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Spring 2014

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Navy Warfare Development Command's

NEXT

Spring 2014

Distributed Air Wing Concept

Volume 2, Number 1

Message from the Commander

RDML Scott B. Jerabek

The future of Navy warfighting starts with Concept Generation and Concept Development (CGCD). Navy Warfare Development Command (NWDC) is designated as the lead agent for CGCD. Our cover story on the Distributed Air Wing Concept is just one of the intriguing new concepts we are developing here at NWDC. We are also helping advance the Department of Defense Air-Sea Battle Concept, also featured in two articles in this issue of *NEXT*.

Our core competencies take on many other challenges the CNO sets forth in his Navigation Plan, and I hope you enjoy reading about them in this issue and help us further these initiatives through your feedback and ideas.

NWDC—"Forward For the Fleet."

MISSION

Navy Warfare Development Command (NWDC) links tomorrow's ideas to today's warfighter through the rapid generation and development of innovative solutions to operational challenges. Our unique synergies and capabilities help move the fleet forward through the 21st century.

VISION

Navy Warfare Development Command operates at the speed of the fleet to stay at the forefront of innovation, focused on nonmaterial solutions for the near-term and the future.

Seamlessly combining our core competencies—concepts, experimentation, modeling and simulation, doctrine, and lessons learned—NWDC generates cost-effective solutions that arm the warfighter with the tools needed to meet the global challenges of the maritime environment.

Our people, know-how, and technology work in unison to effectively move operational capability forward . . . for the fleet.

HISTORY

Naval Doctrine Command (NDC) was established in 1993 to provide the doctrinal foundation for naval forces to effectively contribute to joint and combined operations. NDC was disestablished and Navy Warfare Development Command was created as part of the Naval War College in 1998 at Newport, RI.

Navy Warfare Development Command was aligned under United States Fleet Forces Command (USFF) in 2002 in support of the Sea Trial process. As a result of base realignment and closure (BRAC) commission legislation, NWDC moved from Newport, RI, to Naval Station Norfolk, VA, in June 2010 (the BRAC move was fully completed September 30, 2010).

Commander, Navy Warfare Development Command was designated in 2008 as the Navy's Executive Agent for Concept Generation and Concept Development.

Navy Warfare Development Command is located aboard Naval Station Norfolk, VA. The headquarters facility meets current Leadership in Energy and Environmental Design (LEED) Green Building Rating System standards. The three-story, 84,849 square-foot building includes office space for more than 300 subject matter experts, including foreign liaison officers.

Navy Warfare Development Command headquarters is also the home of the Navy Center for Advanced Modeling and Simulation (NCAMS), a 10,000 square-foot, state-of-the-art modeling and simulation facility that supports the Navy Continuous Training Environment (NCTE), Experimentation, and Concept Generation and Concept Development.

Navy Warfare Development Command's
NEXT

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On the Cover

ATLANTIC OCEAN (July 10, 2013)—An X-47B unmanned combat air system (UCAS) demonstrator completes an arrested landing on the flight deck of the aircraft carrier USS George H.W. Bush *(CVN 77). The landing marked the first time any unmanned aircraft has completed an arrested landing at sea.* George H.W. Bush *was conducting training operations in the Atlantic Ocean. (U.S. Navy photo by MC3 Kevin J. Steinberg/ Released)*

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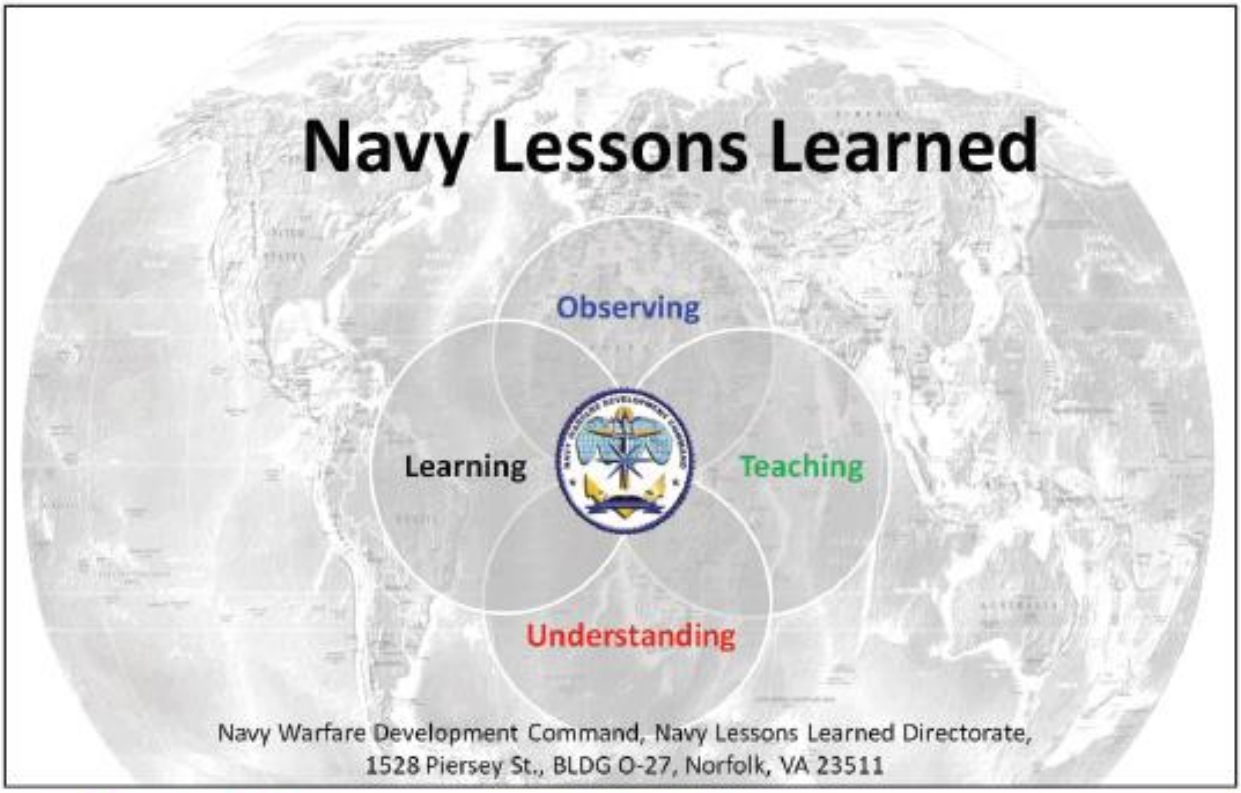
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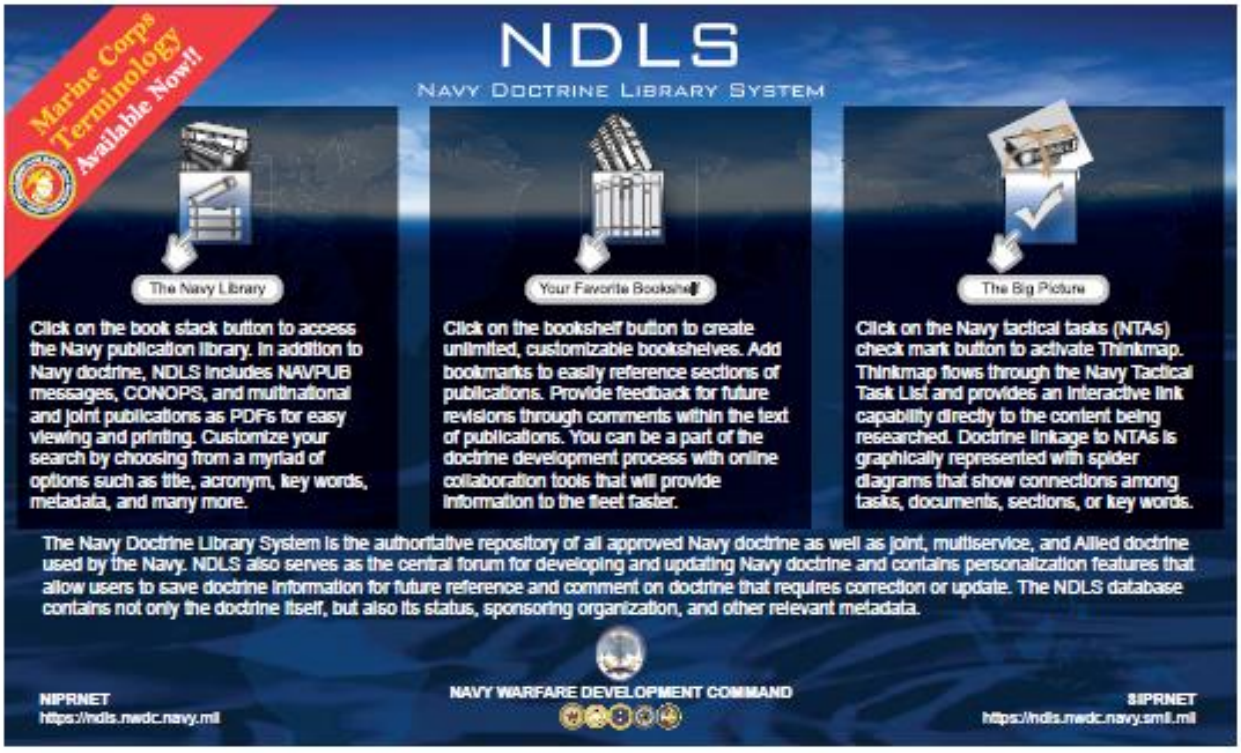
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Your Favorite Bookshelf
Click on the bookshelf button to create unlimited, customizable bookshelves. Add bookmarks to easily reference sections of publications. Provide feedback for future revisions through comments within the text of publications. You can be a part of the doctrine development process with online collaboration tools that will provide information to the fleet faster.
The Big Picture
Click on the Navy tactical tasks (NTAs) check mark button to activate Thinkmap. Thinkmap flows through the Navy Tactical Task List and provides an interactive link capability directly to the content being researched. Doctrine linkage to NTAs is graphically represented with spider diagrams that show connections among tasks, documents, sections, or key words.
The Navy Doctrine Library System is the authoritative repository of all approved Navy doctrine as well as joint, multiservice, and Allied doctrine used by the Navy. NDLS also serves as the central forum for developing and updating Navy doctrine and contains personalization features that allow users to save doctrine information for future reference and comment on doctrine that requires correction or update. The NDLS database contains not only the doctrine itself, but also its status, sponsoring organization, and other relevant metadata.
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Q&A

