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Fleet Arctic Operations Game

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FLEET ARCTIC OPERATIONS GAME

GAME REPORT

U.S. Naval War College
Newport, Rhode Island

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The War Gaming Department of the U.S. Naval War College hosted the Fleet Arctic Operations Game on 13-16 September 2011. The following document was prepared by the War Gaming Department faculty and has been reviewed by the appropriate game sponsor staff personnel. The findings in this report reflect the observations, insights and recommendations that were derived from the participants during game play.

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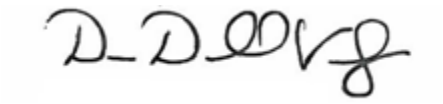
Game reports are developed for the game sponsor; however, the game report and related data may be available on an as-requested basis. For additional information please contact the Chairman, War Gaming Department, Naval War College, 686 Cushing Road, Newport, RI 02841 or via electronic mail at wargaming@usnwc.edu. Further information may be found on our website, located at www.usnwc.edu/wargaming.



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EXECUTIVE SUMMARY

Introduction

The United States Naval War College (NWC) in Newport, Rhode Island hosted the Fleet Arctic Operations Game (FAOG) on 13-16 September 2011. The FAOG was developed and executed under the sponsorship of Commander, Second Fleet (C2F) initially and then Commander, U.S. Fleet Forces (USFF) following the integration of the two staffs. The purpose of the FAOG was to identify gaps that limit sustained maritime operations in the Arctic and recommend DOTMLPF-P actions in order to inform United States Navy leadership.

After reviewing the research literature, the game sponsor and NWC Wargaming Department (WGD) jointly developed three overarching objectives based on C2F's areas of interest:

- Develop prioritized DOTMLPF-P maritime actions which support implementation of the Arctic Road Map.
- List the DOTMLPF-P gaps in maritime forces' ability to conduct sustained maritime operations in the Arctic.
- Develop near-term strategies to mitigate these identified gaps.

These objectives were framed to consider the operational level factors (e.g., risk, time space, force composition, physical and environmental) that influence the maritime force's ability to perform its missions. Additionally, these objectives allowed for consideration of potential partnerships and interoperability issues encountered among U.S. and international forces and organizations.

Participants and Game Structure

In addition to serving as a highly analytic event, the FAOG was designed to enhance participants' understanding of potential challenges and cooperative strategies for conducting sustained maritime operations in the Arctic. Players were selected based on their specialized knowledge of the Arctic region or functional expertise related to planning, operations and cold weather systems. A broad range of backgrounds were sought to ensure that as many perspectives and variables as possible were considered during game play. More than half of the participants in the four planning cells came from military and civilian operational commands and provided expert perspectives from various aspects of sustaining operations in an austere environment. The players in the White Cell were primarily from government, academia and industry and provided expertise on strategy and policy as well as systems and climatology issues concerning the Arctic region.

Primary Findings

Theme 1: The U.S. Navy is inadequately prepared to conduct sustained maritime operations in the Arctic region. This assertion is due to the poor reliability of current capabilities as well as the need to develop new partnerships, ice capable platforms, infrastructure , satellite communications and training. Efforts to strengthen relationships and access to specialized capabilities and information should be prioritized. Currently, U.S. Forces are characterized by an inability to reliably perform and maintain operations in the austere Arctic environment. Reliability is improved by the acquisition and development of information and capabilities made available through strong relationships in order to complete the mission and reduce the likelihood of risk. The U.S. Navy currently must seek these from external stakeholders.

Theme 2: As weather and climate conditions intensify (particularly the presence of ice, strong winds and fog) and as the total time and distance traveled during an operation increases, the greater the risk of both mission failure and loss of or harm to friendly forces becomes. Players placed significant importance on the idea that harsh environmental conditions and large distances will likely create uncertainty in planning and the timeliness of response, which in turn could create conditions which exceed current operational capabilities. Understanding the austere Arctic environment and its impact on the design limitations of aircraft and surface warships is critical to planning operations in the Arctic region.

Theme 3: In order to reduce risk, players increasingly relied on additional information and capabilities through partnerships with the USCG, JTF Alaska, tribal leaders, industry, and multinational partners. As risk increased due to extreme climatic conditions and increased operating and support distances, there was a corresponding increase in the need for specialized information and capabilities. As this trend increased, the required information and capabilities became less available in the U.S. Navy and planners were forced to look elsewhere for the capabilities needed to execute their mission tasking. At the low end of the scale, these could be found inside DoD, but eventually planners needed to rely on industry, international partners, or the whole of U.S. Government. This further reiterates that sustainability in Arctic operations is significantly dependent on strong relationships with international, regional and local partners in government and industry. Mechanisms that strengthen these ties should be prioritized in future planning.

Theme 4: The future application of solutions developed during the game was influenced by the frequency of operations and desired reliability of U.S. Naval forces in the Arctic. Specifically, the more frequent or consistently expected operations or missions would be conducted, the more suitable long term proposed solutions were found to be. Conversely, when less frequent or consistent operations or missions were anticipated, mitigating strategies or short-term solutions were found to be acceptable. Long term solutions tended to be more formalized

and structured in nature while the majority of mitigating strategies were more informal, temporary and less structured.

Subsidiary Findings

Major DOTMLPF-P Gaps, Mitigating Strategies and Proposed Solutions

The overall assessment produced by the game was that the U.S. Navy does not have the means needed to support sustained operations in the Arctic. This was due primarily to the lack of appropriate ship types to operate in or near Arctic ice, the lack of support facilities in the Arctic, and finally the lack of sufficient or capable logistics connectors to account for the long logistics distances and lack of facilities. As noted in Theme 1, these gaps were mitigated or closed through the use of domestic and international relationships with military, coast guard and industry partners which made information or capabilities available to support scenario missions. However, the game identified that many of these relationships and the information and capability requirements that they enable do not exist or are poorly defined, further exacerbating the materiel issues listed above.

Major CONOPS Changes

Overall, the players identified the Arctic Maritime Response Force CONOPS as a valuable tool to support sustained maritime operations in the Arctic. There were three primary changes identified to the CONOPS. First, the focus of the CONOPS should be shifted from warfighting to include the missions identified by Task Force Climate Change as more likely to be a requirement. These include HA/DR, regional security cooperation, maritime security and Maritime Domain Awareness missions. Second, the CONOPS needs to address the likelihood that mission requirements will include short notice crisis response actions. Currently, all planning guidance in the CONOPS allows for extended planning and deployment timelines. Third, the CONOPS should be expanded from an Atlantic Fleet perspective to address access to the Arctic from the Pacific and operations in multiple Combatant Commander and fleet areas or responsibility (AORs).

Recommendations

The recommendations generated by this game are characterized by their potential for immediate impact at the operational level and the feasibility of near-term implementation. These actions are: establish USFF Arctic Working Group or Arctic Center of Excellence; update CONOPS and applicable doctrine to reflect game insights; deploy to the Arctic; build domestic and international relationships; develop and manage lessons learned database; and pursue identified areas for further research.

I. INTRODUCTION

Statement of Sponsor's Interest in this Topic

Commander, USFF requested the Naval War College (NWC) to develop and execute a game which explored potential gaps that limit the U.S. Navy's ability to conduct sustained maritime operations in the Arctic. This game, referred to hereafter as the Fleet Arctic Operations Game (FAOG), sought to identify specific capability gaps, mitigating strategies and proposed solutions to conducting sustained maritime operations in the Arctic. Additionally, this game sought to identify improvements to the Arctic Maritime Response Force Concept of Operations (CONOPS) within the context of eight distinct scenarios. USFF's primary interest in exploring operations in the Arctic within this context stems from the premise stated in the Arctic Road Map that changing conditions in the Arctic (e.g., opening of new passages and an increase in commercial shipping) will require an increased U.S. Navy presence. In order to respond to any emerging threat or incident in the Arctic, USFF also posited that numerous gaps exist in the Navy's ability to conduct sustained maritime operations in the Arctic.

The two overarching documents that guided the development of this research project included the C2F Arctic Maritime Response Force Concept of Operations (CONOPS) Initial Draft Version 1 and the United States Navy Arctic Road Map. The CONOPS provided primary reference for the players during game play, and was used during post-game analysis for comparing and contrasting findings of the game.

Objectives/Rationale for this Game

Based on USFF's area of interest and informed by the scholarly literature review, the Fleet Arctic Operations Game was structured to explore three objectives. The mutually-agreed-upon objectives developed by C2F and the War Gaming Department of the Naval War College are:

- Develop a prioritized list of DOTMLPF-P maritime actions to support implementation of the Arctic Road Map at the Operational Level.

- List DOTMLPF-P gaps in the maritime forces' ability to conduct sustained maritime operations in the Arctic.

- Develop near-term strategies to mitigate identified gaps and update the Arctic Maritime Response Force (AMRF) CONOPS.

It should be noted that all three objectives are primarily analytical in nature. However, this event was also designed to provide experiential value for the players who participated.

Overarching Research Questions

Based upon USFF's area of interest, subsequent literature review by the Naval War College's WGD faculty, and the three primary objectives for this game, the following three overarching research questions were developed:

- What DOTMLPF-P gaps limit the Navy's ability to conduct sustained maritime operations in the Arctic?
- What near-term strategies mitigate these DOTMLPF-P gaps?
- What are the prioritized DOTMLPF-P maritime actions which support implementation of the Arctic Road Map?

These research questions are framed to consider the operational level factors (e.g., risk, time space, force composition, physical and environmental) that influence the maritime force's ability to perform its missions. Additionally, these research questions will also consider potential partnerships and interoperability issues encountered among U.S. and international forces and organizations.

Identification of Independent and Dependent Variables

The two independent variables in this game consist of the DOTMLPF-P gaps (x1) and near-term mitigating strategies (x2). The primary dependent variable is the cells ability to conduct sustained maritime operations in the Arctic. In addition, in order to fully assess the U.S. Navy's ability to conduct sustained military operations in the Arctic, a series of mediator (z) variables, including the operational factors (e.g. time, space, force composition) (z1) and physical and environmental factors (z2) are introduced throughout the entire duration of game play. These factors are pre-scripted and tailored to each move during the game and are provided to the players prior to execution. These mediating variables were assigned in a manner to be progressively more challenging for the players as the game progressed.

II. GAME DESIGN & RESEARCH METHODOLOGY

Discussion of Game Design

Faculty assigned to the NWC's War Gaming Department (WGD) within the Center for Naval Warfare Studies (CNWS) engaged in a preliminary literature review in order to appropriately delve into C2F's area of interest. The two overarching documents that guided the development of this research project included the C2F Arctic Maritime Response Force Concept of Operations (CONOPS) Initial Draft Version 1 and the United States Navy Arctic Road Map. The CONOPS served as the primary reference for the players during game play, and was used during post-game analysis for comparing and contrasting findings of the game. Review of additional literature of historical writings on Arctic operations using student papers in the Naval War College library was also sought.

As an applied research and evaluation project, a one sided, seminar style game, which incorporated elements of the operational planning process, was designed in order to focus on specific events through an inductive lens. Such a process is best suited when addressing complex operational issues including those raised in the research questions. This approach also affords the opportunity to have the experts, operators, and planners from multiple disciplines describe the operational environment in the Arctic, assesses current and future programs and systems, and identify challenges to sustaining maritime operations in the Arctic. The game empowered participants to make assessments of various conditions and factors impacting the ability to conduct sustained maritime operations. The value of this methodology is that it opened the aperture and allowed the participants to explore the issues from many angles without having the participants be constrained by any single hypothesis. This was a single continuous game whereby each move built upon previous ones. Throughout each move, players were afforded the opportunity to use previous improvements made to the CONOPS and apply them to following moves.

An independent white cell reviewed and analyzed player cell derived plans to develop an insights and implications product. The White Cell was comprised of approximately thirty senior U.S. civilian and military stakeholders with extensive knowledge of current future maritime capabilities and programs, as well as representatives from several international maritime partner nations and Arctic subject matter experts from academe. The White Cell was charged with reviewing and analyzing each cell's course of action gaps, mitigating strategies, proposed solutions and CONOPS updates. During this review process, the Cell generated a PowerPoint Slide that captured their major insights and implications. White Cell members developed these inputs through the lenses of C2, Intel, FIRES, Logistics and other observations. During game

play, members of the White Cell also answered incoming requests for information (RFIs) from each of the player cells. White Cell members participated in all combined plenary sessions.

In order to ground the players in a shared experience, the Fleet Arctic Operations Game began on September 13, 2011 with several background briefs covering the Arctic Maritime Response Force Concept of Operations, cold weather systems and platforms and programs, as well as U.S. and International maritime perspectives on current operations in the Arctic.

Game Mechanics

Following the briefing sessions, approximately 88 players were divided into five focus groups (or cells), with 56 players in each of groups A, B, C and D to examine sustained operations in the Arctic from Atlantic and Pacific coast perspectives, and 32 players in the White Cell developed strategic level insights and implications of each groups' moves. A summary of the players' backgrounds, including functional area of expertise, education, and years of experience is found in Appendix E of this game report. A technology demonstration of the knowledge management game tool and Multi Touch Multi User interface was presented to the players.

Subsequently, players engaged in an operational domain problem framing activity to explore various factors (i.e., people, places, environment, and relationships) that maritime leaders should consider when planning or conducting sustained maritime operations in the Arctic. Definitions for each of these factors are found in Appendix F of this game report. This activity served as a mechanism to foster robust, facilitated discussion within the game cells and as the initial mission analysis phase for scenarios that would be introduced the following day. Insights from this activity can be found in section III of this report.

At the conclusion of the facilitated discussion, participants completed a baseline survey and post-activity survey to capture their individual thoughts and insights (see Appendix C). Each cell populated proposed planning assumptions into the game tool, which served as an input by the Control Cell for the development of the overarching assumptions used for game play. Additionally, the control cell examined the survey data, key insights presented in plenary and critical assumptions identified by the analysis team during this activity. The control team developed injects for subsequent game moves in order to provide players a common foundation to plan from.

At the beginning of each move, the cells were presented with a scenario which included the environmental conditions, tailored operational task, and strategic guidance from command authority. These scenarios (e.g., missions and environmental conditions) provided players with the opportunity to plan sustained maritime operations in the Arctic under myriad conditions which became more challenging as the game progressed. Cell A (Atlantic) was paired with Cell B (Pacific) and Cell C (Atlantic) with Cell D (Pacific). Within a move, each pair received a

different scenario which was additionally tailored for the geographic area for each cell. During moves, all four cells concurrently sought to develop a Course of Action which focused discussion on efforts to identify gaps, mitigating strategies, proposed solutions, and improvements to the CONOPS associated with that scenario. Players supported the development of a PowerPoint presentation which summarized the major insights derived from the group during the move. These PowerPoint slides were used as to stimulate discussion in facilitated plenary sessions. Finally, players completed a post-move survey to capture individual perspectives and opinions.

