14th ICCRTS: C2 and Agility

"Rethinking Command and Control"

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Topic 1: C2 Concepts, Theory, and Policy

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Rethinking Command and Control

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Abstract

The term command and control has come into question from both the theoretical and the operational front. Dr. Alberts noted in his *International C2 Journal* article that "the future of command and control is not *command and control*."[1] Rather, C2 should be rebuilt on a new conceptual foundation that incorporates agility, focus, and convergence.

With the military's traditional warfighting roles and mission now being expanded to include peacekeeping operations, humanitarian/disaster relief, and phase zero operations, the question of how well these non-kinetic operations are able to leverage extant C2 systems becomes part of the requirements discussion. A similar rethinking of command and control is occurring at the operational level where commands such as U.S. Southern Command (SOUTHCOM) are shifting away from traditional C2 constructs towards more collaborative endeavors.

In this shifting theoretical and operational environment, how do warfare centers and other technology developers manage C2 portfolios for an often-competing and divergent set of requirements? This paper will focus on the changing environment facing C2 developers and examine how those in the warfighting centers are adapting to providing an agile C2 to meet current mission requirements.

Rethinking Command and Control

[1] David S. Alberts, "Agility, Focus, and Convergence: The Future of Command and Control," *The International C2 Journal* 1, no. 1 (2007): 1-30.

A caveat before beginning, this paper will explore command and control from the naval perspective. While the notions of command and control remain consistent when applied to all aspects of military endeavors, the naval experience will guide the discussions below.

The term command and control (C2) has come into question from both the theoretical and the operational front. At the theoretical level, C2 is being refocused to meet the growing demands of a new security environment. Dr. David Alberts noted in his *International C2 Journal* article that "the future of command and control is not *command and control*."[2] Command and control is a term that, for Dr. Alberts, needs to be re-envisioned to meet the Information Age that is characterized by a complex security environment.

> "…the assumptions upon which *Command and Control* were based are no longer valid. *Command and Control* is not well suited for coalition operations, particularly the kind of complex endeavors called for in the twenty-first century. Furthermore…*Command and Control* is not necessarily the best choice for some military operations."[3]

Similar reconsiderations of the traditional ideas of command and control have been voiced at the operational level. The Vice Chairman of the Joint Chiefs of Staff, General James Cartwright, stated at a 2009 Armed Forces Communications and Electronics Association (AFCEA) event in Virginia:

> "We like this idea Napoleon put together—command and control…We want to centralize power, bring it into the core, bring all the information there and then distribute it, and it fundamentally disadvantages us….I'm not talking about getting rid of the chain of command, but I am talking about enabling the warfighter in ways that are significantly different than what we do today, and the technology is there to do it."[4]

What is C2?

Before we continue with the exploration of the future of C2, one must first define what is C2 and trace its development over the course of military history. This discussion provides a better understanding of why Dr. Alberts is calling for a radical approach to thinking about command and control—and perhaps abandoning the concept all together.

Command and control is defined as "[t]he exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing,

[2]David S. Alberts, "Agility, Focus, and Convergence: The Future of Command and Control," *The International C2 Journal* 1, no. 1 (2007): 1.
[3] Alberts, "Agility," 4.
[4] Dan Taylor, "Cartwright: Navy's Need to Centralize Everything Hurts Warfighter," *Inside the Navy*, 9 March 2009.

coordinating, and controlling forces and operations in the accomplishment of the mission. Also called C2."[5]

From the naval perspective the central figure of C2 is the commander who "commands by deciding what must be done and exercising leadership to inspire subordinates toward a common goal; he controls by monitoring and influencing the action required to accomplish what must be done."[6] Central to the notion of command and control is the hierarchy that allows for a central figure—a commander—to work as a cohesive unit to accomplish a goal. The establishment of a clear "chain of command" has enabled naval commanders to "cope with the uncertainty of combat and to employ military force more efficiently."[7]

The dual nature of C2

The essence of command and control is the management of uncertainty with the assumption that the victor is the one with the better approach. Naval historian Michael A. Palmer further expands on the essence of command and control in his book titled *Command at Sea: Naval Command and Control Since the Sixteenth Century*. Palmer argues that during the advancement of naval doctrine and the expansion of sea control by the dominant maritime nations of the sixteenth century, two philosophies of the application of command and control emerged. The first approach is the adoption of a centralized system of command and control to provide a clear hierarchy of authority. The second system is to accept some elements of uncertainty of warfare and decentralize command and control.[8]

