Naval Transformation: Prospects and Implications

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The U.S. military is awash in visions of transformation. An array of glossy joint and service visions of what has become known as the "military after next"[1] have been produced. Service transformation "roadmaps" have been developed. War games and experiments have been employed by the Department of Defense, the Joint Staff and joint commands, and the services in an effort to "validate" their visions. Analysts inside and outside of the military have opined about the emergent Revolution in Military Affairs (RMA).[2] The rhetoric of "revolution" and, somewhat less radically, of "transformation" is ubiquitous. It remains to be seen, however, whether any of the multitude of "visions" will be translated into reality.

Joint Vision 2020, as *Joint Vision 2010* before it, foresees a military that dominates the full spectrum of military operations, from low intensity conflict to major regional contingencies (MRCs), in new ways. Information superiority is to be the source of dominant maneuver, precision engagement, focused logistics, and full dimensional protection.[3] The Army's transformation project, complete with a "Vision," "Force XXI," and "Army After Next," is billed as the most significant change for the service since World War I. It promises to deliver an "Objective Force" that will be responsive, deployable, agile, versatile, lethal, survivable, and sustainable.[4] The Air Force, which,

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[1] Paul Bracken, "The Military After Next," *The Washington Quarterly*, Vol. 16, No. 4 (Autumn 1993), pp. 157-174.

[2] For a brief overview of some of the most pressing policy issues, see Robert Tomes and Peter Dombrowski, "Arguments for a Renewed RMA Debate" *National Security Studies Quarterly,* Vol. VII, No. 3 (Summer 2001), pp. 109-122.

[3] *Joint Vision 2020* is available at http://www.dtic.mil/jv2020/.

[4] For the Army's Vision and Army Transformation, go to http://www.army.mil/armyvision. For a useful overview of Army transformation issues see Edward F. Bruner, *Army Transformation and Modernization: Overview and Issues for Congress*, RS20787 (Washington, DC: Congressional Research Service, Library of Congress, April 4, 2001).

like the Army, has belatedly discovered that it must be an expeditionary force,[5] in its own

Vision 2020 promises to deliver "Global Vigilance, Reach & Power" by fielding a full

spectrum aerospace force to control and exploit not only the air but also space.[6] The

proposed force will employ "… aerospace capabilities to find, fix, assess, track, target,

and engage any object of military significance on or above the surface of the Earth in

near real time."[7] For the Navy, Network-Centric Warfare (NCW), explicitly advertised

as a vision of warfare for the information age, is to guide the transformation of today's

Navy into the Navy after next. Resting upon the "supporting concepts" of information

and knowledge advantage, assured battlespace access, effects-based operations, and

forward sea-based forces, the Navy's exploitation of information technologies is to result

in a "shift from platform-centric operations to Network Centric Operations."[8]

     In this paper we examine one specific vision of transformation, the Navy's

concept of Network-Centric Warfare. We provide the context for our exploration of the

Navy transformation case by first reviewing the Bush administration's approach to

transformation. In the second section of the paper, we turn to Network-Centric Warfare.

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[5] The Marine Corps, on the other hand, has always recognized that it is an expeditionary force. In *Marine Corps Strategy 21* it bills itself as "the premiere 'total force in readiness.'" Headquarters, United States Marine Corps, *Marine Corps Strategy 21*, Washington, DC, November 2000. Available at http://www.usmc.mil/templateml.nsf/25241abbb036b230852569c4004eff0e/$FILE/strategy.pdf.

[6] The USAF *Vision 2020* can be found at http://www.af.mil/vision/.

[7] From *The Aerospace Force: Defending America in the 21st Century*, p. iii, at http://www.af.mil/lib/taf.pdf. An overview of Air Force transformation issues is provided by Christopher Bolkom, *Air Force Transformation and Modernization: Overview and Issues for Congress*, RS20787 (Washington, DC: Congressional Research Service, Library of Congress, June 1, 2001).

[8] Navy Warfare Development Command, *Network Centric Operations: A Capstone Concept for Naval Operations in the Information Age* (Newport, RI: Navy Warfare Development Command, draft dated 6/19/01), p. 1. The growing literature on NCW includes David S. Alberts, John J. Garstka, and Frederick P. Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 2nd ed. (Washington, DC: C4ISR Cooperative Research Program, 1999); Vice Admiral Arthur K. Cebrowski and John J. Garstka, "Network-Centric Warfare: Its Origin and Future," U.S. Naval Institute *Proceedings*, January 1998, pp. 28-35; Committee on Network-Centric Naval Forces, Naval Studies Board, *Network-Centric Naval Forces: A Transition Strategy for Enhancing Operational Capabilities* (Washington, DC: National Academy Press, 2000), and Edward P. Smith, "Network-Centric Warfare: What's the Point?" *Naval War College Review*, Vol. LIV, No. 1 (Winter 2001), pp. 59-75.

A preliminary assessment of Network-Centric Warfare is provided in the final two sections. Our intent is twofold: (1) to evaluate the prospects for naval transformation and, by implication, the more general phenomena of U.S. military transformation; and (2) to begin to sketch out the implications of contemporary transformation for analytical debates on the nature of military innovation.

Military Transformation and the Bush Administration

In 2001, with the transformation debate already in full swing, the stakes were raised. The Bush administration took office proclaiming its commitment to transformation. Military transformation had emerged as an article of faith for the Bush team during the presidential campaign. In his September 1999 Citadel speech, then-Governor Bush called for "...creating the military of the next century," seizing the opportunity "…created by a revolution in the technology of war" skipping "… a generation of technology," and encouraging "… a new spirit of innovation."[9]

Early in his tenure, in the course of remarks at the Joint Forces Command on February 14, 2001, the new President returned to the themes of his Citadel address:

> "We are witnessing a revolution in the technology [of] war. Power is increasingly defined not by size, but by mobility and swiftness. Advantage increasingly comes from information…. Our goal is to move beyond marginal improvements to harness new technologies that will support a new strategy…. On land, heavy forces will be lighter. Our light forces will be more lethal…. In the air, we'll be able to strike across the world with pinpoint accuracy, using both aircraft and unmanned systems. On the oceans, we'll connect information and weapons in new ways, maximizing our ability to project power over land."[10]

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[9] Governor George W. Bush, "A Period of Consequences," The Citadel, South Carolina, September 23, 1999.

[10] "Excerpts From Bush's Remarks on the Military," *The New York Times*, February 14, 2001.

Even before the President delivered these remarks, Secretary Rumsfeld tapped Andrew

W. Marshall, the Director of Net Assessment and a longtime proponent of, and true

believer in, transformation, to lead a comprehensive review of U.S. defense strategy.[11]

Other panels were established to focus on transformation, conventional forces, nuclear

forces, missile defense, space, crisis response, acquisition reform, and quality of life,

among other issues.[12] Subsequently, the Office of Force Transformation (OFT), lead by

VADM Arthur Cebrowski, USN (Ret), a leading advocate of NCW, was established; the

services were directed by the Office of the Secretary of Defense (OSD) to develop

transformation roadmaps; and, most recently, a Defense Transformation Guidance was

developed to accompany OSD's Defense Planning Guidance.