At the conclusion of each move, Cells A and B, and cells C and D subsequently came together for two distinct moderated plenary discussions. During these sessions, the group leads presented the cells Course of Action and major insights regarding gaps, solutions and improvements to the CONOPS. Subsequently, a Naval War College faculty member facilitated follow-on discussions regarding key insights and themes developed by the analysis team where participants had the opportunity to compare and contrasted insights identified in their respective groups. On the final day of the game, each cell prioritized an aggregated list of mitigating strategies and proposed solutions developed by all cells over game play. Players then engaged in two distinct final combined plenary sessions. Additional player insights not readily discernable from the PowerPoint briefs were captured.

Analytic Framing

The overall framing for this game is a combination of qualitative grounded induction (framed through the C2F's lens of U.S. Navy presence in the Arctic) and more traditional quantitative deduction. The post-game analytic process follows a widely-used process referred to as triangulation. Current thinking in the field of social research suggests that a variety of analytic tools should be employed in behaviorally based activities such as war games, thus maximizing the credibility of the work[i]. One widely accepted methodology that takes advantage of multiple data collection techniques is "triangulation.[ii] This approach allows us to derive the same or very similar conclusions using different datasets or methods.[iii] Much of the strength of triangulation stems from its ability to "distinguish between the idiosyncratic…and the representative."[iv] This method also allows the researcher to "…base inquiry in the assumptions being used… [and] evaluate questions…with the appropriate methodology rather than the methodology driving the evaluation."[v]

Consistent with this approach, data streams collected during this game will incorporate a variety of research procedures into analysis. A brief description of each analytic tool follows. The overarching triangulation approach is also depicted in the figure found in this section of the DCAP.

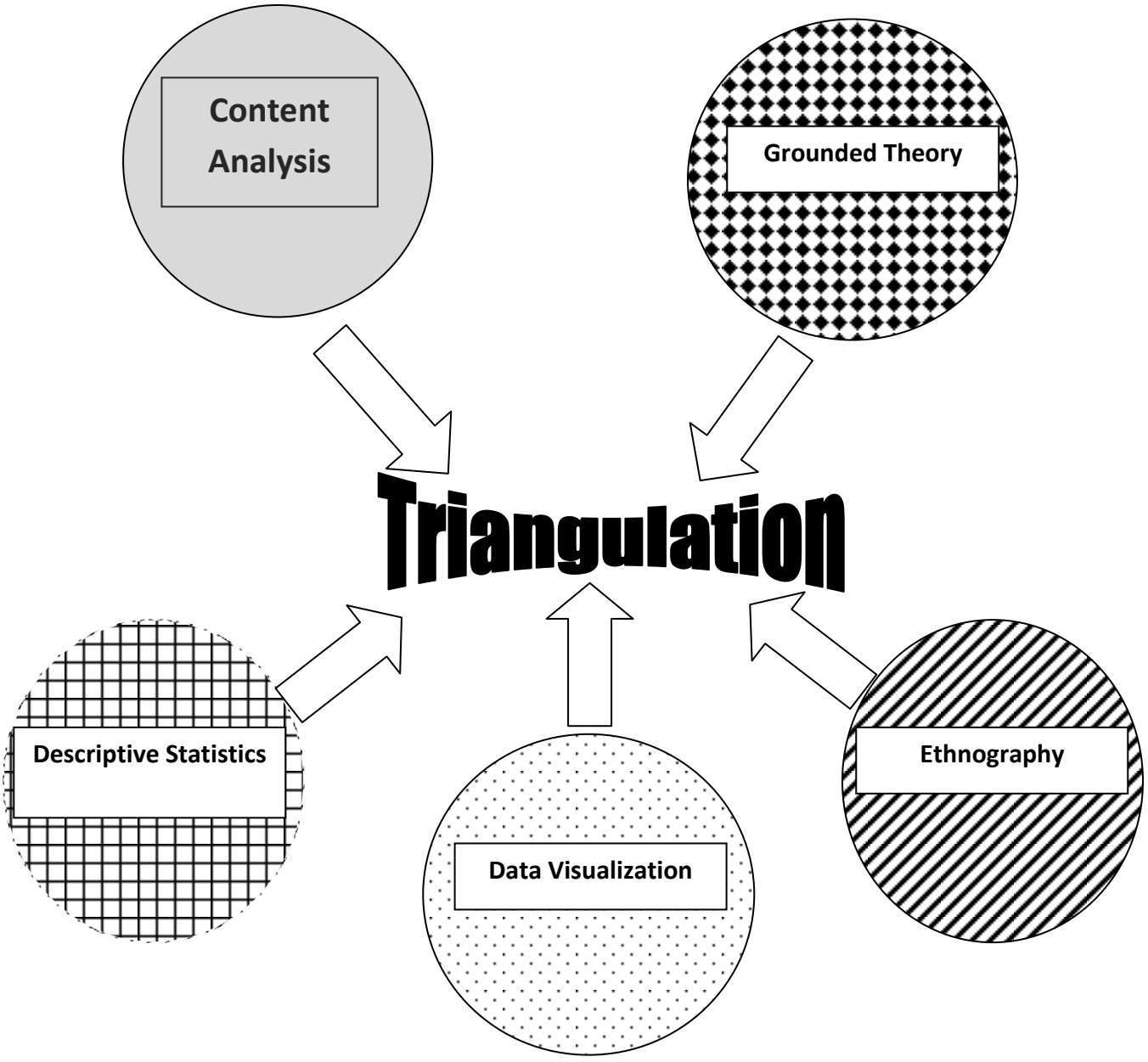
- **Content Analysis**: Described as "a…method whereby a researcher seeks objectively to describe the content of communication messages that people have previously produced"[vi]. "Content analysis involves identifying coherent and important examples…and patterns in the data… [and subdividing]…data into coherent categories, patterns, and themes."[vii] For the purposes of this game, content will be binned to determine which, if any, of the focus areas presented in this DCAP are supported by player actions, comments, or control team assessment.

- **Grounded Theory:** A more detailed, methodologically sound approach to analysis than the initial step of content analysis, grounded theory employs systematic, hierarchical procedures to develop inductively derived theory grounded in data. Rooted from the discipline of sociology, grounded theory "directs researchers to look for patterns in data so that they can make general statements about the phenomena they examined"[viii]. For the purposes of this game, the DCAT will be using "an inductive, theory discovery methodology that allows the researcher to develop a theoretical account of the general features of a topic while simultaneously grounding the account in empirical observations or data"[ix] The primary tool used during post game analysis to facilitate this process is Atlas.ti. Coding will consist of both selective and in-vivo techniques, based on the DCAT's review of the relevant literature and the suggested key search terms in the players' own words.

- **Data Visualization:** Atlas.ti, a grounded induction coding software will be used to depict associations and relationships between disparate data. Word Clouds also were generated to capture and visually depict most frequent words derived from participants. [x]

- **Ethnography:** DCAT members will capture qualitative, descriptive data through observation and listening to participants within a natural setting to understand the social interactions and rational of their decisions and activities during the course of game play..

In addition to these four primary analytic processes, Likert-based survey questions were analyzed using descriptive tools such as mean, median, mode, standard deviation, and variance. This allowed the DCAT to discuss the variance and player cohesion across the cells.



Collection Approach

The datasets collected and analyzed in this game are considered descriptive because they "reveal the nature of certain situations, settings, processes, relationships… [and] systems…"[xi] Because

they are descriptive, the focus of the DCAT prior to presenting these datasets to the Commander, USFF is to aggregate and "assess the data and clarify the information that has been gathered"[xii] . The primary datasets that were aggregated in this game are, in priority order, (1) Player Generated insights via Game Tool, (2) Player Surveys, (3) Plenary PowerPoint slides, and (4) Ethnographic notes from cell interactions and plenary sessions (5) Web IQ inputs. A summary of the datasets and their corresponding analytic methodologies are included in Annex (F).

All of the Data Collection and Analysis Team (DCAT) members involved in these collection efforts received instruction in proper data capture techniques during a pre-game bootstrap session. DCAT members were responsible for ensuring quality assurance/quality control of the datasets submitted during game play. Specifically, DCAT members ensured the following parameters were implemented for these four datasets used for post-game analysis and development of final deliverables:

- Formatting and standardization: Game control staff will have available standard templates for PowerPoint deliverables and data collection notes. Templates will be located in folders for each cell and move. PowerPoint slides will be completed to the same standard across all four game cells.

- Internal validity: Collection instruments are designed correctly to ensure that accurate conclusions can be drawn from the data. To ensure their proper use during game play, specific internal validity issues with these instruments and the information they are designed to collect were identified during the Alpha and Beta tests.

- External validity: Due to the inherent challenges posed by ensuring consistent, accurate measurement in games[xiii], criterion validity is used to "see if the results from an item or set of measures (a scale) are similar to some external standards or criteria."[xiv] External validity applies predominately to the baseline questions that will be asked in the individual player surveys to be captured via the Unclassified GAMENET on 13 through 16 September 2011. In order to "provide…quality controls on data collection"[xv] these questions were evaluated by an internal focus group as part of the Alpha and Beta testing process, prior to being deployed in the game.

Specific roles were assigned to the DCAT based upon their experience, education, and interests. The specific functions assigned to the DCAT, along with the names of those personnel designated to perform them, are as follows:

III. ANALYSIS & RESULTS

Analysis of Game Moves

This section provides an overview of the main themes that players derived as justifications for the activities they discussed. The analysis team explored these player-derived themes and compared them to the data from game play. Players, through an inductive reasoning process, derived a number of hypotheses or themes throughout the game and coalesced on the final day of game play. A mixed methods approach, consisting of various qualitative and quantitative techniques was utilized for triangulation purposes in order to achieve credible and reliable findings from the data collected. Game data were coded, grouped in categories, and themes were developed by the analysis team. Data included post-move surveys, group PowerPoint slides, ethnographic notes, cell game tool decisions, and Web IQ threaded discussions.

Theme 1: The U.S. Navy is inadequately prepared to conduct sustained maritime operations in the Arctic region. This assertion is due to the poor reliability of current capabilities as well as the need to develop new partnerships, ice capable platforms, infrastructure development and training. Efforts to strengthen relationships and access to specialized capabilities and information should be prioritized.

Sustainability creates and maintains the conditions which allow maritime forces to carry out operations at the operational level within a sea, or ocean area, the adjacent coastal area, islands, and the airspace above in order to achieve a desired end state. Sustainability is ensured by the maintenance and acquisition of requisite capabilities and resources to carry out operations in the Arctic region. Accordingly, reliability emerged as a key enabling factor to ensure sustainability and reduce risk. Currently, U.S. Forces are characterized by an inability to reliably perform and maintain operations in the austere Arctic environment. Reliability is improved by the acquisition and development of information and capabilities made available through strong relationships in order to complete the mission and reduce the likelihood of risk. The U.S. Navy currently must seek these from external stakeholders. Figure 1 is a graphical representation of the major categories and relationships that were derived from game play, which in turn, form the basis for subsequent sections under theme 1. This relationship is described in Figure 1 which shows reliability and sustainability to be linked to specialized information and capabilities which are currently enabled by strong relationships. Theme 1 depicts the major areas focused on during game play and concludes that, of the DOTMLPF-P and CONOPS recommendations described in this report, those actions connected to strengthening relationships and improving the availability of specialized information and capabilities should have the highest priority for the U.S. Navy.

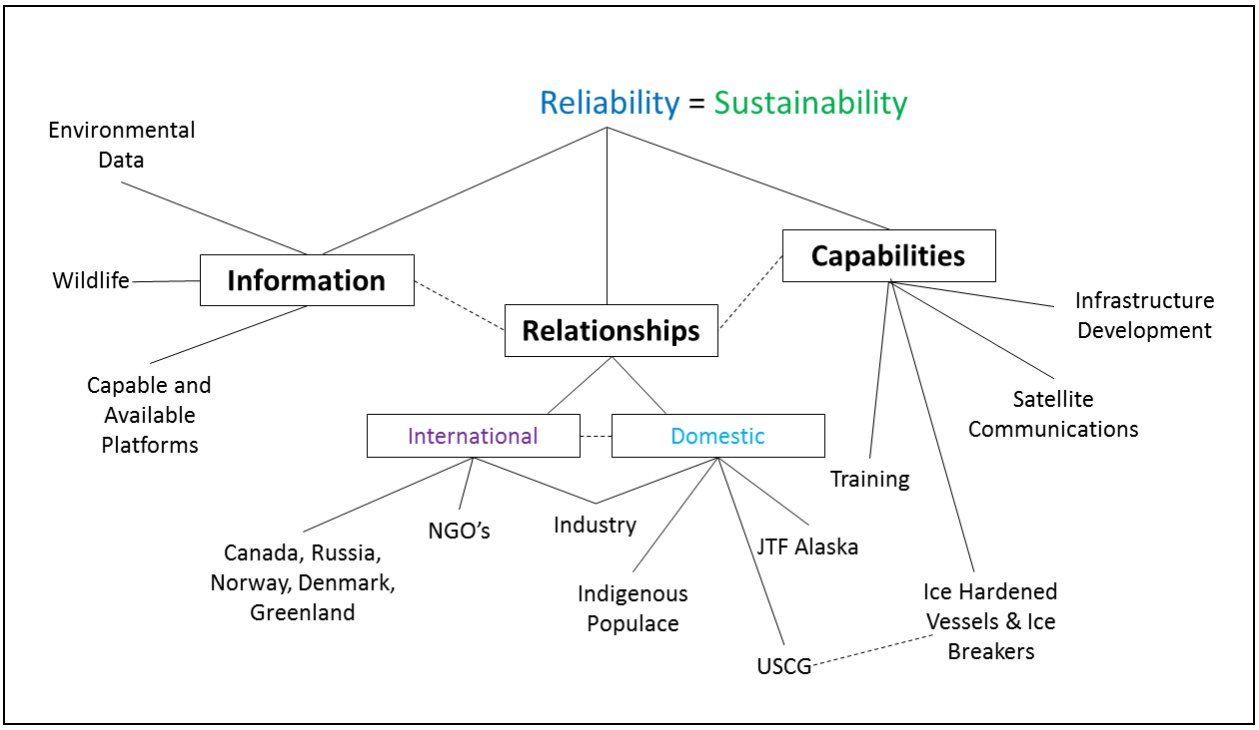


Figure 1. Themes and Relationships Diagram

Relationships and Partnerships

Coordination and Collaboration

Building maritime partnerships with Arctic countries is critical prior to planning for or responding to any emerging crisis in the region. The need for regional cooperative security agreements with international navies and coast guards was identified in order to ensure reliability and sustainment of future contingency operations. Similarly, due to budget constraints and limited capabilities and resources, an increased emphasis was on the need to leverage regional partner capacities. This cooperation and coordination focused on all countries that make up the Arctic nations or those with Arctic capabilities. Specifically, leveraging multinational maritime ice breakers, ice-capable vessels, and the need to share information related to maritime activity and the environment (e.g., weather, ice, fog, etc.) was postulated in order to develop and maintain Arctic Domain Awareness.