The battle that best epitomizes the dual nature of command and control and continues to serve as an allegory for modern day debates over the merits of either approach is the famed battle of Trafalgar of 1805. At Trafalgar, Admiral Nelson's decentralized approach allowed his seasoned commanders to correctly interpret his intent in the heat of battle. Admiral Nelson's decentralized command style centered on his faith "that all of his subordinates would perceive a developing situation in the same way—that is they would have a shared situational awareness."[9] The Combined Fleet led by Admiral Villeneuve did not have the shared experience to allow for a decentralized approach to the battle and thus did not do too well in the chaos that ensued when Nelson's fleet drove through their lines. Nelson's victory over the combined French and Spanish may have helped to save Great Britain from Napoleon but it sparked the debate over which approach to command and control offers the best naval military edge. While Nelson's decentralized model proved advantageous to the British fleet, the centralized version of command and control quickly dominated military tactics.

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[5] Department of Defense (DoD), *Department of Defense Dictionary of Military and Associated Terms*, (Joint Chiefs of Staff: 2008): http://www.dtic.mil/doctrine/jel/doddict/data/c/01078.html.
[6] Department of the Navy (DoN), *Naval Doctrine Publication 6: Naval Command and Control* (Washington, D.C.: Naval Doctrine Command, 1995): 9.
[7] DoN, *Naval Doctrine*, ii.
[8] Michael A. Palmer, *Command at Sea: Naval Command and Control Since the Sixteenth Century* (Cambridge, MA: Harvard University Press, 2005): 12-16.
[9] Edward A. Smith, Jr., "Network-Centric Warfare: What's the Point," *Naval War College Review* 54 (2001):70.

John F. Schmitt argued that the Western reliance on Newtonian science as the main paradigm to problem solving is the key driver in the reliance on centralized command and control.[10] Since then command and control has shifted between a heavily centralized model and some variant of Nelson's decentralized model—with the centralized model dominating most strategies. From the perspective of military theorists and strategists the clear and rational approach that underpins the centralized model of command and control offered the best means to control the uncertainties of war. A Newtonian approach to war allowed for military planners to rely on the scientific method to gather some semblance of control over the chaos of warfare.

> "Newtonian war is deterministically predictable: given knowledge of the initial conditions and having identified the universal "laws" of combat, we should be fully able to resolve the problem and predict the results. All Newtonian systems can eventually be distilled to one simple concept: cause and effect….The object of Newtonian command and control is to gain certainty and impose order—to be "in control."[11]

The centralized/Newtonian model was prominent in Industrial Age warfare where national lines were drawn clearly and the rules of war and engagement were fairly straight forward as great national powers dominated the political landscape. The arrival of the Information Age that is marked by the advent of the microprocessor and the information communication technologies that emerged from it brought about the means to bring Admiral Nelson's self-synchronizing approach to fruition. The Information Age also coincided with the growing interconnectedness of the world that has been described as the globalization of world affairs. With greater connectedness comes greater complexity as information and people have been able to move around with an ease that has never been accomplished before the invention of the jet engine. Also emerging with the complexity of the global environment as seen when transnational terrorist groups are able to mount well organized strikes against well armed military forces.

Network Centric Warfare and C2

Network Centric Warfare (NCW) harnesses the technologies of the Information Age to "[generate] increased combat power by networking sensors, decision makers, and shooters to achieve shared awareness…and a degree of self-synchronization."[12] The center of NCW's approach is similar to Nelson's self-synchronizing command style, but on a larger scale. Network Centric Warfare is defined as "the concept of linking all aspects of warfighting into a shared situation awareness and understanding of command intent so as to achieve a unity and synchronicity of effects that multiplies the combat power of military forces."[13]

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[10] John F. Schmitt, "Command and (Out of) Control: The Military Implications of Complexity Theory," in *Complexity, Global Politics, and National Security*, eds. David S. Alberts and Thomas J. Czerwinski (Washington, D.C.: National Defense University, 1997), 99-100.
[11] Schmitt, "Command and (Out of) Control," 100 -101.
[12] David S. Alberts, John J. Garstka, Frederick P. Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority* (Washington, D.C.: DoD Command and Control Research Program, 2002), 2.
[13] Edward A. Smith, *Effects Based Operations: Applying Network Centric Warfare in Peace, Crisis, and War* (Washington, D.C.: DoD Command and Control Research Program, 2002), 48.