The Bush administration's commitment to transformation was formalized in

DoD's September 2001 *Quadrennial Defense Review Report*. Even as the events of 11

September signaled the onset of the global war on terror, the President and his senior

leadership continued to emphasize the importance of "the transformation of U.S. forces,

capabilities, and institutions."[13] Transformation was once again proclaimed to be "at the

heart" of the administration's "new strategic approach."[14] Indeed, a renewed sense of

urgency was conveyed: "Transformation is not a goal for tomorrow, but an endeavor that

must be embraced in earnest *today*."[15] Four transformation pillars—(1) joint operations;

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[11] Thomas E. Ricks, "Pentagon Study May Bring Big Shake-Up: Unconventional Defense Thinker
Conducting Review," *The Washington Post*, February 9, 2001.
[12] See William M. Arkin, "Rumsfeld Top-To-Bottom Review Evolves," *Defense Daily*, April 16, 2001.
[13] *Quadrennial Defense Review Report* (Washington, DC: Department of Defense, September 30, 2001), p.
iv.
[14] *Quadrennial Defense Review Report*, p. 16.
[15] *Quadrennial Defense Review Report*, p. iv. Emphasis added. In DoD's 2002 *Annual Report to the
President and the Congress*, it is explicitly the attacks of 11 September that lend urgency to transformation.
Donald H. Rumsfeld, *Annual Report to the President and the Congress* (Washington, DC: Department of
Defense, 2002), p. 1. On p. 67 of the *Annual Report*, at the outset of Chapter 6, "Transforming the Force,"
it is argued that "September 11 made manifest the danger of postponing preparations for the future. We

(2) experimentation; (3) intelligence; and (4) research and development and selective

recapitalization—and a set of "six critical operational goals" were identified.[16]

The most prominent dimensions of transformation—technology, doctrine, and

organization[17]—were evident in the characterization of transformation provided in the

2001 QDR:

> Transformation results from the exploitation of *new approaches to operational concepts and capabilities*, the use of old and new technologies, and *new forms of organization* that more effectively anticipate new or still emerging strategic and operational challenges and opportunities and that *render previous methods of conducting war obsolete or subordinate.* Transformation can involve *fundamental change in the form of military operations*, as well as potential change in their scale. It can encompass the *displacement of one form of war with another*, such as *fundamental change in the ways war is waged* in the air, on land and at sea. It can also involve the *emergence of new kinds of war*, such as armed conflict in new dimensions of the battlespace.[18]

This characterization of transformation suggests that remaking the armed forces requires

more than routine, sustaining innovation. Transformation entails, as the 2002 *Annual*

Report explicitly recognized, "discontinuous change."[19] Disruptive innovation—as

suggested by (1) the QDR's use of RMA language; (2) its discussion of transformation's

"social" dimensions; and (3) its recognition of the necessity for "fundamental changes…

in organizational culture and behavior"[20]—is apparently in the offing as well.[21]

The Clinton administration's "balanced," Goldilocks and the Three Bears

approach to transformation, evident in its 1997 QDR, had seemingly been rejected by the

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must prepare now to anticipate future surprises and mitigate their effects." Available at
http://www.defenselink.mil/execsec/adr2002/index.htm

[16] *Quadrennial Defense Review Report*, pp. 30-47

[17] On the dimensions of transformation, see Andrew F, Krepinevich, "Calvary to Computer: The Pattern of Military Revolutions," *The National Interest*, No. 37 (Fall 1994).

[18] *Quadrennial Defense Review Report*, p. 29. Emphasis added.

[19] *Annual Report*, p. 68.

[20] *Quadrennial Defense Review Report*, pp. 6 and 29.

[21] On the distinction between sustaining and disruptive innovation, see Clayton M. Christensen, *The Innovator's Dilemma* (New York: HarperBusiness, 2000).

new administration. Instead, it appeared to have embraced the approach of the National Defense Panel, which in its critique of the 1997 QDR called for "Transforming the armed forces into a very different kind of military from that which exists today," for according "…the highest priority to executing a transformation strategy," and for accelerating transformation.[22] Future readiness, apparently, was now to be accorded a higher priority than current readiness.

Transformation, clearly, is a high priority for the Bush administration. Its commitment to transformation may even exceed that exhibited by the military itself. Transformation has been elevated to the top of the defense planning agenda, despite internal arguments that the military should focus on current readiness, the recapitalization and modernization of existing forces, and the prosecution of the global war on terror. Against this backdrop, the U.S. Navy has struggled to turn the concept of Network-Centric warfare, first developed under the stewardship of then-Vice Admiral Arthur Cebrowski, USN, from an abstract exercise in strategic thinking into a full-fledged plan for naval transformation.

The Naval Transformation Case: Network-Centric Warfare

Network-Centric Warfare provides an useful vehicle for exploring military transformation more generally. At least as much as other service visions, NCW is broadly representative of military transformation. Along with *Joint Vision 2020* and the visions of the other services, NCW emphasizes the need to bring the U.S. military into the information age. New commercial information technologies are to be applied to

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[22] National Defense Panel, *Transforming Defense: National Security in the 21st Century*, December 1997, p. iv.

military tasks. Information technology (IT) is thus viewed as central to the transformation enterprise; it enables the realization of prized capabilities such as precision strike and a "common operational picture." Moreover, NCW is inherently joint; the Navy cannot implement it in isolation from the other services. Indeed, NCW concepts are embedded in *Joint Vision 2020*. It is the essence of "information superiority," the key to *Joint Vision 2020*. Exploring NCW, using it as our visionary touchstone and point of departure, therefore, will reveal much about the broader military transformation enterprise.

According to its proponents, Network-Centric Warfare represents an emerging vision of the future of war.[23] That vision is driven by a particular understanding of the transformation of modern society from the industrial age to a post-industrial or information age at the beginning of the twenty-first century.[24] Advances in information technologies that have resulted in widespread socio-economic changes will also revolutionize the conduct, if not the nature, of war.[25] In particular, the increasing use of

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[23] NCW proponents include Vice Admiral Arthur Cebrowski, the former President of the Naval War College and now Director of DoD's Office of Force Transformation, and the concept developers at the Navy Warfare Development Command (NWDC).

[24] For serious treatments of the forces at work see Daniel Bell, *The Coming of Post-Industrial Society: A Venture in Social Forecasting* (New York: Basic Books, 1999) and Manuel Castells, *The Rise of the Network Society*, 2nd ed. (Oxford: Blackwell, 2000). For popular treatments, see Thomas L. Friedman, *The Lexus and the Olive Tree: Understanding Globalization* (New York: Farrar, Straus, and Giroux, 1999) and James Gleick, *Faster: The Acceleration of Just About Everything* (New York: Pantheon, 1999). Works that have received far more attention in military circles than they deserve include Kevin Kelly, *New Rules for the New Economy: 10 Radical Strategies for a Connected World* (New York: Viking, 1998); Alvin Toffler, *The Third Wave* (New York: William Morrow and Company, 1980); Alvin Toffler, *Powershift: Knowledge, Wealth, and Violence at the Edge of the 21st Century* ((New York: Bantam Books, 1990); and Alvin and Heidi Toffler, *Creating a New Civilization: The Politics of the Third Wave* (Atlanta: Turner Publishing, 1995).