with CAPT James L. Bock
NWDC Decision Superiority Director

NEXT: Some of our readers may not be familiar with NWDC's Decision Superiority Department. Could you give us an overview of what it does for the fleet?

CAPT Bock: Sure. The Decision Superiority Department at NWDC supports fleet activities—especially at the high tactical and operational levels of war—to influence the development of related doctrine, training, and leadership/education solutions. Specifically, Decision Superiority is engaged across NWDC's core capabilities such as concepts and innovation, lessons learned, fleet experimentation, modeling and simulation, and doctrine and concepts of operation. We lead the core team for the Strike Group 360° (SG 360°) war game, provide opposition force replication for both internal and external efforts, and subject matter expertise from all the Information Dominance Corps (IDC) communities. Our Foreign Disclosure Representative, Caroline Remeika, is in the process of getting certified by USFF's foreign disclosure officer (FDO), which will make her the first FDO in the USFF domain, allowing NWDC to expedite releasing our products to allies and partners.

NEXT: The inaugural issue of *NEXT* introduced our readers to what was then called Carrier Strike Group 360° (CSG 360°). Could you give us an update on the war game?

CAPT Bock: Carrier Strike Group 360° has proved very successful and we continuously look for ways to make it even better. We've executed three war games with positive feedback from the fleet participants, the Naval War College, the Office of Naval Intelligence, and USFF. We currently have three more carrier strike groups lined up to play during the first half of 2014 and several others looking to leverage the expertise in CSG 360° to support related events.

Expeditionary Strike Group TWO (ESG–2) is scheduled to observe a game this spring to help determine how it can be adapted to support the Blue/Green team. To that end we rebranded CSG 360° to Strike Group 360° to reflect the effort of including ESGs, amphibious ready groups, and Marine expeditionary units in the war game.

We're also looking at playing future SG 360° war games during different months of the year in order to demonstrate how the local seasonal environment impacts strike group planning and operations.

NEXT: Cyber is obviously a quickly growing area for the Navy. What would you say to a cyber or intelligence specialist looking at NWDC for his or her next shore duty?

CAPT Bock: NWDC is an outstanding shore duty for any IDC professional for multiple reasons: NWDC is located in a fleet concentration area which keeps you connected with the latest IDC operations and issues important to the fleet and the Navy; NWDC has a wealth of experienced personnel in the command—military from all Navy warfare areas, civilians, and contractors—allowing almost unlimited opportunity to learn how to support and integrate into all facets of the Navy and joint force. The knowledge gained from the command is unparalleled, providing deep insight to naval doctrine, fleet experimentation, lessons learned, and concepts development, which can be applied to enhance warfare operational readiness in future tours; and the work you do here directly impacts the fleet—you can bring about a lot of changes and improvements in Navy warfare through your own initiative because the command not only allows for it, the leadership encourages it.

Have a great idea? Bring it to the Navy's marketplace for ideas:

Navy BRIGHTWORK

(formerly CollabLab)

https://www.milsuite.mil/navybrightwork

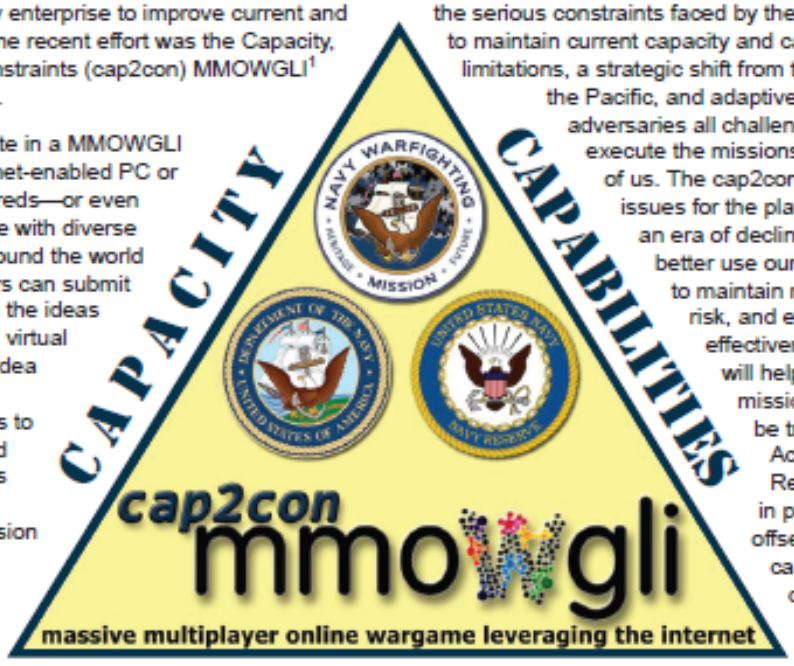
On SIPR at http://www.intelink.sgov.gov/blogs/brightwork

Fleet Input to Shape the Future Total Force

By Robert "Steve" Rowe, Outreach Branch Lead, Idea Harvesting Division, NWDC Concepts and Innovation Department

As part of the ongoing Navy Innovation Campaign, NWDC is using a variety of approaches to collect innovative ideas from across the Navy enterprise to improve current and future capabilities. One recent effort was the Capacity, Capabilities, and Constraints (cap2con) MMOWGLI[1] crowdsourcing game.

