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The Future of C2**

C2 Policy Track

**C2 Policy Evolution at the U.S. Department of Defense  
WWMCCS to a Unified Military Command Capability**

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## Abstract

*The primary command and control policy document for the U.S. Department of Defense (DoD) has been unchanged since 1971, the last time that DoD Directive 5100.30 titled “The World Wide Military Command and Control System” was published. Since this publication has, in effect, been obsolete for at least 10-15 years, one could argue that we have been operating without a Department-level C2 policy for at least that long. By all accounts, as witnessed during recent conflict, our tactical forces are doing a better job of C2 than ever before. The same might not be said for national and strategic C2. Nor may we believe coalition C2 is improved.*

*This situation then begs the following questions: is tactical C2 better because we have no effective department-level policy or in spite of that fact? Is a broad Departmental policy for command and control required only at the strategic and national level, and, if so, what should it address? Is DoD C2 policy necessary to address strategic or tactical C2; national or global issues: regional or theater concerns: or should it be directed primarily toward the joint and coalition environment, or all of the above. A more basic issue is what areas of C2 should be addressed. Some potential categories that come to mind are national, strategic, nuclear, global, regional, theater, joint, tactical, coalition, etc. Finally, but not of least importance, regardless of the categories selected, is a C2 policy needed to determine who should be in charge of ensuring command and control capabilities, at any level, meet the needs of the warfighter and how do these roles and responsibilities fit with legislative and regulatory mandates?*

*Importantly, as we move into a net-centric environment, does C2 change? Is an entirely new policy required that transcends previous policy?*

*Logically, it seems a DoD directive that codifies overall C2 policy for the Department should be at the forefront of DoD directives. This paper will examine the issues associated with replacing the WWMCCS policy of the past and, perhaps more importantly, open a dialog with respect to the future of C2 policies within DoD.*

The Department of Defense (DoD) is transforming its organizational and operational structures to deal with today's complex and rapidly growing asymmetric challenges. This transformation has resulted in new missions and new command relationships. However, the existing command structure is imperfect. Despite globalization and the telecommunications revolution, our military is still dependent upon on hierarchical, familiar, and very predictable 20<sup>th</sup> Century C2 methods and structures. Our national and strategic C2 uses a myriad of systems that are platform-centric and hardware-based. Despite the importance of these systems to our national defense, these programs have largely been independently developed, procured, funded, and managed by disparate services and federal agencies which significantly impede interoperability and information sharing. Over the years, the battle for centralization over decentralization, as well as sub-themes dealing with power and control, has hindered our ability to collaborate and communicate among senior decision makers. The problems and failures of past C2 systems and capabilities can provide valuable lessons learned for articulating the policies that will drive future C2 capabilities.

A cohesive process for implementing an enterprise architecture using advanced collaborative and decision-support capabilities that capitalize on technology will change the way we command, improve the way we fight, and support homeland security efforts. Only through the combination of clearly articulated and enforced policies, strategies and concepts will we achieve effective and efficient warfighter and senior leader decision-making. Deeper and more comprehensive collaboration among key national security agencies is required to begin laying the groundwork for a broader command and control (C2) policy. By defining, integrating and leveraging the entire information infrastructure, principal decision-makers will be able to better execute their responsibilities.

### **Where We've Been**

In the early 1960s, the command and control shortfalls exposed during the Bay of Pigs invasion and the Cuban Missile Crisis highlighted the need for better communications and for a more centralized, coherent, integrated and effective structure for managing military operations. As a result, President Kennedy immediately began to exert pressure for a more centralized command

capability. He “called for the creation of a command and control system that, while located in the Department of Defense, would be responsive to the needs of central decision makers and remain under ultimate civilian control at all times.”<sup>1</sup>

In response to the President, the top secret Partridge Report called for the establishment of the National Military Command System (NMCS) that would provide “a framework for streamlining, modernizing, and centralizing command and control.”<sup>2</sup> At the same time, the Pentagon’s nuclear policy goals evolved in response to civilian leadership. The Kennedy Administration and the Pentagon desired that the United States be able to “terminate a nuclear war on favorable terms by threatening further attack” - implicit in this policy was the requirement for a robust, survivable C2 system.<sup>3</sup>