[25] See John Arquilla and David Ronfeldt, eds., *In Athena's Camp: Preparing for Conflict in the Information Age* (Santa Monica: RAND, 1997); Eliot A. Cohen, "A Revolution in Warfare," *Foreign Affairs*, Vol. 75, No. 2 (March/April, 1996), pp. 37-54; Victor A. DeMarines, with David Lehman and John Quilty, "Exploiting the Internet Revolution," in Ashton B. Carter and John P. White, eds., *Keeping the Edge: Managing Defense for the Future* (Cambridge, MA, and Stanford, CA: Preventive Defense Project, 2000), pp. 61-102; Joseph S. Nye, Jr., and William A. Owens, "America's Information Edge," *Foreign Affairs*, Vol. 75, No. 2 (March/April 1996), pp. 20-36; and Bill Owens, with Ed Offley, *Lifting the Fog of*

networks for organizing human activities is touted as a means for reshaping the way American forces train, organize, equip, and fight.[26]

In brief, networks harness the power of geographically dispersed nodes (whether personal computers, delivery trucks, or warships) by linking them together into networks (such as the World Wide Web) that allow for the extremely rapid, high volume transmission of digitized data (multimedia). Networking has the potential to exponentially increase the capabilities of individual nodes or groups of nodes and to facilitate the efficient use of resources. When networked, individual nodes have access not only to their own resident capabilities but also, more importantly, to capabilities distributed across the network. The loss of a networked node need not be crippling; its functions can and will be assumed by other nodes in a robust network. Since networked

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War (New York: Farrar, Straus and Giroux, 2000). For a more popular account see Alvin and Heidi Toffler, *War and Anti-War: Making Sense of Today's Global Chaos* (New York: Warner, 1993).
[26] See, for example, Cebrowski and Gartska, "Network-Centric Warfare: Its Origin and Future;" Alberts, Gartska, and Stein*, Network Centric Warfare: Developing and Leveraging Information Superiority*, especially pp. 15-23. In his "Preface" to the April 2000 *Navy Planning Guidance,* the then-Chief of Naval Operations Admiral Jay L. Johnson wrote of building "a Navy for the Information Age" and its "transformation to a network-centric and knowledge-superior force." Chief of Naval Operations, *Navy Planning Guidance: With Long Range Planning Objectives* (Washington, DC: Department of the Navy, April 2000), p. i. According to the *Navy Planning Guidance*, p. 51, "The Navy of the future will conduct all operations based on the concept of **Network Centric Operations (NCO)**" (emphasis in the original). Similarly, the Vice Chief of Naval Operations recently declared that "… we are moving away from a platform-centered Navy to one being built around data networks…. [O]ur concept of operations will use as its basis an integrated, common network…." William J. Fallon, "Fighting to Win In the Littoral and Beyond," *Armed Forces Journal International*, June 2001, pp. 67 and 68. VADM Dennis McGinn has asserted, "investment in networks and sensors is transformational." Quoted in Robert Holzer, "U.S. Navy Mulls Fundamental Shift in Tactics, Funds," *Defense News*, May 7, 2001, p. 1. A useful discussion of NCW/NCO is provided by Scott C. Truver, "Tomorrow's U.S. Fleet," U.S. Naval Institute *Proceedings*, March 2001, pp. 102-110. For a comparison of U.S. and Swedish versions of NCW see Nick Cook, "Network-Centric Warfare:? The New Face of C4I," Interavia, February, 2001, pp. 37-39. Cautionary notes are provided by Thomas P. M. Barnett, "The Seven Deadly Sins of Network-Centric Warfare," U.S. Naval Institute *Proceedings*, January 1999, pp. 36-39; Richard J. Harknett and the JCISS Study Group, "The Risks of a Networked Military," *Orbis*, Vol. 44, No. 1, (Winter 2000), pp. 127-143; Franklin Spinney, "What Revolution in Military Affairs?" *Defense Week*, April 23, 2001.

nodes can share information efficiently, they can be designed as simple, low-cost adjuncts to the network itself.[27]

The United States armed forces have been developing, initially by serendipity but increasingly by design, the capabilities for Network-Centric Operations (NCO).[28] In a draft of a capstone concept paper, the NWDC identified four NCO "pillars," or supporting concepts: information and knowledge advantage, effects-based operations, assured access, and "forward sea-based forces" [sic].[29] (See Figure 1.)

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[27] Not all nodes, of course, are created equal. Some are more complex and, therefore, more expensive than others. The point is that networked nodes should be simpler and lower cost than stand-alone nodes.

[28] There is as yet no "official" Navy document or statement that describes NCW. Indeed, there is no real consensus among its proponents about precisely what NCW is or entails. Its proponents charitably view NCW as a dynamic, living, evolving concept. Skeptics are more inclined to characterize NCW as a moving target riddled with ambiguities and informed by dubious analogies. In a definition attributed to John Gartska, NCW is "Warfare which harnesses information technologies in the form of global sensor, connectivity, and engagement grids to achieve a common operational picture that will lead to self-synchronization, massed effects, and the desired lock-out of a given enemy's courses of action." See Robert Odell, Bruce Wald, Lyntis Beard, with Jack Batzler and Michael Loescher, *Taking Forward the Navy's Network-Centric Warfare Concept: Final Report*, CRM 99-42.10 (Alexandria, VA: Center for Naval Analyses, May, 1999), p. 11. The Naval Studies Board's Committee on Network-Centric Naval Forces defined network-centric operations as "military operations that exploit state-of-the-art information and networking technology to integrate widely dispersed human decision makers, situational and targeting sensors, and forces and weapons into a highly adaptive, comprehensive system to achieve unprecedented mission effectiveness." Committee on Network-Centric Naval Forces, Naval Studies Board, *Network-Centric Naval Forces*, p. 12. The Naval Warfare Development Command described NCO as "deriving power from the rapid and robust networking of well-informed, geographically dispersed warfighters. They create overpowering tempo and a precise, agile style of maneuver warfare." Navy Warfare Development Command, *Network Centric Operations: A Capstone Concept for Naval Operations in the Information Age* (Newport, RI: Naval Warfare Development Command, draft dated 6/19/01), p. 1. Available at http://www.nwdc.navy.mil/Concepts/capstone_concept.asp.

[29] Navy Warfare Development Command, *Network Centric Operations: A Capstone Concept for Naval Operations in the Information Age*. What NWDC terms "forward sea-based forces" we call "forward-deployed sea forces." It is not clear that these forces will actually be based at sea.

Figure 1
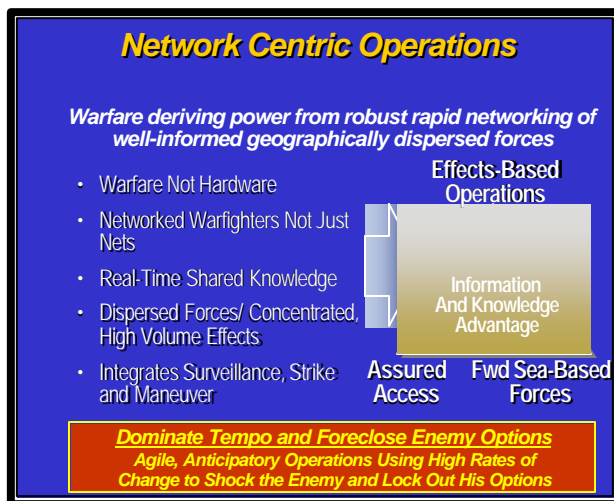
Source: Navy Warfare Development Command,
*Network Centric Operations: A Capstone Concept
for Naval Operations in the Information Age*,
"Executive Summary" (Newport, RI: Naval Warfare
Development Command, draft dated 6/19/01), p. ii.

