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DEFENSE ANALYSIS CAPSTONE REPORT

ARCTIC COOPERATION AND COMPETITION AS PROFESSIONAL MILITARY EDUCATION

by

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December 2023

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As climate change continues to affect the Arctic throughout the 21st century, the region will become increasingly accessible to nation-states for trans-continental commerce, extraction of natural resources, and scientific research. State actors will accordingly expand their security presence in northern latitudes to protect these interests and engage in geostrategic cooperation and competition. Such Arctic-specific concerns are not currently emphasized in Professional Military Education (PME), which disproportionately focuses on ongoing or anticipated conflicts in the Middle East, Europe, and Asia. This capstone project will increase awareness of these strategic concepts as they pertain to the unique operating environment of the Arctic, drawing heavily on the Diplomatic, Informational, Military, and Economic (DIME) model of the instruments of national power. Specifically, this project used tenets of adult learning and serious gaming to produce a board game for inclusion in mid- to-senior level PME for U.S. military personnel and their contemporaries in allied and partner nations. This capstone serves as a framework to translate this game into a cost-effective and accessible web browser–hosted game for the Naval Postgraduate School's Global Education Community Collaboration Online (Global-ECCO) game library.

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ARCTIC COOPERATION AND COMPETITION AS PROFESSIONAL MILITARY EDUCATION

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ABSTRACT

As climate change continues to affect the Arctic throughout the 21st century, the region will become increasingly accessible to nation-states for trans-continental commerce, extraction of natural resources, and scientific research. State actors will accordingly expand their security presence in northern latitudes to protect these interests and engage in geostrategic cooperation and competition. Such Arctic-specific concerns are not currently emphasized in Professional Military Education (PME), which disproportionately focuses on ongoing or anticipated conflicts in the Middle East, Europe, and Asia. This capstone project will increase awareness of these strategic concepts as they pertain to the unique operating environment of the Arctic, drawing heavily on the Diplomatic, Informational, Military, and Economic (DIME) model of the instruments of national power. Specifically, this project used tenets of adult learning and serious gaming to produce a board game for inclusion in mid- to-senior level PME for U.S. military personnel and their contemporaries in allied and partner nations. This capstone serves as a framework to translate this game into a cost-effective and accessible web browser–hosted game for the Naval Postgraduate School's Global Education Community Collaboration Online (Global-ECCO) game library.

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LIST OF ACRONYMS AND ABBREVIATIONS

AC	Arctic Council
ACHOD	Arctic Chiefs of Defense
ACR	armed conflict risk
ASFR	Arctic Security Forces Roundtable
DIME	diplomatic, informational, military, and economic
ER	environmental risk
EUCOM	United States European Command
GDP	gross domestic product
Global-ECCO	global education community collaboration online
GPC	great power competition
NATO	North Atlantic Treaty Organization
NSR	Northern Sea Route
PME	professional military education
PRC	People's Republic of China
SAR	search and rescue
SME	subject matter expert
TA	target audience
UNCLOS	United Nations Convention on the Law of the Sea
VP	victory point

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EXECUTIVE SUMMARY

The Arctic is rapidly warming, changing many nations' impenetrable Northern borders into open arenas for strategic cooperation and competition. These nations have reoriented their national strategies to capitalize on the emerging region, yet Joint Force professional military education lacks tools to effectively prepare future decisionmakers on critical Arctic topics. This capstone has developed an interactive, table-top wargame that significantly increases Arctic knowledge, is immediately deployable, and can be transitioned to a digital format, increasing access to learning for U.S. and partner forces. Quantitative survey data suggests a 61% increase from baseline scores of the intended target audience's understanding of Arctic geopolitics after participating in the wargame.

Background: Dynamic environmental conditions in the Arctic will offer opportunities and challenges for Great Power Competition as sea ice melts and maritime trafficability increases throughout the 21st century. Current professional military education across all service components lacks emphasis on these emergent, region-specific strategic considerations. Educating the joint force about Arctic geopolitical cooperation and competition is becoming more important as partners and adversaries reorient their national strategies to focus on this previously inaccessible region. This education will be important for developing Arctic strategy and policies, and garnering support for investment in technology, infrastructure, military, and commercial capabilities. This wargame is an introductory classroom tool designed to familiarize middle-to-senior level military professionals in the U.S. and allied/partner forces with region-specific concepts that will impact Arctic geopolitics in the mid-21st century.

Learning Objectives: The wargame is scoped to address the following learning objectives at the strategic level of war. Upon completion of the wargame, players will be able to:

- Recall the Arctic and near-Arctic nation-states, understand those actors shared and unique strategic objectives within the Arctic, and apply that knowledge to discussions of future strategic problems in the region.

- Forecast how nation-states might pursue competitive or cooperative actions to further their respective strategic goals in the region and assess how actors can leverage the instruments of national power to achieve their objectives.
- Explain the implications of Arctic climate change for various national strategies, including changes in the accessibility of natural resources, Sea Lines of Communication, and how technological advancements and industrial capacity investment will generate competitive advantages.

Findings: Over fifty individuals play-tested the wargame to assess the efficacy of the learning objectives and data from thirty players were captured in pre-and-post wargame surveys for quantitative analysis. Players were recruited from a wide variety of backgrounds—ranging in rank from Cadets to Field Grade Officers and in Arctic familiarity from strategy novices to experienced subject matter experts (SMEs). Analysis of survey data indicates that the wargame produced a significant increase in knowledge of Arctic geopolitics within the intended target audience, the non-Arctic SME demographic. Median values of Likert-scale survey responses indicate that this group demonstrated an increase in self-professed knowledge of Arctic geopolitics from 4.5 / 10 to 7.25 / 10 after participating in the wargame, a 61% increase. While the Arctic SME testing group unsurprisingly demonstrated only a marginal increase in self-reported knowledge of Arctic geopolitics in post-game surveys, their qualitative feedback validated that the wargame learning objectives are appropriately scoped for the intended target audience and that participating in the wargame successfully accomplished those objectives. Overall, the 90-minute wargame achieves all learning objectives, is reportedly enjoyable to play, and can be produced and disseminated for integration into professional military education in its current physical form or in a future digital medium for easier dissemination.

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I. LITERATURE REVIEW

A. INTRODUCTION

Globalization has enhanced the speed and scale of intergovernmental interactions and shaped the Great Power Competition (GPC) environment of the 21st century. Until recently, this trend has largely bypassed the Arctic region due to its inaccessibility. Advancing climate change is now reshaping the physical topography of the Arctic, opening sea routes, and allowing access to vast potential mineral wealth. As increased trafficability offers nations and businesses new opportunities and challenges in this hitherto ignored region, GPC will inevitably follow. Most military service members are unfamiliar with this rapidly changing area of operations. It is therefore necessary to develop training tools to familiarize them with strategic Arctic concepts. Producing a wargame to educate a joint U.S. and international military audience on these region-specific issues will address this knowledge gap. An educational wargame is one method to accomplish this. It will draw on best practices from serious gaming and apply them to exposing players to current Arctic geopolitical and security issues. Specifically, it will capture applicable information on current Arctic security, political, and economic considerations to be refined into game learning objectives.

B. GAMES FOR ADULT LEARNING

Modern serious gaming traces its roots to Clark C. Abt's seminal work, *Serious Games,* which describes the uses and benefits of games and simulations in a learning environment.[1] In this work, defines the genre, as games "played seriously or casually" that "have an explicit and carefully thought-out educational purpose and are not intended to be played primarily for amusement. This does not mean that serious games are not, or should not be, entertaining."[2] Abt went on to design several computer games including T.E.M.P.R., which aided military officers in studying the Cold War and conflict on a

[1] Clark C. Abt, *Serious Games (*New York: Viking Press, 1987), 9.

[2] Clark C. Abt, *Serious Games*.

global scale.[3] Abt's work focused primarily on using games to aid learning within a population type and demonstrating an improved understanding of a topic through testing. For example, how a game might help an underperforming school-age child succeed or a military officer better understand complex geopolitics. Abt provides evidence for increased learning performance by collecting data on how individuals improved their knowledge base before and after participating in educational gaming. While he dove into learning objectives, there is little discussion on game mechanics or game development best practices.

Since Abt's foundational work, board gaming, video gaming, and simulation technology have undergone a renaissance, bringing board games, video gaming consoles, and computers to living rooms and classrooms worldwide. Due to the boom in game proliferation, established game mechanics and design best practices are readily available. Modern game design mechanics and thematic learning objective accomplishment are paramount to designing a video game on arctic cooperation and competition.

Every game requires mechanics or rules in which the player interacts with the game and other players. Michael Moore's book, *Basics of Game Design* is a primer on elements of game design, how mechanics work, and basic application.[4] Moore's work offers invaluable insights for defining and making sense of complex topics but lacks depth in applying creativity to game design. To understand more about game mechanics, Adams and Dorman's book, *Game Mechanics: Advanced Game Design*, is a nuts-and-bolts publication describing foundational game design concepts.[5] This work focuses on a game as a system, ways to manipulate the system through level progression, in-game economies, and meaningful mechanics to culminate in a balanced and enjoyable game. While Adams and Dorman excel at explaining game mechanics in-depth, their work lacks

[3] Damien Djaouti et al., "Origins of Serious Games," in *Serious Games and Edutainment Applications*, ed. Minhua Ma, Andreas Oikonomou, and Lakhmi C. Jain (London: Springer London, 2011), 25–43, https://doi.org/10.1007/978-1-4471-2161-9_3.

[4] Michael E. Moore, *Basics of Game Design* (Boca Raton, FL: CRC Press, 2016).

[5] Ernest Adams and Joris Dormans, *Game Mechanics: Advanced Game Design* (Berkeley, CA: New Riders, 2012).

depth in adequately framing the entire game as a comprehensive system. These texts influenced the in-game economy, asymmetric balancing, and inclusion of randomness.

Transforming a complex and nuanced geopolitical reality into a serious game requires holistically understanding the system and then defining boundaries. Michael Seller's book, *Advanced Game Design: A Systems Approach*, takes a similar approach to Adams and Dormans but uses a systems dynamics lens rather than a mechanistic approach.[6] This whole-of-system design approach starts with large thematic ideas and then drills down to mechanics to execute the game design. The goal of both books is to shepherd the reader through game-making, although the core thinking of each work differs greatly. Adams' and Dormans' approach of using mechanics as the primary driver of a game differs significantly from Seller's proposition that larger themes will drive mechanics. While both books offer different perspectives on the same topic, they each provided valuable insights which informed the wargame design process.

An educational game, at its core, uses game design to convey learning objectives and maximize retention. *Serious Games: Foundations, Concepts and Practice* focuses on how to ensure games adequately capture learning objectives.[7] This work also describes the importance of the duration of play on retention, evaluation of learning objectives, and economic and legal issues that are unique to serious gaming. This work was key in designing duration controls, learning objective focus, and pre-game and post-game screening techniques to evaluate player experience.

C. ARCTIC COMPETITION: ECONOMIC IMPLICATIONS

As climate change continues to melt Arctic Sea ice and the region becomes more trafficable, nations will increasingly seek to capitalize on this previously inaccessible area for economic gains. Current conditions make Arctic transits costly, dangerous, and feasible only during a narrow summer window, although this annual period is gradually expanding. Scientific projections suggest the predominantly Russian-controlled Northern

[6] Michael Sellers, *Advanced Game Design: A Systems Approach* (Indianapolis, IN: Pearson Education, Inc., 2018).

[7] Ralf Dörner et al., *Serious Games: Foundations, Concepts and Practice* (New York, NY: Springer International Publish, 2016), https://doi.org/10.1007/978-3-319-40612-1.

Sea Route (NSR) will be free of ice throughout the year as early as 2050, except for drifting icebergs that will continue to fracture from northern latitude ice packs.[8] Commercial shipping will therefore still require significant investment in hardening ship hulls for ice impacts and relying on ice breaker escorts for the next few decades. Numerous other challenges complicate Arctic shipping, including frequently dense fog, maintaining situational awareness of highly dynamic ice movements, limited communications and navigation infrastructure, and higher risk and response times for crises, such as industrial oil spills, and coordinating search and rescue (SAR) operations.[9]

In addition to potentially shorter transcontinental shipping routes, economic interests in the Arctic include significant fish stocks and access to as-of-yet unidentified oil, gas, and mineral deposits.[10] According to a Congressional report on the Arctic, "Diminishing sea ice probably will increase access to shipping routes that can reduce trade times between Europe and Asia by about 40 percent for some vessels. In addition, onshore oil and natural gas deposits, as well as an estimated $1 trillion worth of precious metals and minerals will become more available."[11]

Great power competition is already driving nations to vie for influence in the Arctic. China has branded itself a "near-Arctic state" and published a white paper advocating that trans-Arctic commercial routes are a "Polar Silk Road" and a critical component of in its belt-and-road initiative.[12] Russia is actively encouraging other nations to use the NSR for commercial shipping to profit economically with "icebreaker escorts, refueling posts, and [resupply operations]."[13] It is reasonable to surmise that greater foreign use of the NSR and investment in Arctic-capable shipping fleets will

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[8] Arthur MacDougall, "American Challenges in the Arctic," (lecture, Joint C4I/Cyber Staff and Integration Course, Joint Forces Staff College, Norfolk, VA, 01–05 November 2021).

[9] MacDougall, "American Challenges in the Arctic."

[10] Ronald O'Rourke, *Changes in the Arctic: Background and issues for Congress.* CRS Report No. R41153 (Washington, DC: Congressional Research Service, 2023), Executive Summary, https://sgp.fas.org/crs/misc/R41153.pdf

[11] O'Rourke, 20–21.

[12] O'Rourke, 35.

[13] O'Rourke, 41.

increase international dependency on Russian cooperation and provide its government another lever of manipulation, vis-a-vis the Nordstream gas pipelines and Europe.

Aspects of the wargame are designed to familiarize the target audience with the economic implications described above. As the wargame is scoped to the strategic level, many of these concepts are necessarily conveyed in simplified, abstract ways. National resources are collectively a broad, nondescript concept, representing aggregate profits from hydrocarbons, fishing, and extraction of minerals and precious metals. To convey the inherent difficulties in harvesting natural resources in the Arctic, players need to balance exploring resource fields and developing extraction infrastructure with other competing priorities. Familiarization with trans-Arctic maritime trade is a core learning component of the wargame and is reinforced with a temporal mechanic, which demonstrates to players how trade routes will shift over time in response to diminishing polar ice. The geographically accurate map also exposes players to international law concepts about resource extraction in Economic Exclusion Zones and international waters.

D. ARCTIC COMPETITION: DIPLOMACY

Diplomatic power over Arctic territories is a complex issue. The dominant intergovernmental body that governs Arctic issues is the Arctic Council (AC), comprised of eight Arctic States—Finland, Sweden, Iceland, the United States, Canada, Russia, Norway, and Denmark (via its self-governing territorial possession, Greenland). The latter five nations are occasionally referred to as "Arctic coastal states" because they share mainland coastal areas north of the Arctic Circle.[14] The eight-member AC was founded in 1996 as a diplomatic forum for discussing Arctic issues, however, it was established via a joint declaration and is therefore not a treaty organization. Per its charter, the AC relies on unanimous consensus to approve transnational Arctic policies, but lacks any enforcement capacity, instead relying on individual nations to self-enforce negotiated agreements.[15] From 2011–2017, the Arctic Council produced three legal

[14] O'Rourke, 5.

[15] O'Rourke, 10–11, 23.

agreements addressing the following issues: "cooperation on aeronautical and maritime SAR, … marine oil pollution preparedness and response, … and Arctic [international] scientific cooperation."[16] The AC founding charter, the Ottawa Declaration, explicitly precludes the organization from negotiating military security issues.[17]

Diplomatic tensions have escalated in recent years, particularly in response to the 2022 Russian invasion of Ukraine; such disagreements are only likely to increase in frequency and scope as the Arctic becomes more accessible in the coming decades. In February 2020, diplomatic conflict between Moscow and Oslo saw Russia attempting to limit Norwegian access to their Svalbard archipelago, which was previously protected under the 1920 Svalbard Treaty. Russia has concurrently increased its military presence around Svalbard.[18] In response to Russia's invasion of Ukraine, the other seven permanent members of the Arctic Council issued a joint statement announcing that they would temporarily suspend participation in council meetings and those of its subsidiary bodies. This boycott coincides with Russia's chairmanship position of the AC, which commenced in May 2021 and rotates between member states every two years.[19]

Indicative of its ambitions for hegemony over the Arctic, Moscow claims parts of the NSR as "internal waters" in violation of international law, thus justifying the Russian position that it can legally regulate any commercial shipping traversing them; the United States considers those contested areas to be international waters.[20] The Russian Duma is currently considering a 2022 legislative proposition, which would require any foreign warship to seek approval from Moscow 90 days prior to any transit of the NSR. This would effectively solidify Russian control over all ship traffic through parts of the NSR, including denying access to commercial vessels. This proposal would arguably violate

[16] O'Rourke, 11.

[17] O'Rourke, 23.

[18] O'Rourke, 27–28.

[19] O'Rourke, 29.

[20] O'Rourke, 27–28.

the UNCLOS provision for innocent passage and establish a Russian monopoly over trans-Arctic shipping paralleling its coast.[21]

Wargame mechanics are designed to familiarize players with the above political considerations. The open dialogue nature of the scenario allows for players to collaborate for mutual benefit or to choose more isolationist policies. The action choices available to players are designed to tacitly incentivize cooperation between the North American and Nordic States factions, allowing for tabletop discussions on the political benefits and costs of NATO countries' security cooperation in the Arctic.

E. ARCTIC COMPETITION: MILITARY CONSIDERATIONS

Recent Russian investment in the Arctic and PRC dual-use scientific research foreshadow the likely increasing competition that the United States, its allies, and partners will face in the Arctic region.[22] Since 2008, Russia has incrementally enhanced its military presence and capabilities in the Arctic. It has constructed new ports and dual-use, civilian/military SAR facilities, reactivated Cold War-era military bases, allocated and modernized forces to those facilities, and conducted military training exercises in the region.[23]

The United States European Command (EUCOM) maintains a near-persistent joint force presence in the Arctic to demonstrate capabilities and commitment to intergovernmental security cooperation. The 2022 EUCOM posture statement to the U.S. Senate implies that it will gradually increase its presence in the Arctic, in proportion to changing regional trafficability, to facilitate its goals of maintaining strategic deterrence and guaranteeing a free and open region per international norms.[24] The U.S. Navy has

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[21] Jan Jakub Solski, "In the Fog of War: Russia Raises Stakes on the Russian Arctic Straits." The Arctic Institute – Center for Circumpolar Security Studies, last modified September 22, 2022, https://www.thearcticinstitute.org/fog-war-russia-raises-stakes-russian-arctic-straits/.

