

Examining the Transformation to Net Centric Warfare (NCW)



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Introduction

This paper seeks to define and provide a general context to the term Net Centric Warfare (hereafter referred to as NCW). The first portion defines generally accepted descriptions of NCW. After defining NCW we provide some representative Army systems. Army systems are chosen because they represent the most demanding NCW environment. Unlike Naval Fleets and Air Force engagements, infantry-based NCW must use geographically dispersed assets that don't have the benefit of wideband communication links. In addition, the scale of infantry-based engagements vary widely. This paper continues with some further thoughts about the importance of NCW and concludes with where the future is headed.

Net Centric Warfare (NCW) is a term that has been in the Department of Defense lexicon for over a decade. NCW is a Concept of Operations (ConOps) which produces 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-synchronization¹.

NCW can also be described as an attempt to bring the methods and platforms of commercial organizations that use Customer Relationship Management (CRM) and Enterprise Requirements Planning (ERP) to "communications enable" their enterprises. For commercial enterprises, the result of these CRM/ERP systems is the ability to accomplish their respective market missions more effectively. This implies doing more to increase effectiveness while consuming fewer resources. In a military context, it means reducing or eliminating one's adversaries' ability or will to fight with a smaller, more economical and more efficient footprint.

The NCW model is predicated on the existence of secure robust network infrastructure (which provides ubiquitous data transport), combined with shared enterprise services (which provides access to discoverable domain services accessible via a flexible GUI). Given a technology foundation that provides the ability to share data via a fast and robust network infrastructure, NCW has transformed specialized platform centric systems to data centric systems, which facilitate and distribute information rapidly. As a result, an increase in data flow improves the quality and timeliness of

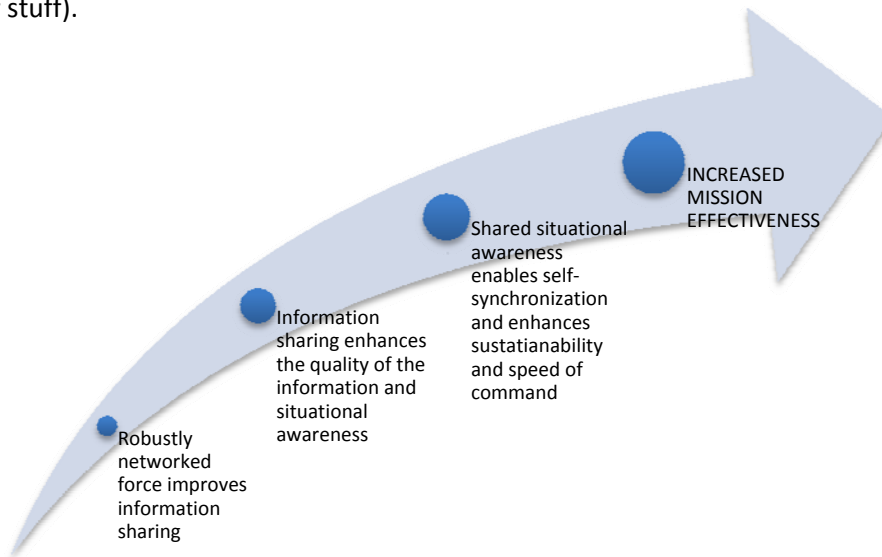
¹ Alberts Net Centric Warfare

available intelligence, thereby increasing the degree of situational awareness and the timeliness of data, enabling self-synchronization and enhancing the decision-making cycle at Command and Control. All these factors ultimately lead to an overall increase in mission effectiveness.

While considering the aforementioned descriptions, one must be mindful that the bulk of what passes for NCW currently is technology structured to address the automated needs of a major conflict. While upwardly scalable, it may not scale downward. As Jeff Cares details in his book, "Distributed Networked Operations: The Foundations of Network Centric Warfare," the belief of most NCW aficionados about approaches to combat assumes that:

"...ubiquitous sensing linked to common operational pictures, centralized databases and computers that can automatically assign weapons to targets will decrease reaction time, increase accuracy and optimize the weapons assignment process."