In 1962, Secretary of Defense McNamara directed that the NMCS be put into operation. The Joint Staff was assigned responsibility for defining user requirements and the functional design of the system. Shortly thereafter, a DoD Directive was promulgated for the World-Wide Military Command and Control System (WWMCCS) that provided for robust C2 support directly to the President of the United States, Secretary of Defense, the Chairman of the Joint Chiefs of Staff and the Combatant Commanders, to ensure the essential means to make accurate and timely decisions for the employment of United States military forces. NMCS was to serve as the principle subsystem of WWMCCS and as the hub for a national level C2 structure. WWMCCS sought to make a defense-wide mega-system which would tie together already existing C2 systems including command posts, sensor systems, automated data processing systems and communications systems.

Despite the intellectual capital spent, WWMCCS had serious inadequacies. Specifically, there was no clear definition of what WWMCCS was to accomplish, and there was a lack of clear cut responsibility. Three incidents in the 1960’s highlighted the WWMCCS deficiencies. The attack on the USS Liberty in 1967 was one of the “most serious failures of C2 to that date.” It

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<sup>1</sup> “The World Wide Military Command and Control System: Evolution and Effectiveness,” David E. Pearson, Air University Press, Maxwell Air Force Base, Alabama, June 2000, page 34.

<sup>2</sup> Pearson, page 35.

<sup>3</sup> Pearson, page 53.

showed an NMCS that was compartmented, hierarchical, and linear in decision making. An “incredible odyssey of messages that might have saved Liberty” were “lost, misrouted, and delayed.”<sup>4</sup> Then, in 1968, the USS Pueblo incident clearly showed that military facilities and command centers lacked the necessary connectivity to give, and respond to, top-level orders and requests for information. Ineffective C2 procedures and systems hindered U.S. military intervention that could have prevented the incident. Finally, in 1969, information that might have prevented the shoot down of a U.S. reconnaissance plane (EC- 121), and certainly the delay of the shoot down information reaching command authorities, occurred because the “various facilities through which the message passed – at each point officials had to consider the message its implications before deciding whether to pass it up the chain of command.”<sup>5</sup>

Regardless of the top-down mandate for WWMCCS, it existed for many years as a “bureaucratic fiction” – an organizational concept of how disparate subsystems were tied together, rather than “a hard commitment of funds, hardware, personnel, and managerial authority.”<sup>6</sup> Key to the organizational construct at the beginning was “a centralized, top-down management structure focusing on the needs of the NCA as a priority for crisis management.”<sup>7</sup> This management structure, the “WWMCCS Council,” was chaired by the Assistant Secretary of Defense (Telecommunications), with the other members consisting of the Deputy Secretary of Defense, Chairman Joint Chiefs of Staff and Assistant Secretary of Defense (Intelligence). The Council was intended to provide a number of functions and serve as an agent of centralization. Its primary functions were to:

- Provide general policy guidance to the JCS regarding the operation and future development of WWMCCS.
- Resolve policy conflicts.
- Review the results of system testing, signaling that effectiveness criteria would now be promulgated at the top rather than at the subunit level.

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<sup>4</sup> Pearson, page 78.

<sup>5</sup> Pearson, page 91.

<sup>6</sup> Pearson, page 55.

<sup>7</sup> Pearson, page 144.

- Facilitate work on a number of projects considered necessary for strategic command and control modernization.
- Serve as a high-level advocate for these projects in future budget wars.