Players can participate in a MMOWGLI game from any Internet-enabled PC or tablet, allowing hundreds—or even thousands—of people with diverse perspectives from around the world to collaborate. Players can submit ideas or comment on the ideas of others using short, virtual "sticky notes" called idea cards. They can also complete action plans to refine ideas from card play. Interesting ideas gather attention and lead to robust discussion of promising topics. Players use game pseudonyms to encourage candid discussion regardless of rank or position. They receive points and earn "badges" for their contributions and for comments made by other players on the ideas that they introduce. The overall goal of MMOWGLI is to create an environment in which diverse participants provide input, collectively expose the best ideas, and collaborate to reach a solution.

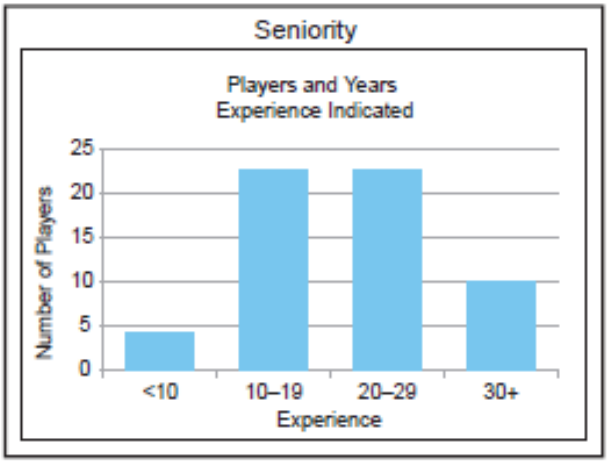


Cap2con was the second MMOWGLI event for NWDC and the third major crowdsourcing event the command has supported.[2] The game theme was developed by the Office of the Chief of Navy Reserve, to examine how the Navy Reserve could be used more effectively to address the serious constraints faced by the Navy as we strive to maintain current capacity and capabilities. Budget limitations, a strategic shift from the Middle East to the Pacific, and adaptive well-resourced adversaries all challenge the Navy to execute the missions the nation expects of us. The cap2con game teed up these issues for the players by asking how, in an era of declining resources, we can better use our Reserve Component to maintain readiness, manage risk, and enhance combat effectiveness. The answers will help to identify potential mission sets that could be transitioned from the Active Component to the Reserve Component—in part or in whole—to offset costs to retain Navy capability and adequate capacity in the face of constrained resources.

Cap2con MMOWGLI brought together a large crowd from locations across the United States, Europe, the Middle East, Africa, and the Pacific—even while underway. Four hundred and seventy-one players registered, contributing 2,868 idea cards and 23 action plans outlining potential ideas. The action plans described potential solutions that could be implemented to enhance total force capabilities, to reduce burdens on the Active Component (enabling greater warfighting focus and helping retention), and improve the effectiveness of the Reserve Component.

[1] MMOWGLI stands for Massive Multiplayer Online War Game Leveraging the Internet. MMOWGLI is an Office of Naval Research and Naval Postgraduate School (NPS)-developed Web-based ideation and discussion platform designed to crowdsource potential solutions to complex Navy problems.

[2] See "em[2] MMOWGLI: Crowdsourcing Takes on Electronic Warfare" in the Summer 2013 *NEXT* for a description of NWDC's first MMOWGLI event. NWDC's Concepts and Innovation Department also moderated the Ideascale crowdsourcing Web site in support of the Chief of Naval Operations' Reducing Administrative Distractions effort.



Of course, no game would be complete without a winner, and a number of players stood out from the crowd. Awards recognized the contributions of players who participated on their own time but also conveyed a sense of humor to maintain the fun of a MMOWGLI experience. At the end of round one, "Pepper1" took first place by earning 4,572 total points and contributing to seven action plans. "Skipper" took second place with 2,243 points, while "IS3" and "D_Quixote" tied for third place.[3]

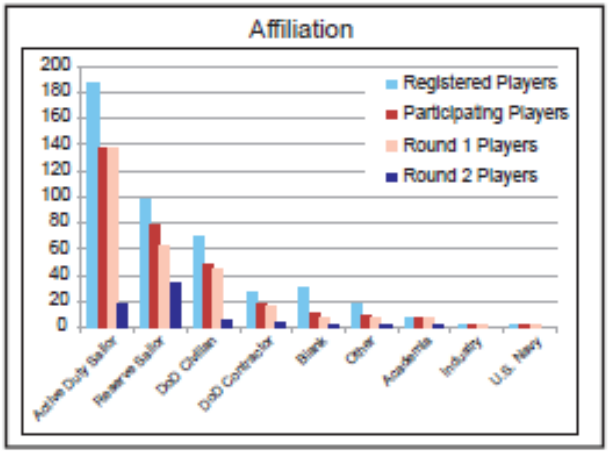
The final awards at the conclusion of round two recognized the overall winners as well as unique contributions by some players. "Pepper 1" retained hold on first place and was the overall game winner with 335 cards played and numerous action plan contributions. "IS3" moved up in round two to take second place overall. The control team presented the Frontline Foxhole award to "Mainemjc," who provided significant contributions from Afghanistan. "RESO5IDWO" was recognized as stealthiest for contributions that had a significant impact on the ongoing discussion. The overall game winners were recognized personally by the Chief of Navy Reserve, Vice Admiral Robin R. Braun.

[3] In this article, players are recognized only by their game pseudonyms to preserve their anonymity.

At press time, the cap2con effort is not yet complete. NWDC, Naval Postgraduate School, and the Chief of Navy Reserve staff are collaborating on a final report on game results. The report will recommend player-generated ideas for further analysis and implementation—informing high-level discussions about Navy force structure, strategies, and capabilities.

