

Network Centric Operations (NCO) Case Study

**Task Force 50 During
Operation ENDURING FREEDOM**

ABRIDGED REPORT

VERSION 1.0



Foreword

The purpose of this case study report is to describe the evolution of network enabled capabilities in the context of naval operations conducted under the command of RADM (now retired) T. Zelibor. The focus is on the background and creation of Task Force 50 (TF-50), and primarily on the evolution of the transformational capabilities that permitted TF-50 to succeed in the manner that it did. The study examines those transformation innovations from their inception up through current day.¹ The evidence is drawn from discussions with key naval and TF-50 personnel, as well as open-source data. This case begins with an overview of the overall case study. It is followed by a brief review of naval fleets, and the stand-up of TF-50. The study then describes the development and success of TF-50, including information regarding various technological systems, information sharing practices, and the importance of strong leadership. This study finds that it is the continuous evolution of a variety of factors that lead to the effectiveness and efficiency of TF-50. It did not require unlimited financial resources to make this change happen. Rather this transformation occurred as a result of intuitive leadership, a culture to allow for change, and personnel willing to trust a new method of operating.

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NCO CASE STUDY: Task Force 50 During Operation ENDURING FREEDOM²

We wanted a better method for distributing information across the battle group. We didn't want it to make the warfighter's job harder. Rather, we wanted to prevent duplication of effort. We needed a dynamic warehouse of continuously updated information. Above all, it had to filter and format information, eliminating the spam, adding value to the information, and ultimately improving speed of command.

~ Rear Admiral Thomas E. Zelibor³

Overview

The United States Ship (USS) *Carl Vinson* (CVN-70) battle group, commanded by Rear Admiral (RADM) (now retired) Thomas E. Zelibor, departed its home port in Bremerton, Washington, on July 23, 2001, ready for a scheduled deployment in support of Operation SOUTHERN WATCH in the Arabian Gulf. On September 11, 2001, the same day that the battle group reached the North Arabian Sea, the al-Qaeda terrorist network attacked the Pentagon, the Twin Towers of the World Trade Center in New York City, and crashed a plane into a rural Pennsylvania field. Over the next several months, the battle group would undertake combat activities it had not planned for and would work in a joint and combined environment fighting the war on terror during Operation ENDURING FREEDOM (OEF).

RADM Zelibor, having seen the power of network centric warfare (NCW) firsthand during the Global 2000 wargame, implemented transformational practices that changed the very nature of command and control (C2) within his command. He saw the need for a more efficient and effective way of conducting daily activities. He sought to change the way those in his command could get information and react to that information by reducing the amount of time needed to prepare briefs (that were outdated as soon as they were created) and by introducing the idea of adding time for staff planning. Under RADM Zelibor's guidance, the sailors and staff were able to transform daily operations and work together more efficiently to achieve their mission.

RADM Zelibor's task force grew by orders of magnitude after the September 11 attacks, the sailors and staff were so successful at streamlining the daily operational process that they were able to make distinct changes that allowed them to experience a shared understanding of the battlespace, to collaborate, and to develop mission objectives

² The NCO Harvard Business Review-Like Case Study: "Task Force 50 During Operation Enduring Freedom" is based on (1) the 2003 Network Centric Operations Case Study: "Network Centric Warfare in the U.S. Navy's Fifth Fleet: Web-Supported Operational-Level Command and Control in Operation Enduring Freedom," conducted on behalf of the Office of Force Transformation by Dr. Mark Adkins and Dr. John Kruse of the Center for the Management of Information at the University of Arizona and (2) open-source information as noted.

³ Zelibor, T.E. RADM. (December 2003). *FORCEnet is Navy's future: Information-sharing, from seabed to space*. Armed Forces Journal.

more quickly. For example, morning briefs were reduced from 1–2 hours to 30–45 minutes, all relevant personnel were able to access continually updated information, and more time was available to plan tactics and strategy. Ultimately, the plans and processes instituted by RADM Zelibor paid off. Under his direction, Task Force 50 (TF-50) clocked almost 25,000 flight hours, flew almost 8,700 sorties, and dropped over 2 million pounds of ordnance. Additionally, TF-50 conducted maritime intercept operations, air-to-ground strikes, undersea warfare, air warfare, Tomahawk Land Attack Missile strikes, and provided protection for shipping.

Background

Navy operations and command posts are cordoned off into separate geographic regions that are represented and commanded by numbered fleets. This story takes place with the Fifth Fleet, which is based in Bahrain and supports naval operations under the command of the United States Central Command (CENTCOM). (See Appendix II for more information regarding the U.S. Navy’s five fleets.) Fifth Fleet’s area of responsibility (AOR) (Figure 1) encompasses roughly 7.5 million square miles of Middle Eastern territory, including the Arabian Gulf and Indian Ocean, and 25 countries including: Bahrain, Saudi Arabia, United Arab Emirates, Iran, Iraq, Pakistan, and Somalia. Units and personnel that operate under the Fifth Fleet are not organic; that is, units train elsewhere and then rotate into the Fifth Fleet for duty.



Figure 1. United States Naval 5th Fleet Home Location and AOR⁴

The task force included a Carrier Strike Group (CSG)—formerly called a carrier battle group (CVBG), combat aircraft, and other support elements including units and ships. The CVBG typically consisted of an aircraft carrier, a Destroyer Squadron (DESRON) and a carrier air wing. Carrier Group Three (CARGRU3) was dual-hatted, operating under the command of the Fifth Fleet as Commander, Task Force 50 (CTF-50). CARGRU3 consisted of the nuclear aircraft carrier USS Carl Vinson, Destroyer Squadron Nine (DESRON 9), and Carrier Air Wing 11 (CVW-11), along with their component ships and aircraft squadrons.

⁴ U.S. Naval Forces Central Command, U.S. 5th Fleet, Combined Maritime Forces Welcome page of commander. From: <<http://www.cusnc.navy.mil/Pages/AOR%20page.htm>>, accessed 15 September 2005.

USS Carl Vinson battle group departed its Bremerton, Washington, homeport in July 2001, and by September 10 it was rounding the tip of India, poised to enter the Arabian Gulf in support of Operation SOUTHERN WATCH. The ongoing mission was to enforce the southern Iraqi no-fly zone and monitor Iraq below the 32nd parallel. (See Appendix III for more information regarding Operation SOUTHERN WATCH.)

However on 11 September 2001, terrorist attacks on American soil altered the commander's operational courses of action (COA). Vice Admiral (VADM) Charles Moore, Commander, U.S. Naval Forces CENTCOM, and Commander, Fifth Fleet, ordered the formation of a multicarrier battle force under the command of RADM Zelibor. CARGRU3 became the core command of what would be designated TF-50. Figure 2 is a picture of CVN-70, the USS Carl Vinson. When VADM Moore passed the order, the battle group changed course and by 12 September had arrived in the North Arabian Sea to spend the next 3 months supporting OEF. By 7 October 2001, the battle group had launched the first strikes in support of OEF.