However, this organizational construct ultimately failed because, at the time, the ability of this high level group to manage the evolutionary approach to WWMCCS was impeded by the size and complexity of the system, the myriad of technologies employed and the varied nature of the organizations involved in its development and operation. Because budgetary control was with the military Services, the institutional process by which WWMCCS was assessed to meet military needs embraced as advantageous those systems and capabilities that posed “no threat to organizational routines, strategies, or ‘essence.’”<sup>8</sup> Eventually, the Services subsumed WWMCCS development and they defined system requirements in ways beneficial to their interests. WWMCCS became a sub-unit dominated construct with interests of the system as a whole emphasizing Services’ needs over those of the national interest. As a result, missions and priorities were never perfectly aligned – the goal of central decision makers did not determine the sub-units’ orientation of actions with any precision or certainty and the center was unable to impose effective oversight and control over lower-level parts of the organization. The sub-groups that made up the organizational structure of WWMCCS acted to enhance their power and prestige relative to other organization constituencies. They collected information to enhance their value and to render other elements of the organization dependent upon their expertise.

In 1985, the Packard Commission recommended changes in three broad areas: planning and budgeting, defense acquisition and military organization and command. The commission report led to the Goldwater-Nichols Act in 1986 – a deliberate move in the direction of a more centralized C2 capability and to eliminate lack of jointness and the problems in C2 interoperability.

Despite the attempts to assert jointness and centralized development of C2 policy, multiple administrations failed to produce “a command and control system responsive to the needs of national leadership.” WWMCCS was partially replaced in the mid 1990s with the Global

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<sup>8</sup> Pearson, page 351.

Command and Control System (GCCS), which promptly broke down into Service stovepipe implementations (GCCS-M, GCCS-AF, GCCS-A). Of greater concern, GCCS consisted only of the applications and programs that supported joint warfighting at the operational level. There was an overt decision not to tie fundamental re-engineering of the “business processes” together with the evolution of the technology in global command and control. In short, GCCS replaced the ADP/IT requirements of WWMCCS, but not the organizational construct that was to drive centralization and provide national control. In fact, that organizational construct was eliminated. Lack of an organizational center of gravity has resulted in a serious lack of coordination between constituent elements. The criteria for system effectiveness are now promulgated by competing organizational factions (centralization vs. decentralization). This competitiveness has led to structural ambiguity, sub-units working at cross purposes, breakdowns of control and system failures.<sup>9</sup>

### **Where We Are**

Today, the Department of Defense is moving away from a centralized WWMCCS concept to net-centric operations. GCCS is being replaced by the Joint Command and Control (JC2) system. While joint operations (operations between and across the military Services) continue to be studied and capabilities funded, little attention is being paid to command and control capabilities required across and between the combatant commanders, as well as across and among the Federal government’s departments and agencies, and up to the President, the nexus of a national command capability. This lack of attention has created a dividing line between operational to tactical C2, national/strategic C2 and inter-agency collaboration. Because the policy that directs both the NMCS and WWMCCS has not been updated in over 30 years there is no unifying force that articulates a national to tactical concept for C2.

Although WWMCCS is dead, its legacy remains with us. On 9/11, the FAA, the White House and the NMCS each initiated multi-agency teleconferences, but none succeeded in meaningfully coordinating the military and FAA response to the hijacking. The follow-on 9/11 Commission recognized this inadequacy as part of the underlying C2 problem. Without a unifying command

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<sup>9</sup> Pearson, page 344.

concept and policy, the “national system” envisioned through the years and true joint operations will never be realized.

In the vacuum left by the loss of the WWMCCS organizational construct, the Defense Department is now largely focused only on joint warfighting without regard to national needs or the requirements associated with new global missions and the increasingly important role of Combatant Commanders association with other Departments and Agencies in the accomplishment of strategic missions. However, changes in warfighter responsibilities, coupled with the Department’s transformational move to Net Centric Operations, creates new concepts for C2, a focus on more than “joint” C2, and the need for updated policy to manage the evolution. That today’s integrated and seamless C2 is more than joint C2, and in fact requires a “unified” C2 strategy, is a direct result of the following:

- Assignment of Global C2 to the U.S. Strategic Command (2002 Unified Command Plan (UCP) Change 2) and Battle Management C2 to the U.S. Joint Forces Command (MID 912) which shifts significant C2 responsibilities to the warfighter.
- The 2001 Nuclear Posture Review and UCP focus on a broader set of missions that require enhanced C2 capabilities and functions for their accomplishment.
- The shift from platform-centric to net-centric operations changes the outcome driver from platform lethality to C2.<sup>10</sup>
- The revolution in Information Technology (IT) – rapid advancements in the technology that significantly increase capabilities.