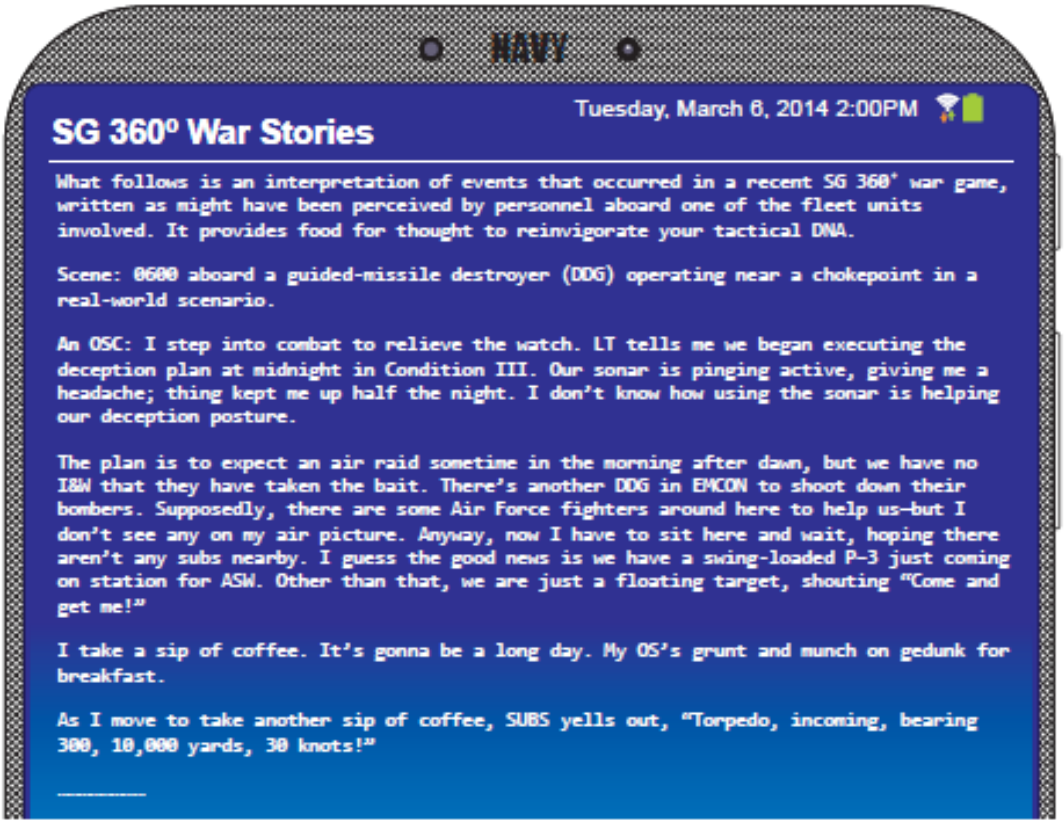
MMOWGLI, and crowdsourcing in general, represent novel ways for the Navy to unearth, explore, and develop concepts for the future. By tapping into our diverse knowledge base and rapidly building on shared ideas, crowdsourcing can accelerate activities relevant throughout NWDC and the Navy.

Contact NWDC Navy Center for Innovation at (757) 341-4720 or e-mail NWDC_NRFK_innovations@navy.mil for assistance about how crowdsourcing may support your needs. Stay tuned for future updates on actions ultimately taken based on crowdsourced ideation such as the cap2con MMOWGLI game.



STRIKE GROUP 360° WAR GAME

Navy Warfare Development Command has taken advantage of in-house wargaming expertise to conduct SG 360º at venues across the fleet. SG 360º is a true free-play war game like those employed at the Naval War College in the interwar period. NWDC's SG 360º war game engages strike group commanders, their staffs, and subordinate warfare commanders in a two-sided, open-ended, real-world scenario war game with the opportunity to win or lose. The game provides an experiential learning opportunity to leadership and staff meant to reinvigorate their tactical DNA by playing against a thinking, agile Red Cell/opposing force. Outcomes are decided by the specific probabilities of detection and strike. Data collected over multiple games is helping to ascertain if certain tactics, techniques, procedures, technology, or the combinations thereof could result in a greater likelihood of establishing sufficient maritime superiority as one measure of mission success. Through the games, we seek to gain a better understanding of the requirements for success in modern conflict at the high end of the spectrum, and to identify key areas in which the United States may gain significant operational advantage. To learn more, contact CDR Sean Kentch, sean.kentch@navy.mil, (757) 341-4207, or Dr. David K. Brown, david.k.brown@navy.mil, (757) 341-4194.



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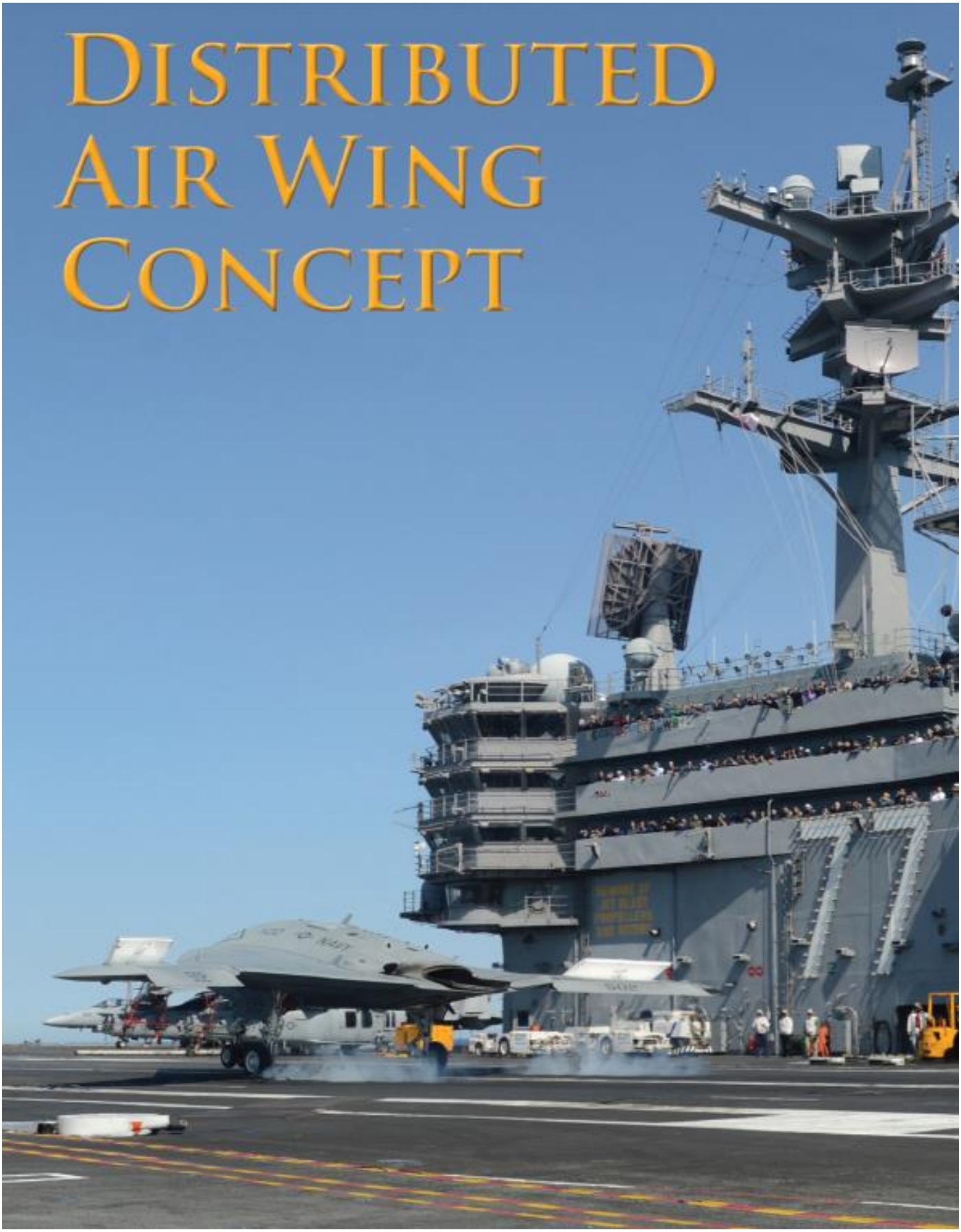
Distributed Air Wing Concept



By Thomas L. Grund, Jr.,
NWDC Concepts and Innovation Department Concept Analyst

Naval aviation celebrated its 100th birthday in 2011. For most of that century, the aircraft carrier was the centerpiece of the U.S. Navy and a unique national asset. Nothing else in the American arsenal operates across the full spectrum of military operations while avoiding the need for foreign base access. However, in spite of breathtaking changes in aviation technology and tactics, there have always been two constants in fleet air over the last 100 years: aircraft were operated by human pilots, and ships that carried aircraft were always large and grew ever larger.