While NCW promised to link all aspects of military activity to allow for greater awareness and unity, command and control remains held by the need to centralize. With the military's traditional warfighting roles and mission now being expanded to include peacekeeping operations, humanitarian/disaster relief, and phase zero operations, the question of how well these non-kinetic operations are able to leverage extant C2 systems becomes part of the requirements discussion.

Strategic trends driving a new C2 approach

A changing geopolitical landscape, as emphasized by recent strategic guidance, points to the need for one to consider a new approach to command and control. Specifically, these strategic documents such as the Joint Forces Command's (JFCOM) *Joint Operating Environment 2008* argue that the new operating environment requires more than unilateral, military-centric approaches; future challenges will demand solutions characterized by their joint, interagency and coalition focus. In many ways, the efforts undertaken in this future environment will seek to undermine the forces that can potentially lead to conflict. As the 2008 *National Defense Strategy* (NDS) explains:

> "The best way to achieve security is to **prevent war when possible** and to encourage peaceful change within the international system. Our strategy emphasizes building the capacities of a **broad spectrum of partners** as the basis for long-term security. We must also seek to strengthen the resiliency of the international system to deal with conflict when it occurs. We must be prepared to deal with sudden disruptions, to help prevent them from escalating or endangering international security, and to find ways to bring them swiftly to a conclusion."[14]

While the United States will seek to maintain its overwhelming military prowess, meeting new and emerging security challenges will require the interoperability of U.S. forces with the more modest means of allies and partners. A globally focused force will have to find a way to operate successfully with partners focused on local or regional threats. Moreover, and as alluded to by the *NDS*, in cases such as humanitarian assistance and disaster relief operations, non-governmental organizations could emerge as critical players as well.[15] An agile C2 capable of adapting to these multi-nation and multi-agency operations will be necessary in meeting many of these non-traditional missions that at times will not only involve non-traditional partners, but non-state actors as well.

Over the long-term, the prospect for instability and conflict will likely increase due to the confluence of several key trends. In its most recent effort to understand the future security environment, the National Intelligence Council (NIC) identified what it terms "relative certainties" over the next 25-year period, including: the prominence of the United States as the

[14] Department of Defense, *National Defense Strategy* (Washington, D.C.: U.S. Department of Defense, June 2008), 9.

[15] As an example of this kind of operation, note the inclusion of non-governmental organizations, such Project HOPE and Operation SMILE, during the deployments of the USS Boxer and USS Kearsage as part of civic assistance mission Continuing Promise 2008 to the SOUTHCOM AOR (Source: SOUTHCOM Commander's Blog, *"US Fourth Fleet - One Partner in the Security and Stability of the Americas,"* January 20, 2009, available at www.southcom.mil.

single most powerful country, albeit less dominant; a greater potential for conflict given rapid changes in the Middle East and the spread of lethal capabilities; and, the emergence of a global multipolar system with the rise of China and India (among others), as well as the increase in the relative power of non-state actors.[16] Underscoring the trend toward an environment defined by the need for multilateral approaches, the report explains:

> "This is a story with no clear outcome . . . Although the United States is likely to remain the single most powerful actor, the United States' relative strength—even in the military realm—will decline and US leverage will become more constrained. At the same time, the extent to which other actors—both state and nonstate—will be willing or able to shoulder increased burdens is unclear. Policymakers and publics will have to cope with a growing demand for multilateral cooperation when the international system will be stressed by the incomplete transition from the old to a still-forming new order."[17]

Recognizing the scope of these challenges, a recent assessment by JFCOM posits the implications for conducting warfare in this century. While questioning the belief that major conventional conflict remains a remote possibility, it acknowledges the need to "recognize and confront the irregular fight we are in."[18] In this regard, JFCOM underscores the need for partnership when possible, unilateral action when required, and a realization that the nature of conflict will continue to change present novel challenges:

> "The forms of future war will each present peculiar and intractable challenges to joint forces. The U.S. will always seek to fight and operate with partners, leading where appropriate, and prepared to act alone when required to support our vital national interests. However, there is every likelihood that there will be few lines of delineation between one form of conflict and another. Even in a regular war, potential opponents, engaged in a life and death struggle with the United States, may engage U.S. forces across the spectrum of conflict. Thus, the Joint Force must expect attacks on its sustainment, its intelligence, surveillance and reconnaissance (ISR) capabilities, and its command and control networks."[19]

Given the changing spectrum of conflict and the present trends affecting the security environment, the need for a robust and agile C2 infrastructure comes into focus. Addressing these challenges within a joint, coalition, and multi-agency framework under circumstances of outright conflict or operations other than war highlight the need for agile C2.

Developing Agile C2

In an ever-changing environment, technology developers face the unenviable task of not only engineering complex systems to meet difficult challenges, but must also do so with an ever-

[16] *Global Trends 2025:A Transformed World* (Washington D.C.: National Intelligence Council, November 2008), iv.
[17] *Global Trends 2025*, vi.
[18] Department of Defense, *The Joint Operating Environment 2008* (Suffolk, VA.: U.S. Joint Forces Command, November 2008), 43.
[19] *The Joint Operating Environment 2008*, 44.

evolving set of requirements. A particularly acute subset of technology development facing these issues are C2-related research and design efforts that not only must seamlessly integrate with existing platforms, but must also act as the glue for emerging systems and requirements.

At the macro-level, Secretary of Defense Robert Gates frames the discussion when he contrasts that the "Department of Defense's conventional modernization programs seek a 99 percent solution over a period of years" while today and tomorrow's "stability and counterinsurgency missions require 75 percent solutions over a period of months." Secretary Gates added that the "challenge is whether these two different paradigms can be made to coexist in the U.S. military's mindset and bureaucracy." [20]

A separate-but-related challenge is ensuring that systems can meet the required mission threads they are/were designed for, while being flexible enough to accommodate emerging changes in the environment and mission set. To that end, in the C2-realm, an initiative stands out as critical in accomplishing this—the Department of Defense's (DoD) shift to a Service Oriented Architecture (SOA). To the Navy, this shift entails that "all services are visible, trusted, accessible and usable – when needed and where needed – to accelerate the decision cycle process throughout the DON WarFighter community…"[21] Just as industry's stand-alone software applications required specialized code to transform the data, move it between systems, and manipulate the data, so too are many military systems stovepiped. The slow-but-steady shift to SOA, whose mainstays include the exposing of data, development and implementation of standards, and interoperability requirements, is essentially the business case for NCW.

With respect to the development of C2 systems, therefore, ensuring that a system is able to meet the *general* requirements for a broad set of mission threads can at times be preferable to one solely optimized for a small set of specific requirements, particularly when time and monetary costs are factored in. That means that in many cases, building the sub-optimal system in terms of operational requirements may be *the* optimal system overall. According to Lee Zimmerman, Chief Engineer of SPAWAR Systems Center Pacific's C2 Department, the idea "is to build a system that is as flexible as possible" and that is able to be fielded today, but still be able to evolve to meet emerging requirements. As mission threads continue to expand to include non-kinetic options, the importance of this kind of re-thinking of C2 cannot be understated.

In a related topic, the DoD acquisition community has recognized the importance of incorporating evolutionary development within the acquisition cycle in their recently issued DoD Instruction 5000.02. The instruction notes that the preferred method for rapid acquisition of mature technology for the user is an evolutionary approach that "delivers capability in increments, recognizing, up front, the need for future capability improvements."[22]

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[20] Robert Gates, "A Balanced Strategy," *Foreign Affairs*, January/February 2009.
[21] Department of the Navy, Chief Information Officer. "Department of Navy Service Oriented Architecture (SOA) Transformation Group Charter." 28 April 2006, accessed at: <http://www.doncio.navy.mil/EATool/Documents/DONSOACharter14Dec06.pdf>
[22] Department of Defense, Instruction 5000.02 "Operation of the Defense Acquisition System," 8 December 2008 (Enclosure 2) accessed at: <http://www.dtic.mil/whs/directives/corres/pdf/500002p.pdf>

The corollary between how the DoD now mandates acquisition and how C2 is evolving is centered in understanding that technology developers are being driven both from a process and a requirements standpoint to devise solutions that work today *and* tomorrow; that work with 'our' radios *and* with 'their' radios, whomever 'they' may be; that seamlessly expose and correlate data across agencies and across borders so that, when needed, warfighters, whether waging war or waging peace, can rest assured that they have knowledge superiority.