[22] Biden, Joseph, *National Security Strategy of the United States of America*. (Washington, DC: White House, 2022), 44, https://www.whitehouse.gov/wp-content/uploads/2022/10/Biden-Harris-Administrations-National-Security-Strategy-10.2022.pdf.

[23] O'Rourke, 25.

[24] Wolters, Tod D. United States European Command Posture Statement to the Senate Armed Services Committee (March 2022).

recently increased surface and sub-surface deployments to the Arctic for training and operations, however, it currently does not interpret an immediate need to invest in ice-hardened surface ships.[25] The U.S. Coast Guard conducts annual deployments of an icebreaker, cutters, and aircraft into the region for training and presence; both USCG and USN currently possess limited infrastructure in the Arctic to facilitate extended operations.[26]

The United States has endeavored to strengthen Arctic security cooperation with allies and partners, predominantly through the two intergovernmental organizations focused on military security cooperation in the region: "The Arctic Security Forces Roundtable (ASFR) and the Arctic Chiefs of Defense (ACHOD) Forum."[27] In 2018, NATO conducted a joint military exercise called *Trident Juncture 18*; it took place in the Baltic and Norwegian Seas and was the first instance that a U.S. aircraft carrier operated north of the Arctic Circle since 1991. Twenty-seven countries participated in a similar NATO exercise in 2022, *Cold Response*.[28] In 2021, the United States and Norway renegotiated the Supplementary Defense Cooperation Agreement, which emphasizes security cooperation centered around four Norwegian military installations.[29]

[25] O'Rourke, 47.

[26] O'Rourke, 47–48.

[27] O'Rourke, 23.

[28] O'Rourke, 46–47.

[29] O'Rourke, 49.

II. PROBLEM STATEMENT

While the majority of mid-career and senior military leaders have extensive experience operating in and studying foreign policy concepts in European, Asian, and Middle Eastern theaters, professional military education broadly lacks emphasis on emergent Arctic threats. As regional factors continue to change, prompting increasing international presence and competition in the Arctic Circle, such academic focus will necessarily become more important. How can a wargame address this gap?

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III. CAPSTONE OBJECTIVE

Our capstone project is an educational wargame to address a current gap in mid-to-senior level professional military education about geopolitical cooperation and competition in the Arctic. Given the region's dynamic conditions, increasing international focus across the spectrum of governments, and the prolonged time scale that investments in technology, infrastructure, and military and commercial capabilities will require to manifest returns, awareness of this niche field of Great Power Competition (GPC) is critical for future policy successes. This wargame is intended as a classroom tool to educate the target audience (TA), comprised of middle-to-senior level military professionals in the U.S. and allied/partner forces, on region-specific grand strategy concepts that will likely influence intergovernmental competition and cooperation in the Arctic in the mid-21st century.

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IV. WARGAME DEVELOPMENT

A. LEARNING OBJECTIVES

This capstone is scoped to address the following learning objectives at the strategic level of war. Upon completion of the wargame, players will be able to:

Recall the Arctic and near-Arctic nation-states, **understand** those actors' shared and unique strategic objectives within the Arctic, and **apply** that knowledge to discussions of future strategic problems in the region.

Forecast how nation-states might pursue competitive or cooperative actions to further their respective strategic goals in the region and **assess** how actors can leverage the instruments of national power to achieve their objectives.

Explain the implications of Arctic climate change for various national strategies, including changes in the accessibility of natural resources, Sea Lines of Communication, and how technological advancements and industrial capacity investment will generate competitive advantages.

B. INITIAL DESIGN ASSUMPTIONS

Primary sources for game data are derived from subject matter experts, national strategy documents, scholarly articles, strategic analysis publications, and symposia to capture the most current and relevant concepts to support the desired learning objectives.

The target audience has a nominal military education with at least broad familiarity with the instruments of national power, current world events, elements of geopolitics, and world geography.

While the final target audience includes international partners, the final product will be in English.

The game only conveys events below the threshold of conflict at the strategic level of inter-governmental cooperation and competition.

C. DEVELOPMENT LIMITATIONS.

The Arctic is a dynamic and rapidly changing region and intergovernmental interactions in the Arctic are subject to many unique geopolitical factors. This educational game cannot possibly capture every aspect or holistically model the incalculable number of variables pertinent to regional geopolitics. As such, the game is necessarily scoped to simplify several core concepts. The emphasis on the strategic level of intergovernmental actions requires abstract representations of numerous complex and interrelated systems. The information used to inform the design of this game was attained exclusively from open-source, unclassified resources, and subject matter experts.

D. DEVELOPMENT PROCESS

This capstone project required dozens of iterative playtesting cycles. Each cycle involved assessing a playthrough to identify design problems and gauge the effectiveness of the wargame to convey learning objectives. Whenever the designers identified a flaw, they collaborated on tentative solutions, made systematic adjustments to game elements, re-tested the game to validate or discard any change in game design, and continued troubleshooting to further refine the mechanics. Over ten weeks from April through June of 2023, in-depth testing on sixteen distinct days produced a nearly finished wargame version. Subsequent changes were comparably minor and pertained mostly to in-game balancing to ensure the asymmetric nature of the game did not lend an unfair advantage to any player faction. A record of those meetings between the capstone designers is included as an attachment (Appendix H).

Early design changes tended to focus more on scoping macro-level problems, such as the quantity and types of player actions to sufficiently meet the desired learning objectives, in addition to refining game mechanics. Later iterations of playtesting focused primarily on economy and action balancing to make the asymmetric nature of each faction work fluidly without having any one faction disproportionately overpowered. There have been dozens of iterative improvements to the player mats, tokens, asset blocks, and game maps. These cumulative refinements to scope, learning objectives, player actions, gaming mechanics, and economy balancing have all been positively

informed by repetitive play testing. Iterative playtest data was captured in two tracking tools to validate the addition of new game mechanics and to optimize economic costs and rewards for player actions (Appendices K and L).

Multiple volunteers participated in playtesting over six months from April through September 2023. Many of these tests were informal play-throughs with the designers' friends and family members and were frequently conducted to get a fresh, third-party perspective on a particular new game mechanic that was being evaluated. As a result, it was infeasible to formally document the specific outcomes and participants of all testing events. However, we created a record of the majority of playtests by reviewing personal SMS text messages and emails, accounting for 45 individual participants, with several of those volunteers assisting with multiple testing iterations. The actual number of people who played the wargame and provided feedback is estimated to be between 55 and 65.

Play-testers were recruited from a wide variety of backgrounds, but individuals with military experience and/or familiarity with serious gaming and game design were prioritized as testing candidates. Of the 45 play-testers whose participation was documented, 17 of them were subject matter experts with professional experience working in national security, foreign affairs, Arctic strategy development, military doctrine, military intelligence, or game design. 30 play-testers completed pre-game and post-game surveys, which provided qualitative and quantitative data.

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V. WARGAME ELEMENTS

A. SCENARIO

The year is 2030. Climate change has produced increasingly dynamic polar ice conditions, resulting in unprecedented opportunities and challenges as nation-states bring Great Power Competition to Earth's final frontier. As the 21st century progresses through 2050, how will you leverage the Elements of National Power to meet your national strategy objectives in this previously uncontested region?

B. PLAYER ROLE LIST

Players act as one of four factions, including the Nordic States (comprising Norway, Sweden, Finland, Iceland, and Denmark), North America (including the United States and Canada), the Russian Federation, and the People's Republic of China. As this wargame focuses on the strategic level, individual player roles are simplified to act as the collective heads of state and policy-making institutions of each nation or groups of nations.

C. PLAYER IN-GAME STRATEGIC OBJECTIVES

Common Faction Objectives: Explore natural resource areas and build resource extraction infrastructure, increase regional influence through Economic Exclusion Zone extension votes in the U.N. or via gaining party membership to the Arctic Council, develop shipping infrastructure to capitalize on new commercial sea lines of communication, develop technology to increase operational capacity in harsh Arctic environments, enhance and deploy military capabilities to secure faction-specific interests in the region.

Nordic States Specific Objective: Develop and promote green technology to slow the rate of climate change, which disproportionately affects Nordic countries.

North America Specific Objective: Maintain an international rules-based order and ensure universal freedom of navigation in international waters.

Russian Federation Specific Objective: Capitalize on geographic proximity to the increasingly open Northern Sea Route to exert control over trans-Arctic shipping through the Russian EEZ.

People's Republic of China Specific Objective: Increase presence in the region to compete on a peer basis with established Arctic Nations for economic and military influence in the region.

D. TIME AND SPACE REPRESENTATIONS

Given the strategic-level focus of this wargame, each round of play will represent two years of real-time. This is intended to depict the extensive timelines for implementing national security, diplomacy, and economic policies and for those initiatives to manifest results. As game iterations typically last between six to eight total rounds, the wargame therefore represents time starting at the year 2030 and extending through the 2042–2046 range. Space is represented in a macro-level, geographically faithful, regionally focused map board.[30] [31] (Appendix C) This map shows most of the Arctic Circle in detail, accurately portraying Sea Lines of Communication, Economic Exclusion Zones, and coastal areas. The polar ice cap, individual shipping routes, resource fields for economic infrastructure investment, and ports are all represented in simplified, abstract ways.

E. AVAILABLE RESOURCES AND ASSETS

Game board tokens symbolize viable resource fields for players to exploit; these represent the estimated trillions of dollars in Arctic hydrocarbons, precious metals, minerals, and fishing industries. Players can create commercial ships, military ships, resource rigs, and technology, all of which are represented as color-coded wooden blocks with symbols. For gameplay terminology purposes, the two types of ships and resource rigs are referred to as assets. These assets and the smaller technology blocks all represent

[30] *ArcticDEM Cartographic Version Map,* University of Minnesota, accessed July 13, 2023. https://data.pgc.umn.edu/maps/arctic/pgc/21/preview/ArcticDEM%20Map%20Poster%20Cartographic.jpg

[31] *China Map: China Shaded Relief,* Hammad Khan, accessed July 13, 2023. https://www.vecteezy.com/photo/9556094-china-map-china-flag-shaded-relief-color-height-map-on-white-background-3d-illustration.

simplified ways to visualize highly complex and abstract systems; they are therefore not intended to represent individual assets, but rather extensive investments in national capabilities and policies over time. Players purchase assets from their individual player mats and place them on the map board. Once purchased and deployed, assets either generate resources to fuel player economies and/or enable players to take certain actions that affect other players or satisfy conditions for attaining victory points. The graphics for the player mats (Appendix D) and game tokens and assets (Appendix E) are attached.

F. IN-GAME PLAYER ECONOMIES

Players need to balance resource tokens, diplomacy tokens, and a variable action economy. Resource tokens represent the cumulative value of players' spending and labor on Arctic initiatives. Players can generate additional resources by investing in trans-Arctic commercial shipping, through in-game conversions of diplomacy tokens at faction-specific exchange rates, and investment in Arctic economic Resource Rigs, which symbolize the infrastructure and personnel required to extract hydrocarbons, marine life, and precious metals for financial gain. Out of a need to simplify complex systems of various nations' private-public partnership dynamics, this economic system is similar for all players.

The key distinctions between faction economies are the number of shipping lanes and natural resource fields available to each player and their respective base Resource Token generation, which they receive at the start of each turn. Base Resource Token values are loosely tied to the real-world relative GDPs of each faction, although for balancing purposes these in-game economic benefits for richer countries, e.g., North America and the PRC, were handicapped. This intentional skewing of economic potential for Arctic initiatives further reflects competing national priorities for funds and domestic political support for Arctic policies. Countries that are arguably more dependent on the Arctic, such as the Nordic States and Russia, are therefore allowed to spend disproportionately more of their respective GDPs on Arctic development. In contrast, North America and the PRC can spend a smaller proportional amount of their GDPs on Arctic ambitions, as their policy initiatives are tacitly split between other globally

spanning agendas and higher domestic spending demands on their comparably larger populations.

Each faction has a unique technology tree, which players can choose to invest in to decrease Resource Token costs for certain actions. This technology mechanism conveys the present-day prohibitive costs of operating ships and building infrastructure in the harsh Arctic environment, which up to now has largely disincentivized extensive public or private sector investment in technology or industrial capacity to produce Arctic-capable facilities and vessels at scale. The PRC player's "Fast Follower" technology represents the potential costs and benefits of intellectual property theft of emergent technologies.

G. INFORMATION SYSTEMS

The wargame is designed in a mixed information format with a shared map board. Players can immediately observe other player actions that directly affect the region, e.g., the placement of additional assets on the game board. Prior to game initiation, players are familiarized with the capabilities and objectives of other players, however, they are discouraged from directly viewing other player mats. Players are encouraged to conduct "table talk" and form non-binding agreements of future foreign policy actions. Such dialogue and willingness to share information (or lack thereof) is intended to reflect the nuances and uncertainty of geopolitics.

H. PLAYER FEEDBACK METRICS

1. Map Board Variables

The wargame models three open-information style variable metrics, visible to all players. These are the overall Armed Conflict Risk level (ACR), the Environmental Risk level (ER), and player Victory Points (VP). Various player actions or inactions affect these metrics in different ways, as indicated on individual player mats and occasionally subject to adjudication by dice rolls. The ACR impacts each player's action economy; its level increases when players choose to pursue more aggressive, competitive actions, and represents the probability of armed conflict erupting over perceived hostile acts. As the

ACR increases into higher tiers, potential negative consequences of subsequent aggressive actions increase, representing the potential of brinkmanship to produce cascading effects between nation-states. At the highest tier, the ACR will limit the number of actions that a player can take on each turn from three to two, which is intended to reflect how elevated intergovernmental tensions can decrease geopolitical maneuver options, as heads of state seek to avoid inadvertently starting a war through policy missteps. If the ACR reaches its maximum level, it symbolizes the transition from Great Power Competition and grey zone activities to a state of open warfare, in which case all players lose the game. To avoid this, each player has at least one option to de-escalate tensions and lower the ACR by making a policy concession or pursuing actions that represent the *entanglement* concept of strategic deterrence theory.

The ER conveys to the TA increased risks from climate change, which is associated in-game with negative impacts on Arctic shipping, economic infrastructure, and military readiness. The ER will increase at a set rate on each round. While players can accelerate the rate at which the ER increases each round by building economic infrastructure that contributes to climate change, they cannot decrease the ER change below the base rate increase per round. As the ER reaches increasingly higher tiers, the dice roll probabilities that adjudicate negative impacts from environmental crises adjust to become more devastating. This mechanism is intended to convey to players the dichotomy of nation-states benefiting from short-term economic gains at the cost of long-term environmental repercussions.

Players win by being the first to achieve 10 VP. This mechanism is an abstract representation of how governments can achieve their respective national strategy goals in the region ahead of their competitors. VP can be earned in various ways, symbolizing various strategic objectives in the Arctic. All players will benefit from common ways to earn VP, such as developing technology to increase Arctic operating capacity, establishing a greater military presence in the region, or creating economic infrastructure. Other mechanisms for VP are more tailored to specific national priorities, such as pursuing environmentally friendly green technology for the Nordic States or promoting Freedom of Navigation along trans-Arctic shipping routes for North America.

2. Cards and Dice Roll Adjudications

The primary means of adjudicating the results of player interactions is via dice rolls—either in the form of two players rolling against each other for a higher score or a player rolling individually to determine the success of a chosen action. Different actions are assigned distinct dice roll conditions and those probabilities are visible on individual player mats and cards. Certain player interactions are guaranteed to be successful. Other interactions range in complexity from the relatively simple written description that a player "must tie or roll higher than the player whom you are acting against for success" to the most complex "if you lose the dice roll against another player, choose two of their assets to be disrupted (42% probability), if you tie or win by one disrupt three assets (30% probability), and if you win by two or more disrupt four assets (28% probability)."

Some probabilities shift throughout the game based on the overall Armed Conflict Risk and Environmental Risk levels, which are affected by aggregate player actions. These variable factors impact players when they take certain actions or, by chance, during the end-of-round World Turn. These instances of consequence feedback are adjudicated by drawing two types of cards; "Conflict Cards" are drawn whenever a player takes an aggressive action and an "Environmental Effect Card" is drawn at the conclusion of every round during the "World Turn." These scalable probability models are designed to reflect the second-order effects of earlier player actions, resulting in either lower or higher relative costs in subsequent rounds.

In addition to dice-roll adjudication, other player feedback mechanisms include the subsequent reactions from other players in response to certain policy choices and cards drawn after executing specific actions. In the current form of the wargame, all feedback is immediate and open knowledge to all players, which serves to better inform players as to the potential consequences of certain strategies. All players can observe whenever the "Global Conflict" and "Environmental Risk" metrics change and are aware that if either variable reaches its maximum limit, all players lose the game. Similarly, all players can observe whenever any player achieves a Victory Point towards his or her win conditions, allowing for dynamic changes in strategic cooperation or competition between players. All players have immediate visibility when any player places an asset

on the game board or whenever any asset is disrupted, rendering it unusable for one turn. This enables players to adjust their strategies in an interactive series of interrelated systems, resulting in a constant cycle of player actions and counter-actions.

I. PLAYER INTERACTIVE RELATIONSHIPS

The game is designed for players to have the freedom to act individually or cooperatively, reflecting real-world geopolitics. Certain factions have abilities that are more effective when combined in mutually supporting roles with other players to enhance their total efficacy, such as committing naval assets to patrol commercial shipping routes to promote freedom of navigation. As such, the Nordic States and North America can each benefit from cooperation, as will Russia and China, to a greater extent than they would gain from other cooperative combinations. This thematically reflects the long-standing ties of NATO, economic interdependency, national values, and democratic liberalism vs. authoritarian forms of government.