The postulated benefits of NCO provided by the pillars of information and

knowledge advantage[30] and effects-based operations[31] include speed of command, self-

synchronization, advanced targeting, and greater tactical stability. Netted sensors are to

provide shooters and commanders with "'unmatched awareness of the battle space."[32]

Within the battlespace, warfighters are to be able to "self-synchronize" their activities to

accomplish a commander's intent by drawing upon a shared "rule set—or doctrine"[33]—

and a common operational picture (COP). In essence, self-synchronization is

accomplished by devolving decision-making downward to the lowest appropriate level,

thus allowing warfighters to respond directly and quickly to tactical, operational, and

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[30] On information and knowledge advantage see http://www.nwdc.navy.mil/Concepts/IKA.asp.
[31] On effects-based operations see http://www.nwdc.navy.mil/Concepts/EBO.asp.
[32] Truver, "Tomorrow's U.S. Fleet," p. 103.
[33] Navy Warfare Development Command, *Network Centric Operations: A Capstone Concept for Naval Operations in the Information Age*, p. 9.

even strategic challenges. Fires are to be employed in effects-based operations (EBO) rather than in attrition-based warfare. Precision guided munitions in conjunction with advanced intelligence, surveillance, and reconnaissance (ISR) capabilities will allow targets to be hit with greater economy—simultaneously rather than sequentially—greatly increasing the possibility of imposing disproportionate effects, particularly psychological effects, on the adversary. Tactical operations may thus achieve strategic objectives.

Finally, by geographically dispersing sensors, shooters, and their supporting infrastructure within an overarching network, U.S. forces will be able to achieve greater tactical stability—a favorable balance between survivability and combat power.[34] Fires, rather than forces, will be massed and delivered beyond visual range. Ideally, EBO, fueled by information and knowledge superiority, will enable U.S. forces to "lock in success and lock out enemy solutions" and options.[35] Smaller, lighter, faster, less complex, and less expensive nodes (i.e., platforms) linked by interoperable, highly redundant, self-healing networks will present adversaries with fewer high value targets and improve the robustness of operations against a determined foe.

Implicitly at least, NCO is a joint vision that harnesses capabilities from all services; it is applicable to warfare on land, air, or sea.[36] That NCO is a Navy concept with naval origins, however, is evident in the two pillars that are more distinctly naval:

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[34] Ibid. p. 11.
[35] Ibid. p. 10.
[36] The joint aspects of NCW are highlighted in John J. Garstka, "Network Centric Warfare: An Overview of Emerging Theory," available at http://www.mors.org/Pubs/phalanx/dec00/feature.htm; John G. Roos, "An All-Encompassing Grid," *Armed Forces Journal International*, January 2001, pp. 26-35; Hunter Keeter, "Cebrowski: Joint Philosophy Fosters Network Centric Warfare," *Defense Daily*, April 12, 2002, p. 8; and Fred P. Stein, "Observations on the Emergence of Network Centric Warfare," available at http://www.dodccrp.org/steinncw.htm and as "Information Paper: Observations on the Emergence of Network-Centric Warfare" at http://www.dtic.mil/jcs/j6/education/warfare.html. Emerging congressional support for NCW as a joint vision is indicated by Joseph Lieberman, "The Future is Networked," *Defense News*, August 21, 2000, p. 15.

assured access and forward-deployed sea forces. Assured access[37] refers to the ability of

the U.S. armed forces to gain entry to and use both overseas infrastructure, such as ports

and airfields, and the battlespace itself, even when confronted with a capable and hostile

adversary.[38] No sanctuary is to be ceded to the adversary. It is the job of the Navy and

the Marine Corps to enable and ensure access by follow-on forces from the Air Force and

the Army—the heavier forces necessary to fight and win major regional contingencies.

The Navy accomplishes this through the combat capabilities inherent in its forward-

deployed presence assets (i.e., the ability to operate in the littoral).[39] Since sea-based

forces "do not rely on permissive access to foreign shore installations that may be

withdrawn or curtailed," they "furnish an assured infrastructure for additional joint

forces."[40]

With its Capabilities of the Navy After Next (CNAN) project, the Naval Warfare

Development Command has sought to determine what technologies, weapons, platforms,

and systems are required by the Fleet to enable NCO. The principal "enabling element"

of NCO is a set of information, sensor, and engagement grids (pictured in Figure 2)

capable of linking all elements of the network with each other and with the wider

information back plane that constitutes the World Wide Web and DoD-specific networks.

This is not a single network but a network of networks, "a global grid of multiple,

interoperable, overlapping sensor, engagement, and command nets."[41] NCO relies

greatly on the development and deployment of large numbers of more capable sensors to

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[37] On assured access see http://www.nwdc.navy.mil/Concepts/AA.asp.
[38] Navy Warfare Development Command, *Network Centric Operations: A Capstone Concept for Naval Operations in the Information Age*, p. 10.
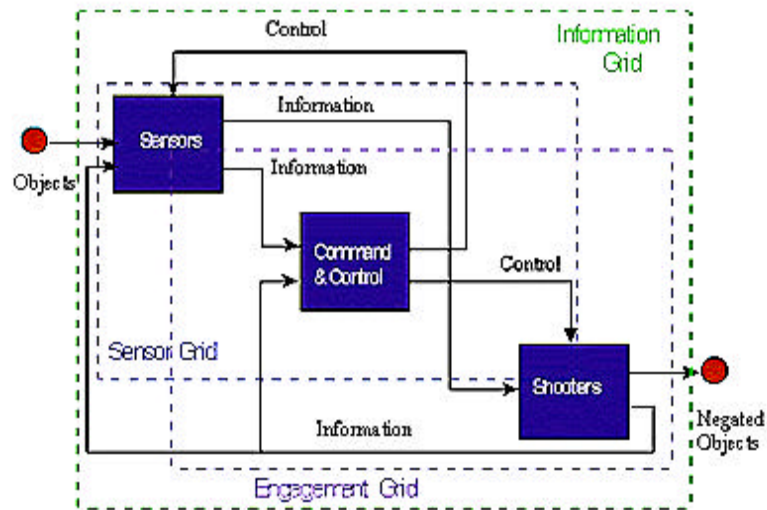[39] On forward sea-based forces see http://www.nwdc.navy.mil/Concepts/FSBF.asp.
[40] Ibid. pp. 4-5.
[41] Ibid. p. 6.

populate the sensor grid and provide a common operational picture. Sensors are to be ubiquitous.

Figure 2
NCW Grids

Source: http://spica.or.nps.navy.mil/netusw

Among existing programs, as illustrated in Figure 3, the Cooperative Engagement Capability (CEC), IT-21, the Radar Modernization Program (RMP), the Web Centric Anti-Submarine Warfare Net (WeCAN), and the Navy-Marine Corps Intranet (NMCI) will help the Navy evolve further towards the ability to conduct NCO.[42] According to the NWDC, a critical future step is the deployment of a multi-tiered—space, air, surface/ground and undersea—expeditionary sensor grid (ESG) combining, among other things, invasive sensing systems, unmanned platforms, massively distributed information

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[42] Background on CEC, IT-21, and NMCI are provided in Ronald O'Rourke, *Navy Network-Centric Warfare Concept: Key Programs and Issues for Congress*, RS20557 (Washington, DC: Congressional Research Service, Library of Congress, June 6, 2001). On IT-21 see J. Cutler Dawson, Jr., James M. Fordice, and Gregory M. Harris, "The IT-21 Advantage," U.S. Naval Institute *Proceedings*, December 1999, pp. 28-32. For Admiral Vernon E. Clark, the Chief of Naval Operations, the NMCI is "the gateway to transformation." See Department of the Navy, *Electronic Business Strategic Plan 2001-2002*, available at http://www.ec.navsup.navy.mil_eb/strategic_plan_toc.asp.

systems, and computer network attack and defense capabilities.[43] At its simplest, the

ESG is a "toolbox of sensors and networks necessary to build… real-time battlespace

awareness."[44]