Figure 2. Image of CVN-70, the *USS Carl Vinson*⁵

In the weeks after the September 11 attacks, TF-50 grew to include 59 ships from Australia, Britain, Canada, France, Italy, Japan, with additional ships from the United States. The Task Force also included six aircraft carriers: USS Carl Vinson, USS Enterprise, USS Theodore Roosevelt, French Ship Courbet, Her Majesty's Ship *Illustrious*, and the Italian Ship *Garibaldi*. Though having such a large force was beneficial, it was also challenging because many of the ships had never trained or operated together. Added to this was the challenge of forming a multinational coalition on short notice. As VADM Moore explained:

...an incredible number of nations wanted to contribute naval forces to support the war on terrorism. Gearing up to integrate those naval forces

⁵ USS Carl Vinson. (2005). CVN 70 History. From: <<http://www.cvn70.navy.mil/history.html>>, accessed 22 April 22, 2005.

and support them under one commander in a coherent operation was an unusual and challenging aspect of [Operation] ENDURING FREEDOM.⁶

Deployment for OEF

Capabilities

The task of commanding a multinational coalition was daunting. However, it was made easier by the new processes and relatively simple information sharing technologies RADM Zelibor had implemented within the Vinson battle group prior to deployment. He created a new process that allowed all sailors, Marines, and other personnel to collaborate and coordinate on mission planning and operations, as long as they were on the network. He called this “the art of the impossible.”⁷ RADM Zelibor recognized the need for a streamlined method of information sharing, and aligned TF-50’s manner of business and operations in accordance with the concept of network-centric operations. He sought to utilize several simple, inexpensive non-Program of Record applications that allowed for increased information sharing and collaboration, including a Knowledge Web (KWeb), multiple chat rooms, and CommandNet. These applications were available to anyone with Secure Internet Protocol Router Network (SIPRNET) access. For coalition and allied partners without SIPRNET access, collaboration was achieved via the Coalition Wide Area Network, which had some access to KWeb and CommandNet by means of U.S. liaison officers placed on coalition ships. These liaison officers had access to the SIPRNET and would release information approved for distribution to non-U.S. forces. (Appendix IV lists the TF-50 ships.)

Knowledge Wall (KWall)

Prior to pre-deployment training exercises, RADM Zelibor participated in an experimental wargame for senior admirals and generals that tested elements of the NCW theory. This wargame, Global 2000, was conducted as a simulated military operation and sought to explore operational and strategic level issues associated with network-centric warfare. Several questions were explored during this wargame:

- Could Network Centric Operations (NCO) accelerate military operations?
- How would commanders and staff manage the increased operational tempo (op tempo)?, and
- How would commanders and staff employ information networks?

At the wargame, RADM Zelibor learned about various network-centric concepts and an application that embodied the key elements of network-centric operations known as Knowledge Wall (KWall). Figure 3 shows a pictorial image of the KWall. Though the

⁶ Peterson, G.I. (2002). “Committed to victory”: Interview with Vice Admiral Charles W. Moore, Jr., former commander, U.S. Naval Forces Central Command/Commander, U.S. Fifth Fleet. Sea Power. From: <http://www.findarticles.com/p/articles/mi_qa3738/is_200203/ai_n904728>, accessed 22 April 2005.

⁷ MacKrell, E.F. CAPT. (2003). *Network-Centric intelligence works*. Proceedings. From <<http://www.usni.org/proceedings/articles03/promackrell07.htm>>, accessed 18 April 2005.

exercise revealed some challenges regarding use of KWall, including poor assessment capability of information validity, saturation of information upload, and individual's inability to effectively use more complex KWall tools, RADM Zelibor became aware of the type of communication and collaboration that could occur if an information-sharing platform was established for all personnel. Whereas RADM Zelibor knew that flag officers typically have sufficient C2 tools to enable strategic- and operational-level goals, he also felt that the KWall could have significant impact for the tactical warfighter as well.



Figure 3. Knowledge Wall⁸

After addressing the problems that KWall exhibited during Global 2000, and modifying the software to suit the battle group's needs, RADM Zelibor implemented KWall software into the Carl Vinson battle group standard operating procedures (SOPs). It was during OEF that KWall first had the opportunity to make a positive impact among watchstanders operating in combat. Lieutenant (LT) Peter Majeranowski, stationed aboard the *USS Princeton* and *USS Carl Vinson* as an air defense commander liaison during OEF, explained that

...the knowledge wall itself had no real power. The power of the system was in harnessing information from multiple sources, fusing it into a consistent, user-friendly format, and instantaneously disseminating that information back to the warfighters and decisionmakers.⁹

⁸ Adkins, M., & Kruse, J. (2003). *Case Study: Network Centric Warfare in the U.S. Navy's Fifth Fleet, Web-supported operational level command and control in Operation ENDURING FREEDOM*. The University of Arizona Center for Management of Information. (Not yet released).

⁹ Majeranowski, P. Lt. (2003). *Knowledge web plays big in transformation*. Proceedings. From: <<http://www.usni.org/proceedings/articles03/promajerowski>>, accessed 18 April 2005.

Knowledge Web (KWeb)

During his command of TF-50, RADM Zelibor implemented the use of KWeb, a SIPRNET-base information sharing portal. More specifically, KWeb was an operational command system that offered multiple large displays for tactical decisionmakers. Personnel could access and view the screens on KWeb to discern information regarding air defense, surface warfare, intelligence, weather, and more. During OEF, the KWeb platform was structured to include multiple tiered displays that allowed users to examine and interpret the information visually. (Appendix V shows a representation of the multiple tiered displays.) Three tactical displays were used to show different areas of theater that could also be displayed on the video wall. Additional displays were used to monitor chat rooms, provide electronic mail (email), keep logs, and track other tasks. KWeb visual displays were also capable of being projected onto screens located in the nearby War Room.

KWeb was not used for creating information, but rather for displaying and sharing that information in an easy-to-understand format. KWeb allowed users to drill down through three Web page levels (overview page, summary page, and content page) to access the information that they needed. The overview page provided top-level information. The summary page was linked to lower-level content authored by each functional area. Finally, the content pages contained specific information about individual items located on the summary page. Dr. Jeffrey Morrison, a Space and Naval Warfare Systems Command (SPAWAR) representative who helped design the Navy KWeb application, referred to the technology as the difference between books kept in library stacks to opened books and information spread over a “large oak library table, easily accessible and constantly changing.”¹⁰

KWeb allowed daily battle group operations to function faster and more accurately, outperforming message traffic and voice communications. For example prior to KWeb, operations were created via operational summaries and intention messages. As such, each night the appropriate personnel would send out their daily intentions that others would sort through to gain knowledge of the operational task structure. However, KWeb allowed officers and staff more time to plan tactics and strategy without the need to read everyone else’s intention messages. One cruiser commander stated, “I didn’t read a single intentions message.”¹¹ Commodore Joe Natale (Commander, DESRON 9) further explained how KWeb provided an invaluable service by allowing many individuals to have the same information at the same time:

Having multiple people, who are not on watch and not at the same place, all having access to the same information is invaluable. It [KWeb] is a fantastic tool that didn’t become clear until Operation ENDURING FREEDOM broke out...This was an operator’s dream.¹²

¹⁰ Ibid.

¹¹ Adkins, M., & Kruse, J. (2003). *Case Study: Network Centric Warfare in the U.S. Navy’s Fifth Fleet, Web-supported operational level command and control in Operation ENDURING FREEDOM.*

¹² Ibid.