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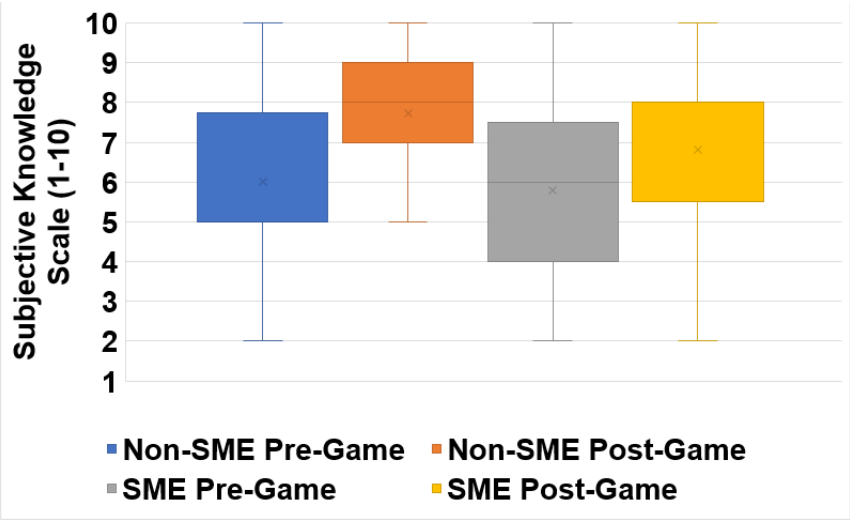
VI. FINDINGS

A. ANALYSIS OF PLAYER SURVEY DATA

Unlike analytical wargames, which are designed to produce data for further applications, this educational wargame is intended to achieve learning objectives. Quantitative and qualitative data derived from pre-and-post-game player surveys provided feedback to assess how effectively the wargame accomplished those learning objectives. The sample size for the data evaluated below includes surveys from thirty players (n = 30). The player survey data collected is provided in supplement 2 and a blank example survey (Appendix I) are both attached.

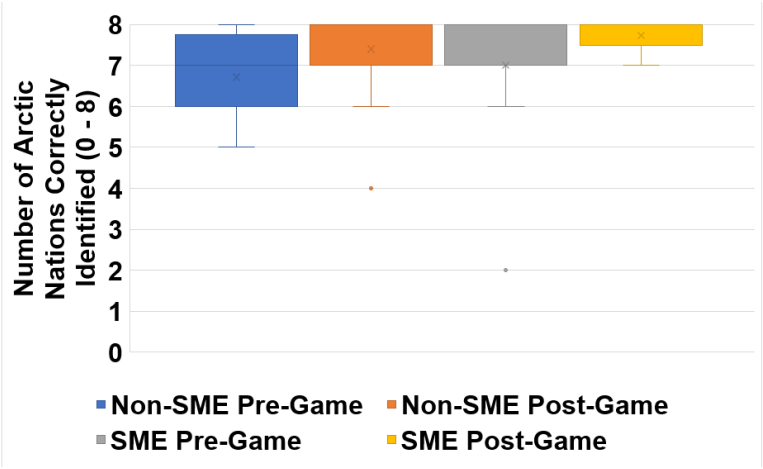
A key takeaway from the data is that players who were not SMEs on any aspect of Arctic geopolitics reported significant increases in personal knowledge of Arctic geopolitics after participating in the wargame **(Figure 1)**. Players provided individual reports on Likert scales ranging from 1 to 10 points. Fourteen non-SME participants reported an increased median valuation of knowledge of Arctic geopolitics of 2.75 points, from a pre-game median score of 4.5 out of 10 to a post-game median score of 7.25 out of 10. Unsurprisingly, the sixteen SME players indicated only marginally higher scores with an unchanged median value of 8, a pre-game average of 7.5, and a post-game average of 7.9, an increase of 0.4. This data suggests that the wargame has utility for educating its primary, non-SME target audience about Arctic geopolitical considerations.



This graph depicts the players' self-reported knowledge of Arctic Geopolitics before and after playing the wargame. Likert scale responses indicate a significant increase in knowledge of Arctic geopolitics within the non-SME target demographic and a marginal increase in the SME audience.

Figure 1. Player Self-reported Knowledge of Arctic Geopolitics.

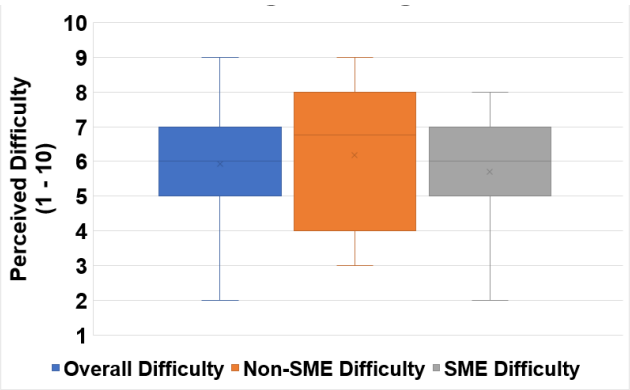
This positive assessment was further supported by tabulating the number of Arctic Nations that players correctly identified in pre-and-post game surveys **(Figure 2)**. Out of the eight Arctic Nations, the fourteen non-SME respondents correctly recalled a median of 6 in pre-game surveys and a median of 7 in post-game surveys. Their average scores increased from 5.9 to 7.1 after playing the wargame. The sixteen SME respondents correspondingly maintained a median score of 8 correctly identified Arctic Nations, although the average score increased marginally from 7.7 to 7.8.



This graph depicts the number of internationally recognized Arctic Nations that players correctly identified in pre-and-post game surveys. Within the non-SME target demographic, players demonstrated a moderate increase in correctly identified Arctic Nations after participating in the wargame, increasing the average score from 5.8 out of 8 to 7.1 out of 8. Unsurprisingly, the SME participants demonstrated only a marginal increase in average score from 7.7 out of 8 to 7.8 out of 8.

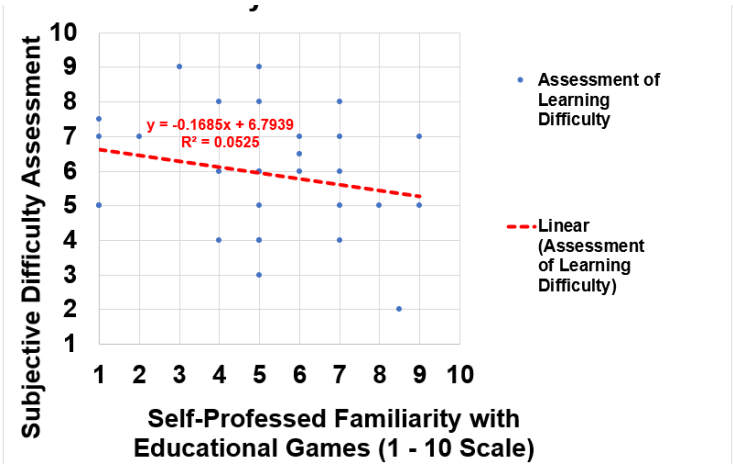
Figure 2. Player Correctness in Identifying Arctic Nations

Post-game survey data assessing respondents' perceptions of how difficult the wargame was to learn suggests that it is a slightly challenging game for new audiences to learn **(Figure 3)**. On a 1-to-10 Likert scale, thirty players responded with a median difficulty assessment of 6, an average of 5.9, and a range from 2 to 9. Unsurprisingly, non-SME respondents reported higher average difficulty ratings than their SME counterparts. There appears to be a slight inverse correlation between players' perceived learning difficulty and their self-professed familiarity with educational games **(Figure 4).** Players who are more experienced with games found this wargame to be less difficult. However, confidence in that correlation is poor due to a very low R^2 value of 0.053.



This graph depicts player post-game survey responses to the perceived difficulty level of the wargame for new players to learn. The question was posed as a 1–10 Likert scale, with 1 being extremely easy and 10 being extremely hard. Responses indicate that the game is overall moderately challenging to learn; it is easier for SME audiences to grasp and slightly more difficult for non-SME players. Non-SME responses show a notably larger interquartile range, likely due to certain younger players being more familiar with gaming in general and a smaller minority having no prior experience with military wargames.

Figure 3. Player Assessed Difficulty Level of Learning the Wargame



This graph models the correlation between players' self-reported familiarity with educational games and their perceived difficulty in learning this wargame. It suggests a general trend that the wargame is easier for new audiences to grasp if those players already have personal experience with wargames. Confidence in this trend is very low, however, due to an R^2 score of 0.052.

Figure 4. Assessment of Learning Difficulty vs. Familiarity with Educational Games

Qualitative comments in surveys and post-game discussions suggest that players consistently increase their understanding of Arctic geopolitics after playing through the wargame and that they enjoyed the experience. In context with the above quantitative data, this suggests that the game successfully achieves the core learning objectives.

B. WARGAME FACILITATION CONSIDERATIONS

The game typically takes new players approximately 90 minutes and lasts an average of seven total rounds. Experienced players can realistically complete the game in approximately 35–45 minutes. To streamline play for new target audiences, the game is optimally preceded by a 60-minute introduction brief to familiarize players with game learning objectives, how real-world thematic concepts are represented and simplified, the in-game player strategic objectives, game mechanics, a facilitator-guided mid-game round to demonstrate more aggressive strategies and counter-strategies, and a suggested quick-start guide (Appendix A), which recommends a series of actions to take during the first three rounds of play. Wargame facilitators should also ensure to have a copy of the game rulebook (Appendix B). If time constraints preclude the full introduction brief, game facilitators can provide a condensed overview and walk new players through the moves of the quick-start guide to expedite the overall game duration. To accommodate this latter time-constrained scenario, a brief instructional video provides a crash course to introduce new audiences to core concepts. (Supplement 4). Throughout all wargame iterations, players are encouraged to ask questions of their game facilitators to address any confusion over the rules or mechanics, although game facilitators should refrain from offering recommendations on strategy.

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APPENDIX A – QUICK START GUIDES

Race for the Arctic

The Arctic is warming three times faster than the global average opening access to a vast expanse. Nations are competing and cooperating for shipping lanes, mineral rights, and security via instruments of national power.

Why Shipping Matters

Northern Sea Route (NSR): Cuts distance from Europe to Japan from 13,000 miles via the Suez Canal to 4,400 miles via the Arctic (66% shorter). Currently accessible.

Northwest Passage (NWP): Cuts distance between Europe and U.S. from 10,700 miles via the Panama Canal to 6,300 mi via the Arctic (40% shorter). Projected accessibility year: 2030

Transpolar Route: Most direct route and primarily transits outside of EEZs increasing its geopolitical importance. Projected accessibility year: 2050

Why Resource Harvesting Matters

Minerals: $2 trillion of rare Earth minerals needed for computing & clean energy technology reside in the Arctic. Currently China has a 90% market share of these rare Earth minerals.

Oil and Gas: 22% of the world's reserve resides in the Arctic.

Fishing: The $2 billion market of marine resources are migrating North, into the Arctic, from traditional fishing grounds changing the status quo of the market and ocean and fisheries law.

Why Security Matters

Polar sea ice and harsh Arctic conditions has formed a 'fourth wall' protecting Arctic nations for centuries. Melting Arctic Sea ice and increasingly temperate weather has opened the Northern frontier.

National Objectives in the Arctic

North America
Primary: Keep rules-based international order via Freedom of Navigation Operations (FONOPS)
Secondary: Build Presence, Protect & Extend EEZ, Develop Resources & Technology

Russian Federation
Primary: Capitalize on Northern Sea Route via Tariffs and Increase Presence & Resources
Secondary: Extend EEZ and destabilize the rules-based international order

People's Republic of China
Primary: Gain presence via dual-use fleet in EEZs and international recognition as an Arctic Nation
Secondary: Gain economic advantage through resource harvesting and shipping

Nordic States
Primary: Keep rules-based international order via FONOPS & Develop Green Technology
Secondary: Extend EEZ, gain economic advantage through resource harvesting and shipping

Quick Start - North America

Objectives

Primary: Maintain rules-based international order via Freedom of Navigation Operations (FONOPS)
Secondary: Build Presence, Protect & Extend EEZ, Develop Resources & Technology

Suggested First Three Turns

Starting Economy: 3 *Resources (R) & 3 Diplomacy (D)*

Turn 1 - Build Arctic Economy
Gain Resources (R) & Diplomacy (D): 5R (Base GDP) & 2D (Base)
Action 1: Develop Arctic Technology – Cost: 1R (Place on Build Resource Rig) – Give Tech Block to China
Action 2: Build Resource Rig– Cost: 4R (Place Rig from Player Mat onto a Resource Claim in EEZ)
Action 3: Contract Shipping Company – 3R (Place it on Vancouver) – Use 3:1 Resource Exchange

Turn 2 – Continue Building Arctic Economy & Assess/Counter Other Players
Gain Resources (R) & Diplomacy (D): 5R (Base GDP) + 2R (Shipping) & 2D (Base) + 1D (Shipping)
Action 1: Develop Arctic Technology – Cost: 2R (Place on Build Ship) – Give Tech Block to China
Action 2: Build Ship – Cost: 3R (Place Ship from Player Mat into N.A. Port on Game Board)
Action 3: Counter Russian Tariff/Chinese Presence – Cost 2R & 2D (Counter Russian Tariffs in Shipping)

Turn 3 – Assess and Counter Other Players & Grow Economy
Gain Resources (R) & Diplomacy (D): 5R (Base GDP) + 2R (Shipping) & 2D (Base) + 1D (Shipping)
Action 1, 2, & 3: *What Do You Need?*
- Player Mat VP – Build Ship *or* Develop Tech
- Turn-Based VP – Diplomatic De-Escalation *or* Counter Russian Tariffs or Chinese Presence
- Build Economy – Build Rigs, Contract Shipping, Research Tech

Key Game Terminology & Concepts

Asset – A general term for any large block on the board (Shipping, Resource Rig, Dual-Use Ship, etc…)

Disrupted – Turn the effected asset on its side. Ships, Cargo Ships, and Resource Rigs can be Disrupted by use (example: exploring & staking a claim) or from a target attack (example: economic sabotage).

Active – An asset that is not Disrupted.

Deployed Ship – Any ship that is not in its home port.

EEZ – Economic Exclusion Zone, the waters 200 NM off the coast in which a country has legal authority. Other nations can not explore and claim resources in a different country's EEZ (Shaded on the Game Map).

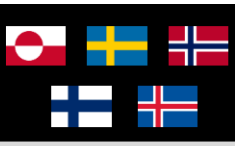
International Waters – Waters not in an EEZ (unshaded on the Game Map).

Interdict – Having ships greater than or equal to the amount of Chinese dual-use ships nullifies their advantage

Armed Conflict Risk – This game is played in the Gray Zone (below the threshold of armed conflict). When the Risk of Armed Conflict increases, the triggering player draws a conflict card. The Risk of Armed Conflict can decrease through cooperation. If the Risk of Armed Conflict gets too high, actions are restricted.

Environmental Risk – The Environmental Risk can never be reduced but certain actions can accelerate it. As it increases the board changes and assets become at risk.

Quick Start – Nordic States



Objectives

Primary: Maintain rules-based international order via FONOPS & Develop Green Technology

Secondary: Extend EEZ, gain economic advantage through resource harvesting and shipping

Suggested First Three Turns

Starting Economy: 3 *Resources (R) & 3 Diplomacy (D)*

Turn 1 - Build Arctic Economy

Gain Resources (R) & Diplomacy (D): 3R (Base GDP) & 3D (Base)

Action 1: Research Green Tech – Cost: 1R Put Tech on Build Green Resource Rig (Give China a Tech Cube)

Action 2: Build Green Resource Rig – Cost: 4R & 1D

Action 3: Retrofit Russia's Resource Rig with Green Tech – Cost: 3D

Turn 2 – Continue Building Arctic Economy & Assess/Counter Other Players

Gain Resources (R) & Diplomacy (D): 3R (Base GDP) + 2R (Rig) & 3D (Base)

Action 1: Contract Shipping Company – 3R (Place on Aarhus)

Action 2: Build Ship – Cost: 3R (Place Ship from Player Mat onto Game Board Port) Gain **1 VP**

Action 3: Counter Russian Tariff/Chinese Presence – Cost 1R & 1D (Use 3:1) – Counter PRC in EEZ

Turn 3 – Assess and Counter Other Players & Grow Economy

Gain Resources (R) & Diplomacy (D): 3R (Base GDP) + 2R (Shipping) + 2R (Rig) & 3D (Base) + 1D (Shipping)

Action 1, 2, & 3: *What Do You Need?*

- Protect EEZ - Counter Russian Tariffs or Chinese Presence
- Turn-Based VP - Retrofit another Player's Resource Rig with Green Tech
- Build Economy – Build Rigs, Contract Shipping, Research Tech

Key Game Terminology & Concepts

Asset – A general term for any large block on the board (Shipping, Resource Rig, Dual-Use Ship, etc…)

Disrupted – Turn the effected asset on its side. Ships, Cargo Ships, and Resource Rigs can be Disrupted by use (example: exploring & staking a claim) or from a target attack (example: economic sabotage).

Active – An asset that is not Disrupted.

Deployed Ship – Any ship that is not in its home port.

EEZ – Economic Exclusion Zone, the waters 200 NM off the coast in which a country has legal authority. Other nations can not explore and claim resources in a different country's EEZ (Shaded on the Game Map).

International Waters – Waters not in an EEZ (unshaded on the Game Map).

Interdict – Having ships greater than or equal to the amount of Chinese dual-use ships nullifies their advantage

Armed Conflict Risk – This game is played in the Gray Zone (below the threshold of armed conflict). When the Risk of Armed Conflict increases, the triggering player draws a conflict card.

Environmental Risk – The Environmental Risk can never be reduced but certain actions can accelerate it. As it increases the board changes and assets become at risk.

Quick Start – Russian Federation

Objectives

Primary: Capitalize on Northern Sea Route via Tariffs and Increase Presence & Resources
Secondary: Extend EEZ and destabilize the rules-based international order

Suggested First Three Turns

Starting Economy: 3 *Resources (R) & 3 Diplomacy (D); 1 Disrupted Resource Rig*

Turn 1 - Build Arctic Economy
Gain Resources (R) & Diplomacy (D): 3R (Base GDP) + 0R (Disrupted Rig) & 2D (Base)
Action 1: Contract a Shipping Company – Cost 3R (Place on St. Petersburg)
Action 2: Develop Military Technology – Cost 1R (Place on Build Ship & Give PRC and Tech Cube)
Action 3: Tariff Shipping Lanes (Place 2 Ship from Port on Shipping Lanes D & F) – Cost 2R & 2D

Turn 2 – Continue Building Arctic Economy & Assess/Counter Other Players
Gain R & D: 3R (Base GDP) + 2R (Rig) + 2R (Shipping) - 1R (2x Tariff) & 2D (Base) + 1D (Shipping)
Action 1: Contract Shipping Company – Cost 4R (Place on Murmansk)
Action 2: Explore & Stake a Claim on a Resource Field in Int'l Waters – Cost 1R & 1D
Action 3: Diplomatic De-escalation – Cost 1R & 2D (Target NA Ships); Decrease Conflict

Turn 3 – Assess and Counter Other Players & Grow Economy
Gain Resources (R) & Diplomacy (D): 3R (Base GDP) + 2R (Rig) + 4R (Shipping) & 2D (Base) + 2D (Shipping)
Action 1, 2, & 3: *What Do You Need?*
- Player Mat VP – Contract Shipping Company
- Turn-Based VP – Tariff Shipping Lanes
- Build Economy – Build Rigs, Contract Shipping, Research Tech

Key Game Terminology & Concepts

Asset – A general term for any large block on the board (Shipping, Resource Rig, Dual-Use Ship, etc…)

Disrupted – Turn the effected asset on its side. Ships, Cargo Ships, and Resource Rigs can be Disrupted by use (example: exploring & staking a claim) or from a target attack (example: economic sabotage).