As the statement above suggests, most of the current thinking on NCW addresses classic, large force-on-force warfare and may need to be carefully tailored from other types of engagements (war on terror stuff).



NCO CONCEPTUAL FRAMEWORK

Recently, the Department of Defense has made many attempts to bring this commercial networked philosophy to assist the transformation of the military. They include the Distributed Common Ground System (DCGS), Army Battle Command System (ABCS) and Future Combat Systems (FCS). Some have reached a measure of success while others may have had the clock (and dollars) run out on them.

NCW Implementation Examples

DCGS

The Distributed Common Ground System is one of the leading examples of current DoD implementations of NCW philosophies. DCGS provides world-wide ground/surface capabilities to receive, process, exploit, and disseminate data from airborne and national reconnaissance sensors/platforms and commercial sources. The ability for any user to discover, access, and understand the data are key tenets of network-centric operations, which is the future of DCGS

operations². DCGS will integrate architecture, standards, and capabilities for implementation of the DCGS Integration Backbone (DIB) and support the migration to net-centricity, including convergence with Net-Centric Enterprise Services (NCES), for the following DCGS programs: DCGS-Army (DCGS-A), DCGS-Navy (DCGS-N), Air Force DCGS (AF DCGS), and DCGS-Marine Corps (DCGS-MC). National Agency capabilities supporting DCGS capabilities will also be integrated, including Imagery Intelligence (IMINT), Signals Intelligence (SIGINT), Measurement and Signature Intelligence (MASINT) and Human Intelligence (HUMINT).

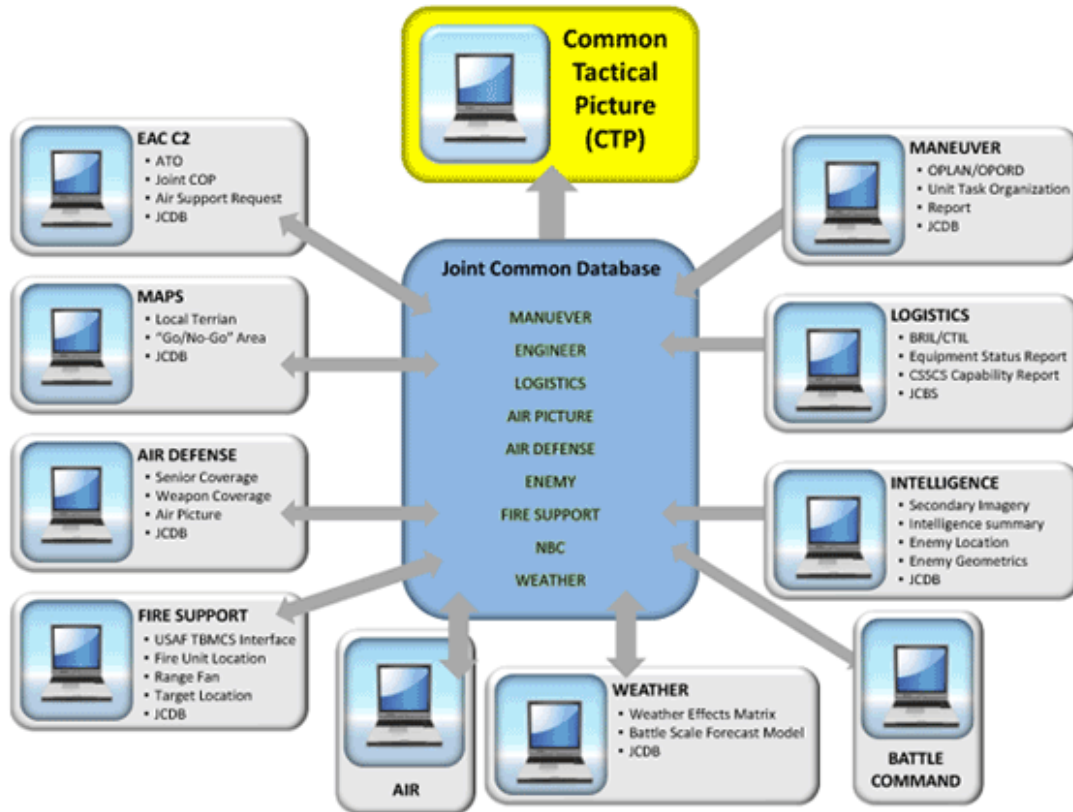
DCGS is focused on the prosecution and execution of NCW at the national level against, for the most part, a classically organized threat. The DCGS-A vision is to expose the capabilities and data from each ISR domain as services across the enterprise, rather than only to the traditional users of each domain's capabilities. This will enable the information from each previously stand-alone ISR system to be combined as fused workflows to provide more relevant and actionable information for the warfighter than ever before. The services approach would provide the easy integration of new capabilities as they become available, without requiring changes to existing capabilities. Based on a SOA foundation, DCGS-A would enable the rapid development of new workflows and capabilities across the entire ISR spectrum and permit the interoperability with other systems to meet the warfighters' needs, both today and in the future.