Chat Rooms

A second method for communication and collaboration that RADM Zelibor implemented was the use of chat rooms. Chat rooms had been used in civilian settings and were first deployed with the Abraham Lincoln battle group in 2000, which was commanded by VADM (now retired) P.M. Balisle. Building on work initiated by the Stennis battle group, the Lincoln battle group incorporated chat—utilizing a new process—into operations including logistics, intelligence, surface operations, and anti-submarine warfare. Based on their utility and ease of use in these settings, RADM Zelibor and his intelligence staff decided that chat could be an effective and efficient means of communication for TF-50 personnel. Indeed, VADM Balisle explained that although his battle group was the first to utilize a significant chat network, RADM Zelibor took “the chat rooms to a new level of fidelity.”¹³

Chat rooms were Internet locations where people on land and within embarked squadrons could meet and communicate virtually by typing messages on their computers. Chat room messages that users typed appeared instantly to everyone participating in that particular chat, which provided a continual sharing and learning platform. As one individual who deployed with TF-50 shared, “the chat is better because it gives history, and you can watch things unfold in near-real time.”¹⁴ These virtual chat locations were set up on a server and were typically arranged to support a specific community of interest (COI). Examples of COI chat rooms included meteorological and oceanographic (METOC) chats, Tomahawk targeting, and logistics chat rooms. Initially when chat rooms were used, some were moderated by a designated individual, but most chat rooms remained unregulated, such that messages were posted without any human intervention. However as time passed, and as newly instituted Navy Knowledge Managers spent many efforts on creating rule sets, rules regarding chat rooms use became well-defined. Chat rooms became regulated, and most were posted under human intervention.

Chat rooms were used extensively within TF-50 because not all of the ships within the command had the time or bandwidth to surf the Internet to communicate and find information. Because of this limitation, the TF-50 intelligence team established secure chat rooms to share time-sensitive intelligence with tactical action officers, Web pages to make analytical details available to everyone on all ships, and voice networks to share information regarding immediate and severe threats.

Chatter on key voice circuits dramatically decreased compared to normal voice traffic during deployments. In the past, nearly all information was passed via voice communications. However the transition began with the Lincoln battle group. On the Lincoln, orders were issued over voice networks, but discussion took place in chat rooms.¹⁵ Similarly during OEF, TF-50 personnel used chat rooms to pass general and tactical information so that voice communications were reserved for time-sensitive information, such as air defense. As noted by the Lincoln battle group commander, “air defense moves too fast to be going back and forth on chat.”¹⁶

¹³ Balisle, P.M. VADM. (personal communications, 20 September 2005).

¹⁴ Adkins, M., & Kruse, J. (2003). *Case Study: Network Centric Warfare in the U.S. Navy's Fifth Fleet, Web-supported operational level command and control in Operation ENDURING FREEDOM.*

¹⁵ Balisle, P.M. VADM. (personal communications, 20 September 2005).

¹⁶ Ibid.

Furthermore, because most information was passed via chat and not by voice communication, background noise in the command centers diminished considerably. Consequently, when voice communications were used to pass information, people took notice. One person deployed with TF-50 described the effect of chat rooms as follows: “Chat was awesome. Chat [was] like getting 20 new radios and being able to work all at once.”¹⁷

Another feature was that the information could be quickly shared by every TF-50 ship’s watch team also participating in that particular chat room. For example, Force Intelligence Watch Officers (FIWO) shared and retrieved information via chat frequently. This process saved an immense amount of time, as explained by Captain (CAPT) Eileen MacKrell: “...the FIWO’s ability to chat in real time with every unit in the battle group meant we could move analysis to tactical users very rapidly.”¹⁸ This capability was extremely valuable because, following the attacks on 11 September 2001, “the exponential growth of terrorist-related threat reporting made rapid coordination and deconfliction essential.”

CommandNet

A third component easing information flow and collaboration was the inclusion of CommandNet. CommandNet was originally developed to fulfill a need for group situational awareness (SA) within the Third Fleet’s intelligence community. It was a low-cost program designed to disseminate critical messages and incidents throughout the distributed force. Its implementation in TF-50, in order to permit cost-effective communication and collaboration within the distributed force, was essential.

CommandNet was designed to be “drop dead simple”¹⁹ based on the fact that RADM Zelibor had requested that any technologies they adopted would be simple and would not require the “fighters to be Web page designers.”²⁰ CommandNet’s simple design allowed warfighters to use the tool with little effort, thus collaborating and sharing information in an almost real time setting. Using CommandNet, personnel could enter data and view the browser from any Web platform. Personnel could use CommandNet on limited or temporary non-existent bandwidth. When messages were entered, others could see the entry within seconds. CommandNet was so widely used that while aboard the USS Vinson, about 14,000 log entries were made.

As such, CommandNet provided the commander SA anytime or anyplace a SIPRNET computer terminal was located, either on land or sea. CAPT Scot Miller, from the CommandNet design team stated that CommandNet is “simplistic, yet has actually allowed a much greater understanding of how and what others are thinking.”²¹ That knowledge led to greater understanding, as explained by one TF-50 watch officer: “The

¹⁷ Adkins, M., & Kruse, J. (2003). *Case Study: Network Centric Warfare in the U.S. Navy’s Fifth Fleet, Web-supported operational level command and control in Operation ENDURING FREEDOM.*

¹⁸ MacKrell, E.F. CAPT. (2003). *Network-Centric intelligence works.*

¹⁹ Adkins, M., Kruse, J., & Younger, R.E. *CommandNet Point Paper.* Center for the Management of Information; University of Arizona, Tucson, AZ.

²⁰ Majeranowski, P. Lt. (2003). *Knowledge web plays big in transformation.*

²¹ Swedlund, E. (11 February 2002). *UA software aids military in cataloging information.* Arizona Daily Star.

difference was night and day...What I saw was the level of knowledge of the watchstanders increase.”²²

Information Sharing Processes

These capabilities impacted the manner in which information was shared among the battle group ships. RADM Zelibor’s staff was able to use both relay and direct information exchange.²³ As in previous deployments, such as with the *Stennis* and *Lincoln* battle groups, during the TF-50 deployment information was sent to and from ships in the formation via the shore. Ships sent information to a server located ashore, where it was held until receiving ships came online to receive the information. The amount of hold time varied, as ships could be offline for many reasons including refueling, turning, blind zones, or aircraft in close proximity. Once ships came back online, they would then get the information being held ashore. This process was estimated to require between 30 and 45 minutes, depending upon the situation.²⁴ Communications with allies and time-sensitive messages were typically sent via email.

Though it took an extra link to transfer information to and from ships, commanders and staffs were generally quite pleased with the information sharing process. A benefit, as noted by VADM Balisle, was that information could be held and did not get lost. Another benefit, as noted by RADM Zelibor, was that SA continually rose. Furthermore, providing the ability for so many to view information enabled individuals to self-synchronize and correct whatever information was incorrect: “if you allow collaboration, and the more eyes that see it [information], [you are] 100 percent guaranteed it will be self-correcting.”²⁵

Leadership

Not only did new information-sharing applications and revised processes have an impact on the effectiveness of TF-50, but leadership had a large influence as well. As explained by CAPT MacKrell, it is important for a leader to fully support transformational efforts. She stated that:

*...if the boss still insists on PowerPoint status briefs every morning, you will still be in the PowerPoint business...If your senior decisionmakers are not receptive to innovative use of technology and tools, you have a challenging sales job ahead of you.*²⁶

CAPT MacKrell’s boss, RADM Zelibor, had a similar mantra: “A smarter, more informed boss makes life a whole lot easier.”²⁷ RADM Zelibor was not an unreceptive

²² Adkins, M., & Kruse, J. (2003). *Case Study: Network Centric Warfare in the U.S. Navy’s Fifth Fleet, Web-supported operational level command and control in Operation ENDURING FREEDOM.*

²³ Balisle, P.M. VADM. (personal communications, 20 September 2005).