The result of these changes drives the need for the first significant update to Departmental C2 policy since 1971, the last time that DoD Directive 5100.30 titled “The World-Wide Military Command and Control System” was published. Specifically, organizational, operational and technical policies are required that articulate integrated, net-centric C2 capabilities that will leverage network connectivity and services to enhance information integration and decision-

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<sup>10</sup> “...possibly the single most transforming thing in our Force will not be a weapon system, but a set of interconnections and a substantially enhanced capability because of that awareness.” Secretary of Defense Donald Rumsfeld, 9 August 2001.

support for the warfighter. Additionally, an update to the DoD Directive S-5100.44 “Master Plan for the National Military Command System” is long overdue.

Since the 1960s our nation has struggled to define a national command and control capability. The NMCS was originally intended “to serve as the C2 ‘bridge’ linking the National Command Authorities (the President and the Secretary of Defense) to the rest of WWMCCS, and in turn to the operating military forces in the field.”<sup>11</sup> Now that the ideology and organizing construct of WWMCCS is gone, new policy is required that will reinstate and organizational center of gravity that provides the direction and oversight needed to enhance senior decision-maker’s ability to dynamically collaborate and improve Combatant Commanders’ execution of supported and supporting roles – both globally and regionally.

### **The Way Ahead**

The links between our strategic objectives and governmental functions should be the focus of a DoD policy for C2 that address key ideological, organizational and technical issues. The lesson of WWMCCS requires that we specifically address five key issues: Organization, Ideology, Scope, Acquisition and Process.

- Our most critical task is conceptualizing an acceptable operational definition and understanding of the organizational center of gravity and its measures of effectiveness. This organizational center of gravity must be established in order to avoid the errors of WWMCCS, which failed to rationalize the WWMCCS management structure. The effort to create policy requires responsiveness to a center, free from a locus of competition and conflict, while still ensuring that coherent single organizational entity and budgetary control is vested with those who have the most interest in seeing the structure succeed.
- An overarching DoD C2 policy should apply an ideology that shifts the focus from “centralization” to assuring a capability supporting senior decision makers in a distributed, collaborative, and cooperative environment. A loosely coupled structure provides a degree of coordination and purpose that flows from the top. Additionally, the capability must have

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<sup>11</sup> Pearson, page 57.

the attributes required for national needs: responsive, flexible, survivable, enduring, reliable and secure.

- The scope of a DoD-wide C2 policy needs to be clear to ensure that C2 extends from the Commander-in-Chief to the warfighter. Application of management functions (administrative, operational, etc.) will be difficult to apply over the whole given the complexity of the environment because no one entity “owns” the enterprise. However, a workable approach can be established by properly dividing administrative and operational tasks.
- C2 capabilities acquisition requires a “weapons system” approach that synchronizes C2 information integration and human decision functions rather than attempting to achieve C2 requirements over acquired communications and transport “programs of record.” A key problem is that collaboration and coordination, as well as communications, always tends to be viewed more as a support function than as a critical function in its own right. As a result, policy is formulated essentially on an ad hoc basis rather than as part of a coherent plan to meet the nation’s requirements. Historically, for much of the previous century, C2 and C3 have been inseparable. As a result, we focus our resources on the third “C,” the *communications* pillar. Our legacy communications systems were mostly stove-piped, point-to-point or broadcast *communications links*. The “weapons system” must be defined – is it a concept, a system in its own right or a real meta-system?
- The process needs to be capabilities-driven vice process-driven. We need to orient the outcome toward providing capabilities closely aligned with the national goals - rather than the WWMCCS “means-oriented” approach. This capabilities-based approach supports increased agility by rapidly integrating information and information technology to meet changing decision making and operational needs, and provide assurance that the right information and resources will be there when and where they are required. This does not mean that decision makers need to adequately specify the sorts of information they require, with whom they might need to communicate, or precisely what type of system best suits their needs. Simply put, they need a comprehensive capability that is user-driven with increased richness in information, and access to expertise through a tailored and shared “operating picture” operating across all levels of government.