In order to improve interoperability, leverage capabilities, and share information between services, interagency and international maritime partners in the long term, the establishment of a standing Arctic Joint Task Force or maritime coordination center was suggested. When describing characteristics of this future cooperative security model, participants drew several parallels to Joint Interagency Task Force (JIATF) South. This model was commonly referred to as 'JIATF- North'. It was also suggested that this model could fall under the responsibility of

Commander, U.S. Northern Command. Conversely, this model was also discussed as a supporting element to a much broader security initiative within the Arctic Council. The existing Joint Task Force (JTF) Alaska model was also highlighted as a means to facilitate cooperation and coordination among entities. However, discussions over the course of the game rapidly evolved to encompass a much broader scope of regional partnerships. The use of Arctic exchange officers on Canadian, Russian, Norwegian and Danish ships was recommended in order to build experience and corporate knowledge in the region.

While player moves across the game leveraged substantial international support and coordination, players simultaneously sought to leverage and integrate all domestic resources, training, and capabilities. Due to budget constraints, capability gaps in resources, lack of subject matter expertise and operational experience, as well as the distance from homeport to theater, players asserted that the Department of Defense should consider the formulation of a "Whole of Government" strategy to facilitate operations in the Artic.

Discussing the relevance of relationships in the Arctic, it was suggested to "institutionalize relationships to leverage available assets from all potential sources; the Navy has extremely limited capability to project power in a surface maritime environment, on behalf of U.S. in the Arctic, including our own U.S. waters, regardless of the geopolitical or emergency situation."

Leverage Industry Capabilities and Best Practices

The United States Navy should leverage industry and commercial capabilities to aid in navigation, sustainment and replenishment at sea. Establishing relationships with regional suppliers was identified as an essential first step to better understanding the challenges and best practices for operating in the austere environment. In order to support these initiatives, the development and application of procedures and policies for non-traditional logistical support to operations is needed. One cell suggested using NAVSEA engineers to resolve integration issues between naval platforms, systems, the operating environment and industry. Initiating these concepts would provide reliability, in terms of quicker access to capabilities that are currently limited or nonexistent in the Arctic region.

Limited Capabilities and Platforms

Acquisition of Ice-Capable Vessels

The limited availability of ice-capable platforms and fuel was a consistent theme that emerged from game play. Throughout the game, the severity of risk to mission and friendly forces was attributed to the inability to effectively sustain operations as a result of limited ice capable platforms. Accordingly, the most significant capability gap identified throughout the game was the inability to navigate in the Arctic region due to the lack of ice capable vessels. Without these

mission-capable assets, the U.S. Navy cannot sustain operations without substantial support from the U.S. Coast Guard and international partners.

Accordingly, a comprehensive acquisition strategy for procuring, leasing, and retrofitting ice capable platforms is needed in order to support sustained year round operations in the Arctic. Specifically, the need to improve existing USCG ice breakers (AGBs), procure additional ice breakers for use by the U.S. Navy and Coast Guard, and the need to retrofit existing U.S. Navy vessels was also identified. The need to generate requirements for heavy lift, cold-weather capable and vertical lift capable aircraft as well as the acquisition of U.S. organic ice rated units to conduct work in the Arctic was highly suggested. One player noted, "Because the Arctic environment is vastly different from most operating environments, the development of an acquisition strategy should be analogous to preparing platforms to operate in high temperature desert conditions".

The development of an Arctic Capabilities Strategy "must include educational, developmental and operational components" to facilitate cooperative exercises with relevant U.S. and international stakeholders through "testing of actual capabilities of a range of seasonal conditions." Lessons learned from Arctic operations "would integrate into Service POMs, CCDR IPLs, and other USG resource claimant processes, as well as policy processes and priorities. The Arctic needs to be considered from both sovereignty and energy aspects, as well as other concerns."

Satellite Communications (SATCOM)

The reliability reach-back capabilities and robust communications is critical in the rapidly changing conditions in the Arctic. Currently, the ability to sustain communications with chain of command while operating in the Arctic is limited due to the ineffectiveness of geosynchronous satellite coverage in the Arctic Circle. The acquisition of additional satellite coverage and bandwidth, the need to generate requirements for that coverage, and the of increase global commercial and military satellite communications footprint was discussed as essential elements for obtaining access in the Arctic.

Logistics and Infrastructure Development

The insufficient infrastructure to facilitate logistics when attempting to sustain operations in the Arctic was heavily emphasized in the game. The United States cannot conduct sustained operations in the Arctic without a reliable fuel source. Harsh environmental and physical conditions demand special considerations in order for critical systems to function and support any shipboard or aircraft operations. In order to mitigate these challenges in the short term, the United States Navy should leverage DOD, industry and multinational logistics hubs and platforms. In the long term, the development of permanent infrastructure at the mid-point of a NWP transit capable of providing fuel to maritime assets was recommended. Additionally, the

strategic positioning of port facilities throughout the Arctic in order to resupply vessels in transit was highly desired. The development of doctrine for logistical support to operations in the Arctic was also highlighted throughout game play. One cell described the need to incorporate maintenance practices to include augmenting Operational Sequencing System (OSS) procedures in current doctrine and Tactics, Techniques, and Procedures (TTPs).

Knowledge and Awareness

There was a substantial lack of knowledge and awareness among U.S. Navy personnel of required training and capabilities that generate requisite capabilities (e.g., platforms, systems, equipment, etc.). Specifically, there was a considerable gap in awareness and knowledge among U.S. maritime operators and planners with respect to the environment (e.g., climate and wildlife). Personnel planning or deploying to the Arctic would require specialized skill sets which are not currently available in U.S. Navy training pipeline or professional military education. One player noted "Encountering unpredictable sea ice conditions will present a planning challenge, of which can only be overcome by institutional awareness and responsive adaptive force packaging."

With respect to environmental data, accurate and timely environmental data (e.g., hydrographic surveys, typography, and forecasting) is essential to decreasing risk to mission and friendly forces and the overall success of the mission. Particularly, one player noted, "the accuracy in data related to the environment will aid planners and operators for potential missions in the region." Current hydrographic surveys being conducted were described as "inadequate to safely conduct sustained Arctic operations." Players also identified the inability to understand the widely distributed and diverse group of semiaquatic marine mammals in the Arctic region. However, of all wildlife species discussed, the polar bear continuously emerged because of its dependence on sea ice, its significance to the Arctic marine ecosystem and interaction with potential visitors (e.g., maritime operators in the region).

In order to achieve and manage shared awareness, foster creative thinking and explore various issues and problems related to the Arctic, the establishment of an Arctic "Center of Excellence (COE)" was suggested. This center would facilitate research, education and training for deployed U.S. Navy operators and other joint, interagency and international stakeholders deploying to the Arctic region. Developing, executing and maintaining this COE was discussed as a primary augment to the proposed JIATF-North concept. Specifically, there is a need to focus on the education of Arctic operations, the environment, and current and future infrastructure, capabilities, and partnerships.

Training for Planners and Operators

The overarching theme derived from 'training' focused on the need to identify a comprehensive list of training prerequisites in order to conduct sustained cold weather operations and determine which training should be developed and maintained within the Department of the Navy.

Emphasis was placed on consistent coordination with USCG to identify and coordinate Arctic related training requirements. Similarly, there is also a need to develop and execute training with international partners in the region. The focus was specifically related to coordinating and leveraging training curricula and facilities of Canada, Norway, and Russia in order to garner specific tactics, techniques and procedures for conducting sustained maritime operations in the Arctic. Lastly, the USN needs to train deployed personnel in polar bear mitigation, cold weather systems and platforms, cold weather survivability, and cold weather gear.

Lessons Learned

Lesson learned in the form of knowledge or understanding of operations in the Arctic gained by experience through both US and international maritime stakeholders was a key requirement generated by the game. "There needs to be a paradigm shift from lessons learned to lessons applied." An increased focus was placed on the limited application of lessons learned among U.S. Navy personnel from previous operations to new ones. These lessons learned were viewed as a key vehicle to improve both individual and organizational proficiency, inform planning, and risk management for a particular operation in the Arctic region.

Due to the lack of knowledge and experience of U.S. Navy planning and operations in the Arctic, the USN should seek to leverage lessons learned from USCG, industry and multinational partners. There was also an overwhelmingly need to develop and institutionalize a process to capture key lessons learned regarding Arctic operations and integrate them into planning and the CONOPS. Lessons learned should be managed and disseminated through central database or forum in order to provide consistency, accuracy and timeliness of information. This information should be complementary to the CONOPS and AJP 3.1

Conversely, lessons learned were also discussed in terms of how other relevant stakeholders in the Arctic could leverage U.S. Navy lessons learned. The Joint Lessons Learned Information System (JLLIS) was noted as an entity that could facilitate this process or be integrated into a database that captures specific lessons learned related to the Arctic. One player noted, "Having a reliable and efficient central location for planners and operators to go to prepare for this environment would be invaluable." Specifically, there is a need to capture and integrate key lessons learned in the areas of logistics and refueling, local culture, existing relationships among industry and multinational partners, and how the environment impacts platforms and systems. The Arctic Submarine Lab was frequently cited as an existing forum that captures key lessons learned related to operations in the Arctic.

Lastly, the proposed Arctic "Center of Excellence" was cited as a tool that could be maintained or integrated into a more structured formalized working group or forum in the U.S. Navy that facilities all information related to planning and operations in the Arctic (e.g., at the operational

level). This formalized group of subject matter experts would be complementary to Task Force Climate Change, which conducts strategic level analysis on matters related to the Arctic.

Theme 2: As weather and climate conditions intensify (particularly the presence of ice, strong winds and fog) and as the total time and distance traveled during an operation increases, the greater the risk of both mission failure and loss of or harm to friendly forces.

While this conclusion may seem rather intuitive, it is fully supported by the analysis of player responses and game play. In the Arctic, risk is increased significantly as compared to non-Arctic operations due to both the austerity of available support and logistics infrastructure, characterized by great distances between operating areas and even the simplest logistics hub, and the extreme conditions caused by the Arctic environment which are unlike those that the Navy has become accustomed to in recent decades. These factors are critical to operational planners contemplating actions in the Arctic and also significant when considering priorities for the implementation of DOTMLPF-P and CONOPS recommendation made in this report.

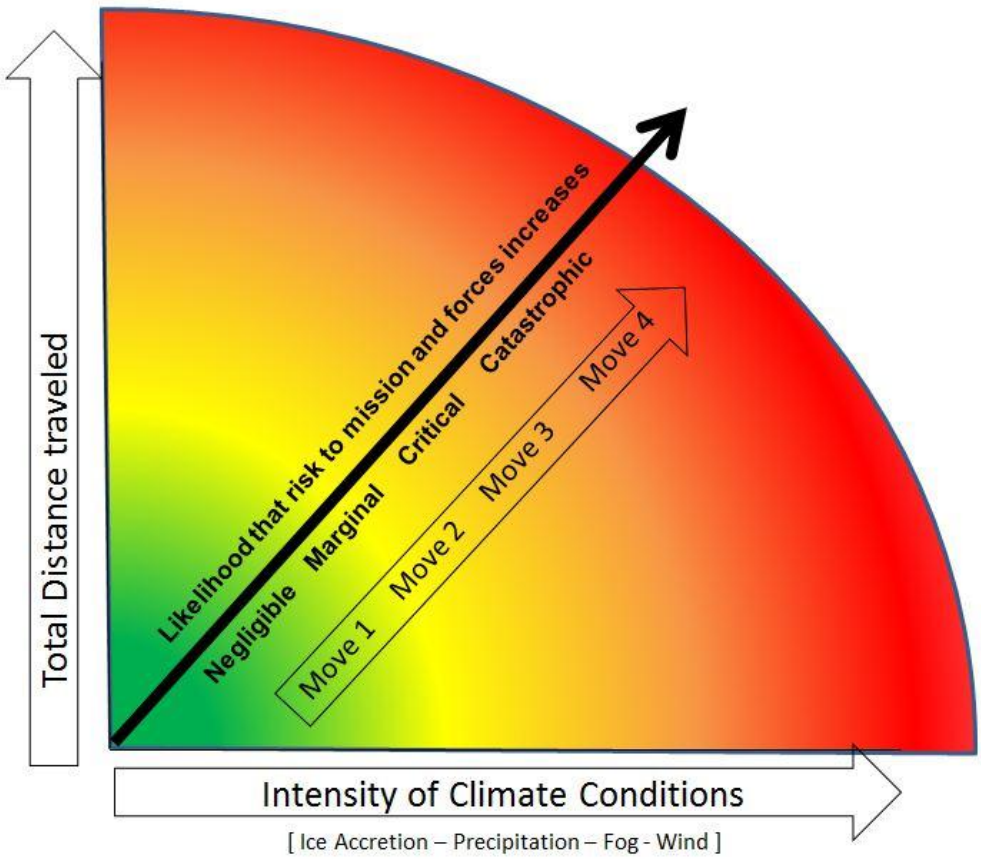


Figure 2. Factors that Impact Risk

Weather and Climate

Ice and fog conditions, and to a lesser extent, precipitation and wind were identified as essential elements that adversely affect the ability to conduct maritime operations in a timely manner. There is a short window of opportunity for ice capable platforms and equipment to arrive on scene and execute the mission before conditions deteriorate. Accordingly, the response time was anticipated to be slower than in lower latitudes due to environmental extremes and lack of infrastructure. Similarly, there is a limited time window to deploy and employ units to conduct salvage operations at depths requiring saturation and cold water diving. The ice adversely impacted existing naval platforms' ability to conduct long term sustained operations in the Arctic. One player noted, "not only do severe ice conditions adversely impact naval platforms, but also water intake and treatment systems on board".

With respect to air operations, persistent cold weather and freezing rain would severely impact rotary wing aircraft maintainability unless shipboard hangar facilities are available. Similarly, cloud cover and fog makes persistent surveillance very difficult, especially during the summer months. Due to limited ice capable vessels, players often opted to send aircraft to conduct surveillance missions in the Arctic.

One player noted, "I sense a certain level of complacency about operating in the Arctic with respect to the weather, ice and ocean conditions that will affect platforms, materiel and personnel. Environmental conditions should not be under-estimated".

Time and Distance

The large distance required to transport supplies to an area of concern greatly inhibited the ability to sustain required time on station. Similarly, the inability to refuel and conduct resupply due to inadequate infrastructure in the region presented the greatest difficulties for players. Specifically, "the lack of refueling capabilities in the Arctic and long distances between refueling stations make it improbable to have a ship (small boy) transit through the Northwest Passage to San Diego." In order to maintain required time on station, sufficient lead time should be allocated when transiting long distances. Infrastructure development in the region, consistent port calls and the use of resupply vessels were discussed as primary solutions to mitigate these shortfalls.

Theme 3. In order to reduce the likelihood of risk, there was an increased reliance on additional information and capabilities through partnerships with the USCG, JTF Alaska, Tribal Leaders, Industry, and Multinational Partners.

Figure 3 shows that as risk increased due to extreme climatic conditions and increased operating and support distances there was a corresponding increase in the need for specialized information and capabilities. As this trend increased, the required information and capabilities became less

available in the U.S. Navy and planners were forced to solicit external stakeholders for the capabilities needed to execute their mission tasking. At the low end of the scale, these could be found inside DoD, but eventually planners needed to rely on industry, international partners, and the whole of U.S. Government. This further reiterates that sustainability in Arctic operations is significantly dependent on strong relationships with all of these entities and that mechanisms that strengthen these ties should be prioritized in future planning. It is also noteworthy that a limit beyond which sustained Arctic operations become impossible, even in the case of perfect relationships and availability to capabilities and information because it is not yet technically feasible to operate in some environments.