Active – An asset that is not Disrupted.

Deployed Ship – Any ship that is not in its home port.

EEZ – Economic Exclusion Zone, the waters 200 NM off the coast in which a country has legal authority. Other nations can not explore and claim resources in a different country's EEZ (Shaded on the Game Map).

International Waters – Waters not in an EEZ (unshaded on the Game Map).

Interdict – Having ships greater than or equal to the amount of Chinese dual-use ships nullifies their advantage

Armed Conflict Risk – This game is played in the Gray Zone (below the threshold of armed conflict). When the Risk of Armed Conflict increases, the triggering player draws a conflict card.

Environmental Risk – The Environmental Risk can never be reduced but certain actions can accelerate it. As it increases the board changes and assets become at risk.

Quick Start – People's Republic of China

Objectives

Primary: Gain presence via dual-use fleet in EEZs and international recognition as an Arctic Nation
Secondary: Gain economic advantage through resource harvesting and shipping

Suggested First Three Turns

Starting Economy: 3 *Resources (R) & 3 Diplomacy (D); 2 Shipping Lanes*

Turn 1 - Build Arctic Economy
Gain Resources (R) & Diplomacy (D): 4R (Base GDP) +2R (Shipping) & 2D (Base) + 1D (Shipping)
Action 1: Fast Follower Technology Advantage - Cost: 2R & 2D (Place on Build Dual-Use Ship)
Action 2: Build Dual-Use Ship – Cost: 6R (Place Ship from Player Mat onto Game Board Port)
Action 3: Deploy Dual-Use Ship to Nordic EEZ – Cost 1R & 2D (Place Ship into Nordic EEZ; Increase Conflict)

Turn 2 – Continue Building Arctic Economy & Assess/Counter Other Players
Gain Resources (R) & Diplomacy (D): 4R (Base GDP) +4R (Shipping) & 2D (Base) + 2D (Shipping)
Action 1: Contract a Shipping Company – Cost: 3R (Place on Hong Kong)
Action 2: Deploy Dual Use-Ship to Russian EEZ – Cost: 1R & 2D (Place Ship into Russian EEZ; Incr Conflict)
Action 3: Maritime Lawfare Challenge – Cost: 1R & 3D (Use 3:1) Return Nordic Ship to Port in EEZ; Incr Conflict

Turn 3 – Assess and Counter Other Players & Grow Economy
Gain Resources (R) & Diplomacy (D): 4R (Base GDP) +6R (Shipping) + & 2D (Base) + 3D (Shipping)
Action 1, 2, & 3: *What Do You Need?*
- Player Mat VP – Contract Shipping Company *or* Build Ship
- Turn-Based VP – Deploy Dual-Use Ship to an EEZ
- Build Economy – Build Rigs, Contract Shipping, Research Tech

Key Game Terminology & Concepts

Asset – A general term for any large block on the board (Shipping, Resource Rig, Dual-Use Ship, etc…)

Disrupted – Turn the effected asset on its side. Ships, Cargo Ships, and Resource Rigs can be Disrupted by use (example: exploring & staking a claim) or from a target attack (example: economic sabotage).

Active – An asset that is not Disrupted.

Deployed Ship – Any ship that is not in its home port.

EEZ – Economic Exclusion Zone, the waters 200 NM off the coast in which a country has legal authority. Other nations can not explore and claim resources in a different country's EEZ (Shaded on the Game Map).

International Waters – Waters not in an EEZ (unshaded on the Game Map).

Interdict – Having ships greater than or equal to the amount of Chinese dual-use ships nullifies their advantage

Armed Conflict Risk – This game is played in the Gray Zone (below the threshold of armed conflict). When the Risk of Armed Conflict increases, the triggering player draws a conflict card..

Environmental Risk – The Environmental Risk can never be reduced but certain actions can accelerate it. As it

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APPENDIX B – RULE BOOK

RACE FOR THE ARCTIC

RULE BOOK

4 PLAYERS // 120 MINUTES

DESIGNED BY CPT ROBERT LEISINGER AND MAJ RACHEL HOWELL

SCENE SETTER

The Arctic is warming three times faster than the global average opening access to a vast expanse. What was a frozen Northern Wall for many nations is now a region of opportunity and challenge. As ice melts and the Northern Wall collapses, nations are competing and cooperating for shipping lanes, mineral rights, and security.

OBJECT OF THE GAME

In Race for the Arctic each player represents a nation or group of nations with national interests in the Arctic. The players use various instruments of national power to cooperate and compete for their Arctic claim. Players explore and claim resources, harvest resources, research technology, build ships, invest in shipping contracts, and use gray zone activities to influence geopolitics in the Arctic.

Race for the Arctic is an asymmetric game in which each player has unique actions that generate currency, diplomacy, and score Victory Points representing the unique national interests of different countries. The player who successfully realizes their nation's Arctic objectives first wins.

GOAL

The goal is to fully realize national objectives in the Arctic through revealing Victory Points on the player mat. The game ends when the first player scores their 10th Victory Point. A typical game lasts approximately 8 rounds. Due to the asymmetrical nature of the game, each player mat is unique, and Victory Points are awarded to actions that align with national objectives.

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Components

General Components

4 Quick Start Guides

1 Game Board

4 Player Mats

2 Conflict/Environmental Risk Tracking Tokens

12 Unclaimed Resource Field Tokens

90 Diplomacy Tokens

105 Metal Resource Coins

- 75 – 1 Resource Denomination
- 15 – 3 Resource Denomination
- 15 – 5 Resource Denomination

18 Conflict Cards

25 Environmental Effect Cards

- 10 – Level I
- 10 – Level II
- 5 – Level III

PLAYER COMPONENTS

6-Sided Dice

Victory Point Tracker

Cargo Ship

Resource Rig

Ship

Investment Cube

Tech Cube

Fast-Follower Tech Cube

Resource Claim

Green Retrofit Token

Security Cooperation

Nordic States (Yellow)

1 – 6-Sided Dice

1 – Victory Point Tracker

4 – Ship Cubes

4 – Green Resource Rig Cubes

4 – Cargo Shipping Cubes

6 – Tech Cubes (Gear Icon)

6 – EEZ Extension Cubes (Blank)

6 – Fast Follower Tech Cubes (Red)

6 – Resource Claim Tokens

4 – Security Cooperation Tokens

8 – Green Retrofit Tokens

People's Republic of China (Red)

1 – 6-Sided Dice

1 – Victory Point Tracker

3 – Ship Cubes

4 – Resource Rig Cubes

7 – Cargo Shipping Cubes

6 – Arctic Membership Cubes (Blank)

6 – Resource Claim Tokens

Russian Federation (Blue)

1 – 6-Sided Dice

1 – Victory Point Tracker

8 – Ship Cubes

6 – Resource Rig Cubes

3 – Cargo Shipping Cubes

6 – Tech Cubes (Gear Icon)

6 – EEZ Extension Cubes (Blank)

6 – Fast Follower Tech Cubes (Red)

6 – Resource Claim Tokens

North America (Green)

1 – 6-Sided Dice

1 – Victory Point Tracker

5 – Ship Cubes

4 – Resource Rig Cubes

4 – Cargo Shipping Cubes

6 – Tech Cubes (Gear Icon)

6 – EEZ Extension Cubes (Blank)

6 – Fast Follower Tech Cubes (Red)

6 – Resource Claim Tokens

Important Concepts

Armed Conflict Risk – This game is played in the Gray Zone (below the threshold of armed conflict). When the Risk of Armed Conflict increases, the triggering player draws a conflict card. The Risk of Armed Conflict can decrease through cooperation. If the Risk of Armed Conflict gets high, actions are restricted. If the Risk of Armed Conflict exceeds the scale of the game, every player loses the game.

Environmental Risk – The Environmental Risk can never be reduced but certain actions can accelerate it. As Environmental Risk increases the board changes and assets become at risk.

EEZ – Economic Exclusion Zone, the waters 200 NM off the coast in which a country has legal authority. Other nations cannot explore and claim resources in a different country's EEZ (shaded water on the game board).

International Waters – Waters not in an EEZ (unshaded water on the game board).

Asymmetric Abilities – Each player mat is unique. A strategy that works with one player, will most likely not be possible or effective with another player.

Definitions

Asset – Any cube on the game board (Ship, Cargo Ship, or Resource Rig).

Disrupt – Immediately turn the effected asset on its side.

- Ships, Cargo Ships, and Resource Rigs can be Disrupted by use (example: exploring & staking a claim) or from a target attack (example: economic sabotage).
- Disrupted assets not accounted for when determining any count within the game example:) resource generation, Victory Point determination, tariffs, etc…
- Disrupted assets are reactivated on the World Turn.

Active – An asset that is not Disrupted.

Deployed Ship – Any ship that is not in its home port.

SETUP

GAME BOARD

Environmental Risk Deck (Blue Card Backs)
- Shuffle Level I cards and place them beside the board
- Retain Level II and Level III cards for later game play

Conflict Risk Deck (Red Card Backs)
- Shuffle all cards and place them beside the board

Ice Cap Setup
- 6 Unclaimed Resource Tokens in International Waters
- Smallest Ice Cap Covers 2
- Largest Ice Cap Leaves 3 Revealed

Resource and Diplomacy Token Supply
- Several supplies placed next to the board accessible to all players

Victory Point Track
- All players begin with 0 Victory Points

Environmental and Conflict Risk Meters
- Both Risk Meters begin at 1

North America (Green)
- 1 Active Ship in Port
- 1 International Resource Claim
- 3 EEZ Unclaimed Resource Tokens
- EEZ Extension Cache begins at 1

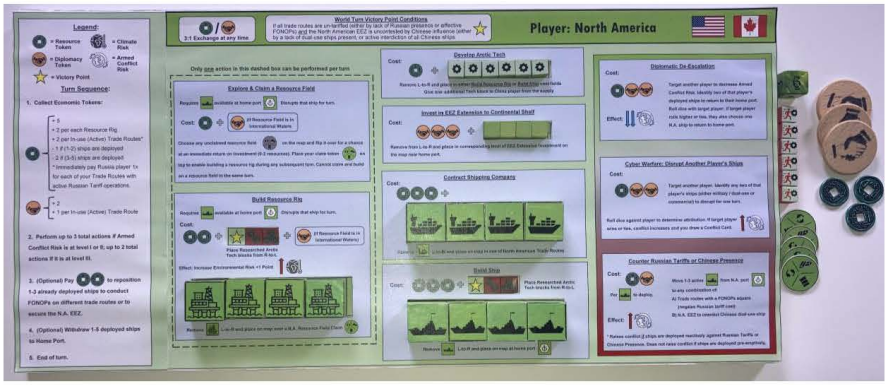
Nordic States (Yellow)
- 1 Active Ship in Port
- 1 International Resource Claim
- 1 EEZ Resource Claim
- 2 Unclaimed EEZ Resource Tokens
- EEZ Extension Cache begins at 1

Russian Federation (Blue)
- 3 Active Ships in Port
- 1 Disrupted Resource Rig
- 1 International Resource Claim
- EEZ Extension Cache begins at 1

People's Republic of China (Red)
- 1 Active Ship in Port
- 2 Disrupted Shipping Routes
- EEZ Extension Cache begins at 1

Player Mat

North America

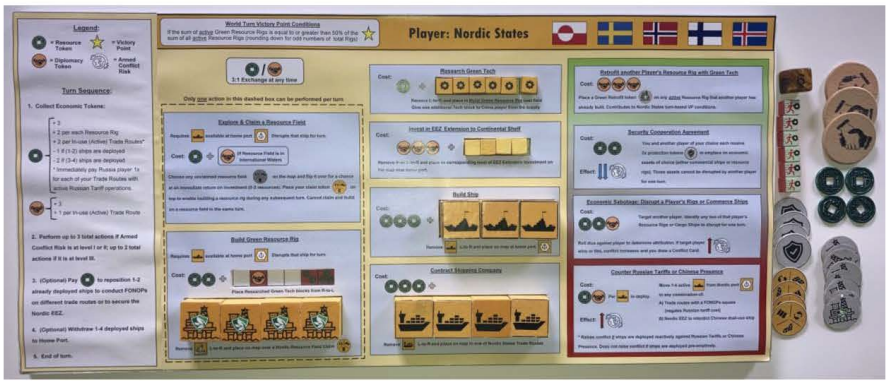


Starting Currency: 3 Resource Tokens and 3 Diplomacy Tokens set in player supply

Player Mat Starting Conditions

6 Fast-Follower Tech Cubes set in player supply	6 Tech Cubes placed on Player Mat
1 6-sided dice set in player supply	4 EEZ Extension Cubes placed on Player Mat
5 Resource Claim tokens in player supply	4 Cargo Ships placed on Player Mat
4 Resource Rigs placed on Player Mat	4 Ships placed on Player Mat

NORDIC STATES

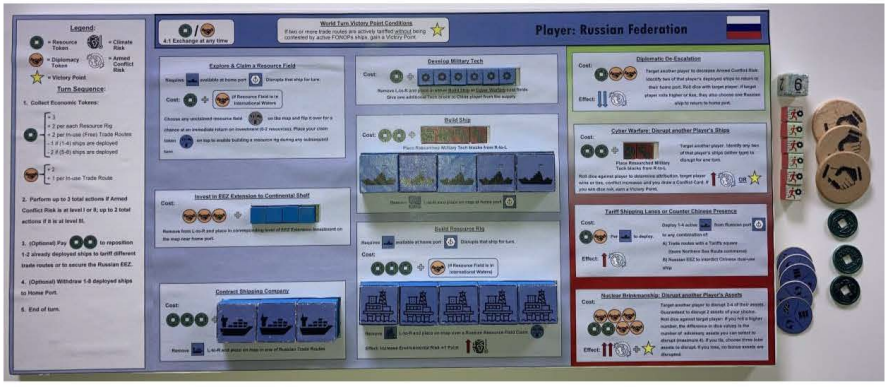


Starting Currency: 4 Resource Tokens and 3 Diplomacy Tokens set in player supply

Player Mat Starting Conditions

6 Fast-Follower Tech Cubes set in player supply	4 Resource Rigs placed on Player Mat
1 6-sided dice set in player supply	6 Tech Cubes placed on Player Mat
5 Resource Claim tokens set in player supply	4 EEZ Extension Cubes placed on Player Mat
4 Security Cooperation tokens set in player supply	4 Cargo Ships placed on Player Mat
8 Green Retrofit tokens set in player supply	4 Ships placed on Player Mat

RUSSIAN FEDERATION

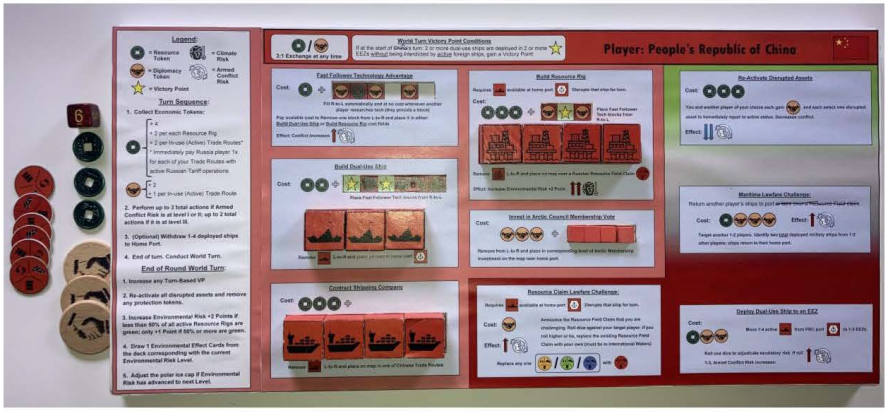


Starting Currency: 3 Resource Tokens and 3 Diplomacy Tokens set in player supply

Player Mat Starting Conditions

6 Fast-Follower Tech Cubes set in player supply	3 Cargo Ships placed on Player Mat
1 6-sided dice set in player supply	6 Tech Cubes placed on Player Mat
5 Resource Claim tokens set in player supply	5 Ships placed on Player Mat
4 EEZ Extension Cubes placed on Player Mat	5 Resource Rigs placed on Player Mat

PEOPLE'S REPUBLIC OF CHINA



Starting Currency: 3 Resource Tokens and 3 Diplomacy Tokens set in player supply

Player Mat Starting Conditions

1 6-sided dice set in player supply	4 Cargo Ships placed on Player Mat
5 Resource Claim tokens set in player supply	4 Resource Rigs placed on Player Mat
3 Ships placed on Player Mat	4 EEZ Extension Cubes placed on Player Mat

Full Game

Quick Start Card

For first time players, it is recommended each player follow the Quick Start guide rather than learning every rule in detail. The Quick Start Guide contains key facts on the state of the world on one side of the card; on the reverse it contains key definitions and suggested starting moves demonstrating various aspects of the game.

A player's first game of Race for the Arctic should not necessarily focus on developing a masterful national strategy. A player should focus on recognizing the goals of each group of nations and how various elements interact. A player should jump in and try any strategy to see how other players respond and how the game rewards their strategy.

Game Play

Race for the Arctic has a set turn order and sequence that must be followed. The first player is always North America followed by Nordic States, Russian Federation, People's Republic of China, and concludes with the World Turn.

Every turn follows the same sequence and is annotated on the left side of the player mat. Many costs and earnings are country specific and annotated on the left side of individual Player Mats.