No longer. As we enter the second century of naval aviation, dramatic advances in technology, combined with changes in U.S. military policy and the global situation are combining to set the stage for a new type of Navy air wing. The Navy may be able to gain significant operational advantage by creating a distributed air wing (DAW) consisting of manned aircraft and unmanned aircraft systems (UAS) embarked on carriers and other platforms. A DAW retains the unique capabilities of carrier strike groups while lowering costs, reducing human risk, and increasing survivability through distribution of assets. It also offers flexibility and scalability to the fleet while complicating a foe's intelligence, surveillance, and reconnaissance (ISR) operations and targeting calculus.

Main Idea

The DAW will not replace the carrier or the large amphibious ship. Rather, the DAW will broaden the use of air assets across the fleet by distributing a variety of manned and unmanned aircraft systems across a wider variety of platforms on the surface, subsurface, and ashore. The DAW will assign missions to the most capable manned or unmanned system with the objective of achieving the greatest synergistic advantage. It will operate larger aircraft (manned and unmanned) from carriers and large amphibious ships, while distributing smaller assets across a full range of platforms, including surface combatants, submarines, auxiliaries, balloons, and even large "mothership" UAS platforms that launch smaller UAS. Core mission areas for UAS integration envisioned in the near term include intelligence, surveillance, and reconnaissance; precision strike; and nonkinetic shows of force. In the long term, UAS could potentially take on roles currently reserved for manned aircraft, including command and control, force protection and early warning, and resupply and aerial refueling (i.e., UAS buddy tankers).

Advantages

The units supporting the DAW may operate together or independently, offering greater flexibility and scalability during operations. Additionally, the DAW increases the Navy's ability to operate in accordance with time-honored principles of war. Its disaggregated structure enhances maneuver, allowing UAS to simultaneously operate from multiple locations instead of a single carrier. The DAW also will allow greater economy of force by maneuvering the right assets into the right location at

ATLANTIC OCEAN (July 10, 2013)— An X-47B unmanned combat air system demonstrator plane completes an arrested landing on the flight deck of the aircraft carrier USS George H.W. Bush *off the coast of Virginia. (U.S. Navy photo by Seaman Brian Stephens/Released)*

the right time, while keeping other high-value units out of harm's way. The wing also will have increased security and survivability through dispersal, where the detection and/or destruction of one afloat platform will no longer affect an entire wing. The DAW will offer greater offensive power by creating more threats from more directions and allowing higher sortie rates through decreased deck cycle delays. Finally, the DAW will increase the Navy's ability to surprise opponents. UAS will be able to launch from unexpected locations, and every afloat platform becomes a potential threat to the enemy.

Risks

In spite of its potential, there are some inherent risks in the DAW concept. The greatest of these is the need to create new procedures for air planning, tasking, and airspace control that integrate new UAS capabilities within the fleet and a joint force. In addition, the DAW's ability to deploy small, ISR-gathering UAS across the fleet may lead to an intelligence windfall but may also overwhelm intelligence analysts. The DAW raises some interesting legal issues. For instance, the possibility of basing UAS on civilian-crewed U.S. naval ships needs to be examined through the lens of the laws of armed conflict, while the use of drone strikes against terrorists has already raised concerns at the United Nations about robotic warfare. All of these issues will need to be addressed as the DAW concept advances.

The Second Century of Naval Aviation

The aircraft carrier will continue to be the mainstay of the fleet long into naval aviation's second century, but the distributed air wing offers the Navy an opportunity to revolutionize the employment of aircraft in the maritime domain. A DAW of manned and unmanned systems embarked in myriad afloat platforms may be the best way to harness the capabilities of emerging technology into a holistic strategic advantage for the Navy and the nation.

ATLANTIC OCEAN (January 17, 2006)—An RQ–8A Fire Scout vertical takeoff and landing tactical unmanned aerial vehicle (VTUAV) system prepares to land aboard the amphibious transport dock ship USS Nashville *(LPD 13). This was the first autonomous landing of the Fire Scout aboard a Navy vessel at sea. With an on-station endurance of more than 4 hours, the Fire Scout system is capable of continuous operations, providing coverage at 110 nautical miles from the launch site. Utilizing a baseline payload that includes electro-optical/infrared sensors and a laser rangefinder/designator, Fire Scout can find and identify tactical targets, track and designate targets, accurately provide targeting data to strike platforms, employ precision weapons, and perform battle damage assessment. (U.S. Navy photo by Kurt Longfield/Released)*

SAN CLEMENTE ISLAND, California (February 7, 2008)—A Scan Eagle unmanned aerial vehicle is launched from a MK V naval special warfare boat off the coast of San Clemente Island. This was the first time a Scan Eagle, used for various applications such as intelligence gathering and battle damage assessment, was launched from this kind of platform. (U.S. Navy photo by Mass Communication Specialist 3rd Class Michelle L. Kapica/Released)

Opposite: ATLANTIC OCEAN (May 21, 2013)—An X–47B UCAS demonstrator conducts a touch-and-go landing on the flight deck of the aircraft carrier USS George H.W. Bush. *The aircraft, nicknamed Salty Dog 501, made its debut aboard* George H.W. Bush *with seven touch-and-go landings.* George H.W. Bush *was conducting training operations in the Atlantic Ocean. (U.S. Navy photo by Mass Communication Specialist 2nd Class Tony D. Curtis/Released)*

Supporting Air-Sea Battle: An Across-Command Approach

By CDR Thomas Himstreet,
NWDC Air-Sea Battle Team Lead

Air-Sea Battle (ASB) is an operational concept aimed at reducing risk and maintaining freedom of action in the accomplishment of military objectives in the contested global commons. Navy Warfare Development Command is actively engaged with U.S. Fleet Forces and the Air-Sea Battle Office to assist in refining the concept and in its implementation. As the Navy lead for doctrine, concept development, and experimentation, NWDC is uniquely positioned to influence and support the development of future force capabilities in line with Air-Sea Battle themes.

World navies have been confronting and countering challenges to access and freedom of maneuver for centuries. However, adversary capabilities to deny access and areas to U.S. forces are increasingly advanced and adaptive. These anti-access/area denial (A2/AD) capabilities challenge U.S. freedom of action by causing U.S. forces to operate with higher levels of risk and at greater distance from areas of interest. U.S. forces must maintain freedom of action by shaping the A2/AD environment to enable concurrent or follow-on operations. NWDC members are developing concepts of operation (CONOPS) that counter adversarial A2/AD capabilities through multi-Service and cross-domain solutions.

U.S. Navy and Royal Malaysian Air Force aircraft conduct a fly-by over the U.S. Navy's forward-deployed aircraft carrier USS George Washington *(CVN–73). (U.S. Navy photo)*

NWDC doctrine, concepts, and experimentation professionals participated in this year's Global War Game 13 directed by the Office of the Chief of Naval Operations and conducted by the Naval War College. While this was a Navy-led war game, the ASB Office was a key participant, and Army, Marine Corps, Air Force, and coalition officers comprised a majority of the player list. CDR Shusuke Kitaguchi, an exchange officer at NWDC from Japan Maritime Self-Defense Force, also played. The 2013 war game explored command and control (C2) of combined forces while executing cross-domain operations (XDO) in a high-intensity A2/AD environment. NWDC's Experimentation Department will support the development of an XDO C2 CONOPS to be evaluated during Global War Game 14.