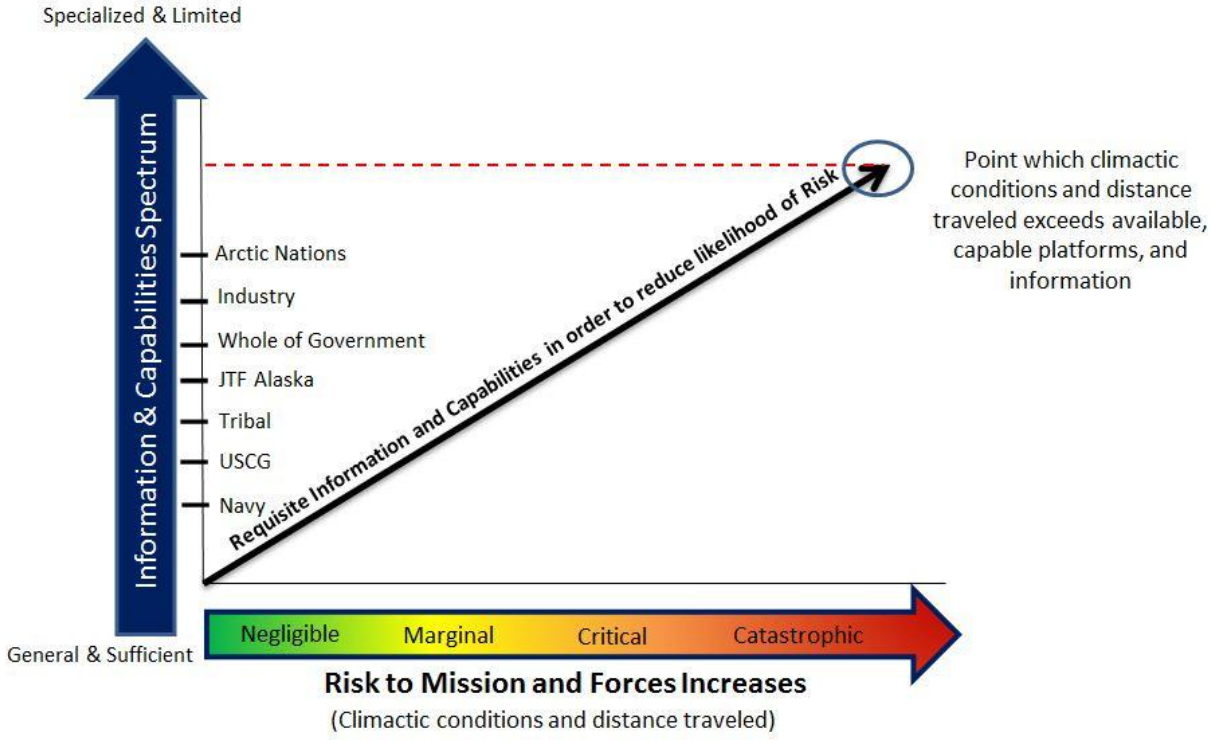


Figure 3. Relationship between information and capabilities and Risk

Information

As distance and weather factors increased during the game, the more reliance on specialized information increased. Planners became more reliant on receiving (e.g., pulling) additional information pertaining to the environment, wildlife, and indigenous populations in addition to augmentation by available and capable platforms and personnel in order to develop MDA and accomplish the mission. Conversely, as these factors increased over game play, there was an increased emphasis on the importance and necessity to disseminate (i.e., push) information to the media, indigenous populace, industry and the international community in order to support

strategic communications efforts, gain access to specific locations, and broaden coordination and response efforts.

Capabilities

Similarly, as both distance and weather factors intensified over the game, the more specialized and less available capabilities were. Unique capability shortfalls were identified with respect to specific platforms (e.g., ice hardened vessels and ice breakers), subject matter experts (e.g., environmental, systems and platforms), logistics infrastructure (e.g., refuel and resupply) and personnel (e.g., operators trained in cold weather operations) unique to the missions encountered during the game. As additional specialized capability requirements emerged during the game, the more players realized how limited their options were. This encouraged them to focus on the value and importance of leveraging local, state, federal and multinational capabilities.

Theme 4: The future application of solutions developed during the game was influenced by the frequency of operations and desired reliability of U.S. Naval forces in the Arctic.

As this game was conducted at the operational level, it was understood that many of the long term solutions may prove to be too expensive or strategically unacceptable to be implemented, hence the opportunity given to players to propose shorter term mitigating strategies. Many solutions of both types are outlined in this report, but one was not favored over the other during the game because of the lack of clarity on the Arctic strategy for the U.S. If the strategic vision is that future Arctic operations are to be short-term, ad-hoc, and infrequent in nature, then the consensus was that temporary, short-term and less formal solutions would be acceptable. However, if regular deployments, frequent operations, exercises and large scale crisis response actions were envisioned, then permanent, formal and comprehensive solutions were favored.

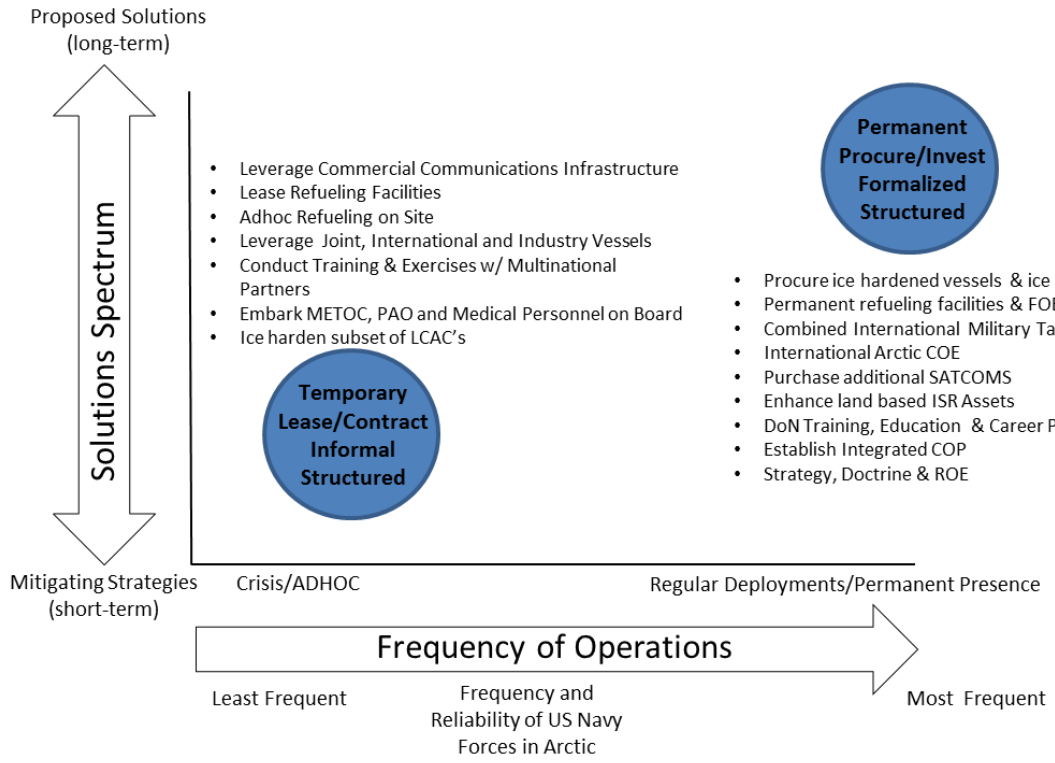


Figure 4. The Relationship between the Types of Solutions and Frequency of Operations

The more frequent or consistent an operation or mission would be conducted, the more suitable long term proposed solutions were found to be. Conversely, the less frequent or consistent an operation or mission was executed; the more mitigating strategies or short term solutions were accepted. Long term solutions tended to be more formalized and structured in nature while the majority of mitigating strategies were more informal, temporary and less structured. Additionally, permanent solutions typically were characterized by long development times and a corresponding need to begin acquisition well before the anticipated need. In the long term, the described permanent solutions would allow a quicker response time for forces and provide the requisite capabilities to respond to both an emerging crisis and regular deployment missions. Accordingly, one player noted, "there needs to be a combination of near term requirement and near term solutions based on operational requirements; long term approach is able to be phased based on a solid mission analysis that drives procurement and investments." Arctic missions are becoming more likely as noted in this comment: "Arctic Council SAR agreement, now in force, and its expected oil spill response agreement, would provide reason to send Navy ships up north and to engage in collaborative exercises." Additionally, "it was evident in our scenarios (that) we will be ineffective with our current gaps."

Further policy guidance pertaining to the USN's role and responsibilities in the Arctic was warranted in developing future short term or long term solutions. "Proposed solutions are costly.

Therefore, DoD and USN leadership must assess our long term strategy and determine the priority to operate in the Arctic relative to our other missions and threat assessments. This will help clarify the investment strategy and prioritize limited resources."

In summary, deliberation on this issue is driven by "the need to develop an Arctic strategy and define USN missions and goals in the Arctic over the next 20 years." The decision to focus on shorter term solutions or longer term, permanent solutions depended on a strategy which would identify which type of employment would prevail. This analysis has not yet been completed. In some cases, the inevitable transition from mitigating strategies to proposed solutions was described as a phased approach that requires resiliency, patience, and a long term commitment to cooperation in the region.

DOTMLPF-P Gaps, Mitigating Strategies and Proposed Solutions

Overview

This game sought to identify gaps in the U.S. Navy's ability to conduct sustained maritime operations in the Arctic region as well as mitigating strategies, and proposed solutions to close those gaps. This section will describe the gaps identified in the game and provide suggested mitigating strategies and solutions organized using the DOTMLPF-P construct. The reasoning behind the selection of the identified gaps, mitigation strategies and solutions will be described as well.

The overall assessment produced by the game was that the U.S. Navy does not have the means to support sustained operations in the Arctic. This was due primarily to the lack of appropriate ship types to operate in or near Arctic ice, the lack of support facilities in the Arctic, and the lack of sufficient or capable logistics connectors to account for the long logistics distances and lack of facilities. As noted in Theme 1, these gaps were mitigated or closed through the use of domestic and international relationships with military and Coast Guard partners which made available information or capabilities required to support scenario missions. However, the game identified that many of these relationships and the information and capability requirements that they enable do not exist or are poorly defined, further exacerbating the materiel issues listed above. These issues and others surfaced during the game are described in the following pages. Comments in quotations are reproduced directly from comments or written survey answers provided by players during the game.

Doctrine

Throughout game play, several key doctrinal gaps affecting the ability to effectively plan or conduct sustained maritime operations in the Arctic were identified. The lack of guidance pertaining to command and control relationships among U.S. and international maritime stakeholders was most notable. This included the lack of a common understanding of the geographical boundaries, roles and responsibilities and capabilities between nations, U.S. commandant commanders and the various U.S. numbered fleets. Furthermore, the capabilities, organization and missions of partner militaries were not well understood, which made coordination a challenge.

Proposed solutions to these gaps focused on additions to or creation of new doctrine. Fleet level C2 issues could be resolved through modifications to the Arctic Maritime Response Force CONOPS as is recommended later in this report. While some C2 relationships between U.S. and international military and civilian organizations are addressed in AJP 3-1, further clarification is needed, particularly with regard to the integration of other governmental agencies (OGAs) into the CTF, particularly this includes non-military agencies from partner nations. Procedures and supporting MOUs for the integration of these various entities, to include additionally those from

non-NATO partners, into a C2 organization must be more fully developed and described in AJP 3-1 or a similar document. This is clearly a long term effort, but it is necessary as a critical enabler to successful international and "whole of government" crisis action response. Looking further ahead, participants called for development of doctrine in support of a multinational maritime coordination center and response force in the region. Because significant sensitivities exist with regard to militarizing the Arctic, there is a need to "keep the military footprint as low as possible" when developing this coordination center and response force. Accordingly, this multinational doctrine must focus on information sharing and enhancing cooperation in order to achieve maritime safety and security in the Arctic.

Other doctrinal shortfalls were identified in the areas of development of awareness regarding environmental and physical conditions, support to salvage and nuclear incident response in the Arctic, and management of interactions with Polar Bears and other Arctic wildlife. "The group had no recollection of extreme cold weather doctrine to support tactical or operational deployment of naval forces for these scenarios. This doctrinal gap would place a high risk to accomplishing the mission and to the forces used in this scenario." Doctrinal guidance supporting a collective understanding of specific environmental and physical conditions that impact operations and a fundamental knowledge of specific capable platforms and capabilities available to perform missions in the Arctic should be developed. The retrieval of nuclear materials in the Arctic was viewed as an area that requires the development of cooperative doctrine between Arctic states "in order to increase the probability of success and prevent international incidents." Finally, the game identified a need for doctrine regarding ROE and training for encountering Polar Bears and other wildlife in the Arctic. This should be accomplished by USFF in the CONOPS. These points should be added to ATP-17 as well as other USN or joint doctrine.

Organization

Organizational shortfalls were exposed in four areas during this game: USN and joint relationships, U.S. Whole of Government organization, structures supporting international cooperation, and structures to support military cooperation with local and regional groups. Beginning with USN and joint organization, definition and structure were found to be lacking at the operational level with regard to operational authorities, geographical responsibilities, and command relationships between U.S. Combatant Commanders, their components and numbered fleets during operations in the Artic. Recent changes to the Unified Command Plan and relative inattention to the possibility of conducting operations in the Arctic have added uncertainty to command arrangements necessary for sustained Arctic Operations. Existing C2 relationships among U.S. and international maritime forces in the Arctic are still immature, require further examination, and may not be sufficient to support timely response to missions that require an immediate USN presence. For example, a need to clarify C2 arrangements between U.S. NORTHCOM, USFF, PACFLT, and the U.S. Navy's 3rd and 6th Fleets was cited, focusing on

further guidance regarding the roles and responsibilities of each entity, OPCON and TACON shift points, and information sharing in the Arctic region. Early planning to identify unique or establish ad hoc relationships was identified as a mitigating strategy.

Current U.S. contingency plans that may require an immediate U.S. "Whole of Government" and international response in the Arctic, also require further refinement. U.S. interagency structures to support operational level support to other agencies in the Arctic do not exist or are immature. On a larger scale, it was seen as likely that the Navy would be requested by another government to assist in a contingency response scenario resulting a need for rapid assimilation into a multinational task organization in which a foreign flag officer will command. "Like (with) any combined operation, establishment and integration of supporting and supported relationships early on in the planning process is critical." Similarly, when operating with coalition partners in the Arctic, naval forces must have the ability to rapidly move and embark special naval units on partner nation vessels. The long-term solution proposed during the game was to establish a standing multi-national organization and supporting task force to prepare for Arctic contingencies. To test and improve this concept, multinational exercises with relevant maritime stakeholders should be conducted. In any case, clearly defined organizational relationships and access to strategic locations, resources, and capabilities would support planning of contingency operations and mitigate risk during their execution. A pre-planned response checklist using this information and access "would be a valuable tool for planners in Crisis Action Cells." Similarly, lessons learned from other multinational and joint contingency operations, such as the Haiti response, should be leveraged to develop these organizational structures and documents..