Player Turn Sequence

1. Collect Economic Tokens
    - Resource Tokens
        - Base GDP (country specific)
            - North America: 5 Resources
            - Nordic States: 3 Resources
            - Russian Federation: 3 Resources
            - People's Republic of China: 4 Resources
        - +2 per Resource Rig
            - Disrupted Resource Rigs do not collect Resources
        - +2 per Trade Route
            - Disrupted Trade Routes do not collect Resources
        - - per Deployed Ships (country specific)
            - North America
                - -1 Resource for 1-2 Deployed Ships
                - -2 resources for 3-5 Deployed Ships
            - Nordic States
                - -1 Resource for 1-2 Deployed Ships
                - -2 Resources for 3-4 Deployed Ships
            - Russian Federation
                - -1 Resource for 1-4 Deployed Ships
                - -2 Resources for 5-8 Deployed Ships
            - People's Republic of China
                - No Resource penalty for Deployed Ships
        - - per Tariff Operation
            - Immediately pay Russian Federation 1 Resource per active Trade Route with active Russian Federation Tariff Operations
    - Diplomacy Tokens
        - Base GDP (country specific)
            - North America: 2 Diplomacy Tokens
            - Nordic States: 3 Diplomacy Tokens
            - Russian Federation: 2 Diplomacy Tokens
            - People's Republic of China: 2 Diplomacy Tokens
        - +1 per Trade Route
            - Collect 1 Diplomacy Token for each active Trade Route
2. Perform 3 Total Actions (unless in Conflict Level III)
3. Optional: Pay Resources to reposition Ships

- North America: 2 Resources to reposition 1-3 already Deployed Ships
- Nordic States: 1 Resource to reposition 1-2 already Deployed Ships
- Russian Federation: 2 Resources to reposition 1-2 already Deployed Ships
- People's Republic of China: No cost to reposition already Deployed Ships

4. Optional: Withdraw any number ships to home port at no cost
5. End of Turn

The World Turn always follows the People's Republic of China player's turn. The World Turn Sequence is annotated on the left side of the People's Republic of China Player Mat.

World Turn Sequence

1. Check and score any turn-based Victory Points
2. Re-activate all disrupted assets and remove all Protection Tokens
3. Increase Environmental Risk by 2 points if less than 50% of Resource Rigs are Green Resource Rigs. Increase Environmental Risk by 1 point if greater than or equal to 50% of Resource Rigs are Green Resource Rigs
4. Draw 1 Environmental Effect card from the deck corresponding to the current Environmental Risk Level
5. Adjust the polar ice cap if the Environmental Risk has advanced to the next level

After the World Turn Sequence, play resumes with the North American Player.

Action Taking

On each player's turn they may take 3 actions unless the Environmental Risk Meter is in Level III. If the Environmental Risk Meter is in Level III, each player is restricted to 2 actions. One action consists of choosing any underlined action title in an action box on the player mat then completing the action text within the box. The same action may not be repeated more than once per turn. A player can choose to take fewer than the allowed actions per turn for any reason.

Note: The North American and Nordic States have a dashed line surrounding Explore and Claim a Resource Field and Build a (Green) Resource Rig. This dashed line indicates that only one of these actions can be performed per turn. You cannot do both actions in one turn.

If an action directs a player to remove a cube from the player mat and place it on the game board, assets are always removed from the Player Mat from left to right. If an action places a cube to lower a cost (Tech Cube) the cube is always placed onto the Player Mat from right to left.

Paying for Actions

Every action has an associated cost in Resource and/or Diplomacy Tokens which must be paid prior to taking the action. If an action cost cannot be paid, the action cannot be taken. A player may use the exchange rate to convert resources to diplomacy or diplomacy to resources at any time. The exchange rates are:

- North America: 3:1
- Nordic States: 3:1
- Russian Federation: 4:1
- People's Republic of China: 3:1

Actions costs for Contract Shipping Company, Build Ship, Build Resource Rig increase as additional assets are built.

Example

The initial cost to Contract Shipping Company is 3 Resources. After the first Cargo Ship is placed on the Game Board, the cost increases to 5 Resources.

Technology Cubes

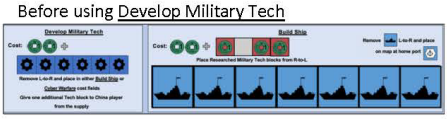
Each country has the ability to use technology to decrease the cost of actions. The table below denotes the title of the technology action and which action is made less expensive by using technology.

Country	Technology Action Title	Action Effected
North America	Develop Arctic Tech	Build Ship and Build Resource Rig
Nordic States	Research Green Tech	Build Green Resource Rig
Russian Federation	Develop Military Tech	Build Ship
People's Republic of China	Fast Follower Technology Advantage	Build Resource Rig and Build Dual-Use Ship

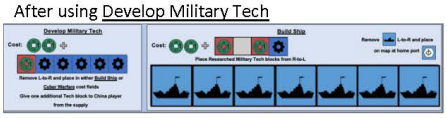
Example

The Russian Federation player would like to implement a strategy to build a ships on the next several turns. The cost of one ship is currently 5 resources. The player can use an action to spend 2 resources to Develop Military Tech. Lowering the overall cost of Build Ship to 4 resources. The future cost of Develop Military Tech is now 3 Resources.

Before using Develop Military Tech



After using Develop Military Tech



Fast Follower Technology Advantage

The People's Republic of China Player Mat does not start the game with any Tech Cubes. Any time North America, Nordic States, and Russian Federation players use their Technology Action and move a Tech Cube, that player gives the People's Republic of China a Fast Follower Tech Cube. The People's Republic of China player places that cube in the Fast Follower Technology Advantage action box (from right to left). The People's Republic of China player may

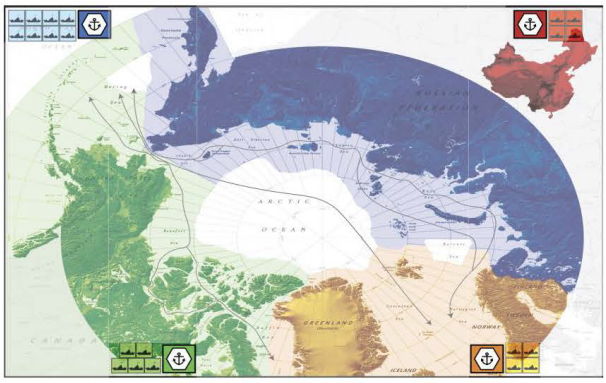
then use Technology Cubes as usual by paying the cost and placing them into an action box to buy down the cost. A Fast-Follower Tech Cube must be available for the action to be used.

Action Types

Build a Ship

Ships are built through the Build Ship or Build Dual-Use Ship action. The cost for this action is asymmetric and variable throughout the game. This action moves a ship from the Player Mat (from left to right) and places the ship in the Home Port denoted by the anchor icon on the Game Board. This ship is immediately counted as an active asset.

Home Ports



Ships fulfill a variety of roles in Race for the Arctic. This table outlines the uses and advantages to ship building.

Country	Action Title	Purpose
North America	Build Ship	Conduct FONOPS on Trade Routes / EEZ. - Counters Russian Federation Tariff Operations - Protects Cargo Resource Generation - Counters PRC Presence in EEZ - Enables Victory Point Conditions
Nordic States	Build Ship	Conduct FONOPS on Trade Routes / EEZ. - Counters Russian Federation Tariff Operations - Protects Cargo Resource Generation - Counters PRC Presence in EEZ
Russian Federation	Build Ship	Conduct Tariff Opeartions and Counter PRC in EEZ. - Generates Resources - Counters PRC Presence in EEZ - Enables Victory Point Conditions
People's Republic of China	Build Dual-Use Ship	Establish an Arctic Presence - Enables Victory Point Conditions

Explore and Claim a Resource Field

Unclaimed Resource Fields are claimed through the Explore and Claim a Resource Field action. The cost for using this action within a player's EEZ is 1 Resource and a ship must be active in the player's Home Port. If the action is on an Unclaimed Resource Field in International Waters, the cost is increased to 1 Resource and 1 Diplomacy. After this action is taken, the player's claim token replaces the unclaimed token and the Ship in the Home Port is disrupted.

The reverse side of the unclaimed token may have a Lucky Strike (depicted by resource token icons) in which the player immediately receives the Resource(s) depicted on the reverse side of the Unclaimed Resource Field Token. If the reverse is blank, there is no Lucky Strike and no additional Resources are collected.

Unclaimed Resource Field

Resource Claim Token

The People's Republic of China player can only claim resource fields in International water via Resource Claim Lawfare Challenge action. This action is only conducted on claimed resource fields.

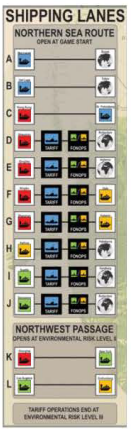
Build a Resource Rig

Resource Rigs are only built upon a player's Resource Claim Token through the Build Resource Rig or Build Green Resource Rig actions; you cannot build on another player's Resource Claim Token unless you are the People's Republic of China. Building a Resource Rig requires an active ship in the player's Home Port and a Resource Claim Token that does not have an existing Resource Rig. The cost for this action is asymmetric and variable throughout the game. After paying for the action, disrupting a Ship in the player's Home Port, the player will move a Resource Rig cube from their Player Mat (from left to right) to the Resource Claim Token on the Game Board. The Resource Rig is immediately counted as an active asset.

Green Resource Rigs

The Nordic States can only build Green Resource Rigs. Any non-Green Resource Rig can be converted to a Green Resource Rig through the Retrofit another Player's Resource Rig with Green Tech action. This action is exclusive to the Nordic States and places a Green Retrofit Token on top of a selected Resource Rig. This action converts a non-Green Resource Rig to a Green Resource Rig for the remainder of the game.

Contract a Shipping Company

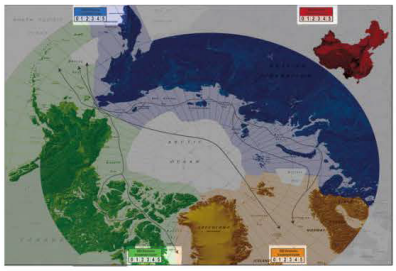


The Contract a Shipping Company action moves a Cargo Ship from the Player Mat (from left to right) onto a Shipping Lane on the Game Board. The cost for this action is asymmetric and variable throughout the game. The Cargo Ship will be placed on a city square matching the player's color. During Environmental Level I, Cargo Ships may only be placed on Northern Sea Route trade routes. During Environmental Levels II and III ships may be placed on either the Northern Sea Route or the Northwest Passage trade routes. Once a Cargo Ship is placed, it is immediately considered an active asset. An active trade route is a trade route with one or more cargo ships; if a trade route has no cargo ships it is considered inactive.

If a white globe square is part of the shipping lane, it is for informational purposes and does not affect game play. If another player's country is part of the trade route, the other player is allowed to contract the corresponding shipping company and each country receives economic benefit as usual; the resources generated do not change with the number of players on a Shipping Lane.

Note: The Contract a Shipping Company action does not allow a player to place a Cargo ship on a Tariff, FONOPS, or white globe square.

Investing in the Arctic



The Invest in EEZ Extension to the Continental Shelf and Invest in Arctic Membership actions have variable costs throughout the game. When this action is taken an Investment Cube is moved (from left to right) from the Player Mat onto the next number in the EEZ Extension Investment Cache on the Game Board.

Gray Zone Actions

Gray Zone actions are depicted on the right side of each Player Mat in a column. Gray Zone actions directly influence another player. The costs are asymmetric and the action and purpose are denoted on the table below.

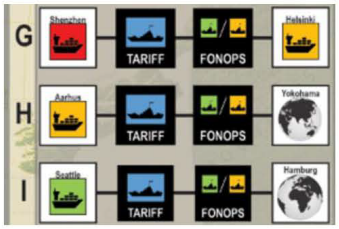
Country	Action Title	Purpose
North America	Diplomatic Deescalation	Decrease Armed Conflict Risk & Return another player's Deployed Ships to theor Home Port
	Cyber Warfare	Disrupt another player's Ships or Cargo Ships
	Counter Russian Tariffs or Chinese Presence	Deploy a Ship for Freedom of Navigation Operations (FONOPS)
Nordic States	Retrofit another Player's Resource Rig with Green Tech	Converts a non-Green Resource Rig to a Green Resource Rig
	Security Cooperation Agreement	Places Protection tokens on 2 assets preventing disruption
	Economic Sabotage	Disrupts another player's Resource Rigs or Cargo Ships
	Counter Russian Tariffs or Chinese Presence	Deploy a Ship for Freedom of Navigation Operations (FONOPS)
Russian Federation	Diplomatic Deescalation	Decrease Armed Conflict Risk & Return another player's Deployed Ships to theor Home Port
	Cyber Warfare	Disrupt another player's Ships or Cargo Ships
	Tariff Shipping Lanes	Deploy a Ship to tariff a Shipping Lane
	Nuclear Brinksmanship	Disrupt another player's assets
People's Republic of China	Re-Activate Disrupted Assets	Return one of PRC and one of another player's assets to Active
	Maritime Lawfare Challenge	Return another player's ships to their Home Port
	Deploy Dual-Use Ship to an EEZ	Deploys a PRC Ship from their Home Port to any other player's EEZ waters

Gray Zone Actions of Note

Counter Russian Tariff or Chinese Presence

North America or the Nordic States can take the action Counter Russian Tariffs or Chinese Presence to conduct Freedom of Navigation Operations (FONOPS). The player can Deploy Active Ships (1-3 Ships for North America; 1-4 Ships for Nordic States) from their home Port to any combination of Shipping Lanes or own EEZ waters. FONOPS, Russian tariffs, and Chinese presence all contribute to Turn-Based Victory Points.

FONOPS to Counter Russian Tariffs



When taking the Counter Russian Tariffs or Chinese Presence action in order to counter Russian tariffs, a North America or Nordic player will move an Active Ship from their Home Port to the black FONOPS square in a shipping lane. FONOPS, Russian tariffs, and Chinese presence all contribute to Turn-Based Victory Points.

This action can be conducted preemptively or reactively to Russian presence. If it is conducted reactively, Armed Conflict Risk increases by 1. The presence of a FONOPS Ship on a Shipping Lane negates any effect of a Russian Ship on a Tariff Square in a Shipping Lane eg:)Tariffs collected, Victory Point conditions, etc...

Note: If in Environmental Risk Level III, Russian Tariffs are no possible. All ships will be using the Transpolar Route, negating the need to traverse Russian EEZ waters.

FONOPS to Counter Chinese Presence

When taking the Counter Russian Tariffs or Chinese Presence action in order to counter Chinese Presence, a North America or Nordic States player will move an Active Ship from their Home Port to their own EEZ waters. There is no designated space on the Game Board for this move, the Ship may be placed anywhere. This action may contribute to Victory Points or deny the People's Republic of China player Victory Points. This increases Armed Conflict Risk by

1 no matter how many ships are deployed. FONOPS, Russian tariffs, and Chinese presence all contribute to Turn-Based Victory Points.

Tariff Shipping Lanes or Counter Chinese Presence

The Russian Federation player may take the Tariff Shipping Lanes action to conduct tariff operations on a specific shipping lane. In order to take this action, the Russian Federation player must pay the associated cost and have between 1-4 Active Ships in their Home Port. Then the player deploys 1-4 ships into any combination of Shipping Lanes or EEZ Waters.

Note: If in Environmental Risk Level III, Russian Tariffs are no possible. All ships will be using the Transpolar Route, negating the need to traverse Russian EEZ waters.

If Deploying to a Shipping Lane, the player moves a Ship from their Home Port onto a black Tariff square. If deploying to counter Chinese presence, the Russian Federation player moves a Ship from their Home Port to their own EEZ. There is no designated space on the Game Board for this move, the Ship may be placed anywhere. This action may contribute to Victory Points or deny the People's Republic of China player Victory Points. This increases Armed Conflict Risk by 1 no matter how many ships are deployed.

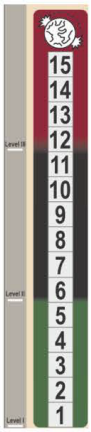
Deploying Dual-Use Ships

The People's Republic of China player may take the Deploy Dual-Use Ship to an EEZ action to deploy 1-3 Active Ships from their Home Port to any other player's EEZ waters. There is no designated space on the Game Board for this move, the Ship may be placed anywhere. This action may contribute to Victory Points. This increases Armed Conflict Risk by 1 no matter how many ships are deployed.

World Effects

Global Lose Conditions

If at any point in the game is the Armed Conflict Risk or the Environmental Risk exceed the scale (16 for Armed Conflict Risk and 26 for Environmental Risk) the game immediately ends and no player is declared winner. Exceeding either scale is a global lose condition.



Armed Conflict Risk

Race for the Arctic demonstrates interaction in the gray zone, below the level of armed conflict. Some actions are cooperative and lower regional tensions while other actions are aggressively competitive and raise regional tensions. Regional tensions are depicted through the Armed Conflict Risk Meter. Armed Conflict Risk Levels (I, II, and III) are depicted on the left side of the Armed Conflict Risk Meter.

The game begins at Level I on number 1 and increases and decreases when an action is taken that has a corresponding Armed Conflict Risk icon. The conflict increases or decreases by the number of arrows associated with the icon.

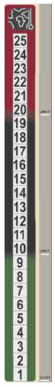
Increases Armed Conflict Risk by 1

Decreases Armed Conflict Risk by 2

If a player takes an action that increases Armed Conflict Risk, at the end of the action they must increase the Armed Conflict Risk Meter then draw a from the Conflict Risk Deck. The Conflict Risk Card will direct the player to roll one dice then take an action depending upon the Armed Conflict Risk Level. The card always refers to the player who increased the level of Armed Conflict.

At Level **III** on the Armed Conflict Risk Meter all players are restricted to two actions per turn. If the increase occurs mid-turn, that player is then limited to two turns total. If it occurs on a player's third turn, the restriction is imposed on the next player's turn.

Environmental Risk



Race for the Arctic is set in changing geography. This is depicted through the Environmental Risk Meter. The game begins at Environmental Risk Level **I** on number **1**. On the World Turn, the Environmental Risk increases by either **1** or **2** depending upon the ratio of non-Green to Green Resource Rigs. If 50% or more of the Resource Rigs are Green, then the Environmental Risk increases by **1**. If fewer than 50% of the Resource Rigs are Green, then the Environmental Risk increases by 2.

Environmental Risk Levels (**I**, **II**, and **III**) are depicted on the right side of the Environmental Risk Meter. As the Environmental Risk increases the polar ice cap changes, Environmental Effect Cards increase in severity, and Russian tariff operations change. If in Environmental Risk Level **III**, Russian Tariffs are no possible. All ships will be using the Transpolar Route, negating the need to traverse Russian EEZ waters.

