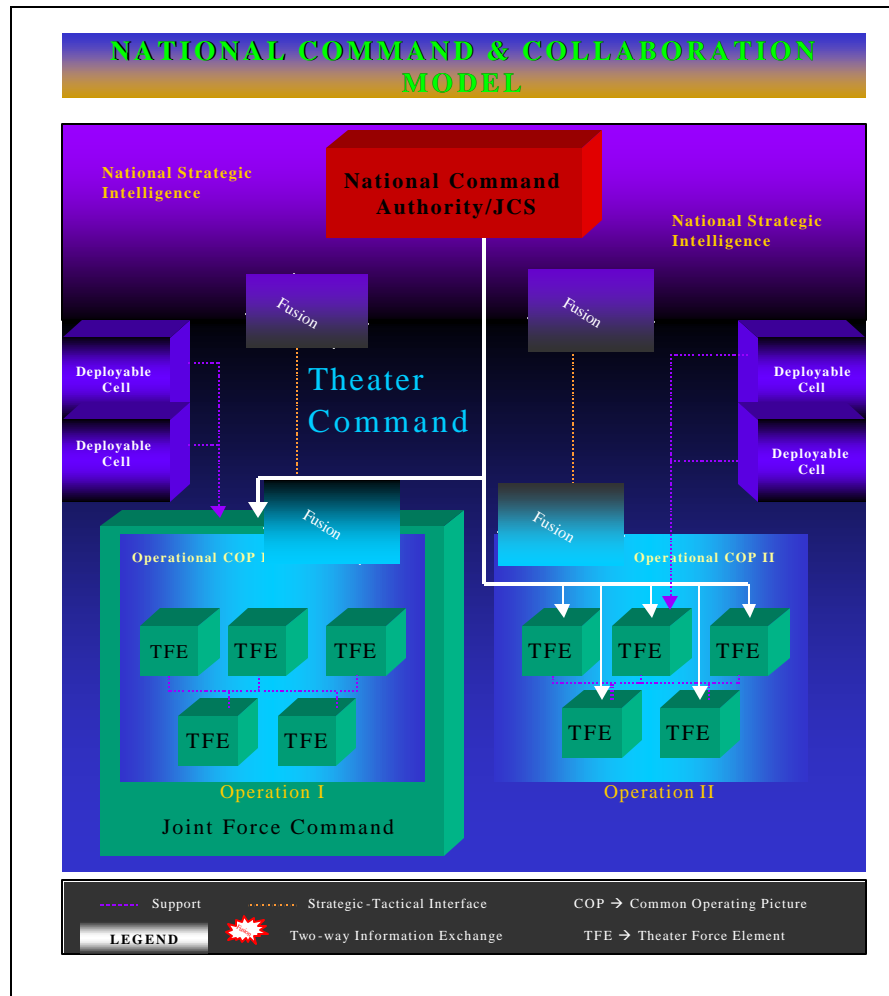
## **NATIONAL COMMAND AND COLLABORATION MODEL**

In the **National Command and Collaboration** model, the chain of command proceeds directly from the NCA to the subordinate theater JFC, or conceivably to the TFEs themselves, acting individually or in self-synchronous coordination with other force elements. The Theater Command does not control the actual conduct of operations here as it did in the Theater Command and Collaboration model. Providing constant situational awareness to the force is separated from mission tasking and force employment, although the Theater Commander does manage in-theater movement of all assets as further discussed below.

Mission tasking and operational control of TFEs is achieved through direct communications between the strategic and tactical levels. In the National Command and Collaboration model, observation and force orientation (Theater Commander) on the one hand – and decision and action (NCA & TFEs) on the other – become parallel and interdependent, yet distinct organizations and dimensions of war.<sup>14</sup> Unburdened from concern for the conduct of operations, the Theater Command is better able to focus on the COP mission. This model includes deployable cells of expertise in various areas to support lower echelon warfighting commanders. In times of crisis, the Theater Commander orchestrates the movement of forces, supplies, and awareness within his area of responsibility with unprecedented vision, speed and accuracy with the aid of theater-strategic COPs. Operational COPs, viewable from all



three levels of war, enable seamless transition of force elements back and forth between Theater Command-managed movement and NCA/TFE-directed operations.