As command and control diverges from rigid structures, so too must the technology that supports *agility, focus, and convergence* be just that: agile, focused, and converging.
At the operational level, commanders are looking for the technologies that would help them to build collaborative centers such as Southern Command's (SOUTHCOM) Partnership for the Americas Collaboration Center (PFACC). The name change reflects Admiral Stavridis' intent to evolve C2 into a more collaborative endeavor at the joint, federal, and international levels. The PFACC model developed at SOUTHCOM will be transferred to the construction of SOUTHCOM's new headquarters, further influencing how SOUTHCOM will organize its C2 functions in the future.

Command and control is undergoing great change at the theoretical and operational level as information technologies have made it possible to imagine a future where commanders can achieve a Nelson-like self-synchronization. The path to that future requires an open and active dialogue between all the stakeholders—the requirements generators, policy makers, theorists, scientist and engineers. As General Mattis noted in his address to the House Armed Services Committee in March of 2009, "C2 is a human endeavor."[23]

[23] General James M. Mattis, "Statement Before the House Armed Services Committee," 18 March 2009, http://www.jfcom.mil/newslink/storyarchive/2009/sp031809.html.

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14th ICCRTS

Rethinking Command and Control

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Authors: Jose Carreno, George Galdorisi, Stephanie Hszieh, Antonio Siordia

SSC Pacific … on Point and at the Center of C4ISR

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Rethinking Command & Control

"…the future of command and control is not *command and control*."

Dr. David S. Alberts
"Agility, Focus, and Convergence:
The Future of Command & Control"
The International C2 Journal, 2007

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C2 Defined

- Department of Defense: The "exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission"

- Navy Perspective: The central figure of C2 is the commander who "commands by deciding what must be done and exercising leadership to inspire subordinates toward a common goal"

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The Dual Nature of C2

- (1) – Centralized system of command and control to provide a clear hierarchy of authority
- (2) – Accept some elements of uncertainty of warfare and decentralize command and control

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Network Centric Warfare & C2

- **Core idea:** harness technologies to increase warfighter efficacy by networking sensors, decision makers, and shooters towards a shared awareness and self-synchronization

- While Network Centric Warfare promised to link all aspects of military activity for greater awareness and unity, C2 remains held by the need to centralize

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Geopolitical Landscape & C2

- **Joint Forces Command**: Current operating environment requires more than unilateral, military-centric approaches
  - Future challenges characterized by joint, interagency, and coalition focus
- **National Defense Strategy**: "The best way to achieve security is to prevent war when possible…"

- **Lesson:** C2 must be interoperable, particularly for non-traditional partners, and must support a broader range of missions

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Challenge: Developing Agile C2

- C2-related research and design efforts must seamlessly integrate with existing platforms, but must *also* act as the glue for emerging systems and requirements
- A Glimmer of Hope: Shift to a Service Oriented Architecture (SOA)
  - Exposing of data, development and implementation of standards, and interoperability requirements

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When Suboptimal *is* Optimal

- Ensuring that a system is able to meet the *general* requirements for a broad set of mission threads can, at times, be preferable to one solely optimized for a small set of specific requirements
- Often, building the sub-optimal system in terms of operational requirements may be *the* optimal system overall

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- **Lesson:** Build a system that is as flexible as possible

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An Operational Perspective

- Partnership for the Americas Collaboration Center (PFACC) at U.S. Southern Command
  - Reflects Admiral James Stavridis' intent to evolve C2 into a more collaborative endeavor at the joint, federal, and international levels

In speaking to how the military's focus on centralized control of all decisions slows down the warfighter

"I'm not talking about getting rid of the chain of command, but I am talking about enabling the warfighter in ways that are significantly different than what we do today, and the technology is there to do it."

General James Cartwright
Vice Chairman of the Joint Chiefs
March 4, 2009
Naval Information Technology Day
Tysons Corner, VA

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