Finally, coordinating with key local, state and federal entities in the scenarios presented was widely recognized as a "substantial organizational gap". During this game, DoD response in support of local, state, and federal responders was described in terms of "effectively setting up conditions that enable rapid ship-to-shore movement of materials in order to execute mission requirements." However, this activity depends heavily on local and regional support, which was found to be lacking. Additionally, the inability of deployed U.S. Naval forces to coordinate and interact with local indigenous populations emerged as a persistent theme during game play. Structures which support persistent engagement and communications with tribal leaders throughout planning and execution in order to gain access to remote areas, better understand the operational environment, and gain credibility and assurance with the local populace are needed. Mitigating strategies for these shortfalls centered on the use of Tribal Liaison officers for community relations and Arctic operations which are maintained by Alaska Command, USCG District 17 and JTF-Alaska. Additionally, the use of ad hoc Tribal Liaison Officers during PDSS and operations as well as the establishment of a permanent Tribal Liaison Officer at NORTHCOM would help mitigate this shortfall.

Training

All players agreed that the U.S. Navy lacks the experience and knowledge base to currently operate forces in the Arctic on a year-round basis. Arctic missions require specialized skill sets which are not currently available in U.S. Navy training pipelines. Specifically cited was a lack of awareness of how to detect the percentage of ice, fog and wind and how these factors created an impact on platforms and systems. Another shortfall was the ability to navigate in Arctic waters and, in particular in austere ports. "U.S. naval officers must have sufficient skill and training to con their vessels independently of assistance from tugs to enter and leave Arctic ports." In general, a lack of sufficient training for operating in the Arctic and, in particular, Arctic-unique operations was noted. "Our expectation is that the USN is going to the Arctic to do something other than sit below decks and shoot missiles (most likely some kind of sea-basing). This means people are going to have to operate small craft and aircraft in extreme cold weather conditions and those connectors present the highest risk and most vulnerable points of failure." Other training deficiencies were identified in the areas of the operation of ship-to-shore connectors, the movement of heavy equipment and the loading and unloading of cargo during operations in the Arctic.

The level of knowledge and awareness of NATO or allied national command authorities, available multinational and industry logistics support hubs, platforms, and points of contact was found to be inconsistent and a weakness among U.S. Navy personnel. "A clear understanding of the various regulatory regimes of the sovereign states that ring the Arctic as well as the international conventions and agreements for planners and operators is essential".

Accordingly, the need to develop a comprehensive list of training prerequisites in order to conduct sustained cold weather operations and determine which training should be developed and maintained within the Department of the Navy was identified. "Future operations in the Arctic region will not be a primary Area of Operations for USN and will not demand across the board training for squadrons and ships to add Arctic training to current Training &Readiness matrices. Rather, ensure a concise NWP or training syllabus exists of surface, helicopter and fixed-wing assets for Arctic operations." This should include a certification program for personnel deploying to the Arctic. Additionally it was suggested to develop an Advanced Qualification Designator (AQD) for Arctic planning and operations. One player noted, "Tracking officers and enlisted with Arctic experience through the Navy Personnel Command (NPC) data base would enable Navy leadership to rapidly identify trained and educated personnel, should a crisis require a U.S. Navy response in the Arctic." Another recommendation was to leverage Navy Expeditionary Logistics Support Group (NAVELSG) as an entity to train and familiarize personnel with cold weather and ice cargo movement operations. Training in the area of polar bear mitigation (e.g., requisite equipment and ROE) was emphasized throughout game play and identified as "a must have for all personnel deploying to the Arctic". Finally, as noted in the

CONOPS section of this report, U.S. Navy personnel must be further trained on the specifics of crisis action response scenarios in Arctic.

While the U.S. Navy does not currently have a significant resource to conduct this training, leveraging other Arctic nations' capabilities was a trend that emerged in many areas including training to mitigate the lack of current capability. Training (e.g., exercises, workshops, games etc.) with other international maritime partners must be developed and executed. Specifically, the U.S. Navy should seek to conduct cooperative training using existing training curriculums and facilities of Canada, Russia, Denmark, and Norway. "The U.S. Navy needs to take every opportunity to deploy ships or personnel to the Arctic. This can also be achieved by participation in Canadian and allied exercises (i.e. NANOOK, or FRONTIER) or by exchanges where sailors of all trades have an opportunity to sail on other countries' ships". Additionally, this game highlighted the interrelationship between the U.S. Navy and U.S. Coast Guard. Aside from leveraging assets and sharing information, players suggested the need to determine and develop Arctic related training requirements for both services. Additionally, players lacked fundamental knowledge of existing coordination constructs (e.g., JTF Alaska and Arctic Council) and responsibilities of domestic organizations (e.g., USN, USCG etc.).

The primary proposal to compensate for the lack of available training among U.S. Navy personnel regarding Arctic resources for information and specialized capabilities was the establishment of an Arctic "Center of Excellence." This center would serve as the focal point for all matters related to research and training for DON personnel as well as own and manage the knowledge base for conducting Arctic operations. Acknowledging the wealth of expertise that exists among the Arctic nations, this center would strive to build relationships and contacts in order to facilitate the rapid connection of a training or information resource to the command that needs it. Additionally, cooperative arrangements with civilian universities, industry, and U.S. and international military universities were also suggested.

Understanding the culture of the local and tribal populaces that inhabit the Arctic was another area that U.S. Navy personnel lack awareness. Leveraging existing entities such as JTF-Alaska, D-17, and international partners in order to engage with local tribal leaders was highly encouraged. The development of long term training syllabus and courses via Navy Knowledge Online (NKO) or in resident (e.g., similar concept or augment to MSOC) in this area was also recommended. Maintaining relationships and a network of contacts with the local and indigenous population in the Arctic should be a focus of the Arctic "Center of Excellence" noted above, providing an exportable capability to Arctic deployers.

This game also exposed a shortfall in the ability to train personnel in the conduct of environmental disasters such as oil spills, especially in the context of the Arctic. "DOD lacks an inherent knowledge of how to handle man-made environmental disasters and is reliant on commercial and civilian experts and equipment." Several scenarios required U.S. Navy to

interact and perform logistics services for these entities. A formalized policy and education plan to facilitate this interaction was suggested. To address this shortfall in the long term, several players suggested developing internal DOD personnel with expertise in the area of environmental spills and cleanup. Additional collaboration with USCG and industry sources with oil spill containment and clean up experience and integrating key lessons learned into the CONOPS would greatly enhance USN capabilities in the long run.

Additional shortfalls were identified in the areas of environmental prediction and observation and in cold-weather survivability. Resources to train ice reconnaissance teams are very limited. To mitigate this shortfall, the U.S. Navy could utilize Canadian Ice Reconnaissance resources to assist in providing ice status to augment satellite imagery or embed contracted ice observers in air detachments. In the long term, the establishment of a training regimen for ice reconnaissance and navigation teams to augment satellite imagery and train air crews as permanent ice observers was proposed. With regard to Arctic cold weather survivability training, it was suggested that all deployed personnel receive pre-deployment training on cold-weather survivability as well as the use of cold weather gear. As a mitigating strategy, the Navy should leverage industry and international partner expertise in this area, while long term solutions involved development of a standing schoolhouse to train personnel on the use of specialized equipment and facilities.

Finally, it was proposed that the lack of a robust onboard repair capability creates significant risk in an austere environment such as the Arctic. "If a U.S. Naval vessel would sustain a significant mechanical or electrical casualty while deployed in such a remote and austere environment, they could be in trouble. At the very least, they will likely need to come off station and return south to affect repairs. Much of our capability and expertise to effect self-repair is much degraded relative to 15 or 20 years ago." This was echoed during another scenario: "A sustained operation in an austere environment far from logistics hubs requires greater self-sufficiency to maintain and repair ships, particularly hull and structural systems (especially with a persistent threat of heavy seas) than currently exists shipboard. (1) Though many ships have capable machine shops onboard, ship's company lacks needed skills and experience levels to employ equipment in the course of effecting repairs. (2) S/F has become reliant on fly-away teams for complex troubleshooting or repairs, IAW a 'operator' vice 'maintainer' philosophy as well as 'minimal manning.' (3) Following repair of hull structures and systems (electrical or mechanical), as well as main propulsion, S/F in general lacks training and qualification for necessary non-destructive testing of repairs."

Material

Shortfalls in materiel suitable for Arctic service emerged as a primary area of focus during the game. A key finding of this game is that the U.S. Navy lacks appropriate platforms, equipment, and communications systems to conduct sustained operations in the Arctic.

Maritime Vessels

The first identified shortfall is in icebreaking capacity. “Single point failure is the USCG Ice Breaker HEALY” was a common refrain as nearly every scenario response directed the immediate deployment of HEALY to the area of interest. In order to mitigate the lack of ice breaking capability in the near term, players relied heavily on coordination and cooperation with the USCG, industry and multinational partners. Specifically, throughout the game, these capabilities were leveraged (leased, borrowed) from both Russia and Canada. These nations’ proximity to the operating areas and operational experience in the region made this the most viable and practical solution. Over the long term it was suggested to develop an Arctic Acquisition Strategy to procure, lease and retrofit ice capable platforms.

Beyond ice breakers, the finding that current warship designs are not robust enough to operate in even light ice which is already broken was highlighted. In other words, even when escorted by an icebreaker, transiting the NWP or other areas with more thanclim minimal ice coverage with amphibious or CRUDES platforms was deemed to be exceedingly risky. Strategic and operational planners will simply need to accept that certain areas in the Arctic remain off-limits to U.S. warships unless the commander is willing to accept risks, the ice recedes away from the area of interest, or ships are produced with additional ice strengthening. As a strategy to mitigate risk, consultation with NAVSEA engineers and naval architects was determined to be necessary to offer the commander sufficient understanding of design limitations, but the unpredictability of ice movement and environmental conditions must also be factored in. Accordingly, the need to strengthen USN hulls and procure ice breakers, ocean going salvage vessels, and tugs was a focus throughout the game. The shortfall of available and capable ocean-going dive salvage ships was area that received significant consideration during gameplay. Leasing these vessels through industry and multinational partners would mitigate this gap in the near term, while procuring additional TATF-X vessels was proposed as a long term solution. “If you want Navy presence up there, we need bigger, better ports with more supplies and ice-classed ships. Ice-class ships cannot be a retrofit of existing designs. Build new ships whose parameters adhere to a simple set of rules to achieve classification. These ships are based on empirical information derived from operating ships in the Arctic environment with minimal infrastructure. This is your best option to succeed in the mission and mitigate catastrophic failure.”

An additional observation regarding readiness of current vessels for Arctic operations was that while “most of our ships were originally designed for satisfactory performance in cold or very cold weather, … maintenance of systems, particularly HVAC, is in general poor condition and most ships should have a thorough and competent assessment and some level of overhaul and refit of these systems before deployment to an Arctic environment."

Amphibious ships were highlighted as especially useful for the types of missions anticipated for the Arctic. “The LPD-17 has a flight deck, hanger and well deck as well as personnel and

equipment carrying capacity and medical capability." LCACs were also utilized frequently during this game as part of the amphibious capability necessary to respond to the various scenarios provided leading to much discussion on the value of retrofitting existing LCACs. "A re-fit of our LCACs would work. Doing that, we can at least take some of the effort for SAR and show a continued presence." Using another approach, it was noted that "the problem is so overwhelming with respect to lack of appropriate hulls and infrastructure to support larger hulls that we probably need to think more out of the box and smaller…getting a smaller vessel with decent legs such as the Tuuli (Finnish 'Arcticized' ACV) which has already been tested might just be the way to go."

The lack of weather protected surface connectors in lieu of open bay small boat transfer vessels (LCUs/RHIB) which do not protect personnel from extreme weather conditions was found to be a limiting factor in mission planning. A mitigating strategy identified included the need to increase the number of trained boat crews and reduce crew rotation time intervals until such time that cold weather canopies or heated modules which can provide protection can be developed.

Finally, players asserted that there is insufficient capacity of naval forces to continue current missions while adding missions, exercises and training in the Arctic with current vessel inventory.

Aircraft

In order to mitigate the lack of ice capable vessels and ice breaking capability in the near term, planners were forced to avoid areas where ice accretion was greatest. In these instances, air lift and air support were relied upon. "A few long range Short Take Off and Landing (STOL) aircraft would be beneficial in order to utilize the scattered gravel strips in the region and operate off ship… it would be great to augment this with existing VTOL (shorter range) aircraft". However, it was noted that the availability of MV-22s for 6 month deployment would be limited. To mitigate this shortfall in the near term, players suggested the use of other aircraft, such as H-60s despite the range and lift problems attributed to this platform. A proposed solution included the need to generate requirements for heavy lift, cold-weather capable, vertical lift capable aircraft.

In order to support air lift and air operations in the Arctic AOR, scenario responses highlighted the need for the development of airfields in Barrow or Prudhoe Bay to include military hangars and fuel storage, as well as roads from Fairbanks to the airfields and supply nodes. "Currently, materiel to support humanitarian relief operations must be drawn from disparate locations and bases, which in turn increases the response time for the required equipment and supplies to arrive on scene." Using airlift capabilities to fly in equipment, personnel, and supplies to a staging area may decrease the response time to a humanitarian relief event. Utilizing materiel from outside

organizations (state of Alaska, FEMA, etc.) to compensate for unavailable or prohibitively distant USN assets was also suggested.

As a final comment, the challenges associated with operating aircraft in the Arctic were highlighted. “Aircraft in these conditions are inherently more dangerous to operate than ships, even in good weather. Sustained helicopter and landing craft operations in these conditions, with all-purpose craft, not specifically designed to operate in these conditions, are going to be very hazardous for the people and the aircraft." Given the harsh physical and environmental conditions in the region and lack of capable maritime vessels, the use of unmanned aerial vehicles for surveillance and distributing resources would be highly applicable and valuable to supporting operations.

Equipment

The U.S. Navy does not outfit ships with PPE rated for Arctic conditions. The availability of cold weather equipment and gear for ships and crew rapidly deploying to the Arctic was highlighted as major materiel gap. To mitigate this shortfall in the near term, a pack-up kit in fleet concentration area ready for transfer to ships deploying on short notice to the Arctic was suggested. Test and evaluation processes for Arctic weather gear and AEL requirements must be established. Procurement of cold weather gear and the development of a ready service locker of Arctic equipment that is available for unit deploying to the Arctic were also suggested. Interestingly, one player noted, “At Little Creek Naval Amphibious Base, there is a rotating pool of gear available for expeditionary operations. You can check out flak jackets, helmets, etc. Same concept should be applied to cold weather gear.” The limited frequency of use of this equipment led players to leverage multinational and industry partners in order to acquire information about best practices for this equipment and for a ready resource for emergency equipage availability.