Figure 3

The Information Grid -- Detailed View
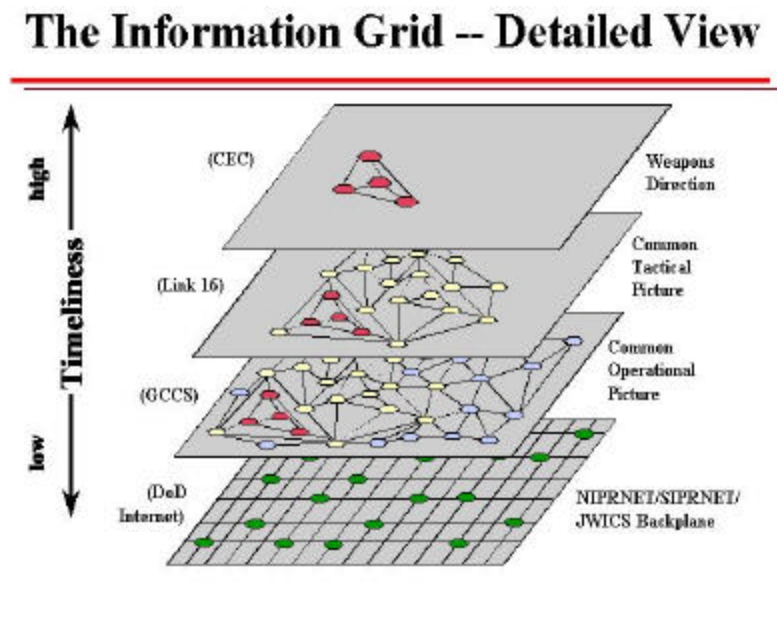
The most robust form of NCW also features smaller, lighter, faster, less complex

platforms (nodes) of all types. This includes unmanned vehicles to deploy sensors or to

serve as sensors, communications relays, and/or weapons platforms. Perhaps the most

significant platform issue from a naval standpoint, however, is whether NCW requires

innovative design concepts such as small littoral combatants (formerly known as

Streetfighter), fast lift, and small-deck aircraft carriers. In the view of its most fervent

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[43] Navy Warfare Development Command, *Expeditionary Sensor Grid*, undated brief, p. 4. See also Robert Holzer, "Massive Sensor Grid May Reshape U.S. Navy Tactics," *Defense News*, May 14, 2001, pp. 1 & 4; and Catherine MacRae, "Services, DARPA Doing Early Research on 'Expeditionary Sensor Grid,'" *Inside the Pentagon*, June 21, 2001.

[44] Navy Warfare Development Command, *The Expeditionary Sensor Grid: Gaining Real-Time Battlespace Awareness in Support of Information and Knowledge Advantage*, Post-Workshop Draft, 06/19/01, p. 3.

advocates, fulfilling the ultimate promise of NCO requires smaller, lighter, faster, less complex, and less expensive nodes/platforms that will facilitate self-synchronization, swarming tactics, and greater tactical survivability. Complexity is located on the web rather than on the node; the complex, expensive platform nodes that populate the legacy force will be displaced by simpler, less expensive nodes. In today's Navy, existing platforms are being networked via, for instance, CEC and IT-21. In the future's network-centric Navy, nodes will be tailored to network requirements from their earliest conception.

In the spring of 2002, "FORCEnet," as portrayed in the *Naval Transformation Roadmap* (NTR), was introduced as the Navy's framework for implementing NCW.[45] Originally developed by the CNO's Strategic Studies Group, FORCEnet has been billed variously, and often contradictorily, as putting the "Warfare" in Network-Centric Warfare and as "the next generation of NCW." Perhaps the most common interpretation is that FORCEnet will allow progress toward implementing the NCW vision by providing an architecture for integrating its components: network systems, sensors, decision aids, weapons, platforms, people, and infrastructure.

Admiral Vernon Clark's SEA POWER 21 (SP 21) draws upon both network-centric concepts and FORCEnet. He argues that the Navy of the 21st century should provide future Sea Strike offensive capabilities, Sea Shield defensive capabilities, and Sea Basing "persistent presence" capabilities.[46] To achieve these overarching goals, the

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[45] *Naval Transformation Roadmap: Power and Access...From the Sea* (Washington, DC: Department of the Navy, 2002), p. 5. For useful reportage on FORCEnet see Gopal Ratnam, "New Office to Drive U.S. Navy Transformation," *Defense News*, April 8-14, 2002, p. 6; and Gail Kaufman and Gopal Ratnam, "U.S. Navy Releases Broad Transformation Outline," *Defense News*, April 15-21, 2002, p. 8.
[46] Admiral Vernon Clark, "SEA POWER 21: Operational Concepts for a New Era," remarks delivered at the Current Strategy Forum, Naval War College, Newport, RI, 12 June 2002.

NTR's three sets of nine transformational warfighting capabilities (see Table 1 below) are

to be developed in a phased process from 2002-2020.[47] FORCEnet serves as an umbrella

both for existing programs such as the Navy-Marine Corps Intranet (NMCI), IT-21, CEC,

and NFN and for major future programs such as the Expeditionary Command and

Control, Communications, Computers, and Combat Systems Grid (EC5G) and the

Expeditionary Sensor Grid (see Figure 4).[48]

Table 5
The NTR's Nine Transformational Warfighting Capabilities

Sea Strike
- Time persistent ISR
- Sensitive Strike
- Offensive information operations
- Ship-to-objective maneuver

Sea Shield
- Theater air and missile defense
- Littoral sea control
- Homeland defense

Sea Basing
- Compressed deployment and employment time
- Enhanced sea-borne positioning of joint assets

Source: *Naval Transformation Roadmap: Power and Access...From the Sea* (Washington, DC: Department of the Navy, 2002).

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[47] During the first phase, 2002-2004, the focus will be on improving networks, sensors, people, and weapons, with networks and sensors the highest priority. People and infrastructure will be accorded highest priority during the second stage, 2004-2010, and platform and infrastructure improvements are to be added to the agenda. Platform and infrastructure improvements join the list of high priority efforts during the third stage, 2010-2020.

[48] A FORCEnet office directed by VADM Dennis McGinn, USN, Deputy Chief of Naval Operations (N6/N7 Warfare Requirements and Programs) was established in OPNAV; in July 2002 the Naval Network Warfare Command (NETWARCOM) was stood up at the Little Creek Naval Amphibious Base.