Environmental Effect Cards

Environmental Effect Cards are divided into three decks, Level **I**, Level **II**, and Level **III**. The deck used corresponds to the Environmental Risk Meter Level. On the World Turn, draw **1** Environmental Risk Card. The Environmental Risk Card will denote a Game Board location and have the potential to disrupt assets within that location. If a dice roll is involved, all assets in the location are rolled and resolved individually.

Example: If the depicted card is draw from the Environmental Risk Deck, the card applies to all assets within the Russian Federation EEZ waters. It does not apply to the Russian Federation Home Port or Russian federation assets elsewhere on the Game Board.

Any player owning an asset (Ship, Dual-Use Ship, or Resource Rig) in Russian Federation EEZ waters will roll a dice for each asset. In this example, if a **1**-4 is rolled on the dice, the asset will be disrupted. If a 5-6 is rolled on the dice, the asset is not affected.

Ice Cap

As the Environmental Risk changes, so does the ice cap. In Environmental Risk Level **I**, the ice cap is at its largest. In Environmental Risk Level **II**, the largest ice cap is removed to reveal a small ice cap. In Environmental Risk Level **III** the small ice cap is removed and the arctic becomes free of ice. As the ice cap changes size unclaimed resource fields may be revealed, shipping lanes change, and tariff operations are affected.

Victory points

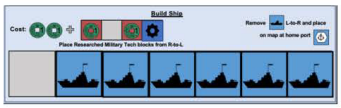
The first player to score 10 Victory Points immediately wins the game. Victory points are tracked at the top of the Game Board on the Victory Point Track. Each player has a colored stone corresponding to their country's color. The game begins with every player at 0 points. Victory Points are awarded by Revealed Victory Points or Turn-Based Victory Points

Revealed Victory Points

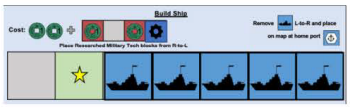
Revealed Victory Points are awarded through taking an action that reveals a yellow Victory point star. When an asset cube is removed from a Player Mat a Victory Point may be revealed if the action is in line with a country's national objectives. A Reveled Victory Point is only awarded once and immediately after it is revealed.

Understanding which actions grant Victory Points is central to Race for the Arctic. A player may look under their cubes at any time to ascertain which actions will yield the most Victory points.

Action before Revealed Victory Point



Action after Revealed Victory Point



Revealing Victory Points can be paired with revealing a cost. The first time a Victory Point is revealed is the only time it is awarded. Whereas the revealed cost increase is an enduring cost increase.

Turn-Based Victory Points

Every round on the World Turn, conditions for Turn-Based Victory Points are checked. Each country has unique conditions for Turn-Based Victory Points which are listed at the top of each Player Mat.

North America

If at the start of the World Turn all Trade Routes are not tariffed (either through lack of Russian Federation presence or FONOPS) and the North American EEZ is uncontested by Chinese presence (either through lack of Chinese presence or counter deployment), gain a Victory Point

Another player may counter this by allowing tariff operations, actively tariffing (Russian Federation), or deploying ships to the North American EEZ (People's Republic of China). Only active ships contribute to determining Victory Point conditions.

Nordic States

If at the start of the World Turn Green Resource Rigs are greater than or equal to 50% of the sum of active Resource Rigs (rounding down), gain a Victory Point.

Another player may counter this Victory Point condition by disrupting Green Resource Rigs. Any disrupted Resource Rig or disrupted Green Resource Rig does not contribute to any portion of this Victory Point condition.

Russian Federation

If at the start of the World Turn 2 or more Trade Routes are Actively tariffed without being countered by active FONOPS, gain a Victory Point.

Another player may counter Russian Federation tariffs by Deploying Ships to FONOPS a Trade Route. If a Trade Route has both a Tariff and FONOPS occurring, the Russian Federation player is considered countered that route does not count toward the Victory Point requirement.

People's Republic of China

If at the start of the World Turn 2 or more Dual-Use Ships are Deployed to 2 or more EEZs without being countered by active foreign Ships, gain 1 Victory Point.

Another player may counter Chinese presence in their own EEZ waters by Deploying their own ships to their EEZ waters. In order for the People's Republic of China player to gain a Victory Point they must have more Ships in that EEZ. If the number of ships is tied, the People's Republic of China player is considered countered and the tie goes to defending player who owns the EEZ waters.

Optional Rules

As players become more familiar with the game the optional rules add strategic value as well as increased challenge.

Diplomacy Veto

During the Perform 3 Total Actions phase of a player's turn, another player may challenge an action by using diplomacy. This is accomplished by the challenging player announcing the challenge then paying the number of diplomacy tokens equal to the total number of resources the other player expended. The original player may counter by paying three additional diplomacy. The challenging player can challenge again with an additional three diplomacy. The challenge and response may continue in increments of three until either player concedes.

Example:

The Russian Federation Player would like to use the ability Nuclear Brinksmanship costing 5 Diplomacy and 2 Resources causing the Armed Conflict Risk to increase by 2 and gaining a VP. The Nordic Player declares a challenge and pays 7 diplomacy. The Russian Federation Player counters by paying an additional 3 diplomacy. The Nordic Player challenges again, paying 3 Diplomacy. The Russian Federation Player does not counter, resulting in a negating of the Nuclear Brinksmanship action; the Armed Conflict Risk does not increase the Russian Federation Player does not gain a VP, and one of the Russian Player's actions is consumed.

Balanced Set-Up

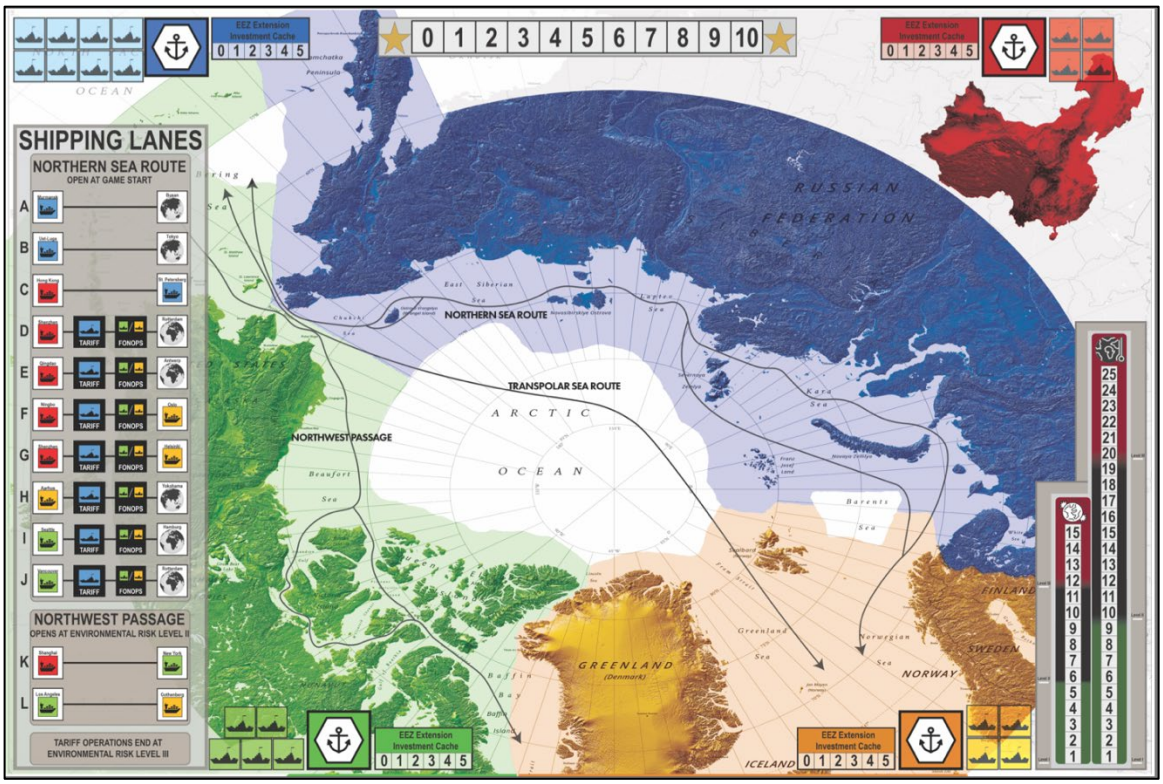
Race for the Arctic is an asymmetric game with starting conditions that slightly some nations. If players would like more balanced conditions at the game start, make the following changes:

- Replace an unclaimed Resource Field in International Waters near the ice cap with a claimed token for the People's Republic of China.
- Reduce the number of explorable resource fields in Nordic states EEZ to 1.

Player Derived Set-Up

As players become more familiar with how Race for the Arctic models the geopolitics of the region, they can explore different scenarios by making nations stronger or weaker. This is accomplished by increasing or decreasing the starting number of resource claims, ships in port, cargo ships on trade routes, starting currency, ice cap state, Armed Conflict Risk Level, or any other game mechanism.

APPENDIX C – GAME MAP



The game board is a 36 inch by 24 inch playing surface.

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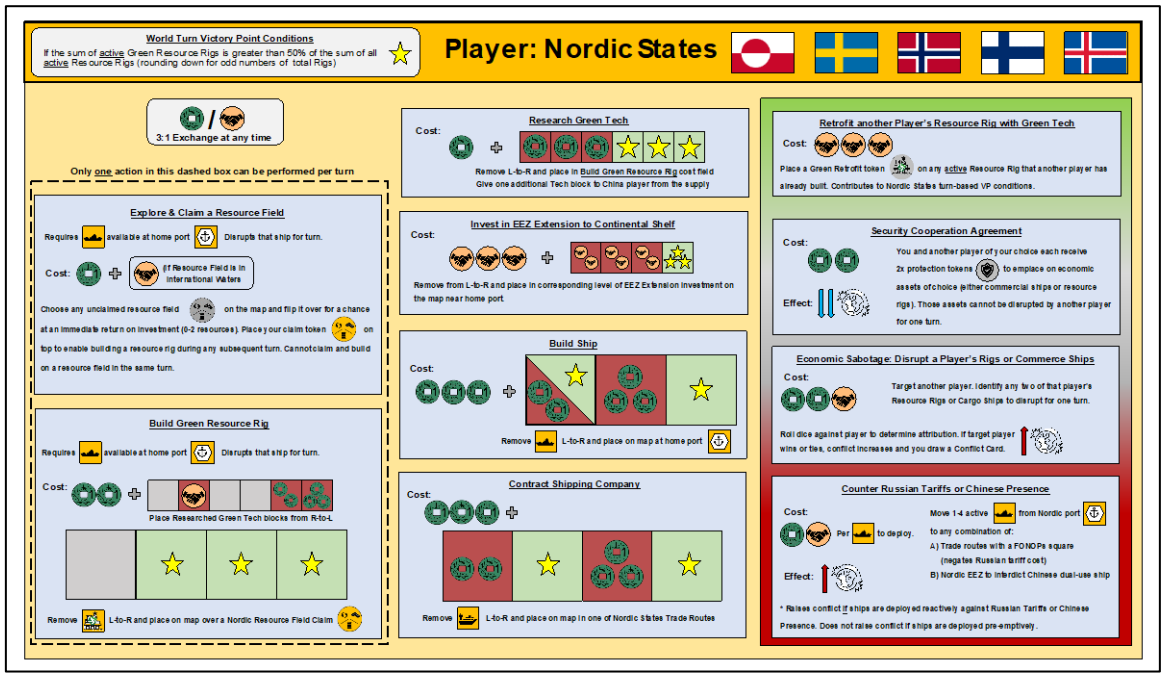
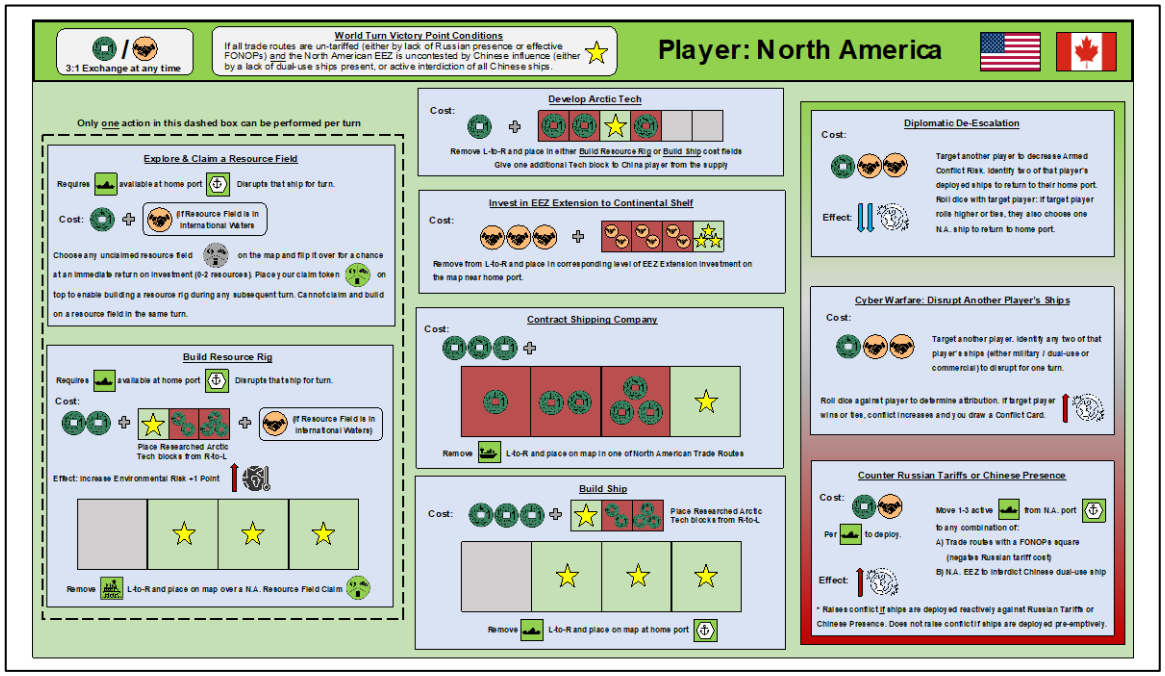
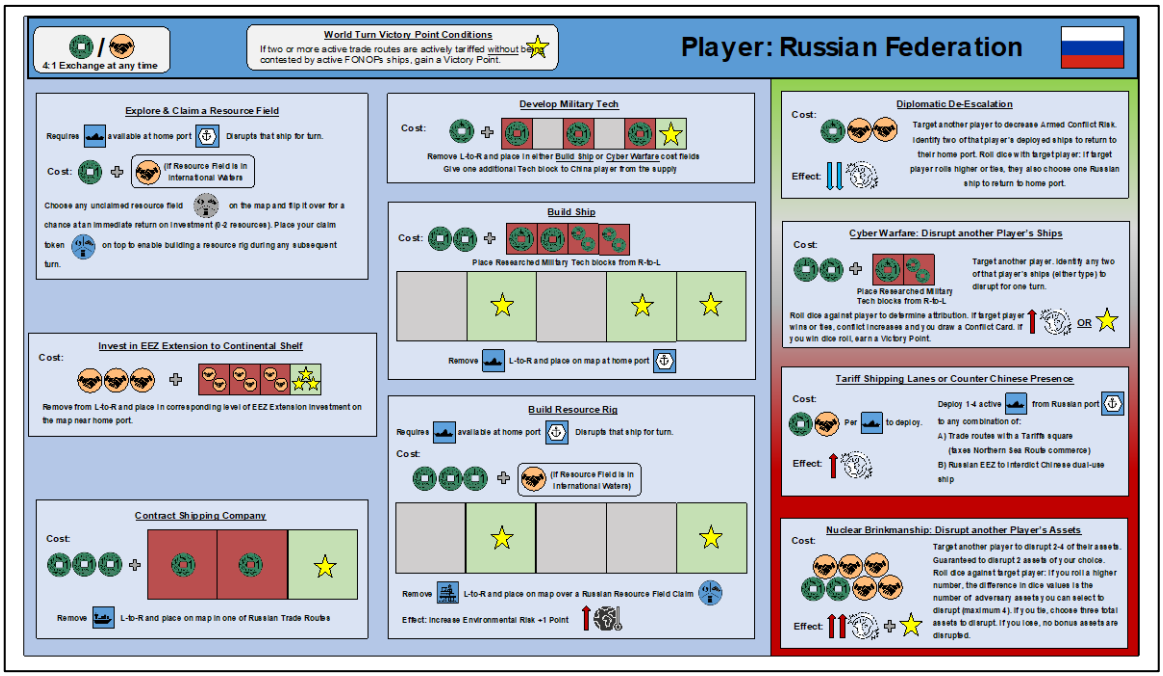
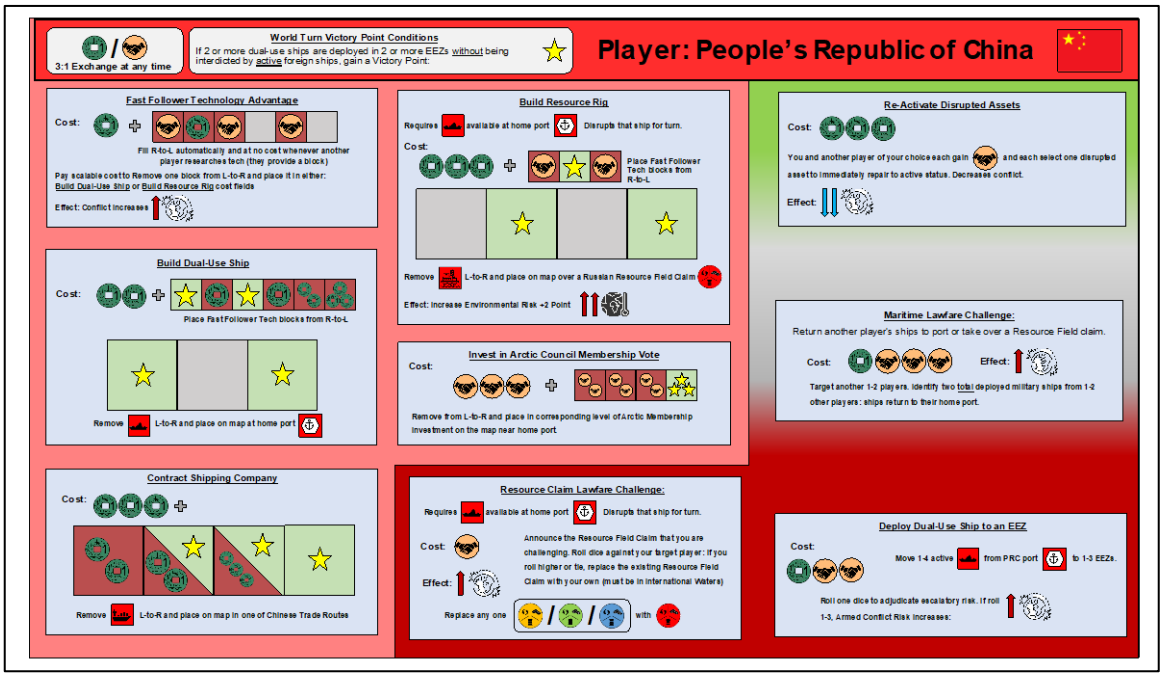
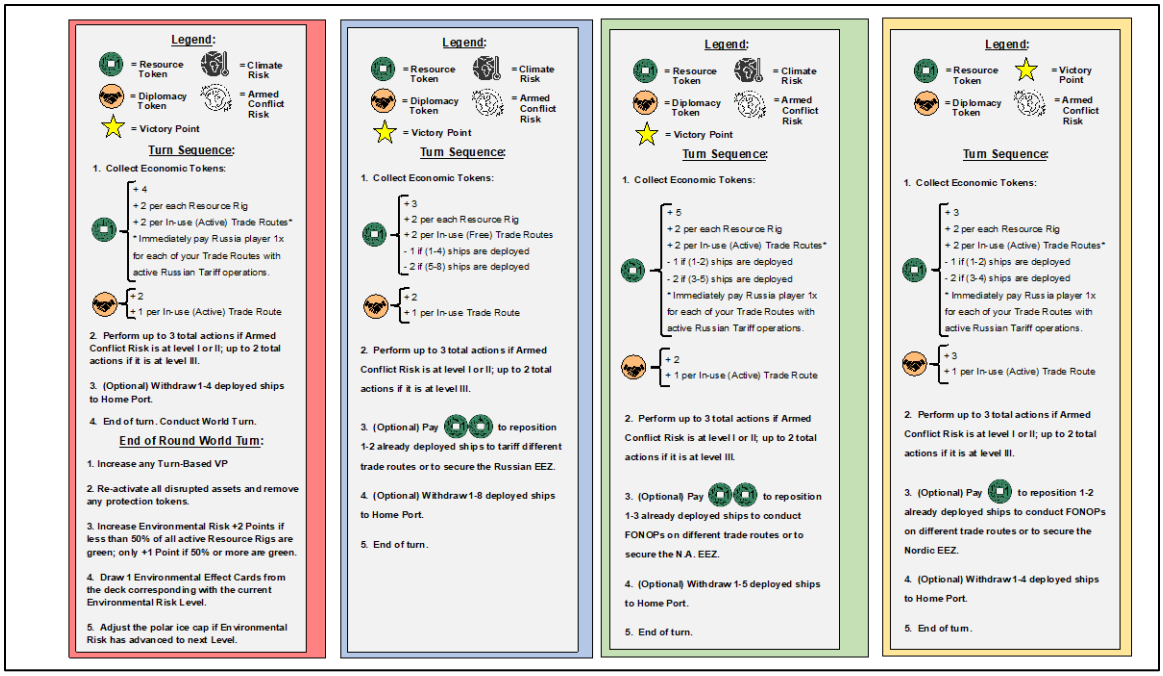
APPENDIX D – PLAYER MATS