Communications

Consistent and reliable communications was identified as another area that lacks sufficient capabilities. Short-term use of multiple communication methods and accepting reduced bandwidth were identified as a mitigating strategy. The acquisition of additional polar orbiting satellites for enhanced communication capabilities was identified as a long term solution.

The ability to conduct satellite surveillance using High Resolution Synthetic Aperture Radar was another substantial shortfall identified in the game. Purchasing additional high resolution SAR imagery through commercial companies or using aircraft as remote sensing platforms was suggested as a mitigating strategy. The acquisition of additional U.S. satellites for SAR and IR imagery was proposed as a longer term solution.

Support to Environmental Disaster Response

A lack of knowledge pertaining to oil spill dispersion trajectories under the ice and below the sea surface was identified. In the near term, players suggested the need to leverage industry and academia while investment in R&D for developing oil dispersion models was proposed as a long term solution.

Leadership and Education

The need for strong support from U.S. political leadership for conducting operations in the Arctic was consistently noted throughout the game despite an observed lack of attentiveness and understanding among senior U.S. military and civilian leadership on the consequences and risks associated with the myriad capability gaps identified in this game. The small cadre of military leaders with significant Arctic knowledge and experience must continue to inform their civilian counterparts and political leadership on the risks and opportunities of sustained operations of U.S. maritime forces in the Arctic. Leadership must have the awareness to balance risk to mission and forces with the costs of capabilities required to mitigate that risk. "The U.S. Navy needs to have a clearer mandate on what the expected Naval missions will be; increased education for policy makers with which to better adjudge risk in the Arctic and determine what costs they are willing to take on in order to increase USN presence."

Additionally, the game identified a general deficiency of knowledge among senior U.S. Navy leadership regarding cold weather systems and platforms, climatic conditions, and C2 relationships in the Arctic. Integrating these topics in both junior and senior officer leadership courses (JPME I & II) as well as the Senior Enlisted Academy was suggested. "The Navy needs to include Arctic education in CAPSTONE courses, summary of this education to senior staffs, and Fleet Commander Support for additional T-class ships, native language speakers, and icebreakers. This would provide knowledge and capability to support increased operations in the Arctic in the next 30 years."

Personnel

Insights regarding key personnel gaps, mitigating strategies and proposed solutions have been integrated within the training, leadership and education categories of this section of the report.

Facilities

The austerity of the infrastructure available to support maritime operations in the Arctic and the great distances from available support facilities to the actual operating area had a tremendous impact planning scenario responses and assessing the risks associated with those plans. As was previously noted, distance and time required for forces to arrive on scene decreased mission success and the lack of logistics facilities exacerbated this problem. Numerous gaps in logistics

infrastructure in the region were identified and the ability to support sustained maritime operations without reliance on extended logistics lines to ports outside the Arctic was questioned. Additionally, the lack of airports within close proximity to operating areas presented severe challenges in conducting resupply and air drops of supplies and resources to the local populace, during HA/DR missions, or to deployed forces. A mitigating strategy proposed during the game was to use "sister service Air transport into Nome from Elmendorf and leveraging private and commercial airfields."

Another aspect of these facilities shortfalls was related to the importance of engagement with the local communities in the Arctic. A fixed base in the Arctic is needed to maintain continuous communications and build relationships with indigenous and regional populations and leadership.

Another conclusion specified that in order to be able to conduct operations for any extended period of time, logistics support from local authorities, industry and multinational partners is required. Leveraging logistics facilities in Canada, Iceland, Greenland and Norway as well as using Thule, Halifax, Nuuk and St. Johns were discussed primarily as mitigating strategies. The development of permanent logistics infrastructure, Joint FOB's, as well as A-PODs and S-PODs were cited as potential long term solutions. Specifically, infrastructure upgrades at Thule, GL, Barrow, Ft. Wainright and Nanisivik to support refueling and resupply were identified as key changes. Thule Air Force Base in the North Star Bay (e.g., Baffin Bay) was discussed as a location that can provide logistical support in the summer months. Conversely, Resolute was noted "as a small community that is often blocked by ice even in the summer."

U.S. support for infrastructure development at Nanisivik was discussed as an example of the complexities related to relying on non-U.S. Arctic facilities. Nanisivik was described as "a mining facility with a pier for loading ore and has historically never been a full-featured port… but has the potential to be refurbished and used for naval resupply." However, "Nanisivik is not yet established, and once it is, it will only be for fuel." In the end, "Nanisivik Naval Facility is intended partially to emphasize Canadian sovereignty in the Arctic. U.S. involvement might entail resolution or mitigation of the U.S.-Canadian sovereignty dispute over the status of Canadian internal waters and international strait in the Northwest Passage region. However, U.S. resources could meaningfully enhance the development of the facility and Canada might be persuaded on that basis."

Policy

A lack of policy guidance regarding coordination and collaboration with multinational military forces (e.g., Canada, Denmark, Norway, Greenland, Finland and Russia) in support of Arctic operations was a prominent concern throughout game play. Specifically, the importance of Russian and U.S. relations and the need to develop U.S. policy towards working with Russian

maritime forces in the Arctic in the form of MOUs, bi-lateral and multilateral agreements in support of future cooperation and collaboration was emphasized. The primary areas identified to facilitate this include: participation in joint multinational exercises and the sharing of training, logistics facilities, and information. Efforts to mitigate short term crisis responses (e.g. environmental spill, natural disaster etc.) were noted as the most likely mission areas for cooperation.

Additionally the lack of guidance regarding U.S. and Canadian C2 arrangements in the Arctic region was significant. Given the scenarios encountered during the game, the U.S. and Canada should have identified a need to "trade off responsibilities" between each other in various operating areas and missions encountered and shared by both nations. Within this construct the importance of identifying and respecting the boundaries of authority and jurisdiction for Arctic operations. The establishment of clear boundaries within which combined operations could be conducted under Canadian leadership and authority (e.g., specifically between Resolute and Sachs Harbor) was suggested. In the long term, players suggested developing a bilateral or multilateral agreement or policy similar to the Maritime Operations Threat Response (MOTR) process to guide decisions on lead agencies for Arctic operations.

A recurring theme was the significant lack of guidance pertaining to how U.S. maritime forces (e.g., USN and USCG) are integrated into a "U.S. Whole of Government" response effort in the Arctic. Concerns were cited regarding the uncertainty of "On Scene Commander Expeditionary Politics when conducting salvage operations close to other nation's territorial waters" and the need for a "specifically whole of government integration." A need to "Identify processes to request support from foreign governments and other U.S. Government Agencies from a whole of government approach." was also cited. Emphasizing the importance of an integrated national approach to HA/DR or other crisis response missions, it was claimed that "Whole of Government (e.g., emphasized by Canada and a topic in the U.S.) or Whole of Governments should be more readily acceptable to the Navy and DoD." Other comments highlighted the uncertainties perceived in the policy guidance regarding lead agencies for various events, or the accessibility of other government assets in the case of a crisis. "We need to have an indication that direction on the military response to a maritime domestic event such as this oil spill will come from U.S. NORTHCOM." This lack of policy guidance also includes the other military services, JTF-Alaska, and local, state and federal agencies as well as NGO's and the commercial sector. Furthermore, "There are many capabilities to sustain operations in the Arctic, but they are underutilized due to the lack of guidance and requirements to properly focus and integrate the capabilities in such a way as to inform decision makers and policy development."

Additional policy recommendations centered on the resolution of policy gaps regarding environmental protection and other factors related to interacting with the natural state of the Arctic. One issue identified was the need for ROE for mitigation of Polar Bears and other wildlife. Another related concept was that maritime forces need to be given policy guidance to

govern how strict environmental regulations in large portions of the navigable Arctic can be addressed. “Sensitivity to environmental regulations in the Arctic is far greater than we experience anywhere else and if our policy to comply with or ignore is an afterthought decision we will lose the jury of the public. We need to decide what we will do and then deliberately plan the solutions and strategic communications to support or mitigate that. Thus, strategic communications needs to be at the forefront of planning operations to understand ‘how our presence looks from the other side’, one player said.” This realization throughout the game encouraged the identification of the need for further policy related to the discharge of waste and disposal of trash from ships in the region. However, it is noteworthy that “a policy for USN to abide by all HN and international regulations will prevent putting most ships in the AOR.”

Updates to Arctic Maritime Response Force CONOPS

This section provides an overview of the main themes that the players identified for improving the Arctic Maritime Response Force CONOPS. The analysis team utilized a grounded theory approach whereby themes were identified through a process of constant comparison and then tested throughout the data. Moreover, the relevance of the themes was determined by linking the themes to the Navy's Arctic Road Map and Arctic Maritime Response Force Concept of Operations. This method attempts to explore both documents and inform leaders of the major challenges and solutions players encountered when planning sustained maritime operations in the Arctic. Comments in quotations are reproduced directly from comments or written survey answers provided by players during the game.

Structural Changes and Overview

Overall, the Arctic Maritime Response Force CONOPS was identified to be a valuable tool to support sustained maritime operations in the Arctic. However, the Atlantic Coast centric approach to the Arctic and focus on war fighting missions and missions with long planning opportunities of the CONOPS was inadequate to meet the most likely missions specified in the Arctic Roadmap. Accordingly, it should be modified to support operations in both of the Atlantic and Pacific Fleets as well as a wider range of operations to include crisis action planning and crisis response.

Given that the original CONOPS was developed by COMSECONDFLT, its Atlantic focus is natural. But, discussions during the game made clear that what works in one region cannot be automatically applied in other regions. Entering the Arctic from the Pacific has a number of significant differences to include changes to C2 procedures to account for interactions between EUCOM, NORTHCOM and PACOM or USFF, PACFLT and the various numbered fleets, the presence of sovereign U.S. territory in the form of Alaska, the corresponding reduction in the criticality of international partnerships, and finally, the existing organization and networking of USCG District 17 and JTF Alaska. For the CONOPS to be broadly accepted and implemented, these factors must be taken into account. A common comment was: "Change the CONOPS to reflect the bias to more of operating in the U.S. Arctic vice the Atlantic Arctic."

Other discussions emphasized that likely missions and scenarios that would require a DOD response consisting of "emergent tasking/crisis action planning in the Arctic." Suggestions included adding information and planning tools on crisis action planning for emergency contingencies, better aligning the document with the Arctic Roadmap. The CONOPS requires a careful review of the missions and what the "U.S. Navy shall, should, or could do in the Arctic." Additionally, the original CONOPS seemed to be written for combat or transit vice sustained operations. There is "a need for more comprehensive vignettes outlining basic considerations for crisis response for man-made natural disasters." For example, "add an oil spill vignette in CONOPS to include decontamination of equipment, personnel (as per industry), and PPE.

Include procedures on special Arctic restrictions, or resources/references for these special procedures."

Correspondingly, it was found that the CONOPS was inconsistent in its guidance regarding missions for an AMRF or sustained operations in the Arctic. The scope of missions listed in the CONOPS appeared to be focused predominantly on war-fighting instead of the more likely scenarios of DOD support and response to emergent contingencies. The original document concentrated on deliberate planning and timelines, and less on crisis action planning (CAP). During the game, courses of action were repeatedly developed that required many assets and services to be deployed and activated on an accelerated basis instead of the months of lead time assumed in the existing CONOPS. To correct this, a crisis action planning section for emergency contingencies should be added into the CONOPS. An abbreviated planning process associated with a crisis action planning timeline similar to the Global Fleet Station (GFS) planning timeline used as an example in the original CONOPS was suggested. The Office of Response and Restoration (NOAA) provides comprehensive information on responding to a natural resource crisis which could serve as a framework. Additionally, the CONOPS should include more CAP vignettes, such as the disaster response, oil spill, or Homeland Security scenarios developed for this game.

Many of the CONOPS changes recommended by game participants pertained to subjects that were already largely addressed in the original document. However, it was believed that the subject matter was inconsistently written, not intuitively organized or needed additional amplification. Organizing the information to more closely align with joint planning doctrine and amplifying pertinent information would improve the CONOPS. For example, in the "Planning and Execution" section, reorganizing topics by joint operational function would help planners to fully integrate the CONOPS into their plans.

Finally, players cautioned against too many additions to the CONOPS. "Keep the CONOPS operational and put tactical elements into the ATP; there was a tendency not to make full use of other publication formats (Shipboard pubs and guidance (Cold Weather Bills, deployment guidance), AT/FP, and ONI assessments; reference to these would help keep the CONOPS focused on its intended use." Suggested revisions to the CONOPS should be crosschecked with existing doctrine or publications to prevent duplication; referring to and referencing the location where the needed information could be found would be sufficient.

Command and Control

The Arctic region is characterized by unique AOR boundaries as well as unique, ill-defined or newly established organizational relationships at and between all levels of command. This creates situations where planners do not fully understand command relationships or where all interactions are based on different ad hoc relationships. A contributing factor to this problem is

that Arctic Maritime Response Force C2 procedures are not adequately addressed in the CONOPS. The CONOPS should address the unusual nature of C2 in the Arctic, specifically in resolving AOR overlaps and boundaries as well as unique and unusual command interactions (such as COMTHIRDFLT operating in the NAVEUR/EUCOM AORs). Other updates should include descriptions of relationships between USFF and PACFLT, LANTAREA and PACAREA, and Canada's JTF-North. The CONOPS should include a chapter or an appendix illustrating and defining existing C2 relationships and authorities which would provide a standardized reference for routine transit or contingency mission planning. Finally, the process of refining the CONOPS should also support refinement of the C2 relationships in the region, and, as such, should be a fully collaborative process with all levels of command represented.

Another area of improvement identified is in the CONOPS' description of communications. This was not examined in great detail during the game due to classification restrictions, but it was noted that the inclusion of a standard or strawman communications plan would be beneficial to planners and operators. This is especially valuable because unique communications systems are required for Arctic sustainability which are not part of communications packages in other AORs. This includes leveraging commercial or partner systems which may require system modifications and which may come with limitations with regard to bandwidth or ability to carry classified information. This communications plan should address the "Arctic communications limitations, specifically the SATCOM footprint, and the corresponding impact to command and control."

A recurring theme in the game was that C2 and command relationships in the Arctic region must be clearly resolved and articulated early in the planning process. The seams in coalition C2, CCDR and numbered fleet boundaries, and in partnerships and roles between interagency organizations, federal-state, and government and non-governmental agencies discussed above create significant additional effort for a planning staff. The CONOPS should highlight this factor and call for staffs to begin C2 planning as early as possible, perhaps with the development of preplanned C2 and communications packages for use in the event of a crisis.