Another active ASB-related NWDC project is the Coordinated Battlespace CONOPS under development. This CONOPS will refine the relationships between the joint force maritime component and joint force air component to operate in a distributed and contested maritime area of responsibility.

The Fleet Experimentation (FLEX) program, managed and executed by NWDC's Experimentation Department, is planning several fiscal year 14 efforts aimed at countering A2/AD threats. This year's TRIDENT WARRIOR experiment, for example, a large-scale at-sea event designed to evaluate a large number of innovative tactics and emerging technologies, will focus on many A2/AD challenges and themes. Additionally, NWDC is supporting Commander, Submarine Forces with an Undersea Domain Operating Concept experimentation campaign designed to gain and maintain undersea dominance in the exploitation of the unique characteristics of this environment.

NWDC's Lessons Learned Department provided valuable insights to the Air-Sea Battle Office by identifying 52 real-world observations that shed light on the challenges of multi-Service cross-domain cooperation. These observations include recommendations that can serve as a departure point for the development of ASB tactics, techniques, and procedures (TTP). Once these TTP are validated through exercises or experiments, they can become institutionalized in Service and joint doctrine and influence the essential tasks that drive and define military training and readiness requirements.

Finally, NWDC analyst, Dr. David Brown, will brief U.S. Fleet Forces on the advantages of taking a mission architecture approach to refining and linking operational and tactical tasks required to fight and win in the A2/AD environment. Current and evolving A2/AD threats impact the training environments to train personnel and test equipment. The mission architecture approach ensures that multi-Service and cross-domain tasks are linked and produce desired effects in the most efficient way. This architecture can be replicated in the Navy Center for Advanced Modeling and Simulation managed by NWDC, which supports all Navy and joint synthetic training events.

Given the importance of the Air-Sea Battle concept, all NWDC departments are applying their unique competencies to develop and train forces to fight and win in contested environments. NWDC is working to develop new capabilities through experimentation and concepts of operation and to institutionalize these in doctrine and training to reduce risk and assure success in the future operating environment. For more on the Air-Sea Battle concept, see page 18.

An AH–64 Army Apache helicopter takes off from the flight deck aboard the amphibious dock landing ship USS Carter Hall *(LSD–50). (U.S. Navy photo)*

Planes and ships from the United States Air Force, Navy, and Marine Corps move together in Exercise VALIANT SHIELD 2006. (U.S. Navy photo)

CATI

Center for Advanced Tactics Initiative

By Rick Pawlowski,
NWDC Center for Advanced Tactics Initiative Lead

The Air-Sea Battle concept was first introduced in 2009 by former Chief of Naval Operations ADM Gary Roughead and his U.S. Air Force counterpart, Gen. Norton Schwartz. The concept outlines the need for integrated Navy, Air Force, and Marine Corps capability applied to the emerging anti-access/area denial threat. ASB is about access and maneuver across the air, land, maritime, space, and cyberspace domains, while relying on inter-Service cooperation and integration.

NWDC aligns to ASB through its Center for Advanced Tactics Initiative (CATI) line of operation which now includes expeditionary strike groups, too. As strike group training and tactics development is challenged to keep pace with fleet needs, CATI integrates rapidly developing doctrine with training to address fleet-identified warfighting gaps at the tactical level. CATI accomplishes this by serving in a key integration role with the strike force training community to synchronize the introduction of new tactical products to the fleet. NWDC, through CATI, provides a number of new tactical products to enable maritime operations in an A2/AD environment.

> In a changing world that demands continued U.S. leadership, Air-Sea Battle is an essential part of sustaining America's military freedom of action and ability to project power.
>
> — Chief of Naval Operations
> ADM Jonathan Greenert[1]

Specifically, there are two tactical memorandums (TACMEMOs) that are a must-read for addressing A2/AD in a maritime environment: TACMEMO 3-56.1-12, Command and Control in a Denied or Degraded Environment (C2D2E), dated April 2012; and TACMEMO 3-51.1-13, Fleet Emission Control Operations, dated July 2013.

The C2D2E TACMEMO highlights considerations for operation of C2 networks and space systems in a denied or degraded environment. Deliberate operational- and tactical-level planning and training are required to fight and win in this environment. Fleet exercise and experimentation efforts help develop a comprehensive understanding of the capabilities and limitations of our C2 systems and networks while operating in an A2/AD environment. Key lessons and observations from fleet A2/AD exercises and experimentation efforts can be accessed through the CATI SharePoint portal at: http://portal.nwdc.navy.smil.mil/cati.

The emission control (EMCON) TACMEMO consolidates several legacy reference products to address tactical considerations necessary to effectively leverage the electromagnetic spectrum and limit adversary exploitation in the maritime environment. Additionally, a related series of signature control (SIGCON) TACMEMOs are due for signature this year to discuss the use of various technologies to control blue force signature in a holistic sense. Complementary to the EMCON TACMEMO, the SIGCON TACMEMOs incorporate the acoustic, emission, and optical measures necessary to enable maritime operations across the entire electromagnetic spectrum.

Both the C2D2E and EMCON TACMEMOs are being used in the fleet and are being validated throughout the strike group training process. These TACMEMOs can be accessed through the CATI SharePoint portal or directly from the Navy Doctrine Library System at: https://ndls.nwdc.navy.smil.mil. CATI also has a selection of A2/AD-related material posted under the Fleet Deception Campaign line of effort on the CATI portal. Fleet feedback is welcome and necessary to further develop these products.

The CATI staff can be reached through the NIPR (https://portal.nwdc.navy.mil/cft/cati/default.aspx) and SIPR NWDC portals or directly with CATI Program Manager Rick Pawlowski at fredrick.pawlowski@navy.mil, (757) 341-4243.

[1] Defense News article by Chris Cavis dated 27 July 2013 located at http://www.defensenews.com/article/20130727/DEFREG02/307270008/.

New Experiment Planning Guide Outlines Process for Rigorous Navy Experimentation

By Jim Gabor, NWDC Experimentation Director and
Al Hindle, Experimentation Analyst

The Experimentation Department at NWDC has published an extensive update to its Experiment Planning Guide (EPG). First developed in 2005 and revised in 2010, this substantial revision is intended as a practical guidebook with information and references for experiment planners and operators to conduct the full range of military experimentation. While the EPG has been prepared with the conduct of complex, large-scale experiments in mind, this content equally applies to the spectrum of operational- and tactical-level experimentation. Although each experiment is unique, common milestones and sequences form the basis of any experiment plan. Experiment planners will need to tailor the generic information presented in the EPG to the scope and goals of their specific experiments.

The foundation of the guidebook combines the experience gained in past fleet battle experiments, sea trial events, FLEX program events, limited objective experiments, limited technology experiments, supported exercises, and war games conducted since 1997 by the Experimentation Department at NWDC. This guidebook also incorporates foundational processes well-honed through scientific research methods and the information found in such standard references as Code of Best Practice for Experimentation[1] and the Guide for Understanding and Implementing Defense Experimentation (GUIDEx).[2]

The new EPG distribution is restricted to Department of Defense and U.S. contractors and is accessible on the Fleet Experimentation Information Management System (FIMS) site contained on the Navy's classified network. A condensed version of the EPG, designed for wider distribution, is in development (estimated March 2014); it provides an overview of the FLEX program but eliminates some of the program administrative and technical data contained in the full version.

Goals of FLEX

- Improving how we fight. Experiments can be used to validate and/or inform war plans, doctrine, Navy lessons learned, and concepts of operation for the current Navy.
- Validating fleet requirements and defining/resolving capability gaps and/or other fleet priorities as presented in the commander's FLEX guidance.
- Exploring concepts, including technological-, doctrinal-, and organizational-desired operational capabilities for the future.
- Fostering innovation. Being an agent for change.