²⁴ Hearne, J. CDR. (personal communications, 13 October 2005).

²⁵ Zelibor, T. RADM. (personal communications, 4 October 2005).

²⁶ MacKrell, E.F. CAPT. (2003). *Network-Centric intelligence works.*

²⁷ Adkins, M., & Kruse, J. (2003). *Case Study: Network Centric Warfare in the U.S. Navy’s Fifth Fleet, Web-supported operational level command and control in Operation ENDURING FREEDOM.*

senior decisionmaker. He had worked with several of the network-centric applications during Global 2000, and sought to have these information-sharing tools implemented throughout every level of the battle group, from intelligence to operations.

Some individuals suggested that RADM Zelibor's leadership had an impact on the battle group's culture. LT Majeranowski explained that because of the culture that the TF-50 leadership helped to create, individuals were more willing to accept the new network-enabled capabilities, and to learn about and implement the newly revised processes.

*...the transformation came from Admiral Zelibor's leadership, resulting in wholesale acceptance of a new and more effective way to collect, manage, display, and use information...Admiral Zelibor created a warfighting culture in the battle group...*²⁸

Many argued that had it not been for RADM Zelibor's continual drive for information sharing and collaboration, the sailors and staff would not have conducted business in the manner that they did, and the Task Force would not have been as efficient and effective as it was. RADM Zelibor supported increased shared awareness among commanders, sailors, and staff by discouraging the use of existing legacy systems and encouraging personnel to use network-enabled applications for communication, information sharing, and collaboration. In fact, he rewarded those in his command who exhibited regular use of the network-centric tools in order to pass information, communicate, and collaborate. For example, RADM Zelibor would personally give positive feedback and encouragement to those who used NCO tools. He also gave out CARGRU3 coins, a coveted reward for those in the military.²⁹

Furthermore, because of the way in which the platforms aided in renovating the process of how operations were conducted, RADM Zelibor was able to delegate responsibility for information to lower levels in the chain of command. For example, petty officers were able to post information independently, without the review from officers or other superiors. RADM Zelibor further explained why he and his staff felt comfortable delegating responsibility to relatively junior levels:

*Because of the way we distributed information and did our command and control, I felt perfectly comfortable. It didn't matter whether somebody [was] off the Horn of Africa or they were in the Northern Arabian Gulf, or they were 500 yards off the stern of the carrier, we were all connected in some way.*³⁰

RADM Zelibor was recognized by superiors for implementing network-centric operations throughout his force. As Admiral (ADM) Dennis Blair explained, RADM Zelibor used what he learned from Global 2000 to create a C2 Knowledge Web, displays, sensors, and new procedures to run the battle force on the Web. The Task Force had arrived in theater ready to support Operation SOUTHERN WATCH, and even though

²⁸ Majeranowski, P. Lt. (2003). *Knowledge web plays big in transformation*.

²⁹ Zelibor, T. RADM. (personal communications, 4 October 2005).

³⁰ Adkins, M., & Kruse, J. (2003). *Case Study: Network Centric Warfare in the U.S. Navy's Fifth Fleet, Web-supported operational level command and control in Operation ENDURING FREEDOM*.

there was a major change in operations planning to support the new tasking, their self-developed information-sharing processes “worked splendidly in Operation ENDURING FREEDOM.”³¹

Results

Deployment Work-Up Benefits

Effects of the changes across technology, people, and processes were felt even prior to OEF. During pre-deployment training, RADM Zelibor and his command staff initiated innovations they would implement months later in support of the war on terror. Impacts were felt in every aspect of daily operations, “...we were acting on pictures and nuggets rather than 100-page documents,” to mission effectiveness with the enemy, as RADM Zelibor described:

It really showed value. During our work-ups during the JTFX where Third Fleet [was] putting us through the paces during our work-up cycle, I found that my staff and my warfare commanders were actually about three or four steps ahead of the Third Fleet staff because we were able to get information out quicker, which caused us to focus more on tactical discussions rather than information briefs. And the whole process caused us to get inside the OODA loop of...our enemy.³²

OEF Benefits

RADM Zelibor reported that, “In my heart, I know we improved speed of command.”³³ His assertion was based on the fact that transforming technology, process, and leadership had an impact on TF-50 and other commands in several ways. First, information was not only accessible to RADM Zelibor and his staff, but also accessible to other commands within the Task Force, throughout the Fifth Fleet, and even those outside the fleet with access to the SIPRNET. For example, the Fifth Fleet Commander’s staff continually sifted through TF-50’s battle damage assessment matrix for details of air strikes. This additional information allowed the TF-50 Commander to pass current information in order to preempt questions from senior commands. Also, following the deployment, TF-50 staff learned that the U.S. Federal Bureau of Investigation had been routinely accessing their intelligence pages. RADM Zelibor stated:

Where we knew it was powerful [was] that if we didn’t update, we got calls from around the globe... [However] we were in the middle of a war,

³¹ Blair, D.C. ADM. (2002). *We can fix acquisition*. Proceedings. From: <<http://www.navalinstitute.org/proceedings/articles/02/problair05.htm>>, accessed 22 April 2005.

³² Adkins, M., & Kruse, J. (2003). *Case Study: Network Centric Warfare in the U.S. Navy’s Fifth Fleet, Web-supported operational level command and control in Operation ENDURING FREEDOM*.

³³ Ibid.

and we weren't getting any calls (from Washington or higher headquarters).³⁴

A second benefit of these innovations was the dramatic increase in battle group SA. Information was available on the SIPRNET, and because individuals had the ability to continually receive information, that information was thus accessible to personnel in every group and at every level. For example, one Operation SOUTHERN WATCH department head stated that (for his squadron), the squadron only had access to the Air Tasking Order (ATO) because that squadron was only interested in looking at what they needed. The department head believed that they did not have a need for the big picture.³⁵ However, that same person said that, as a Battle Watch Captain:

...[I] knew the flight schedule, logistics flight, vertical replenishments, where...forces would be. I had a picture in my mind what was happening.

One individual explained that prior to implementation of the new technologies and processes, the Combined Air Operations Center (CAOC) typically produced the ATO 72 hours before each mission commenced. This meant that weather was not a planning factor (so long before the actual strike day), and that weapons payloads could not be adjusted to account for weather changes.

... initially many aircraft were unable to execute their assigned missions and had to dump these bombs into the sea prior to landing. It was a waste.³⁶

However, technological and process changes occurred in relation to METOC data that eased METOC Web page use for all personnel, including CAOC users. Written METOC data was transformed into the laser forecast, a visually understandable image. Figure 4 shows a transformed METOC page. The METOC Web page:

...evolved into a predictive tool accessible to the CAOC. Because we were dealing with command and current information, together we were able to match aircraft and ordnance for specific weather and areas, working near real time.³⁷

³⁴ Ibid.