This diagram created by the author for illustrative purposes.

Provided with clear mission and higher intent, JFCs and TFEs will realistically operate with the level of initiative, self-synchronization and speed envisaged in the NCW ideal. With integrated COPs moving rich visual information between players at the various the levels of war, The NCA, The Theater Command, and the warfighting forces can potentially act in true concert – as if a single entity.

Several emerging concepts and ongoing initiatives at U.S. Pacific Command signal early gravitation of Theater Commands toward the role envisioned for them in this model. The Commander in Chief 21 Advanced Concept Technology Demonstration (CINC 21 ACTD) seeks to provide better visualization, decision support, collaboration, and knowledge management tools to the warfighter.<sup>15</sup> Further PACOM efforts to integrate tactical and strategic information systems further suggest a trend in the direction of this model. Finally, the new Nimitz-MacArthur Pacific Command Center<sup>16</sup> will incorporate the most advanced information management, decision support, and information technology available today to increase its capacity to provide theater force awareness to the maximum extent allowed by current technology.

### **MULTIPLE OPERATIONS FORCE MODEL**

The **Multiple Operations Force Model** (not pictured) is very similar to the National Command and Collaboration model, except it does not allow direct command of TFEs from the NCA level. The sub-theater Joint Force Commander here exercises operational control over Theater Force Elements, effectively commanding multiple sequenced or simultaneous operations with the aid of the decision support products and services previously described. This model is based upon the premise that the COPs

and other support will allow sub-theater joint force commanders to manage a significantly greater volume of operational tasks and to do so much faster and more efficiently. The Network Centric force commander is thus able to command several simultaneous operations, conceivably an entire campaign, without becoming overwhelmed as a contemporary today operating without these tools clearly would. Again, the role played by the Theater Commander is central to the entire concept of operations.

### **CHALLENGES AND COUNTERARGUMENTS**

Beyond the common arguments against Network Centric Warfare (cost, security, vulnerability, bandwidth, etc.) these models look to technology to deliver the all-important COPs. Beyond that, they look to a central authority (Theater Commands) to develop and implement a process to collect, screen, sort, and fuse all-source information into the COPs, and subsequently display and distribute these products to all who need them in a swift, comprehensive, and continuous manner – no small undertaking! The information fusion process will be essential to eliminating inaccuracies and redundancies, and to correlating same target information to prevent saturation of the system and the warfighter.<sup>17</sup> We currently lack the organization, processes and to some extent, the technology to manage and take advantage of the information as we envision we will with the COPs.<sup>18</sup> No one can say for sure whether or not this capability will come to pass, but the current pace of innovation suggests that the technological problems will be solved. It is up to the military profession to take on

the other aspects of the challenge so that we get there first as opposed to a potential enemy.

The effort of these models to streamline the chain of command substantially increases the responsibilities of the theater, sub-theater, and TFE commanders. It is also conceivable that removing command echelons could reduce flexibility by virtue of having fewer options in the theater "toolkit." These models assume that the technology will more than compensate for the staffing economies and that experimentation will bear out even greater flexibility in streamlined models. Whether or not this assumption is valid must be empirically tested along with other much bolder reorganization schemes.

A potentially controversial aspect of the National Command and Collaboration model is the fact that the NCA becomes much more directly involved in military operations and planning. Command traditionalists fear micromanagement of tactical actions from the strategic level when they envision this type of NCW command organization. While this may sound extreme, and their concerns may be well founded, direct operational involvement by the highest levels of national command structure has historical precedent in the Falklands War and Operation Allied Force (Kosovo), among others. The advantages and disadvantages of close national level interaction in certain military operations is something that must now be studied, because like it or not, the technology enables it and the precedent is there. Through modeling and gaming the possibilities and consequences, we can determine when, if ever, it might be beneficial to have such high level strategic involvement, and develop doctrine to guide such involvement.