The EPG provides relevant information for military experimentation activities undertaken within the Navy as part of the FLEX program. FLEX is designed to conduct experiments to enhance warfighting capabilities or to solve current capability gaps. FLEX is more focused on the near term and oriented at the operational and tactical levels of war. The primary objective of FLEX is to produce tangible products and recommend changes to doctrine, organization, training, materiel, leadership, personnel, and facilities, with an emphasis on nonmateriel solutions.

FLEX is under the codirection of Commander, U.S. Fleet Forces Command and Commander, U.S. Pacific Fleet, who provide guidance and programmatic oversight. Commander, Navy Warfare Development Command

[1] Alberts, Dr. David S. and Hayes, Dr. Richard E., "Code of Best Practice for Experimentation," Command and Control Research Program, Washington, DC, 2005.

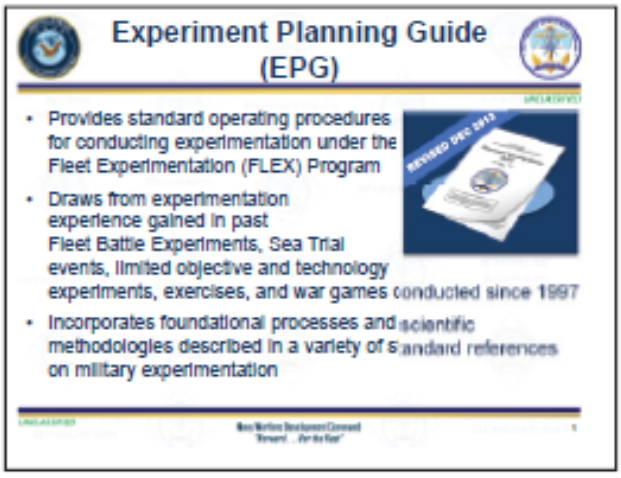
[2] "Guide for Understanding and Implementing Defense Experimentation," Version 1.1, The Technical Cooperation Program, Ottawa, 2006.

manages and executes the FLEX program on behalf of the two fleet commanders. Any experimentation involving fleet assets is considered to be fleet experimentation.

The 2013 EPG reflects the transition from sea trial experimentation to FLEX. In addition, new material has been added to emphasize the importance of constructing the foundation of an experiment or experimentation campaign. The EPG discusses topics such as conducting baseline research, identifying and interacting with stakeholders, and suggesting resources available to experiment planners and analysts. The EPG reinforces the importance of analytical rigor in the planning, execution, analysis, and reporting of experiments as well as producing tangible products of immediate use to the fleet. Analytical rigor refers to the application of precise and exacting standards and close adherence to the scientific method in the examination of a problem and is essential in providing credibility and validity for experimentation results.

The EPG emphasizes the application of project risk management techniques and tools for experiments. It also adds a discussion of multinational experimentation and focuses on the importance of operational security as well as foreign disclosure considerations. The guidebook alerts the reader to the existence of the inevitable administrative and technical matters involved with conducting the experimentation program.

A significant part of the EPG discusses the experiment planning process. This portion includes a codification of the many roles and responsibilities within the process, emphasizing the need for consultation and collaboration in their performance. Emphasis is placed on the content and procedures for conducting milestone events leading up to event execution such as the concept development conference, initial planning conference, main planning conference, and final planning conference. Similarly, the new EPG includes increased focus on the engineering and technical aspects of experiment planning.



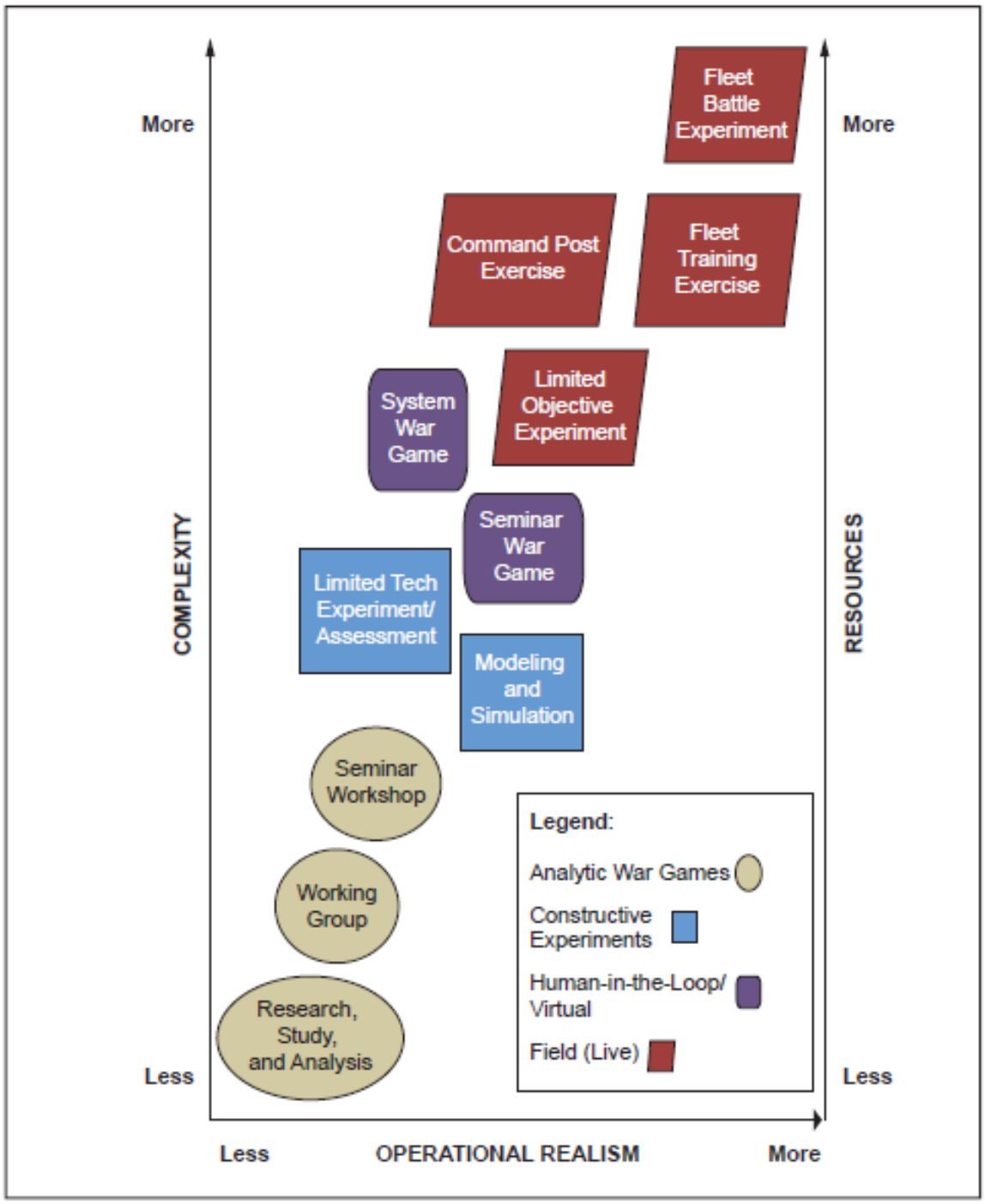
New detail has been added to the 2013 EPG regarding both the planning and post-experiment products of the experimentation process such as the experiment plan, the data collection and analysis plan, the control plan, the analysis report, and the final experiment report. Content models have been included as appendixes to the EPG to reinforce a common format and consistency for these products. In addition, the EPG places renewed importance on tangible products developed as a result of experimentation by NWDC personnel and other participating commands as appropriate. These products include input to existing Navy doctrine, such as Navy tactics, techniques, and procedures or the development of new tactical memorandums and tactical bulletins.