³⁵ Ibid.

³⁶ Ibid.

³⁷ Ibid.

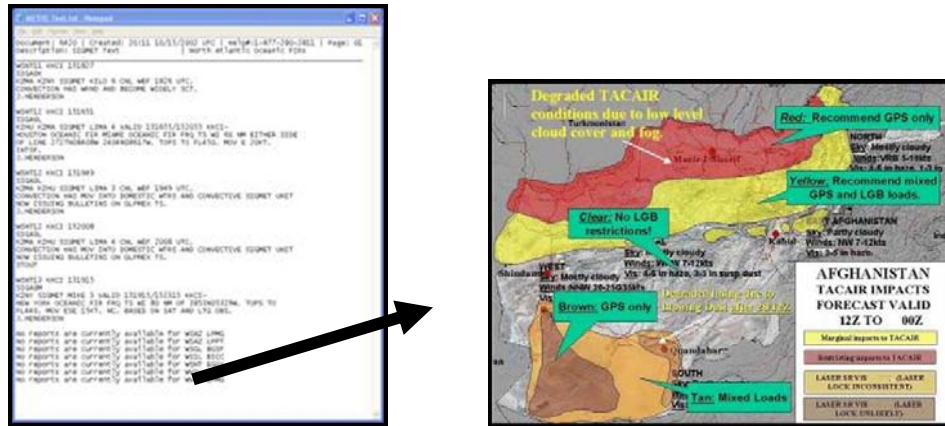


Figure 4. Transformed METOC Data³⁸

Additionally, another person deployed with TF-50 explained that technological capabilities allowed for a much larger awareness and understanding of tasking and operations. As explained:

I probably had 10 times more information than if we [had not] had this technology. It took me some time, but I read every Web page. I'd get up in the morning and read Web pages. I was cued by yellow and reds [i.e., colors signifying levels of importance], then would go into those issues. By the end, I had the Web pages memorized.

A third benefit of the reorganization was that more time was spent executing and planning missions, rather than passing along the information in order to plan and execute the missions. For example, because of the continual intelligence support, daily morning report times were reduced by up to 75 percent, and briefings were spent discussing what to do with the information and what the COA would be, rather than relaying the information to others. As RADM Zelibor explained:

... [O]ur meetings would be issue-focused for about the first 15 minutes and then there would be 30 minutes or so beyond that where we would talk about what-ifs [and] tactical discussions, so the whole tenure of the morning meeting just changed. And because of that, we had already gone through the courses of action and we'd already thought of all the what-ifs of playing the game, what can they do to us next, and so when it happened, or when something would happen, we'd already thought through it and it was executed immediately.³⁹

CAPT Fitzpatrick (TF-50 Deputy Chief of Staff, Operations and Plans) further elaborated how the impact of shared awareness decreased the time needed for decisionmaking to occur:

³⁸ Ibid.

³⁹ Ibid.

Because everybody had the same information available to them and the Web became an authoritative source, they were very rarely surprised, and so when a new issue came up all the warfare commanders across the board were working from the same baseline, you wouldn't have to take that bring-up time to get to a decision point.⁴⁰

Another example of time saved for planning and executing missions included a search and rescue operation over the Indian Ocean. An operator supporting the mission stated that he was able to pass along information to a ship approaching the wreckage:

I look[ed] at one log that [had] the coordinates of the bailout. [The] surface ship heading north towards the bailout area didn't have the same communication ability. I pulled the lat/log and gave it to the surface ship and he said thank you. It was [a] fast and efficient rescue. The network-centric capabilities saved time and allowed the search and rescue team to act faster.⁴¹

OEF Mission Effectiveness

Transforming technologies, processes, and leadership allowed the commander to change COAs from operations supporting the ongoing Operation SOUTHERN WATCH to operations supporting OEF more smoothly. The mission objectives for each were very different; however, the transition was seamless. The technological and process changes embraced by CTF-50 not only enabled the sailors and staff to experience enhanced awareness and communication, but it also allowed the group to plan more quickly and to conduct their mission in support of OEF more effectively. This was in part because the information flow had two directions. As CAPT Fitzpatrick explained, the commanders not only sent information to subordinates, but also received information from them as well:

...It wasn't just us sending information one way down to them. Because of the tools available, the information was coming back up to us also. So we were very confident that we were aware of what they were doing, what they were thinking, and what the tempo of ops was that we could sit back and let them continue to operate independently, and if they misunderstood something or we had another piece of information that they didn't have that became obvious very early on, and we could get it to them and get them a ...correction.⁴²

RADM Zelibor further explained that allowing the sailors and staff to have access to more information decreased the amount of supervision he had to provide.

... [I]f you have enough information that gets to the important decisionmakers, then they know that I trust the information that they have

⁴⁰ Ibid.

⁴¹ Ibid.

⁴² Ibid.

*that they are going to actually execute things without playing 'mother may I' with me.*⁴³

During OEF, TF-50 logged 24,905 flight hours, flew 8,688 sorties, dropped 2,009 bombs, and 2,020,000 pounds of ordnance.⁴⁴ RADM Zelibor later reported that during OEF, his task group flew fewer numbers of sorties than they had originally thought they would need. This has been attributed, in part, to the collaboration and accuracy found in OEF close air support operations that was missing in operations conducted during Operation DESERT STORM. RADM Zelibor stated that the OEF mission:

*...had us flying fewer, albeit significantly longer sorties than previous deployments. Our parts requirements in support of this schedule were as high as twice that routinely experienced on an Operation SOUTHERN WATCH deployment.*⁴⁵

TF-50's success was due to a multitude of factors, including technology changes, process changes, and an innovative leadership style. The culmination of these aspects provided a magnitude of power that CTF-50 was able to unleash during OEF. As ADM Blair stated:

*Rear Admiral Zelibor...and his staff set up a network to command and control battle group functions in preparation for SOUTHERN WATCH, and used it with great effect when diverted to support [Operation] ENDURING FREEDOM.*⁴⁶

The Navy Now

Knowledge Managers

When asked how he saw the future of the Navy, RADM Zelibor explained that knowledge managers (KMs) should be routinely deployed, and they should understand not only the information technology (IT) side of business, but also the operations side.⁴⁷ Since RADM Zelibor's tour, the Navy has developed a new community of Information Professionals (IPs). These IPs, who employ knowledge management strategies and processes, now serve on strike group staffs as the Assistant Chiefs of Staff (ACOS) for C4I, KMs, and Flag Communicators.⁴⁸ The fact that the IP community assigns relatively senior officers to these jobs underscores the importance of KM afloat.

Initially the role of the Knowledge Management Officer (KMO) was undefined, as having a KMO on an afloat staff was new territory. However as time passed, duties became clearer and KMs were included in deployments to oversee tasks including, but

⁴³ Ibid.

⁴⁴ Ibid.

⁴⁵ Navy Supply Corps Newsletter. (2002). *Newsletter talks to RADM Zelibor, USN Commander, carrier group 3 – Thomas E. Zelibor interview*. From: <http://www.findarticles.com/p/articles/mi_m0NQS/is_3_65/ai_90624348>, accessed 21 April 2005.