Figure 4

The EC5G: A Notional Depiction
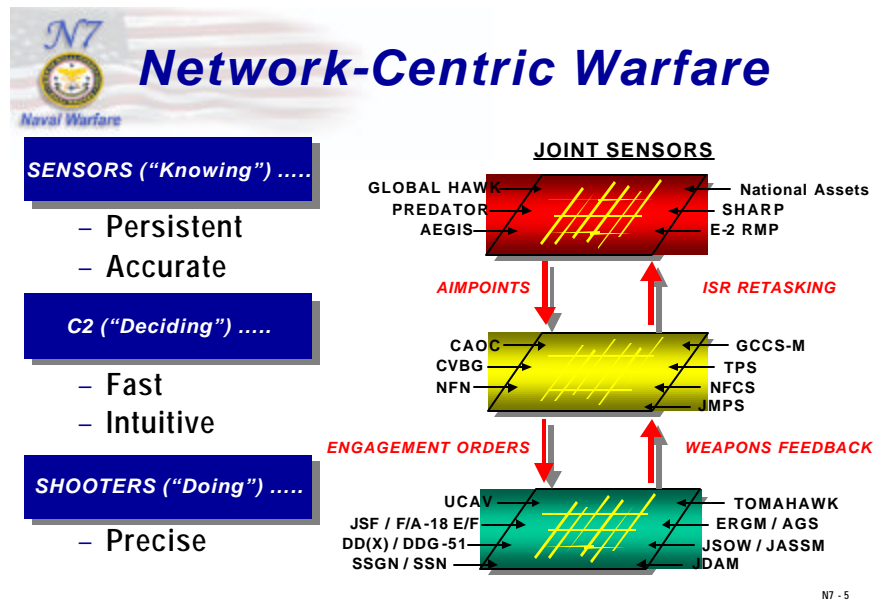
Source: https://ucso2.hq.navy.mil/n7/webbas01.nsf/(vwwebpage)/
webbase.htm?OpenDocument

With the promulgation of SEA POWER 21, FORCEnet, and the NTR, network centric concepts are firmly embedded in the official version of naval transformation. It remains to be seen, however, whether naval transformation will fulfill the overarching vision of transformation suggested by *Joint Vision 2020* and Bush administration defense planning documents.

Naval Transformation: Does it Measure Up?

Judged against the standards established, and the expectations created, by President Bush, the administration's 2001 QDR, and its first *Annual Report*, the naval transformation enterprise falls short, even if—and this is a big if—it is fully implemented in the coming decades. Neither the next Navy of 2010 nor the Navy after next of 2020

will be the old Navy; but they will be recognizable. Operational capabilities are unlikely to have been transformed; instead, capabilities resident in the current Navy will be improved.

The Navy advertises SEA POWER 21 as a "new operational construct;" in reality, SP 21 is merely a repackaging of familiar ideas.   The Navy has long possessed offensive, defensive, and presence capabilities. Relabeled Sea Strike, Sea Shield and Sea Basing, those capabilities will continue to be enhanced, or modernized, but not revolutionized. The "new operational construct" essentially calls for more of the same: routine, sustaining modernization. Some critics have even suggested that the version of naval transformation presented in SEA POWER 21 amounts to little more than employing "sea" as an adjective (in addition to Sea Strike, Sea Shield, and Sea Basing, SP 21 provides us with Sea Trial, Sea Warrior, and Sea Enterprise—covering terms for, respectively, experimentation, personnel development, and organizational process improvements).

Unfortunately for naval transformation proponents, a similar judgment can be rendered against Network Centric Operations, the Navy Warfare Development Command's operational concept for NCW. At the most basic level, the desirability of the information and knowledge advantages hyped by NCO is not new. Military commanders since time immemorial have sought more and better quality information.[49] As for effects based operations, the Navy, and indeed all branches of the military, have always sought to take out targets with an eye toward their effects on enemy forces. Assuring access too is not a novel operational concept. The Navy has long sought to ensure battlespace access for other components of the total force. It has also long been the provider of

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[49] John Keegan, *The Mask of Command* (New York: Viking Press, 1987).

"forward sea-based forces." Dominating the tempo of war and foreclosing adversary options is a central, and traditional, warfighting objective. How all of this is to be done will be improved, but not revolutionized.

The Navy, and the other services as well, is not new to the information age. NCO builds upon existing Navy IT capabilities and programs. Few if any of the capabilities it envisioned entail skipping a generation of technology. It incorporates and builds upon current network capabilities and programs to enhance future connectivity. Routine, sustaining innovation is likely to continue to be the norm. Tellingly, the performance metrics of the nodes, or platforms, and networks envisioned by NCW and NCO require less discontinuous and disruptive innovation than sustaining innovation.[50]

According to the NTR, the objective of naval transformation is "to achieve a broad, sustained and decisive military competitive advantage over existing or potential adversaries."[51] The USN, however, already possesses that competitive advantage. It is the world's preeminent naval force. It now exercises virtually unchallenged command of the seas and possesses unrivalled power projection capabilities. There is nobody in the rearview mirror. That preserving and extending the USN's preeminence requires "… substantially extending boundaries of necessary military competencies and… discovering fundamentally new approaches to military operations"[52] remains to be demonstrated.

The sense of urgency attached to transformation by the President, the 2001 QDR, and the 2002 *Annual Report* is little evident in the NTR and other Navy planning documents. For the Navy, it seems, transformation means business as usual:

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[50] See Peter Dombrowski, Andrew L. Ross, and Eugene Gholz "Selling Transformation: The Defense Industrial Sources of Sustaining and Disruptive Innovation," *Orbis*, Vol. 46, No. 3 (Summer 2002), pp. 523-536
[51] *Naval Transformation Roadmap*, p. 6.
[52] *Naval Transformation Roadmap*, p. 6.

incremental, evolutionary changes in both capabilities and the doctrine necessary to employ those capabilities. The NTR, in particular, features rampant incrementalism. It is replete with calls for "more effectively" utilizing and exploiting assets; for enhancing, increasing, improving (occasionally significantly), and leveraging existing capabilities; and for accelerating current programs.

Few programs have been canceled to free up resources for transformation. Instead, existing Navy programs are billed as transformational. The alignment of programs and resources with the Navy transformation vision and roadmap is far from seamless. Programs remain platform- rather than network-centric. Science and technology and research and development programs remain focused more on near-term technology transition to the fleet than on the long-term basic S&T/R&D that some believe is required for transformation. Routine, sustaining modernization and the recapitalization of legacy systems overshadow programs that could yield disruptive innovation.

To date, naval transformation is a rather modest enterprise. The Navy transformation effort is virtually indistinguishable from routine modernization. At best, it amounts to "modernization plus." It emphasizes sustaining innovation and incremental, evolutionary change.[53] Baring unforeseen developments, the Navy will continue to do what it does now, only better.

The Navy's measured, incremental, evolutionary approach to transformation and its continued reliance upon threat-based planning is not entirely out of sync with OSD's approach. The urgency attached to transformation, the emphasis on discontinuous, even

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[53] Particularly revealing is the Navy's treatment of transformation in its *Highlights of the Department of the Navy FY 2003 Budget*, where the only sustained discussion of transformation appears in Section III, "Recapitalization."

disruptive, change, and the ascendance of capabilities-based planning evident in the QDR

and the 2002 *Annual Report* are not absolute. It is recognized that transformation is a

long-term process; its promise will only be fully realized over time.[54] "Today's

challenges" must be addressed even while the military is transforming for the future;

future readiness is not to be ensured at the expense of current readiness.[55] Prudence and

balance are ever the watchwords: "it would be imprudent to transform the entire force all

at once. A balance must be struck between the need to meet current threats while

transforming the force over time."[56] This appeal to prudence and balance is unlikely to

result in a rush to transformation.

The Transformation Imperative

The military's declared intent to remake itself, and the Bush administration's oft-

stated commitment to military transformation, raises an obvious question: what drives

the quest for innovation? The answer to this question is not obvious. There is no single

country or even group of countries poised to challenge American military supremacy in

the immediate future. The cold war is over; the principal U.S. rival of the past, the Soviet

Union, is defunct. There is ample evidence that the U.S. military is by far the most

potent armed force in the world. In conflicts from the Balkans and the Persian Gulf to the

current campaign in Afghanistan, the U.S. military has achieved its battlefield objectives

with maximum speed and a minimum of casualties. No great power competitors appear

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[54] *Quadrennial Defense Review Report*, p. v; and *Annual Report*, p. 22.
[55] *Quadrennial Defense Review Report*, p. 10.
[56] *Quadrennial Defense Review Report*, p. 16. And on pp. 47 and 48: "This transformation will be conducted in a timely but prudent manner. In particular, prudence dictates that those legacy forces critical to DoD's ability to defeat current threats must be sustained as transformation occurs…. DoD must overcome trends of the past to sustain a balanced defense program that maintains near-term readiness without mortgaging the long-term capabilities of the force."

ready to challenge the United States. The most sophisticated, if not necessarily the

largest, militaries in the world belong to U.S. allies or countries little inclined to

challenge the United States. And fighting and winning the global war on terror does not

requirement transformation.