A strategy for addressing the five key issues will establish a conceptualization of an acceptable operational definition, an understanding of what constitutes organizational effectiveness and the vision and goals leading to a unified military command capability. A true unified military command capability will support accomplishment of departmental essential functions and ensure integration of existing C2 capabilities – command facilities, sensor systems, information technology and communications systems – and by assuring the required horizontal linkages across the DoD.

The unified military command capability policy must support current and anticipated national C4I needs and promote information sharing and collaboration between departments and agencies. Its specific goals should:

1. **Establish Enterprise Governance and Standards.** The enterprise standards serve to integrate global and regional capabilities through net-centric processes and ensure these capabilities will be seamless across all levels of command. Equally important is a governance process that will be overseen through establishment of an empowered senior-level executive council to provide strategy and guidance that ensures the enterprise is properly managed, assessed, and aligned to enable decision superiority. The mission of the executive council is to manage strategic direction, architecture and policy, and to develop inputs to influence existing processes and oversee the Department's efforts to accelerate the establishment of an integrated DoD-wide command and control (C2) enterprise capability. The council will review and advise the Secretary of Defense on all integrated C2 enterprise policy matters. The senior level council will collaborate with all applicable DoD Components, including the Under Secretaries of Defense for Policy, Acquisition, Technology and Logistics, and Intelligence, the OSD Principal Staff Assistants, Combatant Commanders, the Military Departments and Defense Agencies. The council will oversee and influence the current DoD funding, acquisition and requirements processes. Continuous monitoring and participation in these processes will allow the council to provide timely recommendations and corrective actions. To avoid the problems encountered by the WWMCCS Council of the past the responsibilities must be clearly spelled out in Departmental C2 policy. An example

of the oversight and management responsibilities of the senior level council would include the following:

- Establishing a strategic direction, policy and implementing guidance for an integrated DoD-wide C2 enterprise. These actions include providing a unified input into the generation of policies that ensure Service-unique C2 capabilities are integrated with, and not duplicative of, DoD enterprise C2 capabilities.
- Provide inputs into the Joint Capabilities Integration and Development System (JCIDS), the Acquisition Management System and the Planning, Programming, Budgeting and Execution (PPBE) processes that define an integrated C2 approach and objectives, including cost estimates for recommended enhancements and candidate offsets, to the maximum extent possible.
- Evaluating and recommending inputs into the operational, system and technical architectural views of enterprise C2 and related efforts to the Joint Staff, OUSD (AT&L) and OASD (NII).
- Developing C2 data strategies and other net-centric C2 activities, to include an Integrating Command and Control Concept of Operations, IAW DoD CIO policies and directives.

2. **Exploit the current DoD GIG efforts.** The DoD is engaged in a massive transformation effort. A key element of this effort is the transformation of the C2 infrastructure from a huge collection of independent “stovepipe” information systems, each supporting only its original procurement specification, to a unified assembly of interoperating systems that can meet the information needs of decision-makers at all levels with required timeliness and across the threat spectrum. This process is only possible by exploiting the current GIG efforts. Specific C2 technical policies need to address the attributes of C2 systems within the GIG environment. Some of the technical issues which should be addressed include the need to:

- Assure discovery, protection, mediation and performance are enabled through metadata
- Provide data tagging standards and information assurance policies

- Make data and information available on a network that people depend on and trust
- Provide unrestricted bandwidth, frequency and computing capabilities
- Assure appropriate and effective collaboration capabilities and performance support tools
- Support secure and assured information sharing
- Continuously refresh the information content of a user defined shared operating picture
- Promote infrastructure transparency (to the user)
- Assure independence of information and data for consumers and producers
- Consider that all users of information are also suppliers--post before you process
- Support information transactions asynchronous in time and place.