<i>Programs of Record</i>
All-Source Analysis System (ASAS)
Counterintelligence/Human Intelligence (CI/HUMINT) Single-Source Workstation
Tactical Exploitation System (TES)
Guardrail Common Sensor (GRCS)
Prophet control
Joint Surveillance Target Attack Radar System (Joint STARS)
Enhanced TRACKWOLF
Digital Topographic Support System (DTSS)
Integrated Meteorological System (IMETS)

ABCS

Army Battle Command Systems (ABCS) was created as a family of battle command and communications systems to share information from the Battlefield Functional Area (BFA) systems, both horizontally (across echelons of combat units) and vertically (up and down combat unit echelons). Army Battle Command System (ABCS) Version 6.4 is an integrated suite of PEO C3T products that allow a Commander or Soldier to react effectively on the battlefield, in disaster relief, or humanitarian assistance. When combined, the components of ABCS 6.4 form a system that allows Army Commanders and Soldiers to obtain automated views of friendly and unfriendly activity and supply movement and airspace, to plan fires and receive situation and intelligence reports, and lastly, to receive automatically disseminated weather analyses.

² Exhibit R-2, RDT&E Budget Item Justification APPROPRIATION / BUDGET ACTIVITY
Date: February 2008



<i>System</i>	<i>Capability Provided</i>
Advanced Field Artillery Tactical Data System (AFATDS)	Plan and control fires and effects
Air and Missile Defense Workstation (AMDWS)	Planning, control and execution of Air and Missile Defense
All-Source Analysis System (ASAS)	Intelligence operations and analysis places battlefield intelligence from Soldiers and sensors on the same network
Battle Command Sustainment Support System (BCS3)	Logistics and supply information for planning and control
Digital Topographic Support System (DTSS)	Terrain mapping and analysis
Force XXI Battle Command Brigade-and-Below and Blue Force Tracking (FBCB2 & BFT)	Maneuver planning below brigade and situational awareness for theater
Global Command and Control System – Army (GCCS-A)	Army’s strategic and theater command and control system and Army interface to joint systems - division and above
Integrated Meteorological System (IMETS)	Weather analysis
Integrated System Control (ISYSCON)	Communications system network management, control and planning
Maneuver Control System (MCS)	Supports command staff in planning, preparation and execution of battle from corps to battalion
Tactical Airspace Integration System (TAIS)	Airspace planning, control and de-confliction
Command Post of the Future (CPOF)	Supports command staff who are

	geographically separated with collaboration and communications capability for the planning, preparation and execution of battle from corps to battalion
Joint Information Operations Center - Iraq (JIOC-I)	Intelligence ingestion from broad spectrum of sources
Army Airborne Command and Control Systems (A2C2S)	An airborne platform to host battle command capabilities
Joint Network Node	Replaces Mobile Subscriber Equipment but adds beyond-line-of-sight satellite connectivity and uses commercially developed Internet Protocol