Transformation and Defense Planning

In an idealized, or stylized, view of the military planning process, it might be

assumed that a drive for transformation would be based upon a broad-ranging net

assessment of future challenges and requirements. With the assistance of the intelligence

community, planners would scan the horizon for adversaries and potential adversaries,

assess their military potential, and determine the structure, capabilities, and size of the

military needed to deter and, if necessary, fight and defeat possible enemies. Planners

would also assess the current and likely future state of U.S. military forces in order to

determine whether they are sufficient to meet the nation's security needs. If existing

military forces were insufficient or might conceivably weaken over time due to aging

equipment, demographic trends or other considerations, planners would be expected to

take steps to strengthen the armed services. Such steps could include increasing the size

of the force, modernizing and/or recapitalizing weapons and systems, or acquiring

different types of forces.[57]

Defense planners could also opt to fundamentally alter military technologies,

doctrine, and organizational structures—in short, to transform the military or even

generate a home-grown revolution in military affairs.

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[57] Planners should never lose sight of non-military strategic adjustments such as acquiring new allies or shedding past partners. Alternatively, non-military instruments such as diplomacy, economic statecraft and the like can ease the burden placed on the military for protecting the nation into the future.

Threat-Based Planning. A threat-driven approach to force planning focuses on a particular adversary (as, for example, the United States focused on the Soviet Union during the cold war) or, if circumstances or politics dictate, on a set of adversaries. During the post-cold war period, the United States prepared to fight two Major Regional Contingencies (MRCs), or Major Theater Wars (MTWs), simultaneously (or near-simultaneously). Barely disguised was the fact that planning efforts generally looked to Iraq and North Korea as the likely regional adversaries. Force structure and size, deployments, basing, and training were generally based upon exercises using illustrative planning scenarios and theater war plans developed for the particular geography and regional security environments of the Persian Gulf region and the Korean peninsula.

Throughout the 1990s, experts quarreled about whether the United States should be prepared (and was actually prepared) to fight two MRCs simultaneously or near-simultaneously.[58] Planners grappled with the requirement for fighting MRCs at the same time that military forces are engaged in smaller contingencies such as peacekeeping and/or humanitarian operations. While these distinctions matter greatly for the Army, the Marine Corps and the Air Force (in terms of the number of divisions and air wings that must be available and where they must be based or deployed) the dirty secret from the Navy's perspective is that its own force structure requirements derived less from MRC/MTW requirements than from self-serving forward presence requirements.

Capabilities-Based Planning. A capabilities-based rather than a threat-based approach to force planning is featured in the transformation-yielding "paradigm shift"

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[58] For opposing views by two prominent analysts see Michael O'Hanlon, "Prudent of Paranoid? The Pentagon's Two-war Plans," Survival vol. 43, no. 1 (Spring 2001), pp. 37-52 and Fredrick W. Kagan, "The Next War: If You Want Peace, Prepare for Two Wars," Defense Associations National Network's *National Network News* vol. 8, no. 2 (Summer 2001).

touted by the Bush administration. The threat-driven approach of the past that focuses on

a particular adversary (the cold war focus on the Soviet Union) or adversaries (the post-

cold war focus on MRCs/MTWs) has been discarded in favor of a focus on "the growing

range of capabilities" that unspecified (not only unknown but also perhaps unknowable)

future state and non-state adversaries "might possess or could develop"[59] and on the

corresponding capabilities U.S. forces will need to deter, fight, and win in the future.

This capabilities-based approach is to result in the development of a robust "portfolio of

capabilities" that can be employed across the spectrum of conflict in any geographical or

functional theater and is portrayed as requiring "… the United States to focus on

emerging opportunities" that, apparently, would otherwise be foregone or overlooked.[60]

The *Naval Transformation Roadmap* pays lip service, but little more, to the

allegedly paradigm-busting approach of capabilities-based force planning. It is very

much informed by a range of traditional and non-traditional threats. The threat-based

planning of old is alive and kicking. Threats exist that must be deterred by naval forces.

Command of the seas "provides the springboard for the decisive defeat of any adversary."

Power projection "helps to deter threats" and "to disrupt or destroy hostile forces."

"Threats to the homeland" are to be deterred, detected, and interdicted by "forward-

deployed naval forces."[61] Terrorists are explicitly singled out for attention in the

discussion of homeland security. Sea Shield entails the defeat of "area denial threats

including aircraft, missiles, small littoral surface combatants, mines and submarines."[62]

Theater air and missile defense (TAMD) capabilities would not be required in the

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[59] *Quadrennial Defense Review Report*, p. 17.
[60] *Quadrennial Defense Review Report*, p. 14. Why a threat-based approach would neglect "emerging opportunities" is left unclear.
[61] NTR, pp. 7-8.
[62] Ibid., p. 17.

absence of ballistic and cruise missile threats. "[S]mall, fast surface combatants, quiet diesel submarines and sea mines" are also explicitly identified as threats.[63] In the absence of significant current and future threats, there would not be a requirement for Sea Strike, Sea Shield, and Sea Basing. Force planning, naval or otherwise, cannot be solely capabilities-driven. Planners cannot know what capabilities will be required without determining what threats may be encountered.

Threats are also prominently on display in the QDR and the 2002 *Annual Report*—despite the asserted ascendance of capabilities-based force planning. According to the QDR, "an increasing number of states will acquire ballistic missiles with steadily increasing effective ranges."[64] The 2002 *Annual Report* identifies three evil countries that "are arming with long-range missiles and are seeking or acquiring nuclear, biological, and chemical (NBC) weapons": Iraq, Iran, and North Korea.[65] The QDR's survey of the "Changed Security Environment" highlights Asia's "volatile mix of rising and declining regional powers," the "radical or extremist internal political forces or movements" that threaten some of those powers, and "the possibility… that a military competitor with a formidable base will emerge in the region."[66] In the Middle East, "several states pose conventional military challenges and many seek to acquire—or have acquired—chemical, biological, radiological, nuclear, and enhanced high explosive (CBRNE) weapons."[67] The 2002 *Annual Report* explicitly identifies Iran and Iraq as two Middle Eastern states engaged in such activities.[68] Noted as well in the QDR are the danger of Western

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[63] Ibid., p. 19.
[64] *Quadrennial Defense Review Report*, p. 3.
[65] *Annual Report*, p. 12.
[66] *Quadrennial Defense Review Report,* p. 4.
[67] *Quadrennial Defense Review Report*, p. 4
[68] *Annual Report*, p. 12.

hemisphere crises or insurgencies, the "increasing challenges and threats emanating from the territories of weak and failing states" (drug trafficking and terrorism, for instance) and the "diffusion of power and military capabilities to non-state actors," particularly terrorists.[69]

Despite the Bush administration's claim to have abandoned threat-based planning for capabilities-based planning, its 2001 QDR and its first *Annual Report* make ample use of threats emanating from quite predictable places. Neither approach, however, dictates transformation. Indeed, there is little, if anything, inherent in contemporary planning approaches that argues convincingly for military transformation. The origins of military transformation must be sought elsewhere.