Partnerships and Relationship Building

Throughout the game, the need to conduct operations in the Arctic in a cooperative manner due to limitations in any one nation's capabilities was emphasized. The CONOPS should include guidance on standing relationships with Arctic partners as well as the procedures for starting an ad hoc relationship in support of a crisis response operation. Strong maritime partnerships are critical to the ability to operate in the Arctic. Most Arctic nations are also members of NATO and "an appendix with data on NATO procedures" should be included in the CONOPS to facilitate the rapid establishment of C2 in the event of a crisis. The "CONOPS needs to expand and emphasize the potential need for international cooperation to conduct Arctic operations" along with detailed policy guidelines on C2 relationships. The process of requesting support from Arctic nation and partners, specifically Canada, Norway, and the Kingdom of Denmark,

must be provided in an annex along with liaison points of contact (POC) information. Players even went so far as to recommend that "a standing task force for multi-national operations should be established with Arctic nations to address standard C2 relationships (OPCON/TACON, etc.)." It is strongly recommended that the CONOPS provide guidance on using "subject matter experts (SME) as liaison officers to involved organizations" including local communities.

As with all operations, strategic communications are important. Due to the sensitive nature of operating in the Arctic, it is imperative that commanders get the strategic communication right and that it is consistent. The U.S. Navy wants to send the correct message of why the military is operating in the Arctic. In line with this approach, it was recommended to delete CONOPS sections focused on war fighting. Further, guidance is required on conducting military operations that requires the use of lethal fires that prevent adversaries from scuttling ships that conduct illegal activities. The cumulative effects of these instances would adversely impact the ecologically sensitive Arctic region and send a negative message to Arctic partners.

It was also recognized that the nature of maritime operations would always be influenced by "whose Arctic" the operations would be occurring within. Significant geographical, meteorological, geopolitical, and infrastructure differences exist between the Arctic sub-regions. For example, from the U.S. perspective, the presence of Alaska greatly changes the character of Arctic operations when compared to other sub-regions. In almost every other case, a strong relationship with the nearest Arctic nation to the planned operating area is essential to the sustainment of forces and the cooperative response to the planned operation by interested neighbors.

Numerous interested parties beyond the five Arctic Nations were also described. These included U.S. and coalition forces, interagency organization and other government agencies (OGAs), non-governmental organizations (NGOs), and the local population. Prior to and during operations in the Arctic, planners and operators must understand all of these entities and the CONOPS should include descriptions of key stakeholders, their interest areas, and their capabilities. Additionally, these entities could be the key to a variety of specialized Arctic assets which exist and may be utilized, but staffs may not be aware of their capabilities or even their existence. Planners should consider that a partner, NGO, or civilian industry organization may have better capabilities to execute certain missions or tasks. It was recommended that the CONOPS include "an Annex addressing liaison points of contact for Arctic partner nations and actors (NGOs, IGOs, contractors, etc.)"

The CONOPS should provide guidance on the procedure to solicit support from U.S. government agencies given the engagement nature of many Arctic missions. CONOPS changes must include descriptions of multiple U.S. government agencies and capabilities that have a stake in the Arctic such as the National Incident Management System (NIMS). "Maritime

Operational Threat Response Plan should be considered as one process to facilitate the U.S. Whole of Government response to Arctic issues/responses."

The listing of the Arctic's key leaders and their primary points of contact from the various organizations and indigenous people as well as an understanding of their interrelationships must be understood to support PDSS efforts. There is a requirement to successfully engage with Arctic region native populations that requires support from several entities that already have established relationships such as the U.S. Coast Guard (District -17), other Arctic nations (Canada, Kingdom of Denmark, Russia), and JTF-N in order to have a greater chance of understanding and cooperation.

The environmental sensitivities associated with operating in the Arctic with ships required to adhere to the "leave no trace" principle requires the development of specific guidance and procedures associated with sustained maritime operations in this area. As noted elsewhere in this report, the U.S. Navy needs to determine a policy with regard to compliance to the various environmental and operating regulations that exist in large portions of the navigable Arctic for both forces operating today and those currently being developed and procured. This policy should be included in the CONOPS. In support of this policy, the CONOPS should include information on special Arctic restrictions with listed resources and references as well as guidance on how to "adhere to the environmental & wildlife considerations/ regulations of the Arctic coastal state." Additionally, include a section that provides guidance and procedures for the discharge of various types of waste and the need "to hold/store waste for extended periods." Other suggested solutions include the option of discharging waste to other ships for further transport for proper disposal.

Movement and Maneuver

Throughout the game it was noted that harsh and variable environmental conditions and large distances will likely create uncertainty in planning, timeliness and timing, and can create conditions which exceed current operational capabilities. This uncertainty should be understood and taken into account when planning. To reduce this uncertainty, an appendix with a "GO/NO GO criteria chart of ice operations (Air, Surface, and Subsurface operations)" was suggested. "Arctic winter SMEs should be consulted on developing go/no-go criteria, assessing system limitations, etc. if we are considering winter operations in the Arctic." The "CONOPS should identify the environmental (ship) threshold beyond which we are really standing into danger. Kind of like the limits we establish on aircraft and landing craft operations. We know what risk we are taking based on established limits and calculations. Then we determine if we can do it." Guidance must be provided that clearly defines the length of time or thresholds a ship which is not ice rated or designed for Arctic operations can safely remain in the Arctic to inform planners and operators that "there is also no defined amount of ice that non hardened ship can operate in."

It was recognized that no chart could be comprehensive, but that a quick reference guide would be necessary given the lack of Arctic experience and knowledge resident in the force.

A recurring theme throughout the game was that the U.S. Navy's ability to operate in the Arctic under a wide variety of ice and weather conditions is limited and operators must understand the design limitations of aircraft and surface warships. Shipboard design challenges include material limitations associated with hull construction, various shipboard equipment limitations due to Arctic conditions frequently exceeding design limits (sub-zero weather environments), and propulsion and auxiliary equipment designs that do not incorporate measures that prevent sea chests from becoming blocked by sea ice. The CONOPS section covering U.S. Navy "platform selection criteria should be prioritized and is missing key factors such as sustainability and ice (capability)" that best support mission accomplishment. Planners need a table that lists the ice capabilities of all major classes of USN/USCG/USNS/MSC/MARAD ships. This table should contain "the major plus and minus of each class (i.e. a DDG has exposed screws and bow mounted sonar prone to ice damage." It was also suggested that the CONOPS should "add an appendix explaining Ship Ice Ratings to highlight capabilities and limitations." Modification and expansion are also required in the existing "Platform Section" (CONOPS p. 24) to include information on ice breaker and salvage vessels and alternative resource options such as leasing assets from Arctic nations or private industry (see also the discussion on U.S. Navy Contracting procedures later in this report).

Similarly, there needs to be a section on the challenges of operating the airborne assets that provide logistical support and intelligence gathering in terms of the acceptable risk level associated with extreme cold weather, visibility, maintenance support, and transient basing. Players were often surprised by unforeseen limitations in aircraft capabilities that were unknown to the operators, but were well known to engineers or acquisition personnel.

In the case of smaller vessels, several aspects of Arctic operations create unique circumstances with regard to ship-to-shore movement and surface connector operations. These include typical shoreline and bottom characteristics, varying ice composition, and reduced exposure times for vessel crew which prompted a suggestion that procedure to mitigate the impact of these factors be included in the CONOPS. Also required is "amplifying guidance for cold weather impacts to personnel similar to what is contained in USCG/CAN/KoD publications (Safe stay time charts etc.)." The inclusion of cold weather operations information (or reference to the appropriate document) specifically tailored for surface connectors such as LCAC, LCUs, and other U.S. Navy craft would benefit planners and operators.

The CONOPS should reflect the requirement for all units to make accommodations for cold weather operations. Details for these changes are spread throughout numerous technical manuals and the like, but should be assembled and summarized into a reference guide or checklist. Examples include requirements to change lubrication or modify operating procedures for cold or

icy weather. The inclusion of a "list technical references that provide the detailed maintenance practices required to operation critical equipment in the Arctic/extreme cold weather" was suggested.

Because of the specific requirements associated with Arctic operations and the rarity of actual Arctic deployments, it was recommended that the CONOPS establish a structure to preselect units to serve as the AMRF either on a planned or crisis action basis. "A squadron or specific hulls need to be identified for AMRF instead of using the entire fleet as a pool for Arctic response." This smaller pool of units would be the focus for the training and materiel solutions outlined elsewhere in this report. This was recommended as a way to mitigate the risk of Arctic operations. "These deployed assets are self-sufficient for operating in austere, remote environments where potential is much higher for damage to ship's systems and equipment than in normal operating environments. (And you are much farther from help than we have grown accustomed to.)"

For example, in the case of ice navigation, there are specific training requirements and materiel solutions that would need to be implemented for potential Arctic deployers. Instead of spreading these across the fleet, identifying a smaller pool of units would be more cost-effective. In any case, the CONOPS needs to provide detailed guidance to ships operating in various sea ice conditions placing emphasis on ice navigation and the associated risks of operating in sea ice laden waters given current ship designs. The CONOPS should include a comprehensive description of sea ice navigation issues given the fleet's responsibility to "man, train, and equip U.S. Navy ships to navigate around or avoid the ice, or provide an ice breaking capability if we intend to operate in areas constantly covered with ice." Suggested references include the "Canadian Coast Guard web site and search the Ice Navigation Guide. Also look at the Canadian Arctic Waters Pollution Prevention act for guidance on ship/ice operations." Finally, the CONOPS should outline training standards and certification requirements for ice navigation personnel, both resident within the crew or hired for a specific voyage.

Logistics

Arctic infrastructure is austere and extended logistics chains are vital to operating in the Arctic. Due to this, logistics must be planned well in advance. Ports in the region maintain minimal on-hand stores and the long-lead times required to order and deliver fuel or materiel to the region can quickly place a fleet logistics planner in extremis and severely limit the options available to planners and commanders. Additionally, economy of effort is a key to success as whatever forces are operating in the Arctic must be supported from outside.

Logistics operations in the Arctic present several unique scenarios and conditions. The CONOPS should present a strawman logistics plan or an overview of logistics plans for operations in the various regions of the Arctic which should be maintained at the fleet level. As part of this, the

CONOPS should contain an annex that provides a comprehensive listing of Arctic APODs and SPODs with detailed information on each site's capabilities to include the type of available logistic support for U.S. military forces. This annex should also contain information on the preferred lines of communication for each likely operating area in the Arctic. As these lines of communication will be very long, planners must always keep the availability of CLF ships in mind, as they can be a limiting factor. Additionally, the CONOPS should provide planners with enough information to successfully "explore pre-configured logistics packages to support small salvage ships when Combat Logistic Force (CLF) support is not available." Due to the lack of Arctic shore infrastructure and the potential to quickly strain shore side resources, the "knowledge of shore side capabilities is just as important to planning as knowledge of maritime capabilities." Because of the lack of shore infrastructure, the CONOPS should address procedures to pre-position logistics assets in preparation for planned or crisis action deployments. Finally, logistics is an area in the original draft CONOPS document that is characterized by deliberate planning and long planning horizons. This should be modified to address crisis situations more thoroughly. The CONOPS should include crisis action vignettes/scenarios that reflect the difficulty of operating so far from existing logistics hubs in bad weather." Another related issue is that ship husbandry contracts must typically be arranged 6-8 months in advance in order to permit materiel, supplies and fuel to be delivered prior to the ship's arrival. The CONOPS should address this need and explore methods to expedite arrangements for husbandry in the case of a crisis.

Related to this, the issue of Arctic operations requiring long lead times for logistical support coordination and the importance of using PDSS visits for overall coordination was highlighted. There is the potential for circumstances to delay and thus extend timelines associated with crisis and emergent contingencies. It was suggested that PDSS for ports or airfields likely to be utilized in crisis response operations should be regularly visited and their PDSS information updated to reduce delays in deploying into the Arctic. In support of this, a list of military and USCG installations and associated seaport and airfield information needs to be provided in an easy to use reference list that provides basic capability information.

The CONOPS should provide detailed guidance on emergency procedures such as a medical evacuation (MEDEVAC) that requires prior coordination. Guidance is required on emergency medical capabilities and the medical compliment necessary to medically support the force in this remote region. This should include information on embarked medical forces not normally required during International Contingency Operations (ICO) due to Arctic conditions and the need to embark earlier in the operation due to extended distances between operating areas and suitable APODs.

U.S. Navy forces do not normally operate in the Arctic and these units must be supported by equipment pack up kits (PUK) that can be quickly transported to the deploying unit during a crisis response situation. These kits contain PPE and other cold weather support items not

normally carried onboard naval units. The CONOPS should define the composition of the PUKs, the procedures for transferring them to deploying units and the responsible organizations for maintaining them. Players called for a revamping the entire section on materiel concerns associated with clothing requirements (CONOPS pages 31-33) and a comprehensive PPE list with AELs appropriate for Arctic weather conditions. Additionally, the CONOPS should direct fleet logistics planners to work with the Navy Supply System to identify and procure appropriate specialized equipment (see above discussion regarding Pack Up Kits (PUK)). As a last point on this subject, alternative fuel considerations and associated guidance need to be included in the CONOPS. For example, tasks and plans developed during the game had elements that required the use of unleaded gasoline (MOGAS) which is carried in very limited quantities on U.S. Navy ships. U.S. Navy ships may be requested to stow and support various operations that require the use of MOGAS. Similarly, alternative lubricants suitable for cold weather operations may be required and should be identified for possible inclusion in the PUK.

A positive factor for Arctic logistics is the large and increasing industry and exploration presence in the Arctic. Planners should attempt to leverage industry capabilities such as ice hardened designed ships that are already positioned in the Arctic and operated by an experienced workforce. "The most capable and readily available assets may already be in the AOR but are privately owned." The CONOPS should be updated to leverage commercial solutions in areas such as communications, logistics, and specialized vessels such as dive support, salvage, towing, or logistics support. The CONOPS needs to outline an approved procedure or identify the contracting authority to lease ice hardened vessels that are capable of salvage, tug operations, and ice breaking activities. "The most critical update of the CONOPS will be to take the CONOPS from a transient type focus to more of long-term sustained operation focus. This will include thorough examination of the logistics requirements. Additionally, given the Arctic has a vast supply of natural resources a focus should be on our interaction with industry and making sure our equipment/systems can interface with theirs."

Finally, because of the need to self-support logistically, adhere to environmental restrictions, and to retrograde any material brought into the Arctic, it was determined that planners should strive for as small a footprint as possible. Specifically, each operation should be completed with as few ships, aircraft, and personnel as possible. The CONOPS should emphasize that planners must minimize the operational human footprint in order to reduce required logistical support and retrograde requirements while limiting the environmental impact of the operation.

Knowledge and Training

Arctic operations will likely require tailored pre-deployment training and access to in-depth information and analysis on a broad range of topics. These include environmental protection, relations with local and indigenous peoples, operating with coalition partners, fundamental shiphandling, and understanding meteorological conditions.

Some relief to this challenge was proposed by those who described disparate nodes of Arctic expertise and called for the CONOPS to include a catalog of them in support of planning activities. "The CONOPS needs to provide better information concerning already existing Arctic centers of expertise concerning ice and weather forecasting. Secondly the CONOPS needs to provide a better understanding of existing Navy and Coast Guard facilities and Command and Control of other Arctic Nations in order to facilitate planning for Arctic Operations." "Add an Appendix / Annex with resources for key Arctic elements such as the National Ice Center, International Ice Patrol, FNMOC, etc." Players identified that a "Center of Excellence" should be developed to maintain and coordinate all of these relationships, noting that it could be a very small staff element which focused on Arctic relationships, non-Navy capabilities and issues. Were such a "Center of Excellence" to be developed at the Fleet level, its organization and functions should be described in the CONOPS.