⁴⁶ Blair, D.C. ADM. *We can fix acquisition*.

⁴⁷ Zelibor, T. RADM. (personal communication, 4 October 2005).

⁴⁸ Hearne, J. CDR. (personal communication, 13 October 2005).

not limited to, information management, information security, creation of IT business rules for personnel in the fleet, IT account administration, and KWeb administration. Each command has the ability to place the KMO anywhere within the organization. Three specific assignments include special assistant to the Strike Group Commander, the KMO within the Operations Department, and serving concurrently as the Deputy N6 and KMO. Additional tasks often include governance of the Collaboration at Sea and KWeb sites, governance of the Combined Enterprise Regional Information Exchange System enclaves, author and enforcement arm of the Information Management messages, facilitator for battle rhythm process improvement, and change agent for innovation.

Over time, KM requirements and training have improved. It became very important for KMs to have operational or previous deployment experience. The Navy also instituted personal qualification standards (PQS) to ensure that people were trained before they became KMs. Moreover, KMs have had the ability to train one another, and most KMs stayed in touch with one another, providing the opportunity for them to learn and share resources. They also took part in academic courses, such as the Afloat Knowledge Management Course. KMs have also had the opportunity to serve as guest lecturers for a KM course offered at Naval Postgraduate School (NPS). KMs formed communities of practice in which they came together, built curricula, and shared knowledge in order that they all stay current on the latest information management insights.

Naval Network Warfare Command

Establishment

As RADM Zelibor and VADM Balisle indicated, the future of naval warfare lies in the information and technology domains. CAPT Robert N. Whitkop (Commander, Naval Network Operations Command, NNOC—stood up in 2001) further explained, “we are already fighting battles on our networks...that is why it is so important to protect information networks and deny access to our adversaries.”⁴⁹ However, making the modifications needed to fully develop and exploit technological capabilities entails changing peoples’ thoughts and organizational culture into an environment that will be accepting of change and transformational goals. In support of this effort, Naval Network Warfare Command (NETWARCOM) stood up in July 2002 with the goal of serving as the Navy’s central operational authority for space and IT requirements, and acting as the operational forces’ advocates in the development and fielding of such systems.

NETWARCOM, headquartered at Naval Amphibious Base Little Creek in Norfolk, Virginia, acts as the central operational component responsible for the coordination of IT, information operations, and space requirements and operations.⁵⁰ NETWARCOM is based on the concept of a single naval network and supports that

⁴⁹ CHIPS. (2002). *NETWARCOM stands up*. From: <http://www.chips.navy.mil/archives/02_summer/authors/index2_files/netwarcom_stands_up.htm>, accessed 19 October 2005.

⁵⁰ Navy Newsstand. (2002). *Navy establishes Naval Network Warfare Command*. From: <http://www.news.navy.mil/search/display.asp?story_id=1156>, accessed 19 October 2005.

network's end-to-end operational management by more concisely organizing the various staffs working towards this goal. The organization has five guiding principles:

- Networks are a weapon system.
- Information is a domain of the battle environment.
- FORCEnet delivers naval C2 for Joint Operations in the 21st century.
- The space domain is critical.
- Forces are at risk without complete, secure, assured, and timely information.⁵¹

These guiding principles led to NETWARCOM's global mission, which focuses on information age business options to support the warfighter:

*Naval Network Warfare Command creates warfighting and business options for the Fleet to fight and win in the information age. We deliver and operate a reliable, secure, and battle-ready global network. We lead the development and integration of Information Operations capabilities into the Fleet.*⁵²

NETWARCOM is headed by a Vice Admiral, and oversees authority of three commands:

- Naval Network and Space Operations Command (NNSOC) in Dahlgren, Virginia
- Navy Component Task Force Computer Network Defense (NCTF CND) in Washington, DC
- Navy Information Operations Command (NIOC) in San Diego, CA (newly redesignated as a merger of Fleet Information Warfare Center and Naval Security Group Activity)

Navy Information Operations Command

Sensing the benefits of information warfighting, the Navy took its first step toward integrating all of its Informational Operations capabilities following the stand up of NETWARCOM.⁵³ On 27 July 2005, the Fleet Information Warfare Center (FIWC) Detachment in San Diego and the Naval Security Group Activity (NSGA) in San Diego

⁵¹ Naval Network Warfare Command. (2005). *Home: Navy's central operational authority for network, information operations, and FORCEnet*. From: <<https://ekm.netwarcom.navy.mil/netwarcom/nnwc-nipr/>>, accessed 19 October 2005.

⁵² Ibid.

⁵³ Information operations is the warfare composed of five integrated capabilities: Electronic Warfare, Computer Network Operations, Psychological Operations, Military Deception, and Operational Security that work with supporting and related capabilities to impact, disrupt, and corrupt an adversary's decisionmaking process while protecting one's own. Information from: Navy Newsstand. (2005). *First NIOC stands up as NSGAs align with NETWARCOM*. From: <http://www.news.navy.mil/search/display.asp?story_id=19396>, accessed 19 October 2005.

were disestablished. The two were merged into one new command: the NIOC in San Diego.

The NIOC provides cryptographic and information operations capabilities previously provided by the two separate FIWC and NSGA commands. As VADM J.D. McArthur (Commander, NETWARCOM) explained,

*now these functions will be at NETWARCOM, and we will be able to provide an integrated, synchronized team in the area of information and network warfare. And with this merger, we now have our first command that will lead the way to full spectrum information operations in addition to the cryptologic mission.*⁵⁴

Summary

Naval transformation, such as that exhibited by RADM Zelibor, has been a continuous evolution since the mid-1990s. From the use of chat aboard the *USS Abraham Lincoln*, to the development of KWall at Global 2000, and to RADM Zelibor's implementation and support of transformational technologies, ideas, and behaviors, NCO capabilities continue to grow and strengthen. Evidence gathered in this study suggests that it takes not only sophisticated technology and money to facilitate transformation. It also requires the synergistic development of technology and funding, as well as the co-evolution of organization, people, process, trust, and of course, strong leadership and an environment that will allow transformational people to initiate and sustain innovation. RADM Zelibor explained the concept very succinctly: "I am not an innovator," he said. "I just know what works."⁵⁵

⁵⁴ Navy Newsstand. (2005). *First NIOC stands up as NSGAs align with NETWARCOM*.

⁵⁵ Zelibor, T. RADM. (personal communications, 4 October 2005).