3. **Establish an Enterprise Command Architecture.** Provide migration path for legacy applications and data to the net-centric environment and create portfolio investment strategies. Revised or developed C2 technical architecture standards must support commanders in exercising command and control over assigned and attached forces across the full spectrum of military operations by: identifying the C2 domain technical standards that supplement the standards listed in the DoD IT Standard Registry (DISR) and Nuclear Command and Control sub-domain; employing appropriate systems engineering and analysis practices to achieve integration across the C2 enterprise; promoting seamless interoperability for C2 systems through use of common standardized interfaces and protocols for C2 systems, networks, transmission media and systems management; and defining metrics for new and updated C2 systems that provide the ability to measure agile C2 characteristics. In addition, this C2 technical architecture must still ensure the stringent availability, priority, security and survivability requirements are met for crisis and nuclear command and control operations. One approach toward achieving these goals is to use portfolio management by establishing a 'portfolio' of services from existing C2 programs of record that fulfill defined capabilities. This shifts focus from programs/platforms to capabilities and to data and services. An essential focus of the portfolio approach is defining key net-centric elements: domain lexicons, ontologies and taxonomies, thus ensuring authoritative data from programs of record are visible, available and usable, as well as exposing program services and

applications to the network. With success, we can then capture portfolio lessons into guidance, policy, doctrine and standards for broader domain applications.

## **Summary**

This paper has traced the evolution of DoD command and control from the early 1960's to its current transformation for net-centric operations. It has reviewed the lessons of the past beginning with the Bay of Pigs invasion, the advent of the NMCS as a framework for streamlining, modernizing and centralizing C2, and the significance of WWMCCS and its legacy. In discussing the current situation, we have noted the Department's on-going transformation to net-centric operations and joint C2 at the operational and tactical levels. Note has been made of the dividing lines among operational to tactical C2, national/strategic C2, and inter-agency collaboration. Of significance is the vacuum left by the loss of WWMCCS and its organizational construct, yet its legacy remains.

Additionally, the Department's transformation and changes in warfighter responsibilities mandate new C2 concepts and the need for policy and governance to manage the evolution that will fully enable C2 within a collaborative information environment and focus on a broader "unified" C2 in addition to the important "joint" C2.

Without an adequate basis founded in policy to begin characterizing the existing C2 systems, it will be difficult to execute C2 transformation. The single greatest reason why the current expensive, duplicative, and often ineffective collection of C2 systems continues to grow is that there has not been a sustained, consistent, repeatable (and persistent) approach to evaluating the systems and managing their evolution toward improvement. Additionally, without an organizing construct, an organizing center of gravity, these efforts will, like the blind man and the elephant, continue to attempt to identify piece parts of the problem without ever understanding the bigger whole.

The way ahead must focus on and address key ideological, organizational, and technical issues. Most importantly, an organizational center of gravity must be established to fully rationalize and

operationalize the DoD C2 management effort. The nexus of its efforts must be to assure a C2 capability that is distributed, collaborative, and cooperative from the Commander-in-Chief to the warfighter – a unified military command capability. That capability will not only enable effective and efficient warfighter and senior-level decision making, it will lay the groundwork for a broader C2 capability. This broader national command capability will enable deeper and more comprehensive collaboration across the Federal executive branch.

To avoid the problems encountered in the past, this governance center of gravity and its responsibilities must be clearly defined by DoD C2 policy. As stated in the beginning, only the combination of clearly articulated and enforced policies, strategies and concepts will achieve effective and efficient warfighter and senior decision-making. The locus of this effort must be a governance center of gravity charged with implementing an enterprise architecture using advanced collaborative and decision-support capabilities that capitalize on technology to transform the way we command, improve the way we fight and support homeland security efforts. By defining, integrating and leveraging the entire information infrastructure, principal decision-makers will be able to collaborate and cooperate and better execute their responsibilities.

*Acknowledgment: The discussion of the historical origins of WWMCCS and the NMCS in this paper relies heavily on “The World Wide Military Command System: Evolution and Effectiveness” by David E. Pearson, Air University Press, Maxwell Air Force Base, Alabama, June 2000.*