FCS

FCS provides Commanders and Soldiers with leading-edge technologies and capabilities, allowing them to dominate in asymmetric ground warfare while allowing the Army to build a force that can sustain itself in remote areas. The FCS program consists of new Manned Ground Vehicles (MGVs), a family of unmanned air and ground vehicles, the Non Line of Sight-Launch System, and advanced tactical and urban sensors that are all connected by a state-of-the-art network. Soldiers of the Army’s Evaluation Task Force (AETF) are currently evaluating Spin Out 1, which consists of FCS Brigade Combat Team (BCT) Battle Command capability, Joint Tactical Radio System (JTRS) (GMR/HMS), Unattended Ground Sensors, the Non Line of Sight-Launch System, the Small Unmanned Ground Vehicle (SUGV) and the Class I Block O Unmanned Air Vehicle.

Network connectivity also enables the Soldier to more effectively employ and control FCS unmanned ground and aerial systems, and to take full advantage of embedded training, logistics, and medical functions.

The FCS Network connects FCS platforms to the Soldier at every echelon, from Brigade to Squad. The Network also integrates our communications with other Department of Defense Agencies and with our allies.

The long development and deployment cycles of FCS, coupled with its inability to meet urgent critical needs in a manner deemed efficient by both the DoD leadership and Congress, has led to its very recent cancellation. Certain elements of FCS will be integrated into other programs, so it will live on in other incarnations and may possibly contribute to the overall transformation of NCW success.

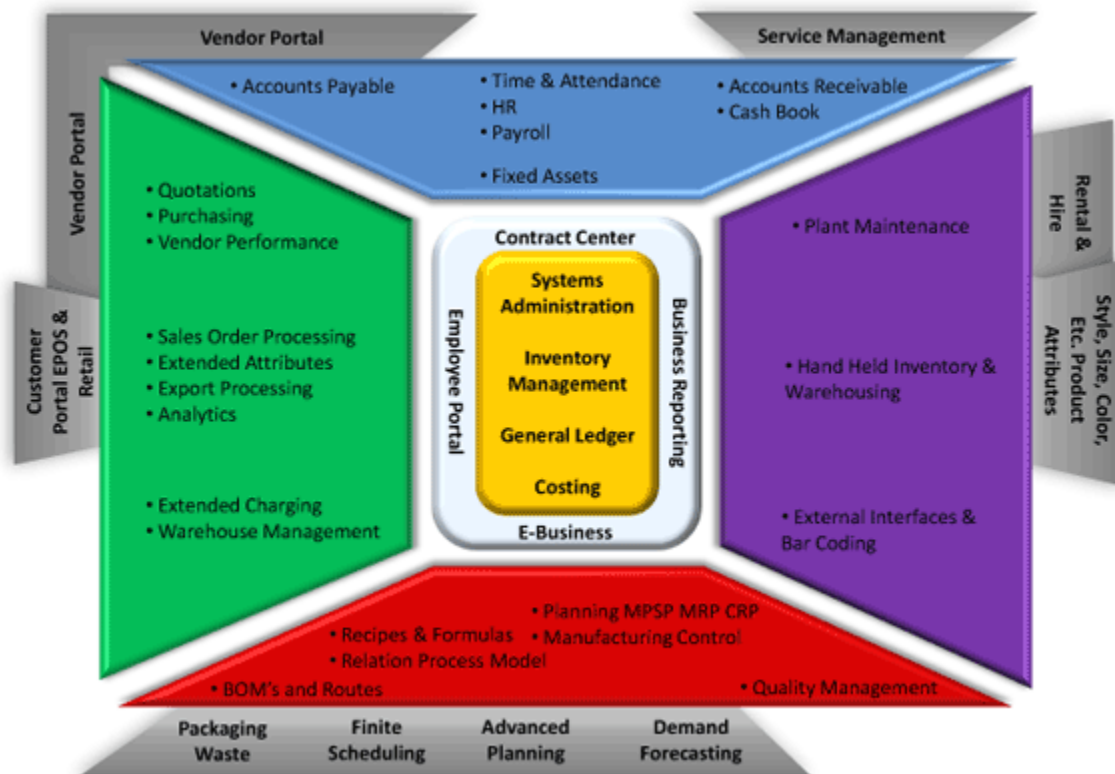
Challenges In Implementing NCW

If implemented, a major problem of NCW is that the operational structure in which they operate harnesses very little of the information superiority power they generate.