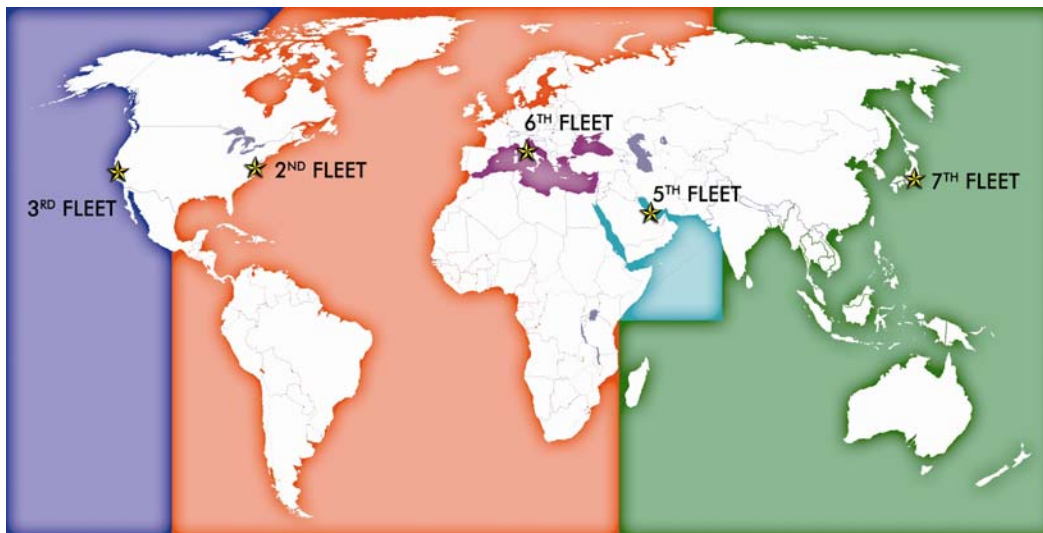
Appendix A. Acronym

ACOS	Assistant Chief of Staff
ADM	Admiral
AOR	Area of Responsibility
ATO	Air Tasking Order
C2	Command and Control
C4I	Command, Control, Communications, Computers and Intelligence
CAOC	Combined Air Operations Center
CAPT	Captain
CARGRU3	Carrier Group Three
CENTCOM	Central Command
COA	Course of Action
CTF-50	Commander Task Force – 50
CVN-70	USS Carl Vinson
CVW-11	Carrier Air Wing 11
DESRON	Destroyer Squadron
DESRON 9	Destroyer Squadron Nine
Email	Electronic Mail
FIWC	Fleet Information Warfare Center
FIWO	Force Intelligence Watch Officer
IP	Information Professional
IT	Information Technology

KM	Knowledge Manager
KMO	Knowledge Management Officer
KWall	Knowledge Wall
KWeb	Knowledge Web
Lt	Lieutenant
METOC	Meteorological and Oceanographic
NCO	Network Centric Operations
NCW	Network Centric Warfare
NETWARCOM	Network Warfare Command
NSGA	Naval Security Group Activity
NIOC	Navy Information Operations Command
OEF	Operation Enduring Freedom
PQS	Personal Qualification Standards
RADM	Rear Admiral
SA	Situational Awareness
SIPRNET	Secure Internet Protocol Router Network
TF-50	Task Force 50
UNSCR	United Nations Security Council Resolution
USS	United States Ship
VADM	Vice Admiral

Appendix B. U.S. Navy's Five Fleets

- Currently there are five naval fleets.
- These include the:
 1. Second Fleet, which operates in the Atlantic Ocean
 2. Third Fleet, which operates in the eastern Pacific Ocean
 3. Fifth Fleet, which is based in Bahrain and supports naval operations under the command of the United States CENTCOM
 4. Sixth Fleet, which operates in the Mediterranean Sea
 5. Seventh Fleet, which operates in the western Pacific Ocean
- Fleet rotations are typically 6 months in length. However as the world is not stable, neither is the fleet rotation timetable; deployments are often longer than 6 months in duration.
- The figure below represents the fleet home locations and the AOR of each of the five naval fleets.



Appendix C. Information on Operation SOUTHERN WATCH

- The goal of Operation SOUTHERN WATCH was to ensure that Iraq complied with United Nations Security Council Resolution (UNSCR) 688.
- UNSCR 688 stated that Iraqi leader Saddam Hussein would stop the repression of the Iraqi civilian population.
- In support of this goal, the coalition barred Iraqi fixed and rotary wing aircraft from entering the surveillance area.
- The figure shows the Iraqi no-fly zones.⁵⁶



⁵⁶ Image from: Global Security. (2003). Southern Watch. From: http://www.globalsecurity.org/military/ops/southern_watch.htm, accessed 22 April 2005.

Appendix D. TF-50 Coalition Ships

United States of America		United Kingdom	Japan
<u>USS ENTERPRISE</u>	<u>USS CARL VINSON</u>	<u>HMS ILLUSTRIOUS</u>	JDS Hamana
USS Nicholson	USS Antietam	HMS Southampton	JDS Kirisame
USS O'Brien	USS Ingraham	HMS Kent	JDS Kurama
USS McFaul	USS O'Kane	HMS Bayleaf	JDS Towada
USS Arctic	USS Sacramento	HMS Triumph	
USS Providence	USS Key West	HMS Trafalgar	
USS John Paul Jones	USS Olympia	RFA Fort Victoria	
USS Kitty Hawk	USS Peleliu		
USS Curtis Wilbur	USS Comstock	Australia	Italy
USS Gary	USS Dubuque	HMAS Sydney	<u>ITS GARIBALDI</u>
USNS Rappahannock	USS John Young	HMAS Anzac	ITS Aviere
USNS Saturn	USS Russell	HMAS Kanimbla	ITS Zeffiro
USNS Niagara Falls		HMAS Adelaide	ITS Etna
USNS John Ericsson		Canada	France
<u>USS T. ROOSEVELT</u>		HMCS Iroquois	<u>FS COURBET</u>
USS Leyte Gulf	USS Bataan	HMCS Charlottetown	FS Var
USS Peterson	USS Shreveport	HMCS Halifax	
USS Detroit	USS Whidbey Island	HMCS Preserver	
USS Hartford			

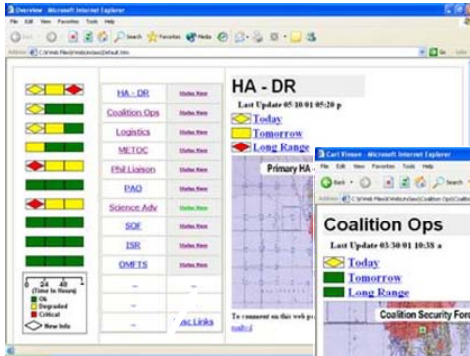
Appendix E. KWeb Hierarchy



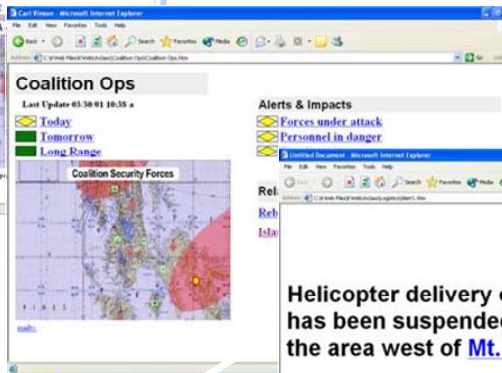
KWeb Hierarchy



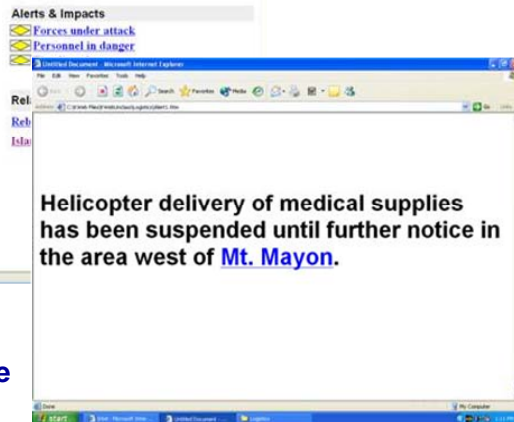
Office of Force Transformation



Overview Page



Summary Page



Content Page

Appendix F. Teaching Note for Use with “TF-50 During Operation ENDURING FREEDOM”⁵⁷

“TF-50 During Operation ENDURING FREEDOM” is intended for an hour-long discussion in military and business courses focused on the business effects of strong leadership, information management, and process change.