4:1 Exchange at any time
World Turn Victory Point Conditions
If two or more active trade routes are actively tariffed without being contested by active FONOPs ships, gain a Victory Point.
Player: Russian Federation
Explore & Claim a Resource Field
Requires available at home port Disrupts that ship for turn.
Cost:
if Resource Field is in International Waters
Choose any unclaimed resource field on the map and flip it over for a chance at an immediate return on investment (@-2 resources). Place your claim token on top to enable building a resource rig during any subsequent turn.
Invest in EEZ Extension to Continental Shelf
Cost:
Remove from L-to-R and place in corresponding level of EEZ Extension Investment on the map near home port.
Contract Shipping Company
Cost:
Remove L-to-R and place on map in one of Russian Trade Routes
Develop Military Tech
Cost:
Remove L-to-R and place in either Build Ship or Cyber Warfare cost fields
Give one additional Tech block to China player from the supply
Build Ship
Cost:
Place Researched Military Tech blocks from R-to-L
Remove L-to-R and place on map at home port
Build Resource Rig
Requires available at home port Disrupts that ship for turn.
Cost:
(if Resource Field is in International Waters)
Remove L-to-R and place on map over a Russian Resource Field Claim
Effect: Increase Environmental Risk +1 Point
Diplomatic De-Escalation
Cost:
Target another player to decrease Armed Conflict Risk. Identify two of that player's deployed ships to return to their home port. Roll dice with target player: if target player rolls higher or ties, they also choose one Russian ship to return to home port.
Effect:
Cyber Warfare: Disrupt another Player's Ships
Cost:
Place Researched Military Tech blocks from R-to-L
Target another player. Identify any two of that player's ships (either type) to disrupt for one turn.
Roll dice against player to determine attribution. If target player wins or ties, conflict increases and you draw a Conflict Card. If you win dice roll, earn a Victory Point.
OR
Tariff Shipping Lanes or Counter Chinese Presence
Cost:
Per to deploy.
Deploy 1-4 active from Russian port to any combination of:
A) Trade routes with a Tariffs square (taxes Northern Sea Route commerce)
B) Russian EEZ to interdict Chinese dual-use ship
Effect:
Nuclear Brinkmanship: Disrupt another Player's Assets
Cost:
Target another player to disrupt 2-4 of their assets. Guaranteed to disrupt 2 assets of your choice. Roll dice against target player: if you roll a higher number, the difference in dice values is the number of adversary assets you can select to disrupt (maximum 4). If you tie, choose three total assets to disrupt. If you lose, no bonus assets are disrupted.
Effect:


3:1 Exchange at any time
World Turn Victory Point Conditions
If 2 or more dual-use ships are deployed in 2 or more EEZs without being interdicted by active foreign ships, gain a Victory Point:
Player: People's Republic of China
Fast Follower Technology Advantage
Cost:
Fill R-to-L automatically and at no cost whenever another player researches tech (they provide a block)
Pay scalable cost to Remove one block from L-to-R and place it in either: Build Dual-Use Ship or Build Resource Rig cost fields
Effect: Conflict Increases
Build Dual-Use Ship
Cost:
Place Fast Follower Tech blocks from R-to-L
Remove L-to-R and place on map at home port
Contract Shipping Company
Cost:
Remove L-to-R and place on map in one of Chinese Trade Routes
Build Resource Rig
Requires available at home port Disrupts that ship for turn.
Cost:
Place Fast Follower Tech blocks from R-to-L
Remove L-to-R and place on map over a Russian Resource Field Claim
Effect: Increase Environmental Risk +2 Point
Invest in Arctic Council Membership Vote
Cost:
Remove from L-to-R and place in corresponding level of Arctic Membership Investment on the map near home port
Resource Claim Lawfare Challenge:
Requires available at home port Disrupts that ship for turn.
Cost:
Announce the Resource Field Claim that you are challenging. Roll dice against your target player: if you roll higher or tie, replace the existing Resource Field Claim with your own (must be in International Waters)
Effect:
Replace any one with
Re-Activate Disrupted Assets
Cost:
You and another player of your choice each gain and each select one disrupted asset to immediately repair to active status. Decreases conflict.
Effect:
Maritime Lawfare Challenge:
Return another player's ships to port or take over a Resource Field claim.
Cost:
Effect:
Target another 1-2 players. Identify two total deployed military ships from 1-2 other players: ships return to their home port.
Deploy Dual-Use Ship to an EEZ
Cost:
Move 1-4 active from PRC port to 1-3 EEZs.
Roll one dice to adjudicate escalatory risk. If roll 1-3, Armed Conflict Risk increases:


Legend:
= Resource Token
= Climate Risk
= Diplomacy Token
= Armed Conflict Risk
= Victory Point
Turn Sequence:
1. Collect Economic Tokens:
+ 4
+ 2 per each Resource Rig
+ 2 per In-use (Active) Trade Routes*
* Immediately pay Russia player 1x for each of your Trade Routes with active Russian Tariff operations.
+ 2
+ 1 per In-use (Active) Trade Route
2. Perform up to 3 total actions if Armed Conflict Risk is at level I or II; up to 2 total actions if it is at level III.
3. (Optional) Withdraw 1-4 deployed ships to Home Port.
4. End of turn. Conduct World Turn.
End of Round World Turn:
1. Increase any Turn-Based VP
2. Re-activate all disrupted assets and remove any protection tokens.
3. Increase Environmental Risk +2 Points if less than 50% of all active Resource Rigs are green; only +1 Point if 50% or more are green.
4. Draw 1 Environmental Effect Cards from the deck corresponding with the current Environmental Risk Level.
5. Adjust the polar ice cap if Environmental Risk has advanced to next Level.
Legend:
= Resource Token
= Climate Risk
= Diplomacy Token
= Armed Conflict Risk
= Victory Point
Turn Sequence:
1. Collect Economic Tokens:
+ 3
+ 2 per each Resource Rig
+ 2 per In-use (Free) Trade Routes
- 1 if (1-4) ships are deployed
- 2 if (5-8) ships are deployed
+ 2
+ 1 per In-use Trade Route
2. Perform up to 3 total actions if Armed Conflict Risk is at level I or II; up to 2 total actions if it is at level III.
3. (Optional) Pay to reposition 1-2 already deployed ships to tariff different trade routes or to secure the Russian EEZ.
4. (Optional) Withdraw 1-8 deployed ships to Home Port.
5. End of turn.
Legend:
= Resource Token
= Climate Risk
= Diplomacy Token
= Armed Conflict Risk
= Victory Point
Turn Sequence:
1. Collect Economic Tokens:
+ 5
+ 2 per each Resource Rig
+ 2 per In-use (Active) Trade Routes*
- 1 if (1-2) ships are deployed
- 2 if (3-5) ships are deployed
* Immediately pay Russia player 1x for each of your Trade Routes with active Russian Tariff operations.
+ 2
+ 1 per In-use (Active) Trade Route
2. Perform up to 3 total actions if Armed Conflict Risk is at level I or II; up to 2 total actions if it is at level III.
3. (Optional) Pay to reposition 1-3 already deployed ships to conduct FONOPs on different trade routes or to secure the N.A. EEZ.
4. (Optional) Withdraw 1-5 deployed ships to Home Port.
5. End of turn.
Legend:
= Resource Token
= Victory Point
= Diplomacy Token
= Armed Conflict Risk
Turn Sequence:
1. Collect Economic Tokens:
+ 3
+ 2 per each Resource Rig
+ 2 per In-use (Active) Trade Routes*
- 1 if (1-2) ships are deployed
- 2 if (3-4) ships are deployed
* Immediately pay Russia player 1x for each of your Trade Routes with active Russian Tariff operations.
+ 3
+ 1 per In-use (Active) Trade Route
2. Perform up to 3 total actions if Armed Conflict Risk is at level I or II; up to 2 total actions if it is at level III.
3. (Optional) Pay to reposition 1-2 already deployed ships to conduct FONOPs on different trade routes or to secure the Nordic EEZ.
4. (Optional) Withdraw 1-4 deployed ships to Home Port.
5. End of turn.

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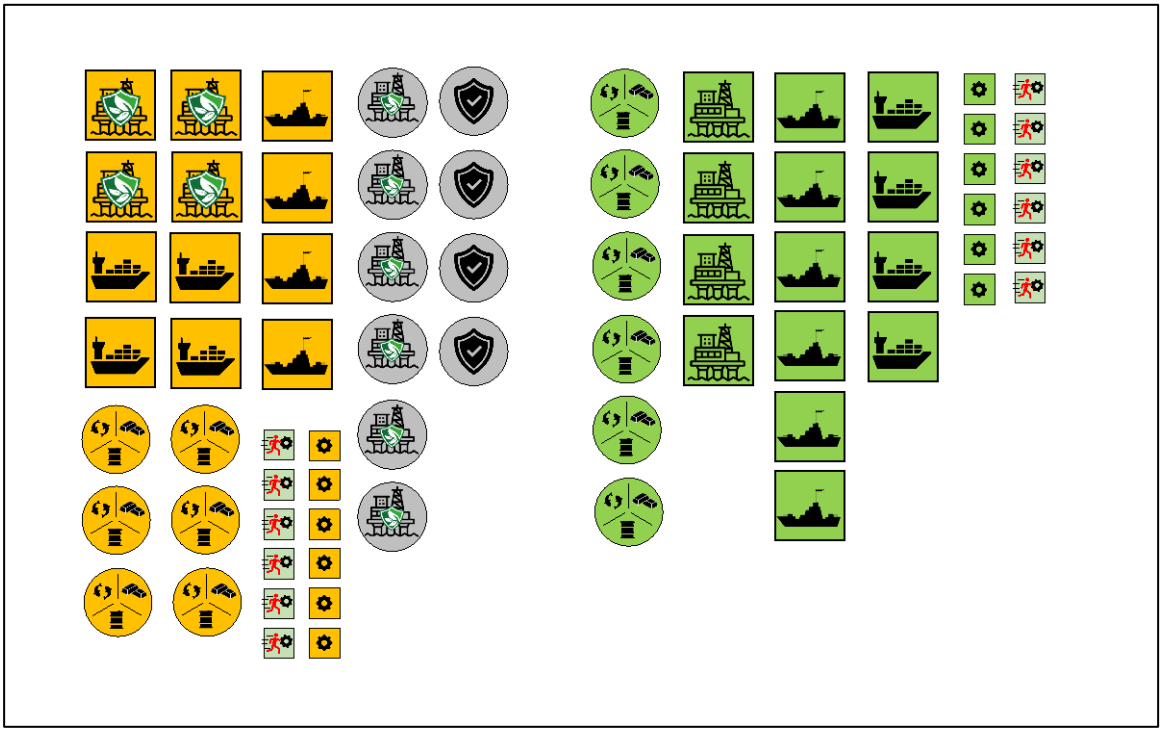
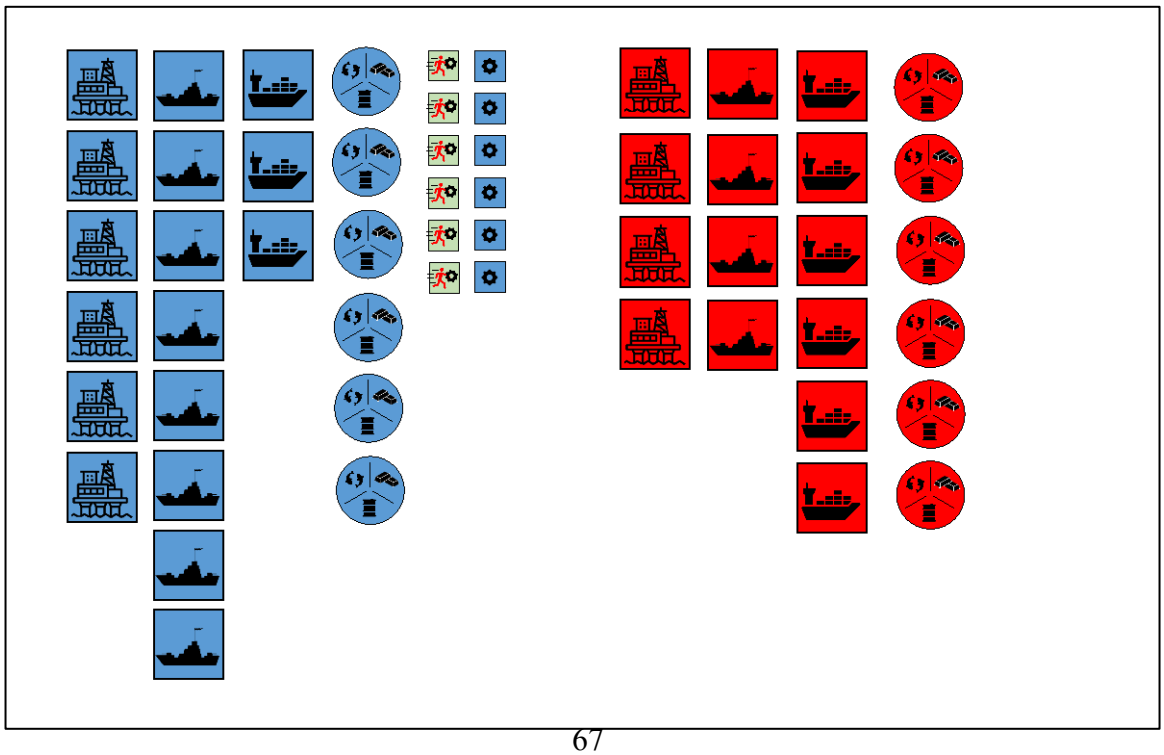
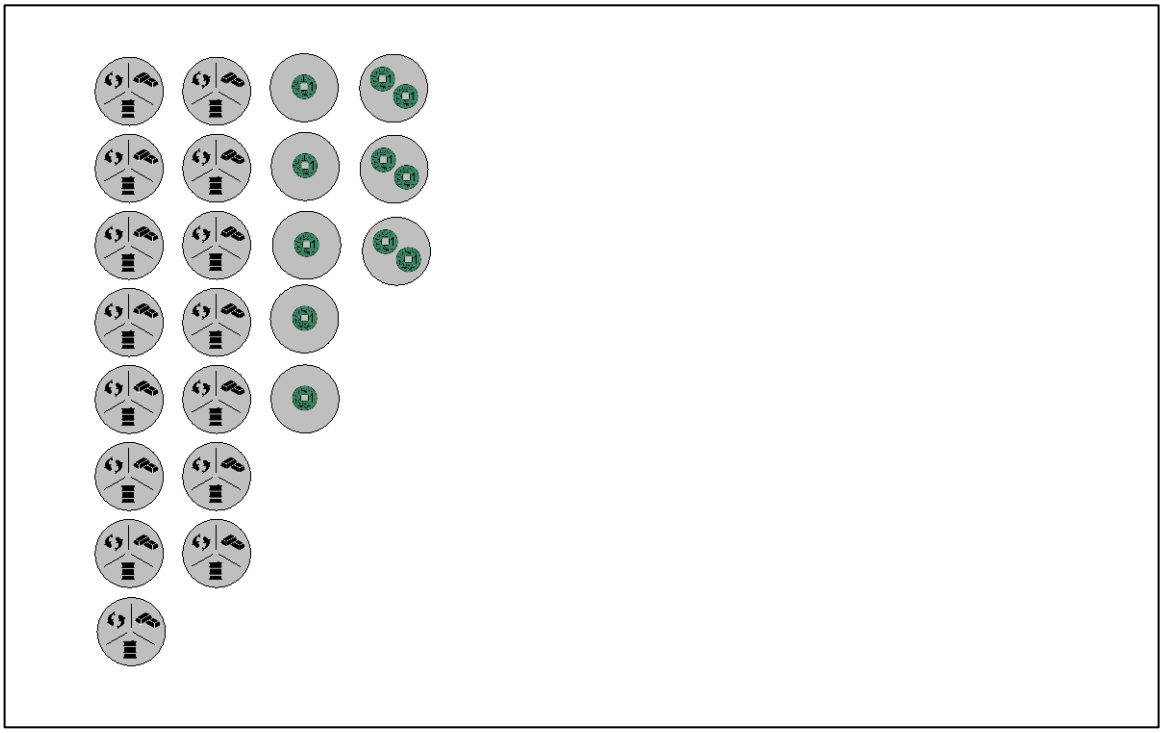
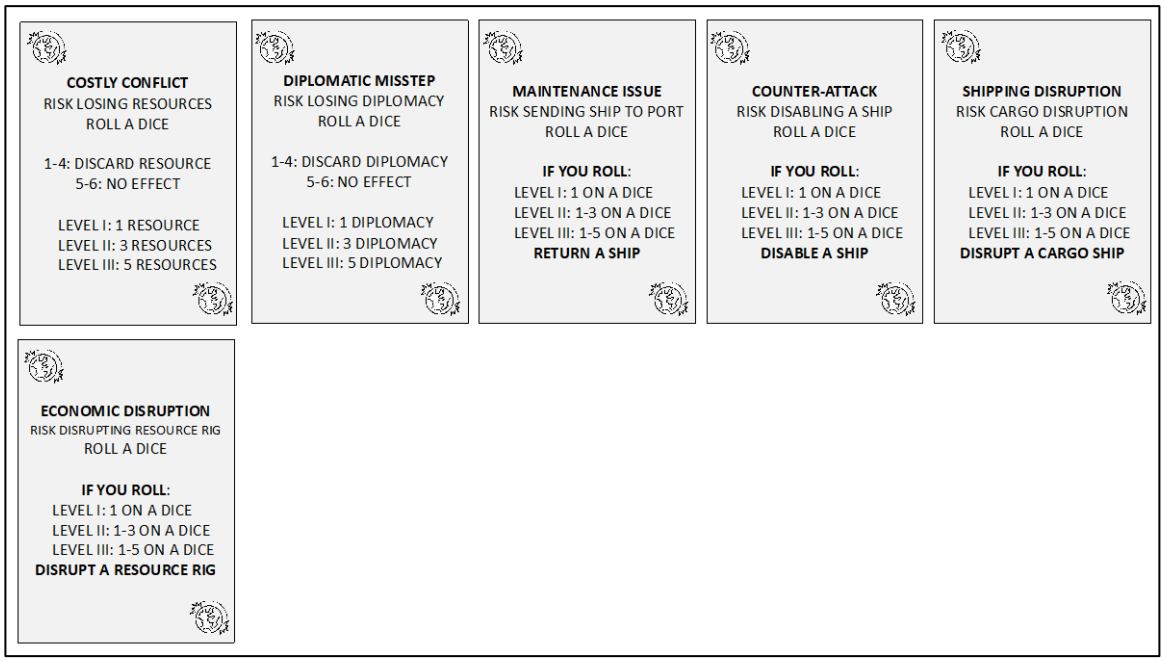
APPENDIX E – ASSET AND TOKEN GRAPHICS