We have seen what the representative net centric C3 (command, control, and communications) or C4ISR (command, control, communications, computers, intelligence, surveillance, reconnaissance) tend to look like. In order to determine the architectural/mission faithfulness of the implementations, we need to compare them against the definitions and systems from which the concepts sprung.

Enterprise resource planning (ERP) system is the term used to describe a companywide computer/communications system used to manage all of the information, functions, resources or elements of a business from a set of shared databases. Typically included in these types of systems are

more specialized subsystems, the most prevalent being a customer relationship management (CRM) system. The CRM component is made up of those processes within the ERP system that the enterprise uses to track and organize its contacts with current and past customers. Intelligence information about customers' interactions (adversaries/threats) is managed by CRM systems in a manner that allows easy access to business intelligence, enabling sound and effective corporate (military) decision-making.



It is immediately noticeable that a major difference between the NCW systems and their commercial counterparts is the level of architectural integration that commercial systems exhibit. A closer look at the representative NCW systems will show that their net-centricity is bolted on. Instead of standardizing on a Point of Sale (POS) system, it would be as if a retailer permitted each store manager to operate their own POS system and then interconnected them back at the corporate headquarters using a rat's nest of cables. Taken in a NCW context, the result is not because the NCW designers are not as smart as their commercial brethren, but it is the artifact of intrinsic flaws in the acquisition and organizational components of DoD enterprises that is the issue: they were developed in a pre-NCW environment and have not yet completed their transformation efforts.

NCW cannot be truly achieved by haphazardly and awkwardly cobbling together a rag tag set of existing systems. The march towards the widespread implementation of enterprise-type, service oriented architectures like the Global Information Grid (GIG) or Net Centric Enterprise Services (NCES) will be difficult to achieve through the byzantine aggregation of late 20th century systems. Tim Berners-Lee (the inventor of the World Wide Web) did not say "Let's take gopher, Usenet, etc. and stitch them together on a desktop to integrate these functions." Instead, he analyzed the problem, created a new architectural concept that included the functionality of the aforementioned tools, and ultimately created the Web. With the Web in place, Marc Andreessen, along with a team at the

National Center for Supercomputing Applications, was then able to develop the first graphical web browser. It was these elements that unleashed the major net centric leap that makes our current lives easier, more informed, more collaborative and more economical.

Today we are at NCW Rev 0.0, which means that current systems are the earliest realization of NCW as defined in this paper. The “net-centricness” is bolted on and not an intrinsic property of these system’s design or their ConOps. Rather than start at existing systems of record—which severely limited NCW Rev 0.0—the next revision, NCW 1.0, should aggregate them and attempt to move them up the capability ladder. We should use Open Source technologies, implement a proof of concept and “ingest” the critical, secure elements into it. In this manner we can more economically and efficiently harvest the “golden nuggets” that exist in each of the current NCW systems. There are arguments that state Open Source systems are not reliable or secure, but this issue is irrelevant since we merely seek them as proof of concepts instead of operational systems. The proof of concept systems can then be considered during the acquisition strategy and can be made available to all vendors and contractors that are interested in participating in building the final operational systems. The additional advantage of doing this is that the vendors, contractors, etc. will have a target to aim for rather than be engaged in a food fight to protect their own parochial systems at the expense of the warfighter. The benefit to the DoD is that the dollars spent re-inventing the wheel can be applied directly to achieving real operational capability.

Conclusion

In closing, NCW is moving forward at a pace roughly comparable to an overall DoD transformation. The financial crisis and the strain it will put on military budgets will demand that the DoD become even more aggressive in fully implementing this concept to minimize duplication and inefficiency. Whether NCW will achieve the high hopes with which it was conceived will depend ultimately on how well the DoD transforms itself operationally and philosophically.