Summary of the Case

The case study “TF-50 During Operation ENDURING FREEDOM” presents the nature of RADM Zelibor’s original deployment plan, the evolution into TF-50, and the method of operations during OEF. The case study opens with a challenge section, which is followed by background regarding naval fleets and the organization of TF-50. This section is followed by an outline of capabilities and leadership during OEF, and finally a conclusion section.

This material is supported by statements from individuals serving with TF-50 during OEF, and through open source documents. The case study requires about 30-45 minutes of reading time.

Where to Use the Case

“TF-50 During Operation ENDURING FREEDOM” is intended to be used in a number of contexts.

For military personnel, the case describes how new technological platforms, revised process change, and strong leadership can enhance understanding and mission execution. Specifically, the case study describes how information tools and management allowed TF-50 personnel to more easily access information vital to mission planning.

For the general audience, the case demonstrates how a combination of process and technological changes, pioneered by strong leadership, can have a positive impact on employees. If time can be saved by reducing the time needed to pass information, efforts can be placed on decisionmaking, and ultimately creating a solid product.

Teaching Objectives & Sample Questions

For both military and general audiences, the case study should teach that:

- KWeb increased efficiency in communication by eliminating the need for operation summaries. This allowed commanders to spend more time planning fleet tactics and strategy.

⁵⁷ This Teaching Note is for the Instructor’s use only and should not be distributed to students. For questions regarding the use of the case, please contact author Christine W. Balisle at EBR, Inc. at 703-893-6800. You may also contact case study writer and teacher Thomas W. Shreeve at 703-848-9003.

1. What is a way that KWeb and other technologies aided in planning?
 2. How would this benefit the command and staff in the projected future?
- New technologies and strong leadership can enhance information sharing and eliminate redundancies in standard operating procedures.
 1. What aspect is most important in enhancing information sharing and ultimately enhancing standard operating procedures? (answer: there is no best one area)
 2. Why is the co-evolution of technologies, leadership, and process so important?
 - Information sharing is often desirable in complex, multinational environments. However, cultural factors can inhibit such exchange even when the relevant technological connectivity is in place.
 1. What barriers could impede information sharing in this context?
 2. What are methods of overcoming these information sharing and collaborative challenges?
 - A robustly networked force will be more agile than a force not similarly networked.
 1. What are the benefits of a networked force?
 2. What constitutes a networked force?
 - Increased communication, awareness, and understanding can lead to quickened decisionmaking and action.
 1. What factors most impact decisionmaking and action?
 2. In what way does enhanced information sharing lead to decisionmaking and action?

Teaching Plan

It is recommended to break this case study apart into four discussion topics.

The first discussion period should give the students an opportunity to familiarize themselves with the Navy structure and background on TF-50.

This section should last about 10 minutes.

The second discussion period should focus on the new information-sharing capabilities that were introduced during TF-50.

This discussion should last about 15 minutes.

The third discussion period should describe the impact of RADM Zelibor's leadership during TF-50. Specifically introduce what process changes RADM Zelibor instigated and how he went about ensuring that all personnel operated in accordance with the new

methods.

This discussion should last about 15 minutes.

The final section should discuss the outcome of TF-50 and what obstacles could have made TF-50 operations more challenging. Question students about commanding not only different fleets for the first time, but also commanding units from five other nations. Ask students: if this scenario were to occur again, what steps they may take that RADM Zelibor did not, or what steps RADM Zelibor considered that they would not?

This section should last about 20 minutes.

Appendix G. Sources

Adkins, M., & Kruse, J. (2003). *Case Study: Network Centric Warfare in the U.S. Navy's Fifth Fleet, Web-supported operational level command and control in Operation ENDURING FREEDOM*. The University of Arizona Center for Management of Information. (Not yet released).

Adkins, M., Kruse, J., & Younger, R.E. *CommandNet Point Paper*. Center for the Management of Information; University of Arizona, Tucson, AZ.

Blair, D.C. ADM. (2002). *We can fix acquisition*. Proceedings. From: <<http://www.navalinstitute.org/proceedings/articles/02/problair05.htm>>, accessed 22 April 2005.

CHIPS. (2002). *NETWARCOM stands up*. From: <http://www.chips.navy.mil/archives/02_summer/authors/index2_files/netwarcom_stands_up.htm>, accessed 19 October 2005.

Global Security. (2003). *Southern Watch*. From: <http://www.globalsecurity.org/military/ops/southern_watch.htm>, accessed 22 April 2005.

MacKrell, E.F. CAPT. (2003). *Network-Centric intelligence works*. Proceedings. From <<http://www.usni.org/proceedings/articles03/promackrell07.htm>>, accessed 18 April 2005.

Majeranowski, P. Lt. (2003). *Knowledge web plays big in transformation*. Proceedings. From: <<http://www.usni.org/proceedings/articles03/promajernowski>>, accessed 18 April 2005.

Naval Network Warfare Command. (2005). *Home: Navy's central operational authority for network, information operations, and FORCEnet*. From: <<https://ekm.netwarcom.navy.mil/netwarcom/nnwc-nipr/>>, accessed 19 October 2005.

Navy Newsstand. (2005). *First NIOC stands up as NSGAs align with NETWARCOM*. From: <http://www.news.navy.mil/search/display.asp?story_id=19396>, accessed 19 October 2005.

Navy Newsstand. (2002). *Navy establishes Naval Network Warfare Command*. From: <http://www.news.navy.mil/search/display.asp?story_id=1156>, accessed 19 October 2005.

Navy Supply Corps Newsletter. (2002). *Newsletter talks to RADM Zelibor, USN Commander, carrier group 3 – Thomas E. Zelibor interview*. From: <http://www.findarticles.com/p/articles/mi_m0NQS/is_3_65/ai_90624348>, accessed 21 April 2005.

Peterson, G.I. (2002). "Committed to victory": Interview with Vice Admiral Charles W. Moore, Jr., former commander, US Naval Forces Central Command/Commander, U.S. Fifth Fleet. *Sea Power*. From:
<http://www.findarticles.com/p/articles/mi_qa3738/is_200203/ai_n904728>, accessed 22 April 2005

Swedlund, E. (11 February 2002). *UA software aids military in cataloging information*. Arizona Daily Star.

U.S. Naval Forces Central Command, U.S. 5th Fleet, Combined Maritime Forces. *Welcome page of commander*. From:
<<http://www.cusnc.navy.mil/Pages/AOR%20page.htm>>, accessed 15 September 2005.

USS Carl Vinson. (2005). *CVN 70 History*. From:
<<http://www.cvn70.navy.mil/history.html>>, accessed 22 April 22, 2005.

Zelibor, T.E. RADM. (2003). *FORCEnet is Navy's future: Information-sharing, from seabed to space*. Armed Forces Journal.