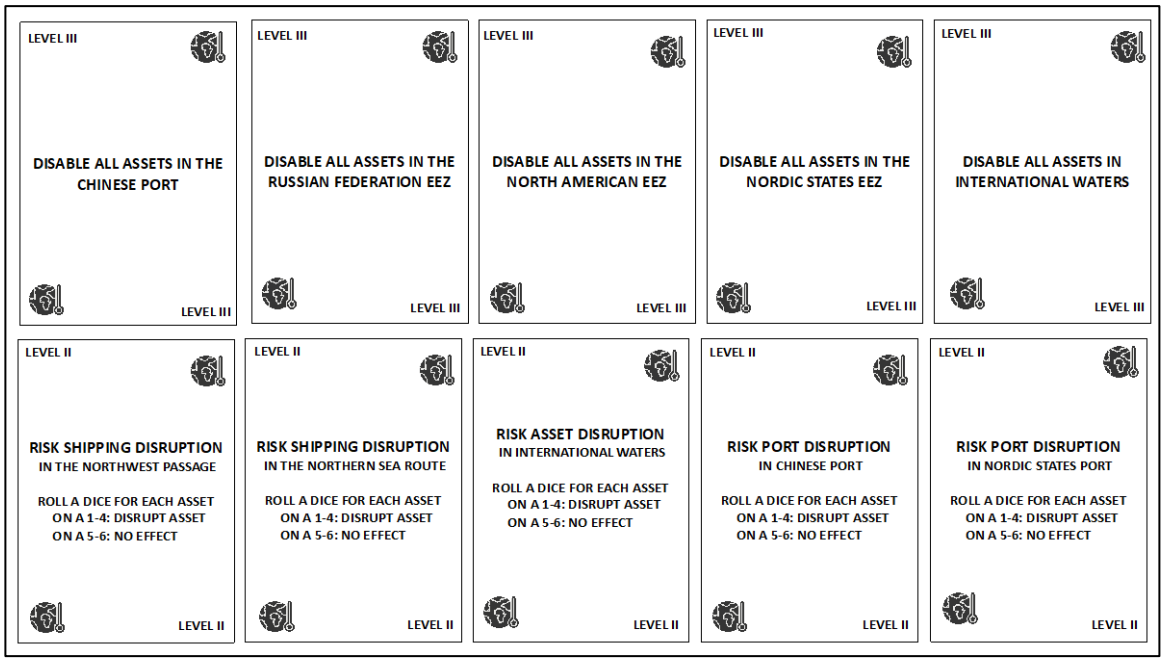






APPENDIX F – CARD GRAPHICS





LEVEL II

RISK PORT DISRUPTION
IN NORTH AMERICAN PORT

ROLL A DICE FOR EACH ASSET
ON A 1-4: DISRUPT ASSET
ON A 5-6: NO EFFECT

LEVEL II

LEVEL II

RISK PORT DISRUPTION
IN RUSSIAN FEDERATION PORT

ROLL A DICE FOR EACH ASSET
ON A 1-4: DISRUPT ASSET
ON A 5-6: NO EFFECT

LEVEL II

LEVEL II

RISK ASSET DISRUPTION
IN RUSSIAN FEDERATION EEZ

ROLL A DICE FOR EACH ASSET
ON A 1-4: DISRUPT ASSET
ON A 5-6: NO EFFECT

LEVEL II

LEVEL II

RISK ASSET DISRUPTION
IN NORDIC STATES EEZ

ROLL A DICE FOR EACH ASSET
ON A 1-4: DISRUPT ASSET
ON A 5-6: NO EFFECT

LEVEL II

LEVEL II

RISK ASSET DISRUPTION
IN NORTH AMERICAN EEZ

ROLL A DICE FOR EACH ASSET
ON A 1-4: DISRUPT ASSET
ON A 5-6: NO EFFECT

LEVEL II

LEVEL I

RISK PORT DISRUPTION
IN CHINESE PORT

ROLL A DICE FOR EACH ASSET
ON A 1-2: DISRUPT ASSET
ON A 3-6: NO EFFECT

LEVEL I

LEVEL I

RISK PORT DISRUPTION
IN NORDIC STATES PORT

ROLL A DICE FOR EACH ASSET
ON A 1-2: DISRUPT ASSET
ON A 3-6: NO EFFECT

LEVEL I

LEVEL I

RISK PORT DISRUPTION
IN NORTH AMERICAN PORT

ROLL A DICE FOR EACH ASSET
ON A 1-2: DISRUPT ASSET
ON A 3-6: NO EFFECT

LEVEL I

LEVEL I

RISK PORT DISRUPTION
IN RUSSIAN FEDERATION PORT

ROLL A DICE FOR EACH ASSET
ON A 1-2: DISRUPT ASSET
ON A 3-6: NO EFFECT

LEVEL I

LEVEL I

RISK RIG DISRUPTION
IN RUSSIAN FEDERATION EEZ

ROLL A DICE FOR EACH ASSET
ON A 1-2: DISRUPT ASSET
ON A 3-6: NO EFFECT

LEVEL I

LEVEL I

RISK RIG DISRUPTION
IN NORDIC STATES EEZ

ROLL A DICE FOR EACH ASSET
ON A 1-2: DISRUPT ASSET
ON A 3-6: NO EFFECT

LEVEL I

LEVEL I

RISK RIG DISRUPTION
IN NORTH AMERICAN EEZ

ROLL A DICE FOR EACH ASSET
ON A 1-2: DISRUPT ASSET
ON A 3-6: NO EFFECT

LEVEL I

LEVEL I

RISK SHIPPING DISRUPTION
ON ROUTES A, D, & H

ROLL A DICE FOR EACH ASSET
ON A 1-2: DISRUPT ASSET
ON A 3-6: NO EFFECT

LEVEL I

LEVEL I

RISK SHIPPING DISRUPTION
ON ROUTES C, G, & J

ROLL A DICE FOR EACH ASSET
ON A 1-2: DISRUPT ASSET
ON A 3-6: NO EFFECT

LEVEL I

LEVEL I

RISK SHIPPING DISRUPTION
ON ROUTES B, F, & I

ROLL A DICE FOR EACH ASSET
ON A 1-2: DISRUPT ASSET
ON A 3-6: NO EFFECT

LEVEL I

APPENDIX G – SAMPLE PLAYER SURVEY

Name:
Rank and Service, or Organization:

Race for the Arctic Wargame Pre-Execution Survey

Q1: On a scale of 1 – 10 how familiar are you with Arctic strategy and geopolitical considerations?

1 2 3 4 5 6 7 8 9 10

Q2: List as many of the "Arctic Nations" as you can:

_____, _____, _____, _____,
_____, _____, _____, _____.

Q3: List as many (broad) national strategic interests specific to the Arctic that you feel the above countries share:

_____, _____,
_____, _____,
_____, _____,

Q4: In geopolitical terms, what do you believe makes the Arctic unique versus other regions?

Q5: On a scale of 1 – 10 how familiar are you with serious games (AKA adult learning games)?

1 2 3 4 5 6 7 8 9 10

For SMEs who have professional experience with Arctic strategy and policy:

Q6: (Open Ended) What strategic-level concepts of Arctic competition do you feel are important to convey to military Field Grade Officers?

Name:

Race for the Arctic Wargame Post-Execution Survey

Q1: On a scale of 1 – 10 how familiar are you with Arctic strategy and geopolitical considerations?

1 2 3 4 5 6 7 8 9 10

Q2: List as many of the "Arctic Nations" as you can:

_____, _____, _____, _____,
_____, _____, _____, _____.

Q3: List as many (broad) national strategic interests specific to the Arctic that you feel the above countries share:

_____, _____,

_____, _____,

_____, _____,

Q4: In geopolitical terms, what do you believe makes the Arctic unique versus other regions?

Q5: What are the implications of climate change on future Arctic maritime commerce?

Q6: What are the implications of current Arctic Nation EEZs and international waters on natural resource extraction efforts and proposed EEZ extensions?

Q7: What role(s) do you see militaries playing in the Arctic in the coming decades?

Q8: On a scale of 1 – 10 how difficult was this game to learn how to play (with 1 being effortless and 10 being overly complicated)?

1 2 3 4 5 6 7 8 9 10

Name:

Q9: What would you recommend changing about this game?

Q10: Any other open-ended feedback:

For SMEs who have professional experience with Arctic strategy and policy:

Q11: (Open Ended) In the context of your answer to the pre-game survey question 6:

> **"What strategic-level concepts of Arctic competition do you feel are important to convey to military Field Grade Officers?"**

Do you feel that this wargame effectively conveys the strategic-level concepts that you indicated earlier? Would you recommend further emphasizing or de-emphasizing certain aspects?

Q12: Would you be willing to offer subsequent feedback as an informal SME advisor as this wargame is progressively refined towards its ultimate digital medium? If so, please provide your email below.

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APPENDIX H – LOG OF PLAYTESTS

05 April 2023
Location: Glasgow Hall, Room 128
In Attendance: Rachel Howell and Robert Leisinger
Outcome: Initial prototype playtest. Resulted in a complete re-design.

18 April 2023
Location: Rachel Howell's Residence
In Attendance: Rachel Howell and Robert Leisinger
Outcome: Refined player objectives, actions, and turn sequencing. Organized general format of player mats and identified aspects to include on map.

26 April 2023
Location: Rachel Howell's Residence
In Attendance: Rachel Howell and Robert Leisinger, and game design SME
Outcome: Further updated available player actions and in-game economic system. Designed player pre-and-post game surveys.

28 April 2023
Location: Robert Leisinger's Residence
In Attendance: Rachel Howell, Robert Leisinger, and 2 board game SMEs
Outcome: Played several advanced games to learn various mechanics (Scythe, Wingspan, Viking Chess, and Dominion). Informed the scalable action cost mechanic and asset transfer from player mats to map board.

01 May 2023
Location: Robert Leisinger's Residence
In Attendance: Rachel Howell and Robert Leisinger
Outcome: Informed decision to change from a card-based economy to tokens; updated asset tokens.

03 May 2023
Location: Glasgow Hall
In Attendance: Dr. Jeffrey Appleget, Rachel Howell, and Robert Leisinger
Outcome: Prompted extensive simplification in player actions from 19–20 each down to 9–10 per faction. Simplified player interaction mechanics for technology trees. Removed the temporal, buff / de-buff style block mechanic.

08 May 2023
Location: Robert Leisinger's Residence
In Attendance: Rachel Howell, Robert Leisinger, game development SME, and 2 board game SMEs
Outcome: Simplified and adjusted player actions, adjusted action costs, refined map metrics and turn-based VP conditions. Prompted extensive redesign to player mats.

12 May 2023
Location: Rachel Howell's Residence
In Attendance: Rachel Howell, Robert Leisinger, and board game SME
Outcome: Economy balancing and further adjustments to select player actions, aesthetic representations of resource and diplomacy costs on player mats. Adjusted player starting conditions and quick-start guide.

16 May 2023
Location: Rachel Howell's Residence
In Attendance: Rachel Howell, Robert Leisinger, game development SME, and board game SME.
Outcome: Further changes to asymmetric turn-based VP mechanics, switched faction-unique aggressive player action, re-designed Nordic States player strategic objective and asset disruption action. Adjusted ship sustainment costs.

17 May 2023
Location: Glasgow Hall, Room 128
In Attendance: Rachel Howell, Robert Leisinger, 5 NPS Students
Outcome: Blind playtest. Refined asset disruption mechanic, adjusted economy balancing and world turn mechanic.

19 May 2023
Location: Robert Leisinger's Residence
In Attendance: Rachel Howell and Robert Leisinger
Outcome: Iterative play testing. Completely changed card mechanics. Developed spreadsheet for tracking player actions and cost to refine economy balancing. Changed the AC membership / EEZ extension mechanic. Added Nordic States retrofit resource rig with green tech action.

23 May 2023
Location: Rachel Howell's Residence
In Attendance: Rachel Howell and Robert Leisinger
Outcome: Iterative play testing resulted in changes to action costs and faction-specific technology trees.

27 May 2023
Location: Rachel Howell's Residence
In Attendance: Rachel Howell, Robert Leisinger, and 3 board game SMEs
Outcome: Minor changes to economy balancing.

31 May 2023
Location: Dudley Knox Library
In Attendance: Rachel Howell and Robert Leisinger
Outcome: Minor economy balancing and technology buy-down tree adjustments. Updated player mats.

03 June 2023
Location: Robert Leisinger's Residence
In Attendance: Robert Leisinger and 3 civilian play testers
Outcome: Blind playtest. Refined mid-game walkthrough scenario.

06 June 2023
Location: Glasgow Hall, Room 286
In Attendance: Rachel Howell, Robert Leisinger, and 6 NPS faculty
Outcome: Blind playtest. Informed change to icecap.

05-06 September 2023
Location: Sandhurst, United Kingdom
In Attendance: Rachel Howell, Dr. Robert Burks, and Dr. Jeffrey Appleget
Outcome: Two distinct play tests with approximately 15 players rotating in to play various factions. Players were game designers for military and civilian applications as well as regional experts.

12 September 2023
Location: USAFA
In Attendance: Several military and civilian SMEs
Outcome: Blind playtest. Collected player survey data for analysis and SME recommendations for changes.

12 September 2023
Location: USAFA
In Attendance: Four Air Force Academy Cadets
Outcome: Blind playtest. Collected player survey data for analysis.

13 September 2023
Location: USAFA
In Attendance: Several military and civilian SMEs
Outcome: Blind playtest. Collected player survey data for analysis and SME recommendations for changes.

13 September 2023
Location: USAFA
In Attendance: Four Air Force Academy Cadets
Outcome: Blind playtest. Collected player survey data for analysis.

12 October 2024
Location: NPS Campus, MOVES Conference Room
In Attendance: Robert Leisinger and 4 NPS faculty
Outcome: Demonstrate game to MOVES key personnel for initial digitization.

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SUPPLEMENTALS

1. Supplemental 1 of 4: Game Turn Log
2. Supplemental 2 of 4: Survey Data
3. Supplemental 3 of 4: Economy Balancing
4. Supplemental 4 of 4: Instructional Video

The supplemental material contains information that is difficult to display in letter-page format. The game turn log is a spreadsheet that allowed for in-game tracking of player actions for iterative adjustments throughout the game design process. The survey data is a spreadsheet that has complied all the survey data used in this capstone; it was used to conduct the quantitative analysis that produced Figures 1 through 4. Future player survey data can be added to this spreadsheet to increase the dataset or to aid in gauging the efficacy of future game iterations. The economy balancing spreadsheet is a tool used throughout the game design process to weigh the in-game economic costs of player actions and inform iterative adjustments. As the game is developed further there may be a need to change action costs or adjust the number of actions; this spreadsheet will aid in making those changes. The instructional video is an overview of the wargame structure, objectives, and mechanics. It is intended as an introductory learning aid to familiarize new players with the wargame prior to playing it.

To access the supplemental material(s) listed here, contact the Dudley Knox Library or visit the thesis pages in the library's Calhoun database.

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