Another critical challenge to the whole concept of NCW is the fact that it seems to be gaining more skeptics as time passes, rather than recruiting more believers dedicated to helping move the concept forward. A more participative strategy is needed throughout the force structure before an overwhelming mass of “anti-inertia” forms. One approach to preventing this is to stop writing more about the increasingly theoretical and focus upon what is presently known, putting greater numbers of military professionals to work at all levels.

Finally, implementing NCW fully will likely lead to simplified organizational structures, fewer war fighting commands, and untraditional roles for many players. Tradition, service stovepipes, and general bureaucratic conservatism may prove to be even greater impediments to moving toward NCW than the technological challenges and our ability to discover the right paths to follow.

## **CONCLUSION**

In the not too distant future, warfighters and their commanders will share unprecedented visual awareness of every pertinent aspect of the battlespace. These elements will be able to see what each other see in real time and share the composite picture, allowing increased speed of command, higher tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization.

But how do we get there from here? Herein I argued that the current hierarchical command structure of the United States military is ill suited to take maximum advantage of the emerging concept of Network Centric Warfare and that the United States military should explore bold organizational models that reflect the

expanded capabilities that we foresee in the emerging concept. I further argued that the speed of Information Age warfare will demand more express command channels, and that we can accommodate this fact by streamlining the operational chain of command without sacrificing or endangering mission effectiveness. In an effort to shake us out of a time-honored paradigm, this paper described three notional models that reflect nontraditional relationships between command echelons at every level.

As noted early on, little has been written about Network Centric Warfare beyond an exciting yet obscure vision of an endstate. Furthermore, the later writings seem to be moving away from us, vis-à-vis becoming more distant and theoretical as opposed to more tangible and seemingly achievable. Let's face it – there seems to be far more skeptics than believers in uniform, and the numbers are tending in the wrong direction. There are numerous reasons for this, but a primary one is the fact that in the two or three years since the concept burst on the scene, we have made little tangible progress. And as we continue to prophesize on what future capabilities will be, enthusiasm and interest continues to wane, and understanding to blur.

The time is now to stop foreseeing and start seeing - to stop speculating about the unknown and start experimenting with what we know now. We know, for example, that how we currently organize, and how we exercise command is not the way we will need to do it as a Network Centric fighting force. This was clear before Global 98, which organized around the task of gaining a better understanding of command and control issues in Network Centric Warfare.<sup>19</sup>

Because NCW will likely render the “chain of command” as we know it obsolete and undesirable, we must boldly experiment with different ways of organizing and interrelating to achieve military objectives. And we must begin doing so now. To prepare for this future, we have to be willing to remake ourselves into whatever form we discover makes us most effective as netted warfighters, ignoring tradition, operating beyond our comfort zones, and letting no one or nothing stand in the way of progress.