Technological Opportunism?

If transformation is not a product of contemporary defense planning approaches, what is driving the push for technological, doctrinal and organization innovation? One intriguing possibility is the presence of technological push. By this argument, military and civilian transformation proponents have been seduced by the promise of information age technologies. After all, much of the economic boom of the 1990s (particularly, that associated with the "new economy") was fueled by developments in the information technology sector. Even more significant are the changes evident in numerous aspects of daily life, from the widespread adaptation of information and telecommunications technologies in the home to vast changes in the nature of the workplace (for example, "paperless" offices, business to business e-commerce, and "New-Old" economy firms). As microchips became cheaper they were embedded everywhere (from automobile

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[69] Q*uadrennial Defense Review Report*, p. 5.

engines to toaster ovens), thus increasing capabilities and, in some cases, dropping prices.

Telecommunications advances had similar effects—the internet became less expensive,

accessible and easy to use; cellular phones became ubiquitous; and digital media

overwhelmed popular culture. Business journalists and media flaks assured the public

that the new economy was fundamentally transforming the nature of markets and

society's relationship to technology.

To military officers operating systems with IT components several generations

out of date, the possibility of introducing more modern information and technologies into

the force seemed promising. In the case of naval transformation there is ample anecdotal

evidence for the role played by technological opportunism. Then-Vice Admiral Arthur

Cebrowski was fond of admiring the technological cycle times of Silicon Valley firms

and referencing "Moore's Law" about advances in computer processing power. He

circulated amongst his staff and students at the Naval War College books like Kevin

Kelly's *New Rules for the New Economy: 10 Radical Strategies for a Connected World*

that purported to explain the origins and implications of the information age.[70] In his

written work, Admiral Cebrowski and his co-authors drew upon business analogies and

examples from the retailing strategies of Wal-Mart to the trading practices of securities

firms.[71]

For transformation advocates the problem was often less convincing the rest of

the military that there was as Brave New World in the commercial technology sectors

than determining how such technologies might be adapted to warfare. Network-Centric

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[70] Kevin Kelly, *New Rules for the New Economy: 10 Radical Strategies for a Connected World* (Penguin, 1999).

[71] Arthur K. Cebrowski and John J. Garstka, "Network-Centric Warfare: Its Origin and its Future," U.S. Naval Institute *Proceedings*, January 1998, pp. 28-35.

Warfare with its emphasis on the determining roles of information and communication in the battlespace provided just such a rationale. Once a strong deductive case could be made for an IT RMA, the problem became how to reform the acquisition system to accommodate more rapid cycle times. Acquisition regulations and other types of government requirements (export control laws, intellectual property rights, and the like) only served to impede the rapid adoption of emerging information technologies into the rapidly out-dated military. The solution to this problem was create a "revolution in business affairs" to complement and support military transformation.

In some respects, this technology push argument parallels aspects of the explanation for military technological innovation advanced by Evangelista.[72] In the nuclear arms race between the United States and the Soviet Union, the strategic dynamic was less important in determining the nature of American military innovation than internal factors; as Evangelista put it, "a new weapon starts with a technological idea rather than a response to a specific threat or as a means to fulfill a long-standing mission."[73] Only later, when it is necessary to justify new weapons to decision-makers and budgeteers, do external factors such as threat perceptions matter.[74]

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[72] Matthew Evangelista, *Innovation and the Arms Race: How the United States and the Soviet Union Develop New Military Technologies* (Ithaca: Cornell University Press, 1988),

[73] Evangelista, p. x.

[74] Evangelista presents only one version of innovation, however. As Evangelista himself notes, the broader literature on military innovation, both doctrinal and technological, poses two general type of answers to the question of what drives innovation. The first centers on developments external to the nation-state. The second focuses on processes, structures, and ideas located within the confines of the state. Before we can assess fully the sources for the transformation imperative we need to look more carefully at the alternative suggested by other analysts studying military transformation and innovation. The most prominent and often conflicting accounts include Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca: Cornell University Press, 1991); Barry R. Posen, *The Sources of Soviet Military Doctrine: France, Britain and Germany Between World Wars* (Ithaca: Cornell University Press, 1984); Elizabeth Kier, *Imagining War: French and British Military Doctrine Between the Wars* (Princeton, NJ: Princeton University Press); and Kimberly Marten Zisk, *Engaging the Enemy: Organization Theory and Soviet Military Innovation, 1955-1991* (Princeton, NJ: Princeton University Press, 1993).

By analogy, the absence of threats in the post-cold war period (and concomitant debates over what types of planning approaches should be used) was less important to naval transformation advocates than the possibility that technological modernization could yield a more capable, less expensive force.[75] In effect, it was argued that the systematic introduction of information age technologies would help the Navy overcome several of its most pressing problems: the need to maintain force structure (next generation platforms would be cheaper and therefore more numerous), to reduce casualties of both American soldiers and civilian non-combatants (weapons could be fired at greater distances with more accuracy from stealthier platforms), and to operate with fewer officers and enlisted personnel (automation would reduce the demand for sailors and force fewer of them into dangerous situations). When the time came to justify the expenditures necessary to achieve transformation objectives, threats could either be manufactured—the possible emergence of a peer competitor—or, failing that, the threat based-planning approach itself could be replaced.

"Conclusion"

What today passes for military transformation and, in particular, naval transformation is less revolutionary than their advocates imply and official rhetoric suggests. Under a best case scenario—where most if not all of the military embraces transformation, the resources necessary to implement transformation are readily available, and the technological challenges inherent in developing new capabilities are

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[75] Among other differences from the framework elaborated by Evangelista, the current drive for naval transformation, especially on the technology side of the equation, came less from the in-house progress of the federal laboratories, naval systems commands or the naval industrial base than from outside the government entirely. The advances in nuclear weapons systems analyzed in innovation and the Arms Race were developed largely in federal facilities by government employees.

met—the Navy after Next will be simply a modernized version of the existing fleet. With the long-term presence of legacy systems and the modest goal of transforming 10-15 per cent of the force, the Navy After Next will be an improved version of today's Navy. The prospects for discontinuous, disruptive change are slim.

The major exception to this generalization, in effect, proves the rule. Network Centric Operations proposes some novel ways to conduct naval operations: self-synchronization and "swarming," for instance. Yet, it is precisely against these concepts that much of the resistance to NCO has coalesced. War games that purport to "validate" swarming have been roundly criticized. Efforts to promote surface combat vessels that are smaller, faster, less complex, less expensive, and thus more numerous, have fallen on deaf ears. Resistance to replacing, or even supplementing, big-deck aircraft carriers with small-deck carriers, or perhaps eliminating carriers altogether, has been especially vociferous. Indeed, recent designs for the Littoral Combat Ship look less like the "Streetfighters" (which were to fight in "swarms") proposed by VADM Cebrowski than like modern frigates. Suggestions that the Navy no longer deploy in carrier battle groups (CVBGs) or amphibious ready groups (ARGs) have been roundly criticized.

Is the lack of real transformation a problem? Not especially. In our view, there is no compelling strategic rationale for transformation. Transformation is not required for the maintenance and extension of either U.S. military dominance specifically or U.S. primacy generally. Nor is it a requirement for fighting and winning the global war on terror. Generic capabilities designed to meet generic threats (as in capabilities-based planning) or old threats pumped up for a new millennium (as in threat-based planning

against an Iraqi or Korean foe) in the service of force protection will suffice in the absence of a clear and present danger.