New appendixes to the EPG include the aforementioned product models, a detailed risk management approach, an end-to-end FLEX process flow chart, and selected administrative reference material.

The EPG can be found on the FIMS portal (https://fims.nwdc.navy.smil.mil/portals/epg/default.aspx), which also contains standalone copies of the various product models, examples of recent internal and external products, a slide deck of EPG extracts for training purposes, and originals of many of the graphics and tools contained in the EPG. The content of the FIMS page will be dynamic, with additions to the reference material as new products are prepared and approved.

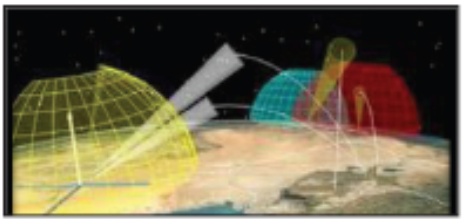
NWDC encourages comments and best practices from the Navy users within the experimentation and operational communities.

For more information or to provide input about the EPG, contact Jim Gabor at james.gabor@navy.mil, (757) 341-4165.



The EPG describes common experiment activities that may be employed individually or as part of an experimentation campaign. This graphic provides a notional, nonscaled view of these activities in terms of relative resource demands, complexity, and operational realism.

Preparing to Fight Within the EM-Cyber Domain



By Dr. Christopher L. Lichtenberg, Principal Investigator and Jon M. Brewster, Operations Research, Space and Naval Warfare Systems Center Pacific.

Electronic warfare battle management (EWBM) is the Navy's key 21st-century technology enabler designed to ensure dominance of the electromagnetic maneuver (EM2) and cyber battlespace.

"Future wars will not be won simply by effectively using the electromagnetic (EM) spectrum and cyberspace; they will be won within the EM-cyber domain." Chief of Naval Operations, ADM Jonathan Greenert, December 2012.

EWBM enables the Navy to fight within the EM-cyber domain. Fully embracing the central role of the EM spectrum and computer networks in modern warfare, EWBM presents electronic warfare (EW)/EM2 situational awareness to the commander in an easy to understand, tailored graphical user interface to facilitate man/machine orchestration of distributed EW, communications, and information operations (IO) systems into a single, integrated weapons system. EWBM ensures the Navy remains unchallenged in securing freedom of action across the full range of the EM-cyber operations.

The intent is to develop the next generation integrated electronic warfare battlefield visualization capability from the seabed to space, including critical elements of the surface, air, space, IO, and cyber domains to enable an advanced electronic warfare threat characterization, targeting prioritization, and tactical engagement C2 capability. The primary enabler of this technology is the development of a high performance computer-based machine learning/artificial intelligence reasoning algorithm that will process, analyze, and characterize individual signals within the electromagnetic environment and analyze its contribution to the overall threat environment. Additional efforts will provide the integration of strike group organic and national-level electronic warfare/threat warning systems as the key enabling technology to deliver full integration of intelligence and operational data.

Why Now?

The EM-cyber domain has become the central enabler and Achilles heel of 21st-century warfare—the Navy must command this domain to ensure control of the seas.

The Navy cannot afford to stand still in a world in which rapidly changing, ever-advancing technology arms potential adversaries with unprecedented capability. Given the Navy's ever-increasing reliance on EM cyber-enabled sensing, targeting, navigation, communications, networks, and network-connected unmanned systems, the warfighting imperative is now to develop a capability to ensure unimpeded maneuver across the EM-cyber domain—that capability is EWBM.

What Will EWBM Do?

EWBM will centralize C2 of naval equipment using the electromagnetic spectrum to focus and manage spectrum utilization to accomplish mission objectives.

The EWBM C2 concept utilizes comprehensive EM battlespace awareness to enable EM2, integrated fires, and assured C2 of task force communications across the theater of operations.

EWBM connects radio frequency (RF) systems into a single integrated system to enable coordinated hard kill/soft kill; agile control of ship/task force RF emissions; and synchronized employment of countersurveillance, countertargeting, and enhanced military deception systems and tactics, while providing real-time, high-fidelity EM battlespace awareness through distributed operation of EW and IO systems. EWBM marries real-time meteorological and oceanographic (METOC) sensing to RF propagation modeling and prediction while providing continuous health and status of all systems within the EWBM network.

Using imperfect information, EWBM will transform the analytical piece between sensing (leading to awareness and understanding) by unleashing the power of high-performance computing, reasoning algorithms, artificial intelligence, risk analysis, and decisionmaking.

EWBM enables the information operations warfare commander (IWC) to exercise operational and tactical control of RF systems and EW assets, plan and execute EW/EM2 strategies in support of commander's objectives, and coordinate with all other warfare commanders and appropriate intelligence and combat resources in the tasking of assigned assets. EWBM will support IWC collaboration with appropriate maritime operations center cells/EW staff and enable coordination with regional fleet information operations centers and other distributed operations/reachback support centers.

What Capabilities Will EWBM Add to Navy CS, C2, and ISR?

EWBM capabilities add the ability for comprehensive, collaborative management and use of the EW/EM2 environment—spanning combat systems, C2, and ISR—to accomplish mission objectives and the ability for end-to-end access and control of EW/EM2 assets across the CS-C2-ISR environment. A portion of EWBM development supported specifically by NWDC and the Chief of Naval Operations (CNO's) Rapid Innovation Cell is the integration of METOC data as a key component for predictive analysis. The METOC application will permit data draws from several meteorological databases and, coupled with an artificial intelligence package (the brains of the METOC application, counter-ISR, and the entire EWBM suite), it will be able to provide the commander with a means to choose a path to maximize detection, to minimize counterdetection, and to keep the force safe.

Why Space and Naval Warfare Systems Command Center Pacific?

Space and Naval Warfare Systems Command (SPAWAR) is the information dominance systems command that enables the seamless integration required to build information as a main battery for naval warfare. Working with Program Executive Officer (PEO) Command, Control, Communications, Computers, and Intelligence, Space and Naval Warfare Systems Center Pacific (SSC Pacific) is uniquely positioned to take advantage of multiple ongoing Navy investments (e.g., Office of Naval Research, Small Business Innovative Research, and in-house investments) across multiple SPAWAR program offices and PEOs and focus these on the EWBM objectives in alignment with evolving development, experimentation, and prototyping opportunities.

The CNO's Rapid Innovation Cell, managed by NWDC, has teamed with SSC Pacific to bring to bear the range of expertise needed to provide candidate solutions for science and technology investment across the EWBM areas of exploration (i.e., communications capabilities, sensor capabilities and interfaces, fusion methods, and operator interface innovations).

Copied/modified with permission, "White Paper for PWM-120 on Electronic Warfare Battle Management and Distributed Operations," 25 February 2013; Dr. Christopher L. Lichtenberg, Principal Investigator and Jon M. Brewster, Operations Research, Space and Naval Warfare Systems Center Pacific.

Editor's Note: At the Crossroads of Information and Integration is a regular feature showcasing NWDC's partnership in capability, tactics, and doctrine development across the fleet.

(U.S. Navy photo)


It's more than a game
...it's the art of war
STRIKE GROUP 360°
Strike Group 360°
https://www.nwdc.navy.mil/strikegroup360