APPENDIX A  
NATIONAL COMMAND STRUCTURE

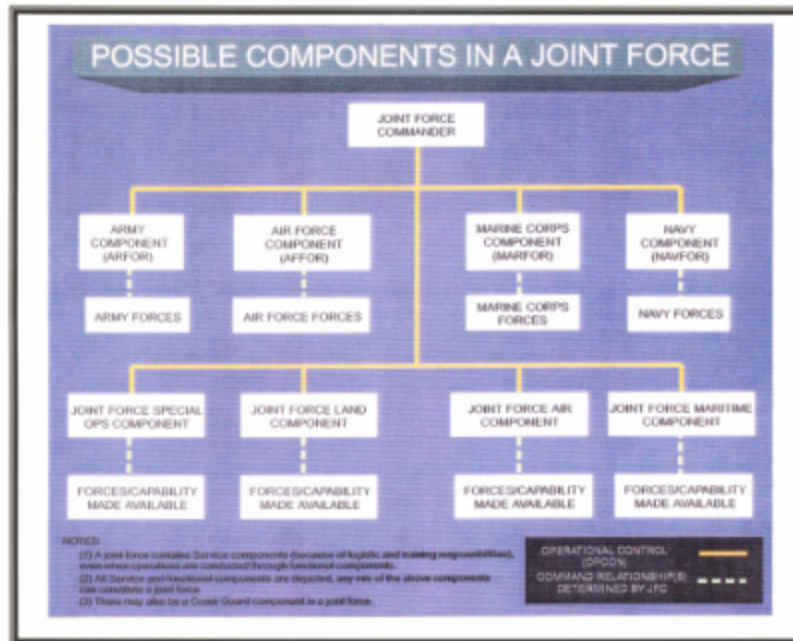


Reproduced from JP 3-0, Table II-3



**APPENDIX B**

**JOINT COMMAND STRUCTURE**



Reproduced from JP 3-0; Table II-5

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## Notes

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<sup>1</sup> For a discussion on the revolutionary impacts of the *levee en masse*, see various writing on French Revolution. Examples include Ross, Steven T., *Handbook of the Wars of the French Revolution*, NWC, 2000; and Chandler, David, *On the Napoleonic Wars*, London: Greenhill, 1994.

<sup>2</sup> Global 98 was the first major fleet wargame designed to explore the implications of emerging concept of Network centric Warfare in an empirical setting. The game disclosed several critical questions and insights discussed throughout this paper.

<sup>3</sup> *Global 98, Network Centric Warfare*, July, 1998, p. 14 "Insight."

<sup>4</sup> Alberts, et al, *Network Centric Warfare*, p. 2.

<sup>5</sup> Other operational aspects of NCW include speed of command, self-synchronization, etc. See Alberts, et al, *Network Centric Warfare* and *Global 98 Network Centric Warfare*.

<sup>6</sup> This COP description represents a conglomeration of thought from various readings and authors, including Alberts, et al, *Network Centric Warfare*, Cebrowski, "Military Responses to the Information Age," and *Global 98*, among others.

<sup>7</sup> This entire passage taken almost verbatim from Joint Doctrine (JP 3-0). It is presented here to call attention to how fundamentally at odds the military command structure is with the network concept, in order to set the stage for the introduction of the notional models.

<sup>8</sup> Orders might flow through the traditional hierarchy as follows: 1) National Command Authorities – 2) Combatant Commander – 3) Joint Force Commander – 4) Service Component Commander/Functional Component Commander – 5) Sub-service Component Commander /Sub Functional Component Commander—6) Tactical Commanders and warfighting elements.

<sup>9</sup> Speed of Command is defined as "the conversion of superior information position into action." It involves the ability to make optimum decisions based upon the rapid assessment of friendly and enemy alternatives. Read more on speed of command and other key concepts of NCW in Alberts, et al, *Network Centric Warfare*, starting at p. 87.

<sup>10</sup> Cebrowski, "Military Responses to the Information Age," p. 27.

<sup>11</sup> *Ibid.*, p. 28.

<sup>12</sup> Command and *collaboration* as opposed to command and *control* is a decentralized control concept currently being examined by the United States Marines Corps that envisions commander's intent and the common operating picture being conveyed to the warfighter through networked information systems.

<sup>13</sup> OPCON = operational command.

<sup>14</sup> Refers to the OODA loop of Observe-Orient- Decide-Act often referred to in descriptions of Network Centric Warfare.

<sup>15</sup> Lawlor, Pacific Command Build Electronic Bridges, in *Signal*, Nov. 2000, pp. 51-55.

<sup>16</sup> USCINCPAC homepage, <http://www.pacom.mil/staff/newhq/newhq.html>

<sup>17</sup> Loosely attributable to Jenik and Schaffer, "Beyond the Rose Colored Glasses." See bibliography entry above.

<sup>18</sup> Martin, Zachary, *An Emerging Concept*, p. 91.

<sup>19</sup> Global 98 identified the exploration of Command and Control in Network Centric Warfare as the central theme of the game.