There needs to be "clearer guidance to utilize and leverage the U.S. Navy's Lesson Learned database and personnel." The lack of U.S. Navy Arctic corporate knowledge, ice capable assets, and Arctic experience has created a vast knowledge gap which could be closed by the capture of numerous lessons learned in the Navy's Lessons Learned database. The lessons learned must also incorporate "lessons learned from academia, partner nations, industry" and this database "needs to reflect real world experiences in the Arctic environment from a broad group of experts (international, national, and academia.)." These insights should be incorporated into the CONOPS. The CONOPS should direct all levels of command to use the Navy Lessons Learned process to seek out knowledge from the broadly available non-Navy expertise and to feed this knowledge back into the lessons learned system. The CONOPS should also include a mechanism for regular review of lessons learned and revision of the CONOPS itself.

There are numerous Arctic-specific areas where specialized training is needed to support safe, sustained operations. The CONOPS should describe and define crew training standards for ships or aircrew deploying to the Arctic. Because this remains a rare event, these standards would not need to be maintained for all ships, but only for the selected few likely to operate there. This description should include Navy or non-Navy sources for required training in support of both deliberate or crisis action timelines. "The organizations (organic or DOD contracted) providing this training would have the subject matter expertise to prepare units to operate in the Arctic."

In a similar vein to the ice navigation training mentioned in the Movement and Maneuver section of this chapter, a need for U.S. Navy training implementation on ice familiarization and identification training for shipboard personnel was repeatedly identified, METOC detachments, and air surveillance personnel to perform ice recognition, monitoring, identification and prediction duties. The CONOPS should outline non-Navy sources for this expertise in support of crisis response as well as training standards to include guidance on the level of ice navigation training required before operating in the Arctic.

Another specialized skill in support of sustaining Arctic operations is linguistics. It was recommended that the CONOPS clearly define the need for embarked linguist support in the various regions of the Arctic. This section should also specify the languages needed for various regions as well as sources for non-Navy expertise in these fields. An embarked linguistic capability enhances the ability to quickly interact with other Arctic nations or indigenous groups to ensure timely coordination.

Planners and operators supporting Arctic operations need to know a common language. The CONOPS should include a section of terms and definitions associated with the Arctic environment and associated operations to ensure clarity of understanding. An example of a common misunderstanding is the definition of "ice-free" conditions. "It should be clear when and in what conditions the operation is expected to be conducted." Similarly, the CONOPS should have a regularly updated appendix containing links to databases and a listing of publications that supports U.S. Navy units in preparing for and conducting operations in the Arctic environment. If an Arctic "Center of Excellence" were to be established, then this section should be maintained in collaboration with it.

Another useful addition to the CONOPS would be a strawman Arctic ISR plan. This could serve both as the starting point for actual operational plans and as an example to educate planners on the unique aspects of and resources available for Arctic ISR. This plan would support various CONOPS missions such as Maritime Domain Awareness, oil recovery efforts, and HA/DR operations. "The CONOPS should cover in greater detail, a plan to do sustained ISR as a combined effort with international partners. This pertains to collection on ice coverage, changing weather conditions, oil dispersion, etc." The plan should address proper positioning of limited ISR resources and the possibility of combining ISR efforts with international partners using Thule AFB as a coordination node.

Important considerations for planners and operators preparing to send forces into the Arctic are the sensitivities associated with disturbing indigenous wildlife while operating in the Arctic. Wildlife migrations take place at sea, on land, and in the air. Operations in this environment should not normally adversely impact wildlife and the indigenous people who live and depend on these food sources. A comprehensive Arctic marine mammal/wildlife guide of historic hunting grounds as well as contact listings to determine the latest information on the current hunting ground locations is a prerequisite to Arctic operations. Either this information or reliable references which can be used to obtain it should be incorporated into the CONOPS. Arctic deployers must also be prepared to deal with the dangers of indigenous wildlife such as polar bears. Specialized Force Protection training, policy, rules of engagement and procedures to protect forces from this wildlife should be included in the CONOPS. It was suggested that planners coordinate with indigenous populations and First Nation Rangers for local expertise and as a force protection security resource.

A complete understanding of the characteristics of the Arctic environment needs to be available in a CONOPS appendix providing detailed oceanographic information, seasonal ice conditions, and weather data to support extended Arctic operations. This appendix should address the "corresponding assumption of risk as it pertains to intelligence preparation of the environment." This is especially important in terms of operating in the vicinity of Arctic ice. Arctic ice conditions are dynamic and the addition of an ice appendix containing guidance and information such as ship ice rating matrix with associated capabilities, ice navigation information, and procedures for operating in sea ice would provide the necessary resources supporting operations in the Arctic environment. The ice appendix would provide Arctic seasonal information, various types of sea ice characteristics, reference links, and a listing of organizations providing weather forecasting, oceanographic, and hydrographic information. Example organizations include "the National/Navy Ice Center for ice remote sensing and ice charts, and Fleet Numerical Meteorology and Oceanography Center (FNMOC) for numerical weather and ice forecasts."

IV. RECOMMENDATIONS

In focusing on the specific gaps that limit sustained operations in the Arctic region, players sought to identify specific recommendations that USFF should consider when planning or conducting operations in the Arctic. The following recommendations are characterized by their potential for immediate impact at the operational level and the feasibility of near-term implementation. The major DOTMLPF-P actions USFF should develop and implement are: establish USFF Arctic Working Group; update CONOPS and applicable doctrine to reflect game insights; deploy to the Arctic; build domestic and international relationships; develop and manage lessons learned database; and pursue identified areas for further research. These are summarized here with details provided earlier in the report .

Establish USFF Arctic Working Group or Arctic "Center of Excellence"

Develop a permanent working group within USFF to manage and facilitate all maritime planning and operations associated with the Arctic. The core of this group would be a small group with the primary duty of establishing and maintaining a corporate knowledge of Arctic matters. This entity's primary focus would be to create resources to rapidly identify and consult with U.S. and international entities in order to improve operational readiness for U.S. Naval forces and personnel. This would serve as a necessary first step toward establishing a permanent liaison entity with other U.S. and international Arctic stakeholders. Specifically, this entity would be responsible for: coordinating and conducting research projects, workshops and seminars; collaborating with Navy, Joint, interagency, and industry as well as multinational stakeholders at the operational level; integrating lessons learned into applicable doctrine; coordinating with Task Force Climate Change; managing and disseminating all information pertaining to the Arctic at the operational level; tracking U.S. Navy Arctic expertise and experience; and ensuring the Navy is adequately manned, trained and equipped for Arctic operations.

Other roles would include managing networking with indigenous communities in the Arctic and leverage similar efforts performed by USCG District 17, Canada's JTF North, JTF-Alaska or the like. In the case of Arctic deployments or exercises, this group would push fundamental required information to the force and then respond to pull requests as needed, acting as a research support activity for deployed forces. Finally, this group would be responsible for revising the CONOPS. It is recommended that this group serve as the support hub for all U.S. Navy Arctic activities until such time that Arctic deployments or exercises become much more common than they are today.

Update CONOPS to Reflect Game Insights

This should be executed by the Arctic Working Group discussed above and should include all operational level stakeholders (NAVEUR, PACFLT, C3F, C6F) with participation by NORTHCOM, EUCOM and PACOM.

Deploy to the Arctic

During game play, it was repeatedly suggested that "The best way to gain expertise and experience in the region is to deploy forces to the Arctic". Accordingly, USFF should periodically deploy a ship to the Arctic for a sustained period to gather lessons learned and conduct COMREL with indigenous population. Coordination with USCG and multinational forces to conduct refueling and resupply should also be considered during deployment.

Build Relationships

Working to improve cooperation with multinational partners (e.g., Canada, Russia, Demark, Norway and Greenland) in the areas of information sharing, training and platform acquisition should be a priority. This should include efforts to develop bilateral and multilateral agreements with these nations in order to leverage capacities, resources and information. In order to foster long term partnerships with relevant multinational maritime forces and develop operational experience in the Arctic, USFF should position Arctic exchange officers on Canadian, Russian, Norwegian and Danish ships as feasible. Additionally, regular and frequent exercises should also be conducted among Arctic nations' maritime forces in order to explore interoperability challenges and capability deficiencies. Similarly, USFF should spearhead efforts to build relationships within the U.S. Navy (PACFLT, NAVEUR) and across the U.S. government in order to build standing procedures, organizational structures and mutual trust.

Using the Arctic Center of Excellence described above, USFF should develop and maintain a contact list of all domestic (e.g., Navy, joint, interagency, and industry) and international (e.g., all Arctic states' maritime forces and Arctic Council) Arctic. Within each of these respective commands, indicate the commands' roles, responsibilities and capabilities pertaining to Arctic planning and operations.

Develop and Manage Lessons Learned Database

Coordination with Navy, joint, interagency and industry as well as international maritime partners in order to garner specific lessons learned regarding Arctic planning and operations should expand. This should be integrated with other lessons learned using the Navy Lessons Learned Database. Finally, applicable U.S. Navy lessons learned regarding operations in the Arctic should be made available to other domestic and intentional Arctic stakeholders.

Areas for Future Research

This section summarizes various areas for further study that may be useful to Commander, USFF or other Arctic stakeholders through follow-on gaming or other research methods. These insights may be useful to USFF as it seeks to improve the AMRF CONOPS and complete Arctic Road Map tasking. The insights discussed in this report result from an inductive reasoning approach and do not test a conclusive set of hypothetical actions that could be executed in a different context – for instance, in the real world or even in other scenarios. However, the capability gaps, mitigating strategies and proposed solutions developed by experts with a significant understanding of the region and functional areas were broad in nature and are intended only to indirectly inform Navy decisions regarding sustained maritime operations in the Arctic region. This makes follow-on research efforts important to gaining a comprehensive understanding of Arctic maritime operations.

U.S. Navy Doctrine and Strategy

Explore existing U.S. Naval strategy and its applicability to the Arctic region. Players asserted myriad conditions and factors that are unique to the Arctic environment, which in turn, substantially impact relationships, capabilities and information at the operational and tactical levels. Leveraging the CS-21 refresher in 2012 would be an ideal forum to explore, how, if at all, Arctic operations should be integrated for strategic consideration. One player noted, "It may seem a retro move back to the Blue Nose Navy but we do need to update and re-think our old doctrine for the area and then put it into practice in a way that allows us to evaluate and edit as needed. Just jumping to the conclusion that it is 'just colder but still Navy' is not a safe or really effective way to approach this. Everything from cold water deck work to well deck operations, flight ops and engineering must be carefully evaluated against our current state of technology on ships."

Relationships

Explore challenges and proposed collaborative solutions to sharing information (e.g., environmental information) among Arctic nations' maritime forces in order to achieve Maritime Domain Awareness. At a minimum, the *challenges* explored should include legal, policy, cultural, and technical restrictions. Specific efforts in support of proposed *collaborative solutions* should include: cooperative strategies and structures, supporting capabilities in an information sharing system, and the specific information required to support national objectives. Similarly, the integration or "fusion and analysis" of environmental information specific to the Arctic region should also be considered within this research path.

Explore Command, Control, and Communications relationships among U.S. (Navy, Joint, and Interagency) and international maritime partners (e.g., all Arctic states) in the Arctic. These

relationships should be explored under various climatic conditions and seasons, missions or operations (e.g., crisis or scheduled deployment), and geographical locations in the Arctic region. Specific, gaps, seams, overlaps as well as supported and supporting relationships should be also examined. Subsequently, further research should be conducted to explore the characteristics, attributes, and responsibilities as well as the missions and organizational structure of a potential Joint, Interagency Arctic Task Force comprised of U.S. and international stakeholders in the Arctic region (e.g., JIATF North model proposed during gameplay).

Explore the sharing of operational data when coordinating and collaborating among relevant U.S. and international Arctic stakeholders during operations in the Arctic (e.g., both crisis and scheduled deployments). Specifically, examine information sharing processes and "real-time data transfer for rapid access and translation into operational and research products, and structures required to facilitate coordination among stakeholders both at sea and ashore. The sharing of information should be explored through three lenses: pre-operations, during operations, and post-operations.

Explore the integration of information (e.g., lessons learned) pertaining to Arctic operations among relevant stakeholders in order to prepare Navy planners and operators for Arctic operations. Elements of this study should include: operational requirements, categorization of information, impediments to information sharing, and data standardization criteria. Some U.S. based elements that can be leveraged include, Office of Naval Research, Navy Research Lab, USACE Cold Regions Research and Engineering Lab, Naval Post Graduate School, Naval War College, and the Arctic Submarine Lab. More importantly, lessons learned from commercial industry and multinational civilian and military organizations should also be incorporated in this study.

<u>Capabilities</u>

At the unclassified level, explore the capabilities and limitations of all domestic and international Arctic stakeholders in order to establish a baseline understanding of capable and available platforms, systems, and personnel in the region. Capability areas of focus should include national space based assets, operating in high altitude regions, ice breakers and ice hardened vessels, training and logistics facilities, and existing relationships among the local populace and tribal leaders. This study would also specifically generate 'lessons learned' from multinational partners regarding the effects of cold weather conditions on maritime forces' equipment, platforms, and aircraft as well as communication systems.

Based on the reliability and frequency of U.S. Naval forces' in the Arctic, the U.S. Navy should conduct a feasibility study to explore the costs and benefits of platform acquisition. Specifically, compare purchasing or leasing of ice breakers and ice capable vessels from industry

and international partners, hardening existing U.S. Navy vessels (LCACs), and developing a new 'futuristic' ship designed to meet emerging requirements in the region.

Science & Technology

Explore alternative ways to employ capabilities (e.g., Maritime Domain Awareness, Maritime Security and HADR) in the Arctic through the development and application of technological solutions (satellites, sensors, etc.) vice a "Man on the Ice." More specifically, explore the use of "sensors and sensor systems to improve observational programs, including the use of UUVs, UAVs, acoustic navigation and communications."

Logistics

***Explore new and innovative ways to conduct resupply and refueling in the Arctic*.** Focus on finding a reliable, cost efficient and effective fuel source through domestic or international channels in order to refuel U.S. navy vessels during transit in the Arctic region. Specific areas of research should include viable and reliable options for refueling and replenishment at sea, as well as the use or development of shore infrastructure. "The U.S. Navy should leverage existing DoD research initiatives that explore expeditionary power and logistics (including waste management) in the Arctic."

Environment

Explore new processes, relationships, and systems to improving weather and ice forecast modeling in the Arctic region. Specific areas of further research should include factors and processes that drive the retreat of the sea ice cover, atmospheric circulation, wildlife patterns, surface radiation balance, ocean circulation and mixing, and waves and swell in ice. "Having a better understanding of the myriad environmental considerations that impact operations (e.g., indigenous hunting grounds and marine mammals (noise, migratory patterns) in the Arctic will better prepare U.S. Navy planners and operators." Collaboration with U.S. and international civilian universities, industry, and government organizations was highly encouraged.

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